
THE RELATIONSHIP BETWEEN
THINKING AND DRIVING STYLES
AND THEIR CONTRIBUTION TO
YOUNG DRIVER ROAD SAFETY

THIS THESIS IS SUBMITTED IN FULFILLMENT OF THE
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ABSTRACT

This thesis explores the relationship between thinking and driving styles and their contribution to young driver road safety. In doing so, it aspires to strengthen the focus on road *safety* instead of road *unsafety*. Although the majority of literature on traffic safety concentrates on crashes, crash risk, and aberrant driving behaviour, this research concentrates on people and safe driving styles. In other words, this study is undertaken from a positive point of view, and it presents and uses the first positive definition of road safety.

Young drivers are overrepresented in traffic fatalities, and they have been at the centre of many crash focused studies. However, although the number of young driver deaths has been reduced in the past decade (Chen, Ivers, Martiniuk, Boufous, Senserrick, Woodward, Stevenson and Norton 2010a), young drivers still represent 25% of the road related deaths, but make up only 15% of the licensed drivers (Department of Infrastructure Transport Regional Development and Local Government 2009). It seems that past research, the majority of which is negatively focused on crashes and aberrant driving behaviour, has not yet led to a satisfactory improvement of young driver road safety. This study, therefore, focuses on young drivers' safety from a positive perspective.

Mixed methodology is used to find an answer to the main research question *Can knowledge of thinking and driving styles contribute to young driver road safety?*, using self-report questionnaires and group interviews with young drivers. The thesis examines the relationship between young drivers' thinking and driving styles, emphasising patient and careful driving. The traffic safety literature and the parallel literature on thinking styles is used to get a better understanding of the construct of driving style, and what driving style means to young drivers themselves. It argues that thinking and driving styles can both be regarded as intellectual styles and a model for the development of driving styles is proposed. The findings from this research have implications for driver training content as well as for driver training execution.

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Working on a PhD thesis is a perilous undertaking because it confronts the candidate with several of their hidden fears, anxieties, and worries, and unveils the enormous amount of things one does not know. At the same time it unleashes lots of creativity, stimulates the brain, breeds stamina, and opens up whole new worlds of knowledge. This makes the road to completion a rocky one, with high highs and low lows. I did not go this road alone and I would like to take this space to acknowledge the people who travelled with me; the ones who were there for shorter periods, and especially the ones who went with me all the way.

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ABBREVIATIONS AND GLOSSARY

ACT: Australian Capital Territory.

L-plater: a driver holding a learner permit.

L-plates: Australia has a graduated licensing system for drivers. Drivers on a learner's permit have to be accompanied by a fully-licensed driver and display L-plates at the rear and front of their car.

MDSI: Multi-dimensional Driving Style Inventory (Taubman - Ben-Ari, Mikulincer and Gillath 2004).

MSG: theory of mental self-government (Sternberg 1997).

Negative view on road safety: a focus on crashes, crash risk, and aberrant driving behaviour (e.g. angry driving, risky driving)(Lehtimäki 2001).

Negative definition of road safety: safety defined as a lack of something (e.g. crashes) (Lehtimäki 2001).

Positive definition of road safety: safety defined as some harmonious circumstances that so far have not been explicated further (Lehtimäki 2001).

Positive view on road safety: a focus on people, and normal safe driving behaviour or driving styles (e.g. patient driving, careful driving) (Kleisen 2009).

P-plater: a driver holding a provisional licence (intermediate).

P-plates: Australia has a graduated licensing system for drivers. Drivers on a provisional licence must display P-plates on the rear and front of their car.

TSI-R: Thinking Style Inventory-Revised (Sternberg, Wagner and Zhang 2003).

Young drivers: male and female drivers between 18-25 years of age.

1 INTRODUCTION

James: Uhm, when I'm happy, I'm more - I mean, I respect other drivers, you know, and my aim is to be safe on the road because of the other - I mean, happy thinking attracts more happy situations. But when I'm angry, what happens is, you know, you - you do attract situations where it makes you more angry. Like people overtaking you, you know, or someone stopping unexpectedly or - so it's all about what you're thinking and how you're feeling, yeah.

This quote from one of this study's group interviews with young drivers captures clearly the connections participants experience between the way they think, the way they feel, and the way they drive. While this research was set up to explore the correlations between thinking and driving, the group interviews added an element of feeling to the mix (which has contributed to a proposed model for the development of driving styles). The idea that 'happy thinking attracts more happy situations', as expressed in the quote, aligns perfectly with the positive view in this thesis; this research focuses on road *safety*, people and positive driving styles, instead of road *unsafety*, crashes, and aberrant driving behaviour (as the majority of studies in this field do).

This introductory chapter outlines the background to this study. It explains the purpose, the aims, and the approach taken to conduct this research. The significance of the study is discussed, and an overview of the dissertation finishes the chapter.

1.1 BACKGROUND TO THE STUDY

On 2 March 2010 the General Assembly of the United Nations declared the period between 2011 and 2020 as the Decade of Action for Road Safety, in recognition of the enormous global burden of the nearly 1.3 million fatalities caused by traffic crashes and of the 20 to 50 million people who sustain non-fatal traffic-related injuries each year (General Assembly United Nations 2010). Drivers 16-24 years of age are over-represented in the statistics regarding crashes and fatalities on the road (Organisation for Economic Co-operation and Development (OECD) 2006). Youth make up 10.1% of the total population of the 30 countries of the OECD but account for 26.7% of the

driver fatalities in these countries (OECD 2006). World Health Organization (WHO) data, cited in the OECD (2006) report, show that in 2001 traffic crashes were the second greatest cause of death for 15-29-year-olds worldwide and the number one killer for men in this same age group. The OECD states that in the member countries over 8500 young drivers die in car accidents each year, resulting in big social and economic costs for individuals, families and societies. These figures warrant extra attention for young drivers in road safety research.

It sounds contradictory, but the field of road safety or traffic safety research is mainly occupied with studying road danger since it generally focuses on traffic crashes or the prevention of crashes (see for instance af Wählberg 2003a; 2006; Arnett, Irwin and Halpern-Felsher 2002; Berg 2006; Catchpole, MacDonald and Bowland 1994; Chen, Senserrick, Martiniuk, Ivers, Boufous, Chang and Norton 2010b; Clarke, Ward, Truman and Bartle 2006; Twisk 1994; Zhang, Fraser, Lindsay, Clarke and Mao 1998). Aberrant driving behaviour, such as risky or angry driving, also has received much more attention in the field than normal safe driving (see for instance Åberg and Rimmö 1998; Blockley and Hartley 1995; Deffenbacher, White and Lynch 2004; Deffenbacher, Lynch, Oetting and Swaim 2002; Jonah, Thiessen and Au-Yeung 2001; Kontogiannis, Kossiavelou and Marmaras 2002; Rimmö 2002; Sullman and Baas 2005; Vallières, Bergeron and Vallerand 2005). Most researchers provide no explicit definition of road safety in their published work. Instead, they adhere to the common usage of the term in a negative way, meaning a reduction in the numbers of crashes, injuries and deaths caused by some form of traffic (Lehtimäki 2001).

The problem with this negative focus on road safety is that at the individual level crashes are relatively rare events (Elander, West and French 1993), and the scarcity of crashes is one of the essential problems for studies trying to predict traffic crashes (af Wählberg 2003a). Lehtimäki (2001) stresses that it is very important for traffic safety work to develop a positive definition of traffic safety, although he does not actually provide such a definition. Nevertheless, he states that traffic safety can either be explained as a lack of crashes, or could be seen as “some actual harmonious circumstances not explicated up to now” (p.8). Lehtimäki points out that the negative and positive views suggest different mental activities on the part of the driver while acting in traffic. When defining road safety in a negative way, a driver must match the activity of driving with thinking about conceivable harmful results that will most often not happen. From a positive point of view, the driver is informed by, and acts in, the actual situation.

This study supports Lehtimäki's (2001) suggestion of different mental activities required of the driver in relation to either a positive or negative focus on road safety, and posits that more research is needed based on a positive view of traffic safety. In addition, although there has been a reduction in young driver road fatalities in Australia during the past decade (Chen et al. 2010a), and despite the realisation of an array of prevention strategies (Senserrick 2007), young drivers are still overrepresented in traffic crashes; while making up 15% of the total amount of licensed drivers, they represented 25% of the road related deaths in 2008 (Department of Infrastructure Transport Regional Development and Local Government 2009). Past research, the majority of which is negatively focused on crashes and aberrant driving behaviour, has not yet led to a satisfactory improvement of young driver road safety. This study, therefore, focuses on young drivers' safety from a positive perspective.

The present research concentrates on the human factors in road safety because it is generally accepted in the field that road users play a large part in road safety. External factors of the traffic system (e.g. economy, climate, culture, demography) and internal factors of the traffic system (e.g. road engineering, automotive engineering) also influence traffic safety but these can be moderated by human behaviour. For instance, the potential risk of a condition of the road can be diminished through compensatory behaviour (e.g. slowing down) or can be enhanced by the fatigue of the driver (Roine 1999).

The role of human factors in traffic safety has been acknowledged, albeit from a negative point of view, through a paradigm shift in the field of road safety. The literature has shifted from a focus on 'accidents' to a focus on 'crashes' (Peden, Scurfield, Sleet, Mohan, Hyder, Jarawan and Mathers 2004). Traditionally, road safety researchers have been concerned with traffic accidents (Peden et al. 2004). The word 'accident' suggests a random event that cannot be predicted or expected; an act of god. In reality, such events do not occur by chance and they can be expected to happen (Loimer and Guarnieri 1996). Traffic accidents are presently perceived as a human-made problem, which makes them predictable and largely preventable (Peden et al. 2004; World Health Organisation 2004). In approximately 90-95% of traffic crashes road users, or human factors, are the sole or dominant contributory factor (Elander et al. 1993; Özkan 2006; Roine 1999). The term 'crash' is preferred over 'accident' (Elander et al. 1993; Peden et al. 2004) to signal this paradigm shift, although both terms are still used in the literature (Nyberg 2007). This study uses the term 'crash' throughout.

The present study focuses on safe driving styles, which have been linked in previous research to fewer crashes (Taubman - Ben-Ari et al. 2004), so they could be qualified as positive driving styles. There is some confusion as to what is considered a driving style. A widely used definition of the construct of driving style (see for instance Arthur and Graziano 1996; Deery and Fildes 1999; Deery and Love 1996; Horswill and McKenna 1999; Isler and Starkey 2008; Özkan 2006; Özkan, Lajunen, Chliaoutakis, Parker and Summala 2006; Sümer, Özkan and Lajunen 2006; Wallace 2008; Zimbardo, Keough and Boyd 1997) is

“driving style concerns the way individuals choose to drive or driving habits that have become established over a period of years” (Elander et al. 1993: 279).

This definition is ambiguous, since it gives two different explanations for driving style: one either makes a choice in regards to their driving style (implying some level of consciousness) or one uses an habitual way of driving (implying some level of subconsciousness). Adding to the confusion on the definition of driving style is that studies in road safety tend to use the concepts of ‘driving style’ and ‘driving behaviour’ interchangeably (e.g. French, West, Elander and Wilding 1993; Miller and Taubman - Ben-Ari 2010; Nyberg 2007; Sigurdardottir 2009) or use both constructs without explicitly defining them (e.g. Farah, Polus, Bekhor and Toledo 2007; Hatakka, Keskinen, Gregersen, Glad and Hernetkoski 2002). The ambiguity of the constructs fosters the question whether it could be useful to rethink the way driving style and driving behaviour are conceptualised, in order to further clarify the role that each construct plays in road safety.

This study is based on the assumption that ‘driving style’ and ‘driving behaviour’ are different constructs and examines the parallel literature of ‘styles research’ (Zhang and Sternberg 2005; 2006) in an attempt to refine the definition of ‘driving style’. ‘Thinking style’, ‘learning style’, and ‘cognitive style’ are the most commonly used terms in the field of styles research (Zhang 2004d); all falling under the recently proposed umbrella-concept of ‘intellectual styles’ (Zhang and Sternberg 2005; 2006). Intellectual style encompasses different types of cognitive styles, such as thinking style. Intellectual styles have certain characteristics, such as cognitive, affective and psychological aspects, which correspond with factors that previous research has found to play a role in driving (as discussed in Chapter 2). This inspires consideration of whether driving style and thinking style can both be intellectual styles.

If driving style is indeed a cognate construct of thinking style, this implies that driving styles may also be developed through socialisation and training since thinking styles are partly socialised (Balkis and Isiker 2005; Sternberg 1997; Zhang 2005b) and can be changed through self-awareness and training (Balkis and Isiker 2005; Brandt 1998; Harrison and Bramson 1982; Hsu 1999; McClanaghan 2000; Spicer 2004; Walters, Trgovac, Rychlec, Di Fazio and Olson 2002). In addition, thinking styles have been found to contribute to students' academic performance (Zhang 2002b) so it is conceivable they may also contribute to other learning environments, such as driver training, which most often involves young drivers. Young drivers are in the process of developing their driving style and it is still unclear how this exactly takes place (Miller and Taubman - Ben-Ari 2010). Therefore, researching thinking and driving styles could contribute to the development of positive driving styles through improvement of driver training.

There are four reasons why the present study concentrates in particular on thinking styles (Sternberg 1997). Firstly, it has been stated in previous research that there has not been enough discussion in the field about "how young drivers think and why they think the way they do" (Harré 2000: 208). Secondly, thinking styles are thought to influence an individual's every action (Jones 2004) and manifest themselves in every activity (Grigorenko and Sternberg 1997) and so it is conceivable that thinking styles are also involved in the act of driving. Thirdly, thinking styles are considered to be states, which means they are modifiable (Balkis and Isiker 2005; Sternberg 1997), thus offering opportunities for change. In contrast, many road safety studies have investigated relationships between personality traits and crash risk (see for instance Arnett, Offer and Fine 1997; Oltedal and Rundmo 2006). Although these studies contribute to knowledge on differential crash involvement, they do not offer much opportunity for change to the individual since personality traits are seen as relatively stable and unchangeable (Westen, Burton and Kowalski 2006). Fourthly, previous research in road safety has stated that it is important to obtain knowledge on drivers' cognitions apart from their relationships with crashes (Hatakka 1998), which aligns with the positive focus of this study, while the majority of studies on personality characteristics in road safety are negatively concentrated on crash risk.

To summarise, the majority of studies in the field of road safety have a negative focus concentrating on crashes. The problem with these studies is that on an individual level crashes are rare events. There is a need for traffic safety research undertaken from a positive point of view, focusing on normal safe driving. Road safety studies tend to use 'driving style' and 'driving

behaviour' interchangeably while the present study posits they are different constructs. The parallel literature of thinking styles can contribute to a better definition of the concept of driving style. The present study proposes that thinking style and driving style may be cognate constructs, which could imply that it is possible to train people in the use of safe driving styles. Since it remains unclear how individuals develop their driving styles, young drivers are suitable participants for this study as they are in the process of acquiring their driving styles. The use of certain thinking styles could be part of this process since thinking styles have been found to contribute to learning environments other than driver training as well. Furthermore, any relationships between certain thinking and driving styles could assist in the training of young drivers in the use of positive driving styles. Thus, with a positive angle on road safety the present study explores the thinking and driving styles of young drivers.

1.2 PURPOSE OF THE STUDY

While driving style is a prominent concept in the road safety literature, there is no unambiguous definition for it. Furthermore, it is not clear how an individual develops their driving style. The literature of the field of styles research that may inform the formulation of a new definition of driving style has not yet been considered in the traffic safety literature. In addition, there is no empirical research available which explores the relationships between thinking styles and driving styles. Moreover, not many road safety studies have been done that have focused on normal safe driving, and the literature does not provide a positive definition of road safety.

The purpose of this study is to investigate the connections between thinking styles and driving styles regardless of their connection to traffic crashes and so focuses on safe driving. The study explores the construct of driving style based on the assumption that driving style and driving behaviour are separate concepts, and on the assumption that driving style and thinking style are cognate constructs. The main research question *Can knowledge of thinking and driving styles contribute to young driver road safety?* has been designed to develop a fuller understanding of the construct of driving style, of the relationships between thinking and driving styles, and of the possibilities to incorporate this knowledge into driver training with the purpose of enhancing young driver road safety.

1.3 AIMS AND APPROACH

This research has four aims: to develop a clearer definition for the construct of driving style; to explore if thinking styles can contribute to the development of positive driving styles; to study young drivers from a positive point of view on road safety; and to define road safety in a positive way.

The positive focus of this study concentrates the research on ‘people’, rather than on ‘crashes’. Therefore a combination of both quantitative and qualitative data, or mixed methods research, offers the best opportunity to answer the main research question in a meaningful way. Possible relationships between thinking and driving styles can be established through quantitative research. The use of established self-report measures anchors this study in previous research since both the fields of thinking style research and road safety generally employ quantitative methods. However, this study focuses on people; hence it is important to explore how the findings relate to the actual experience of young drivers. For instance, the literature only provides an ambiguous definition of driving style and often does not discern between driving style and driving behaviour. This puts into question what self-report instruments are actually measuring, and if this relates to the understanding of the measured constructs by young drivers. The present study uses group interviews to explore the way young drivers construct meaning for the concepts of driving style and thinking style and it examines if the way young drivers talk about ‘driving style’ and ‘thinking style’ solidifies the theoretical definition, investigating the relationship between extant theory and practice.

The qualitative group interviews provide insight about the way young drivers construct meaning for the concepts of safe driving, and driving context. Knowledge of young drivers’ understanding of safe driving contributes to determining the usefulness of a positive definition for road safety. Furthermore, the group interviews present essential background information for the present study through discussion of participants’ experiences with learning to drive.

1.4 SIGNIFICANCE OF THE STUDY

The present study makes several contributions to the fields of thinking styles and road safety; both theoretical and practical. Practical contributions to the traffic safety field are the positive focus on normal safe driving, a definition for road safety from a positive perspective, the validation of the Multi-dimensional Driving Style Inventory (Taubman - Ben-Ari et al. 2004) for Australian

young drivers, its finding of significant correlations between thinking and driving styles, and its finding that certain thinking styles are more predictive of safe driving styles than well known factors such as 'sex', 'age', and 'exposure' (time or distance driven). Practical contributions to the thinking styles field are the findings in relation to sex differences in correlations between thinking styles, leading to a proposition of separate models of driving for males and females. Theoretical contributions to the academic discourse are a reconceptualisation of the construct of driving style as an intellectual style, the inclusion of driver training into thinking styles research in relation to teaching and learning, refined definitions of driving style and driving behaviour, and a proposed model for the development of driving styles. Finally, the present study makes a contribution through its use of mixed methodology, which is unusual in both fields of research but results in a more complete account of young drivers' thinking and driving.

1.5 DISSERTATION OVERVIEW

This thesis presents seven chapters. It progresses through literature, methodology, the quantitative data analysis, and the qualitative data analysis before presenting the findings with a discussion of their relevance to the literature and implications for driver training.

Following on from this first introductory chapter, Chapter 2 presents the informing literature from the field of thinking styles and the field of road safety. It critically discusses the theoretical frameworks that are used in the respective fields, which leads to a framework for the present study. Chapter 2 also introduces the sub research questions that are derived from gaps in the literature on thinking styles and road safety, and which support the research question of the present study *Can knowledge of thinking and driving styles contribute to young driver road safety?*

Chapter 3 describes the constructionist epistemology that forms the backbone of this study. It also presents the methodology and the research methods, and establishes the validity and reliability of the self-report measures used for an Australian sample of young drivers. The chapter describes the participants of both the quantitative and the qualitative part of the study, the data analysis techniques used, and the way this study was implemented. Chapter 3 ends with a discussion of the limitations of this study.

Quantitative data were collected with self-report questionnaires for this study, the results of which are presented in Chapter 4. The quantitative analysis found relationships between thinking

and driving styles, and it found that certain thinking styles play a role in predicting certain driving styles.

Chapter 5 presents the findings from the group interviews that were held with young drivers. The interviews explored the way young drivers constructed meaning for the concepts of driving style and thinking style, thus underpinning a refined definition of driving style. Important themes that emerged from the group interviews are also presented in Chapter 5 and highlight young drivers' thinking about safe driving, the driving context, and learning to drive.

Chapter 6 discusses the findings from both the quantitative and the qualitative parts of this study in relation to the relevant literature in the field of road safety and the field of thinking styles research. It proposes a positive definition of road safety, and a refined definition for the construct of driving style. A model for the development of a driving style is proposed, as is an emerging framework for thinking in relation to driving. It also discusses the correlations between thinking and driving styles, any sex differences in relation to thinking and driving, and the implications of the present study's findings for driver training.

Chapter 7 summarises the major findings of this study, highlights the contributions that the study makes to the field of road safety and the field of thinking styles, and proposes areas for further research.

1.6 SUMMARY

This chapter provided the background to the present study, and argued for researching road *safety* instead of road *unsafety*. While the majority of studies in traffic safety focus on crashes, crash risk, and aberrant driving behaviour, the fact remains that on an individual level crashes are comparatively rare events. Thus, researching normal safe driving can contribute to a more complete body of knowledge on road safety, and it may lead to a positive definition of road safety, which the literature has not yet provided.

Previous research has suggested there should be more discussion about the way young drivers think and why they think like that, which is a reason to concentrate the present study on thinking styles in relation to driving. Additional reasons are that thinking styles are thought to be modifiable, and that research into thinking styles of young drivers can contribute to knowledge on

their cognitions separated from any correlations with crashes. This knowledge of young drivers' cognitions regardless of links with traffic crashes is called for in previous research and aligns with a positive focus on road safety.

There is a lack of clarity in the literature on the definitions of driving style and driving behaviour. The present study uses the literature of thinking styles research in order to refine the definition of driving style, and suggests that driving style and thinking style may be cognate constructs. If driving and thinking style are indeed associated concepts, this would imply that (driver) training and socialisation can influence driving style development while, according to the literature, so far it has remained unclear how driving styles actually develop. Since young drivers are still developing their driving style, they form the focus of the present study.

The next chapter discusses how gaps in the literature of thinking styles and road safety research have led to the development of a set of sub research questions, underpinning the main research question *Can knowledge of thinking and driving styles contribute to young driver road safety?*

2 LITERATURE REVIEW

This chapter discusses the literature in the fields of thinking styles research and road safety that informs the research question *Can knowledge of thinking and driving styles contribute to young driver road safety?*, and explains which gaps in the literature have led to the sub research questions. The sub research questions are presented throughout the chapter where they follow from the literature discussed.

The chapter starts with a short overview of the field of thinking styles, followed by a discussion of a recently developed model of intellectual styles. This threefold model of intellectual styles underpins this study's proposition that thinking and driving style could be cognate constructs.

The chapter continues with a discussion of a few studies that examine thinking in relation to driving behaviour, and develops the justification for choosing the theory of mental self-government as the thinking style theory for this study (Sternberg 1997). An overview of the main models of driving behaviour follows, finishing with a model specifically describing young driver behaviour. All well known models in the field have been developed from a negative focus on road safety (so risk or crash based) which highlights the gap in the literature in regards to road safety research concentrating on normal safe driving. In addition, it has to be noted that most theory is on driving *behaviour* and not specifically on driving *styles*.

The hierarchical nature of driving is discussed, which is generally accepted in the field of road safety research. This chapter also examines the driving education framework goals based on the idea of four hierarchical levels in driving decision making. The role that thinking styles could play within this framework is suggested.

After a discussion of the multi-dimensional driving style inventory (Taubman - Ben-Ari et al. 2004), and a justification for choosing this instrument to measure driving styles in the present study, the chapter finishes with an explanation of the initial theoretical framework for this study.

2.1 THINKING STYLE RESEARCH

This section briefly sketches the history of the field of styles research, after which it describes in more depth Zhang and Sternberg's (2005; 2006) threefold model of intellectual styles,

which is used as an overarching framework in this study, and Sternberg's (1997) theory of mental self-government.

Cognitive style, learning style, and thinking style are the most commonly used terms in the field of styles research (Zhang 2004d) although the same terms are conceptualised by different scholars in different ways. This has led in the past to a “bewildering confusion of definitions” (Curry 1983: 1). The main differences can be explained with an example of a topic discussed in school, such as the Second World War. Learning styles can characterise how an individual prefers to learn about the war (e.g. visual or auditory), cognitive styles refer to the way one processes the information (e.g. see every battle as a separate entity or see all battles as acts of war), and thinking styles give insight in how an individual likes to think about the material one is learning (e.g. think about local issues or global issues)(Sternberg and Zhang 2001).

The present study focuses on thinking styles, because they have been found to have predictive value for academic achievement in different cultures (Bernardo, Zhang and Callueng 2002; Boyle, Duffy and Dunleavy 2003; Cano-Garcia and Hewitt Hughes 2000; Grigorenko and Sternberg 1997; Lee and Tsai 2004; Spicer 2004; Zhang 2001a; 2004c; 2007) and for other types of behaviour, such as vocational purpose and criminal behaviour (Walters 1996; Walters 2006; Walters and Elliott 1999; Walters et al. 2002; Zhang 2004a). Some research even suggests that thinking styles influence an individual's every action (Jones 2004) and that thinking styles manifest themselves in every activity (Grigorenko and Sternberg 1997). Thus, it is conceivable that thinking styles also affect driving.

Understanding individual differences in styles of thinking has been a long term interest of psychologists (de St. Aubin, Rusch Blahnik and Lucas 2007). All research on thinking styles is built on three assumptions: qualitatively different ways of processing information exist; individuals prefer or tend to use certain styles over others; and complete profiles of human cognition cannot be built on ability alone or on single scores of intelligence, such as intelligence quotient (de St. Aubin et al. 2007). The emergence of style as a theoretical concept reflects a psychological concern for individuality since the concept is, without exception, used to describe some “individual quality, form, activity or behaviour, sustained over time” (Rayner and Riding 1997: 5).

Previously, scholars in the thinking styles field described the style construct as one's *habitual* way of thinking (Miller 1987; Riding and Cheema 1991). More recently academics have defined a

style as an individual's *preferred* way of thinking (Sternberg 1997; Zhang and Sternberg 2005). In contrast, as discussed in section 1.1, the road safety field widely uses Elander et al.'s (1993: 279) description of driving style as "the way individuals choose to drive or driving habits that have become established over a period of years", which combines both views on the nature of styles into one, albeit ambiguous, definition. In this study, the view of a style as one's preferred way of doing something is used and, because it is proposed that thinking and driving style could be cognate concepts, this definition refers to both constructs; a thinking style is seen as one's preferred way of thinking, while a driving style is viewed as one's preferred way of driving.

A myriad of theories and models of styles was developed during the period between the late 1950s and the early 1970s (Zhang and Sternberg 2005), with an amplitude of labels on different styles as a result (Riding and Cheema 1991; Riding 1997). There has been much confusion in the field of style research, partly because many researchers working within this field did not mention the existence of other types of styles, resulting in different concepts being referred to by different scholars as cognitive and/or learning style (Riding and Cheema 1991). If the work on styles undertaken between the fifties and the seventies sometimes seems chaotic, it is partly due to the diversity in research and hypothesising (Zhang and Sternberg 2005).

The lack of confluence resulted in a decline in the quantity of studies between the early 1970s and the mid 1980s (Riding and Cheema 1991). However, a renewed interest in the study of styles has emerged in the past two decades, both in academic and non-academic settings (Zhang and Sternberg 2005). There are three major motives for this renewed interest in style constructs: they represent a bridge between cognition and personality; they seem to have major implications for educational achievement; and they might improve vocational choice and performance (Sternberg and Grigorenko 1997). New research comprises conceptual integration of different styles, proposals of new styles, and empirical studies researching the relationships among the different style labels (Zhang and Sternberg 2005). The present study falls within the latter category of research, examining the relationships between thinking and driving styles. This study broadens the field of styles research through proposing that 'driving style' is a cognate concept of other style constructs, such as thinking style. This proposition is based on the threefold model of intellectual styles (Zhang and Sternberg 2005; 2006), which is discussed in the next section.

2.1.1 THE THREEFOLD MODEL OF INTELLECTUAL STYLES

The term ‘intellectual style’ was coined by Zhang and Sternberg (2005; 2006) in their threefold model of intellectual styles, the most recent integrative model in the field of style research. Intellectual style is a general term that envelopes all major style constructs developed in the past decades, such as thinking style, learning style, cognitive style, decision making and problem solving style, and perceptual style (Zhang and Sternberg 2005; 2006). The threefold model is the only integrative model in the literature that suggests a new hierarchical level to the field of styles. This offers the possibility to bridge the general field of styles research with the field of road safety.

An intellectual style is defined as one’s preferred way of processing information and dealing with tasks (Zhang and Higgins 2008; Zhang and Sternberg 2005). According to Zhang and Sternberg (2005; 2006), there are five different aspects to the concept of intellectual style: cognitive, affective, physiological, psychological, and sociological. Cognitive, because processing of information always requires some kind of cognitive operation; affective, because one’s feelings about a task influence the processing of information and one’s dealing with the task; physiological, because our style is affected by the way our senses (e.g. smell, touch) absorb information; psychological, because the interaction between one’s personality and the environment influences our choice of style; and sociological, because the society one lives in will have preferences for certain ways of thinking (Zhang and Sternberg 2005). In defining the concept of intellectual style along these aspects, Zhang and Sternberg integrate the different areas within psychology (personality, education, cognition, social), where the various models of thinking styles originate from, and therefore the threefold model of intellectual styles is seen as a major contribution to the field of styles research (de St. Aubin et al. 2007).

Zhang and Sternberg’s (2005; 2006) model is called threefold because they envision three types of intellectual styles. Type I styles imply higher levels of cognitive complexity and generate more creativity. Type II styles indicate a tendency to favour norms and denote lower levels of cognitive complexity. Type III styles can show characteristics from both Type I and Type II styles, depending on the demands of a specific task. For example, some tasks require internal thinking (work independently, alone: e.g. writing a book), while other tasks benefit from external thinking (work with other people, interaction: e.g. work on a team project). For many years the different style concepts that fall within the category of intellectual styles have been seen as different rather than

better or worse. However, Zhang and Sternberg (2005) argue that intellectual styles are value-laden, not value-free, so some are seen as more positive than others. Although different societies value different styles (Bernardo et al. 2002), Zhang and Sternberg (2005) suggest that generally Type I styles are seen as better than Type II styles.

Previous research in road safety has found that cognitive, affective, physiological, psychological, and sociological factors also play a role in driving (see for instance Bristow, Kirwan and Taylor 1982; Eby and Molnar 1998; Martiniuk, Ivers, Glozier, Patton, Senserrick, Boufous, Lam, Williamson, Stevenson, Woodward and Norton 2010; Özkan 2006). By extension, it is possible that a driving style can contain all five mentioned aspects and, therefore, could be classified as an intellectual style and a cognate construct to thinking style. Thus, Zhang and Sternberg's (2005) threefold model of intellectual styles is used as the overall theoretical framework for this study. This proposition is examined through the first sub research question, *Can driving styles and thinking styles both be intellectual styles?*

2.1.2 THINKING AND DRIVING

The use of a thinking style theory in relation to driving is a novel approach. The few road safety studies that have examined thinking in relation to driving behaviour were focused on thought content rather than on thought process. For instance, in a quantitative study with a focus on crash risk, angry thoughts have been linked to angry driving behaviour (Deffenbacher et al. 2004; Deffenbacher et al. 2002). In a qualitative study on thinking in relation to driving, undertaken from a positive viewpoint on road safety, Lehtimäki (2001) reports that his participants thought about certain rules while driving, which he calls 'maxims'. These maxims are not viewed as absolute rules that without a doubt would produce safe driving, but rather as rules of thumb that guide participants' behaviour in taking safety related precautions. Important maxims in relation to safety were "There is always some risk in traffic. Traffic is never completely safe. There are unpredictable and unexpected incidents" and "People do not obey the rules. Driving according to the rules is safe driving" (Lehtimäki, 2001: 119).

Lehtimäki (2001) found that young female drivers and master drivers used convergent thinking, which he explains as they quickly produced suitable maxims when thinking about driving thus minimising uncertainty. Young male drivers on the other hand thought divergently, only

implicitly thought of the appropriate maxims, and failed to quickly and effectively generate preventive measures. Lehtimäki's (2001) findings are in contrast with previous research on thinking in the field of styles research, not related to driving, that found that female adolescents scored higher on divergent thinking than male adolescents in five of seven tests (Olive 1972). The two studies cannot easily be compared since Lehtimäki's (2001) study is qualitative and Olive's (1972) study is quantitative, but the disparate findings suggest they may use different interpretations of the concepts of convergent and divergent thinking. The different results (from a quantitative and qualitative study using seemingly cognate constructs) is one of the reasons why the present study uses mixed methodology.

The present study focuses on thinking processes rather than thoughts. It does not use the dichotomy divergent-convergent thinking (Guilford 1950), considering that there are multiple ways of interpreting these concepts. For this study, the thirteen thinking styles of the theory of mental self-government (Sternberg 1997) are used because this has been classified as a testable theory (de St. Aubin et al. 2007). Sternberg's theory is discussed in the next section.

2.1.3 THE THEORY OF MENTAL SELF-GOVERNMENT

The theory of mental self-government (MSG) is based on the idea that the different ways in which societies are governed may be, at some level, external reflections of styles of thought (Sternberg 1997; Sternberg and Grigorenko 1997). Sternberg (1997) proposes a theory of how these thinking styles could work, internally as well as externally, based on aspects of government. He defines a thinking style as an individual's preferred way to use their abilities (Sternberg 1997; Sternberg and Grigorenko 1997). The MSG is nomothetic and continuous; individuals can possess every style to some degree, but they will differ in their preferences, and strength of those preferences, and the type of tasks or situations that will evoke specific preferences (Sternberg and Grigorenko 1997). In other words, an individual utilises a profile of styles that can vary with environmental demands (Tang 2003).

MSG identifies thirteen thinking styles, which fall under five dimensions: functions, forms, levels, scopes and leanings. Functions comprise the legislative style, the executive style, and the judicial style. The four different forms are the monarchic style, the hierarchic style, the oligarchic style, and the anarchic style. The two levels of MSG are the local style and the global style. The

scopes of the MSG consist of the internal style, and the external style. Finally, the two major leanings of MSG are the liberal style, and the conservative style. Table 2-1 gives an overview of the key characteristics of the thirteen thinking styles.

TABLE 2-1: KEY CHARACTERISTICS OF THE MSG THINKING STYLES

Key characteristics	Thinking style
Creating rules, likes to do things their own way	Legislative
Implementing, likes to follow established rules	Executive
Judging, likes to evaluate rules and procedures	Judicial
Multi-tasking, multiple goals with different priorities	Hierarchic
Likes to focus on one task at the time	Monarchic
Has multiple goals of equal importance at the same time	Oligarchic
Random approach, does not like systems or rules	Anarchic
Likes abstract thinking, problems of a general nature	Global
Preference for details and precision in tasks	Local
Likes to work independently, alone	Internal
Likes to work with other people, interaction	External
Allows change, goes beyond existing rules	Liberal
Prefers familiarity, follows traditions	Conservative

(After Sternberg 1997)

An empirically based reconceptualisation of the thirteen MSG thinking styles has led to the three types of styles (Zhang and Higgins 2008), that were discussed previously in relation to the threefold model of intellectual styles. The MSG styles are divided as follows. Type I thinking styles include the legislative, judicial, hierarchic, global, and liberal styles. Type II thinking styles include the executive, local, monarchic, and conservative styles. The anarchic, oligarchic, internal, and external thinking styles make up Type III. Type I and II styles have been judged as tight groupings of styles, based on sound logic and an intensive review of research on overlap between styles, but Type III has been criticised for having as the only common denominator that they do not fit nicely into either Type I or Type II (de St. Aubin et al. 2007). See Table 2-2 for a schematic overview of the thinking styles according to type.

TABLE 2-2: MSG THINKING STYLES ACCORDING TO TYPE

Type I	Type II	Type III
Higher levels of cognitive complexity, generate more creativity	Lower levels of cognitive complexity, tendency to favour norms	Task demand determines characteristics, which can be both from Type I or Type II
Legislative	Executive	Anarchic
Judicial	Local	Oligarchic
Hierarchic	Monarchic	Internal
Global	Conservative	External
Liberal		

(After Zhang and Higgins 2008)

Sternberg’s (1997) MSG depicts a comprehensive and testable theory of thinking styles (de St. Aubin et al. 2007), which has been used in many empirical studies in a range of different countries such as the United States, Spain, the Philippines, Hong Kong, mainland China, Korea, Norway and Turkey (Zhang and Higgins 2008). This previous extensive cross-cultural research makes it likely the MSG is a useful theory to study a sample of Australian young drivers.

In this study it was expected that a preference for certain thinking styles would be associated with the development of a certain driving style. For instance, the executive (implementing tasks with prescribed procedures) and conservative (using traditional approaches to tasks) styles are expected to have a connection with the patient (polite, calm and attentive) and careful (keeping traffic rules, cautious) driving styles, while the legislative (being creative) and liberal (taking new approaches to tasks) styles may be associated with a risky (excitement from dangerous driving) or dissociative (daydreaming, non attentive) driving style. The MSG is operationalised through the Thinking Style Inventory-Revised (discussed in Chapter 3), which is used to answer the sub research questions, *What are young drivers’ thinking styles?* and *Are there any sex differences in young drivers’ thinking styles?*

2.2 ROAD SAFETY RESEARCH

Since the main body of research in the field of traffic safety focuses on negative aspects, such as aberrant driving behaviour and crash involvement, it is impossible to give an overview of the field solely from a positive perspective. This situation in itself highlights a gap in the literature in

relation to normal and safe driving, which is a justification for the present study. Lehtimäki (2001) discussed 58 major road safety studies. He classified 53 works as using a negative definition of safety (e.g. lack of crashes), four as showing some potential towards a positive definition of road safety, and only one (Vaaranen 1998, as cited in Lethimäki, 2001) as based on positive safety thinking because it considers driving behaviour as related to the actual driving situation (as opposed to, for instance, thinking about possible crashes that in reality do not happen).

As discussed in Chapter 1, Lethimäki (2001) argues convincingly that a positive definition of road safety is necessary, especially in relation to driver training. Lethimäki's biggest objection to a crash based definition of road safety is that it is normally impossible to use crashes as a real-time perception. According to Summala (1985) it would actually not be rational to take crashes into account while driving, since they happen too infrequently. Fuller (2005: 461) also argues that "risk of collision is generally not relevant in the decision-making loop". Lethimäki states that a negative view of road safety poses a problem for driver training because a driving instructor needs to emphasise existing objects in the actual driving context (such as other drivers, road signs or pedestrians) instead of 'non-entities' such as crashes. In that sense, crashes cannot be used as teaching aids, according to Lethimäki (2001), stressing the importance of a positive definition of road safety based on real entities in the traffic context and independent of the concept of damage (e.g. crashes). His phenomenographic interview study of newly licensed young males (comparing them to newly licensed young females and master drivers) did not yield an exhaustive positive definition of road safety (Lehtimäki 2001). Therefore, another sub research question for this thesis is, *How can road safety be defined in a positive way?*

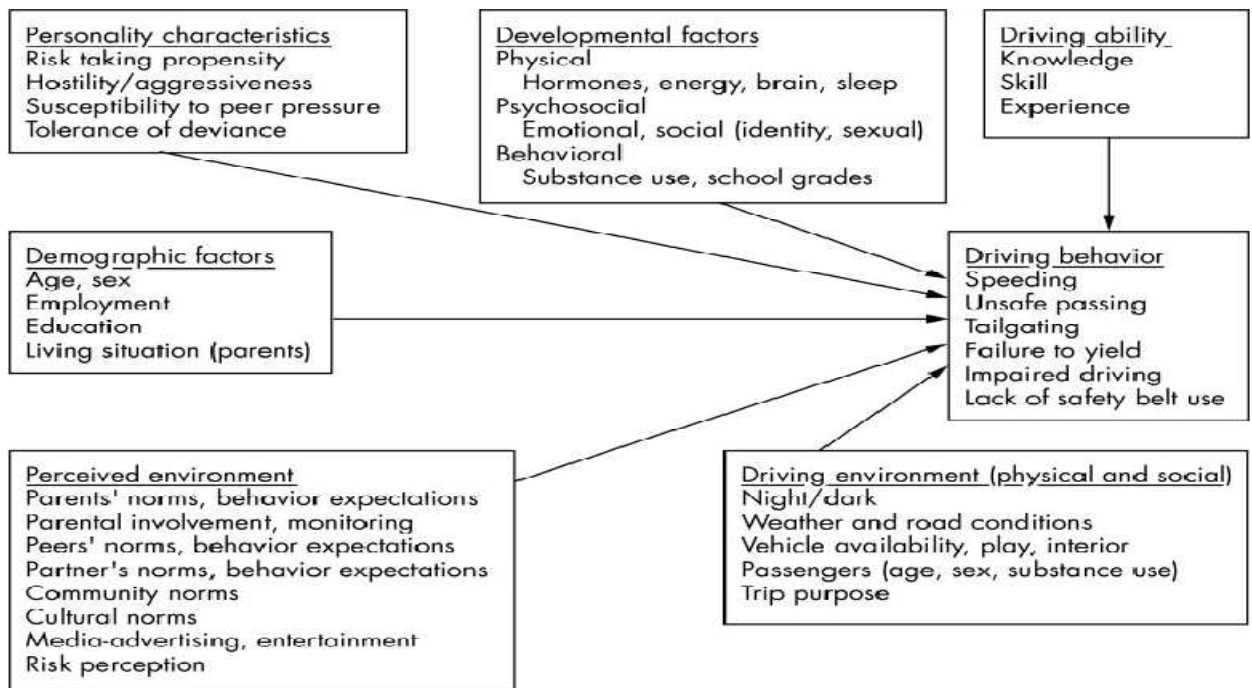
In the body of literature on young drivers, Lethimäki's (2001) study is among a minority. Despite Summala's (1985) statement that it would not be 'rational' to think about crashes while driving, and Fuller's (2005) remark that drivers generally do not take crashing into account when making decisions in traffic, the majority of studies on young drivers focus on dangerous driving behaviour, crash risk and crash involvement (see for instance Arnett et al. 2002; Begg and Langley 2004; Bina 2006; Catchpole and Styles 2005; Catchpole et al. 1994; Deery and Fildes 1999; Elliott, Waller, Raghunathan and Shope 2001; Fernandes 2007; Ho and Yong Gee 2008; Prato, Toledo, Lotan and Taubman - Ben-Ari 2010; Redshaw 2006; Shope 2006; Shope and Bingham 2008; Styles, Imberger and Catchpole 2004; Williams 2003; 2006; Williamson 2000). The literature seems to emphasise 'the young driver problem', (e.g. Fernandes 2007; Gregersen 1996; Shope 2006;

Sigurdardottir 2009; Triggs and Smith 1996; Wundersitz 2007) over the young drivers themselves. Since the present study does not concentrate on crashes or aberrant driving behaviour, the next section provides only a short and limited overview of the main findings of previous (negatively focused) research on young drivers, with the aim of putting the present study into the broader perspective of the road safety field.

Beforehand it has to be noted that the literature varies widely in the definition of young drivers, which may account for some of the contradictory findings that have been reported (Jonah 1986). While some research studied all drivers between the ages of 16 and 25, others have used more restricted age ranges such as 16-20 years or 18-25 years, while it is rare that individual age years are examined (Jonah 1986). This difference could be partly due to the differences in the legal age to obtain a drivers licence between countries and states. Regardless of the reason for differences in the definition of young drivers, caution needs to be taken in comparing findings from research with young drivers of different ages and countries. In other words, treating 'young drivers' as a homogenous group may be problematic (Cameron 1982). Nevertheless, the findings presented here are generally accepted in the field and stem from research in different countries involving young drivers from different cultures.

There are a number of reasons why young drivers are more at risk in traffic than other groups and these are often interrelated (Sigurdardottir 2009). Major contributors to young drivers' crash risk mentioned in the literature are the factors of 'inexperience', 'age', 'risk exposure' and 'risk taking' (Smart, Vassallo, Sanson, Cockfield, Harris, Harrison and McIntyre 2005; Wundersitz 2007). In addition, research has paid a considerable amount of attention to a small group of 'young problem drivers' (Smart et al. 2005), who excessively take risks (Cavallo and Triggs 1996; Jonah 1986). Shope (2006) has categorised the multiple factors that influence young drivers' behaviour (see Figure 2-1), and has focused solely on negative driving behaviour such as speeding and tailgating. There is no research published that has tested if the same factors also influence safe driving behaviour and, if so, if the processes are similar.

FIGURE 2-1: INFLUENCES ON YOUNG DRIVER BEHAVIOUR



(Following Shope 2006)

Young drivers have single vehicle crashes more often than other age groups (Cavallo and Triggs 1996; Engström, Gregersen, Hernetkoski, Keskinen and Nyberg 2003). Of all age groups young drivers are most at risk when driving at night (Cavallo and Triggs 1996; Engström et al. 2003; Triggs and Smith 1996). Young drivers are more often involved in crashes related to fatigue than older drivers (Dobbie 2002; Engström et al. 2003). Some research suggests that young drivers use seat-belts less often than do other age groups (Begg and Langley 2000; Engström et al. 2003; Triggs and Smith 1996). When young drivers drink drive they are more at risk of crashing than older drivers (Cavallo and Triggs 1996; Engström et al. 2003). Young drivers are more likely to use risky driving styles, such as speeding and tailgating (e.g. Bina 2006; Eby and Molnar 1998; Elander et al. 1993; Jonah 1986; Prabhakar, Lee and Job 1996; Turner and McClure 2003). There is some evidence suggesting that carrying passengers increases crash risk for young drivers (Cavallo and Triggs 1996; Chen, Baker, Braver and Li 2000). There is increasing awareness that the way young drivers behave in traffic is related to their overall lifestyle and general situation (Gregersen and Berg 1994; Møller 2004; Møller and Gregersen 2008; Twisk and Stacey 2007). Finally, young male drivers are more at risk in traffic than young female drivers (Glendon, Dorn, Davis, Matthews and Taylor 1996; Harré 2000; Laapotti and Keskinen 2004; Whissell and Bigelow 2003).

The fact that young males have a much higher risk of car crashes than young females (NRMA 2007) is an additional argument to treat young drivers as a heterogeneous instead of a homogenous group, as Cameron (1982) implied (although she was talking about ‘age’ not ‘sex’). For instance, besides a higher occurrence of crashes for males it was found that the factors behind male and female drivers’ crashes are quite different (Laapotti and Keskinen 1998). Because of these different mechanisms behind crashes of young males and females it may not be possible to talk about typical young driver crashes (Hatakka et al. 2002). Some research has concentrated on young male drivers only (e.g. Åberg 1993; Falk and Montgomery 2009; Ho and Yong Gee 2008; Redshaw 2006; Sigurdardottir 2009; Styles et al. 2004), while other studies have examined the differences between the sexes (e.g. Barjonet 1988; Bingham, Shope, Zakrajsek and Raghunathan 2008; Gosselin, Gagnon, Stinchcombe and Joannis 2010). All these studies have a negative focus on road safety in common.

The present study has examined sex differences for all quantitative and qualitative results to establish if the distinctions found in previous research are also evident when focusing on safe driving instead of crash risk. Most research uses the term ‘gender’ rather than ‘sex’, but in this study ‘sex’ is referring to both the biological and psychosocial aspects of differences between females and males (Halpern 1992). The word ‘sex’ is used throughout to refer to both ‘sex’ and ‘gender’ in the cited research. It follows Halpern’s reasoning that the word ‘gender’ is often used as a euphemism in order to avoid the possible physical overtones of the word ‘sex’; that ‘gender’ originated as a grammatical term used to distinguish masculine and feminine words and did not refer to femaleness or maleness; and that psychology and biology are so closely coupled that it is often difficult to determine if differences between males and females are due to biological factors or to the psychosocial concomitants of these biological factors (Halpern 1992).

Although ‘sex’ is mentioned as a factor in some models of driving behaviour, generally theories or theoretical models of driving in the literature do not distinguish between males and females. An exception to this rule are two separate models developed for aggressive driving by either males or females (Lajunen and Parker 2001) but there are no examples in the literature of different models for normal safe driving. This fosters the sub research questions, *Are there any sex differences in safe driving?* and *Is it useful to develop separate models of driving for young males and females?*

2.2.1 THEORIES AND MODELS OF DRIVING

This study focuses on the construct of driving style, but the literature mainly discusses theories and models of driving behaviour. This could be due to the fact that many studies do not explicitly discern between driving behaviour and driving style. Several models of driving behaviour have been developed in the last decades (Summala 2005). Some models focus on the driver or on the driving environment; there are functional models, and there are models that display motivational, cognitive, social or emotional angles (Huguenin and Rumar 2001). Although “a fundamental concern of traffic psychology is traffic safety” (Michon 1985: 500) the majority of models of driving behaviour are concerned with risk.

One of the earlier published theories of driving behaviour did focus more on safety than risk (Gibson and Crooks 1938) but this was not widely followed in later studies. The theory was concerned with ‘the field of safe travel’, which refers to “the field of possible paths which the car may take unimpeded”, and relates to the visual field of the driver (Gibson and Crooks 1938: 454). Since then quite a few driving behaviour models have been developed centring on risk. The ones most cited and discussed are the zero-risk model (Näätänen and Summala 1974), the theory of reasoned action (Ajzen and Fishbein 1980), the theory of risk homeostasis (Wilde 1981), the threat avoidance model (Fuller 1984), the theory of planned behaviour (Ajzen 1985), and the task-capability interface model (Fuller 2000; 2005). Only recently a group of scholars developed the conceptual framework of safe driving behaviour (Strecher, Shope, Bauermeister, Chang, Newport-Berra, Boonin, Giroux, Guay, Candee and Ewing 2006), which uses elements of some of the mentioned risk models. The next section discusses all models briefly to provide a background for the framework of safe driving behaviour.

2.2.1.1 ZERO-RISK MODEL

Näätänen and Summala (1974) theorise in their zero-risk model that individuals do not continuously assess their risk of crashing or of getting fined by police while driving. They only evaluate risk when it surpasses their personal risk threshold. This means that although there may be objective risks in the traffic environment, a driver’s subjective experience of risk is mostly zero (no experience of risk). Crashes generally occur because a driver’s risk threshold is too high; an individual perceives the risk (of crash or arrest) as being zero while, objectively, it has a higher value and the driver should adapt their driving (e.g. slow down). Causes that raise a person’s threshold for

subjective risk are perceptual errors, so called extra motives (such as a desire to drive at high speed) and disappearance of feelings of risk due to forced confrontations with traffic which turn out to be non-aversive (e.g. nothing happens while speeding) (Näätänen and Summala 1974).

Reactions to subjective risk could be seen as important determinants of driving behaviour, assuming that drivers are able to foresee occurring hazards and make correct adjustments (Fuller 1984). However, the theory is unclear about how a driver can determine that their risk threshold is exceeded when they do not constantly evaluate risk (Rothengatter 2002). Later research found that, mostly, driving is a rather habitual activity, during which the driver has no concern of risk (Summala 2005).

2.2.1.2 RISK HOMEOSTASIS THEORY

Wilde's (1981) theory of risk homeostasis proposes that drivers have some internalised target level of risk and while driving they make constant adjustments in order to equal their perceived level of risk to this target level. The target level of risk is the risk that a driver is willing to accept taking into account other relevant goals (such as arriving at a destination on time). Adjustment actions carried out by drivers carry a level of objective risk of a crash because the target level of risk is usually greater than zero (Fuller 1984). According to Wilde a decline in the crash frequency/severity can only be accomplished through reducing a driver's target level of risk (Wilde 1981).

Wilde's theory is much debated; especially its prediction that changes in the traffic system will not improve safety, since road users tend to maintain their target level of risk (Summala 2005). Many successes in safety developments indicate otherwise (e.g. Evans 1991; Robertson and Barry Pless 2002). As Fuller (1984: 1139) asserts: "a considerable amount of evidence refutes the hypothesis." In addition, Wilde's theory assumes that drivers think about risk while driving; an assumption that is rebutted by Fuller (1984; 2005) and Summala (2005) amongst others. It has been suggested though, that the theory could be more useful when Wilde's 'target level of risk' is replaced by 'target level of feeling' (Vaa 2001). Vaa suggests that the target level of feeling would be unique for every driver, and the driver may or may not be consciously aware of it. Examples of target feelings during driving are 'relaxed, secure' and 'vigilant, highly attentive, arousal' (Vaa 2001). Vaa's proposal could make Wilde's theory more suited to research that is focused on traffic safety from a positive perspective.

2.2.1.3 THREAT AVOIDANCE THEORY

Fuller's threat avoidance theory (1984) posits that drivers are motivated to avoid threats or aversive stimuli. Stimuli in the traffic environment (e.g. other vehicles) are not aversive in themselves, but they can have an aversive potential and generally a driver's own actions determine if their interaction with the road environment will be punishing (Fuller 1984). Drivers may undertake anticipatory avoiding actions if they believe a threat is present (for instance through warning signs), or they may delay their response to a later moment (face the challenge). A driver may choose to undertake anticipatory adjustments, without knowing for sure that they are required for safety. Information that the anticipatory response was necessary will reinforce this kind of action in the driver, while an accumulation of feedback that the avoidance action was unnecessary can lead to extinction of the anticipatory response (Fuller 1984; 1988; Harrison 2005). An example of extinction of anticipatory actions is when repeatedly road signs warn for upcoming road works that are not actually encountered, drivers will not slow down anymore at the warning sign, unless road works are in sight (Gardner and Rockwell 1983).

Regarding Fuller's threat avoidance theory, it is unclear if drivers actually think about threats while driving and also what situation or stimuli they perceive as threats. If drivers do not think about risk while driving (Summala 2005) it seems plausible they might also not think about threats. Furthermore, several factors can lead to an underestimation of risk and threats. One factor is an overestimation of one's driving capability (e.g. Catchpole and Styles 2005; Strecher et al. 2006). Another factor is optimism bias; an individual's belief that pleasant events are more likely, and unpleasant events are less likely, to happen to them than to their peers (Weinstein 1980). Optimism bias may have people believe that they are less likely to be involved in a car crash than their average peer (Finn and Bragg 1986; Matthews and Moran 1986) and that they are better drivers than their peers (Job 1990a; Job, Hamer and Walker 1995), therefore they would underestimate risk and threats.

2.2.1.4 TASK-CAPABILITY INTERFACE MODEL

More recently, Fuller developed his task-capability interface model (Fuller 2000; 2005), based on his earlier theory of threat avoidance (Fuller 1984). While his first theory proposed that drivers try to maintain a constant level of risk, the task-capability interface (TCI) model states that drivers are motivated to maintain a constant level of task difficulty. The earlier used concept of mental

workload (Brookhuis and De Waard 2001) seems to resemble task difficulty, but the concept was not unambiguously defined (Fuller 2005). According to Fuller, task difficulty is determined by the demands of the driving task in relation to the capabilities of the driver; when capabilities transcend demand, the task is easy; where capability equals demand, the task is very difficult; when demands exceed capability, the task is too difficult and loss of control will occur. Loss of control can occur as a fragmented degradation; quality of performance might deteriorate or task elements with lower priority (such as mirror checking) may be dropped and eventually followed by dumping of high priority tasks (such as looking ahead) (Wickens and Hollands 2000). Unfortunately, in many instances when the task demands exceed a driver's capability, the driver will not be able to stay on the planned trajectory, avoid an obstacle, or stop in time (Fuller 2005).

Several interacting elements determine the demands of the driving task: environmental factors (e.g. visibility, road signs), other road users, operational features of the vehicle being driven (e.g. anti-lock brake system) and course and speed of the vehicle (Fuller 2005). In order to assess task demand, a driver needs access to a flood of information varying in distribution, level of complexity, rate and certainty (Fuller 2005). Processes of attention, perception, decision-making, and prediction will influence the way in which the driver converges the information flow, according to Fuller. Since driving is a self-paced task (Fuller 2005; Näätänen and Summala 1974; Summala 2005), speed is the most significant factor in the elements of task demand, because if one drives faster, less time is available to take in information, process it and respond to it (Fuller 2005). Choice of speed is therefore a fundamental way in which the driver can influence the task demand (Fuller 2005). In that same line, speed or acceleration/deceleration behaviour has been mentioned as the common thread of driver behaviour resulting in one's driving style (af Wählberg 2006).

Fuller's TCI-model may be the theory that is most concerned with the actual circumstances during driving that influence task-difficulty and could therefore be seen as aligned with Lethimäki's (2001) idea of a positive focus on road safety in that respect. On the other hand, it is unclear how the TCI-model is linked to safe driving. Fuller (2005) suggests that a preferred level of arousal may play a role in the perception of task demand and that an optimal arousal level exists that will both sustain performance and is rewarding for the driver. However, the model does not explain if this optimal level of driving is equivalent to safe driving other than from the negative definition of safety as having no crashes. A positive definition of road safety is needed to further explore this model.

2.2.1.5 THEORY OF PLANNED BEHAVIOUR

The theory of planned behaviour (Ajzen 1991; Ajzen and Madden 1986) is an expansion of the theory of reasoned action (Ajzen and Fishbein 1980). The latter will therefore not be discussed separately. The theory of planned behaviour (TPB) might be the most widely used social cognitive framework on health related behaviours (Victoir, Eertmans, Van den Bergh and Van den Broucke 2005) and it is broadly used as a general social psychological model in the field of traffic safety. The TPB views behavioural intention as a function of attitude, belief, and social norm. Attitude refers to a tendency to evaluate a person, concept or group either positively or negatively (Eagly and Chaiken 1992). A belief is a psychological state of an individual who is convinced some proposition is true, which can contribute to forming an attitude towards something (Westen et al. 2006). Social norms are certain standards that guide an individual's thoughts, feelings and behaviours (Westen et al. 2006). An assumption of the TPB model is that individuals carefully weigh different options and their consequences before rationally deciding on a course of action (Ajzen 1991). Ajzen's model has been extended with the factor of anticipated affect (Lawton, Parker, Manstead and Stradling 1997). Lawton et al. (1997) concluded from their study that drivers are more likely to commit violations (e.g. speeding) if they expect to experience positive emotions (e.g. pride, pleasure) while doing so, than when they anticipate negative emotions (e.g. fear).

The TPB has often been used to study risky driving behaviour determinants (Ulleberg and Rundmo 2003) such as violations of traffic laws (Moyano Díaz 2002; Rothengatter 1994), speeding (Elliott, Armitage and Baughan 2005; Parker, Stradling and Manstead 1996), drink driving (Åberg 1993), aggressive violations (Parker, Lajunen and Stradling 1998) and seat belt use (Budd, North and Spencer, 1984). However, research using the TPB does not always account for a big proportion of the behaviour under study (Ferguson, Robinson and Cohen, 2002). Two factors make the TPB less useful for the present study. Firstly, driving has been described as a rather habitual activity (Summala, 2005) and, with behaviours that are mainly habitual, the association between intention and behaviour is not as strong (Strecher et al., 2006; Webb and Sheeran, 2006). Secondly, studies in road safety using the TPB focus on intentions that a driver has before he commences driving (e.g. driver intends to drive at an easy pace) and if the actual driving behaviour matches the original intention (e.g. driver has driven to destination at an easy pace). The original intention is based on unknown circumstances because the driver has no knowledge of the actual situation during his (intended) drive, such as which other road users will be present and how they will behave. As Fuller

(2005) asserts, some scenarios are difficult to anticipate because of the variable predictability of events that unfold during the drive. Since this study intends to focus on the actual circumstances while driving (Lehtimäki, 2001), the TPB seems less viable to study driving style from a positive viewpoint on road safety.

2.2.1.6 CONCEPTUAL FRAMEWORK OF SAFE DRIVING BEHAVIOUR

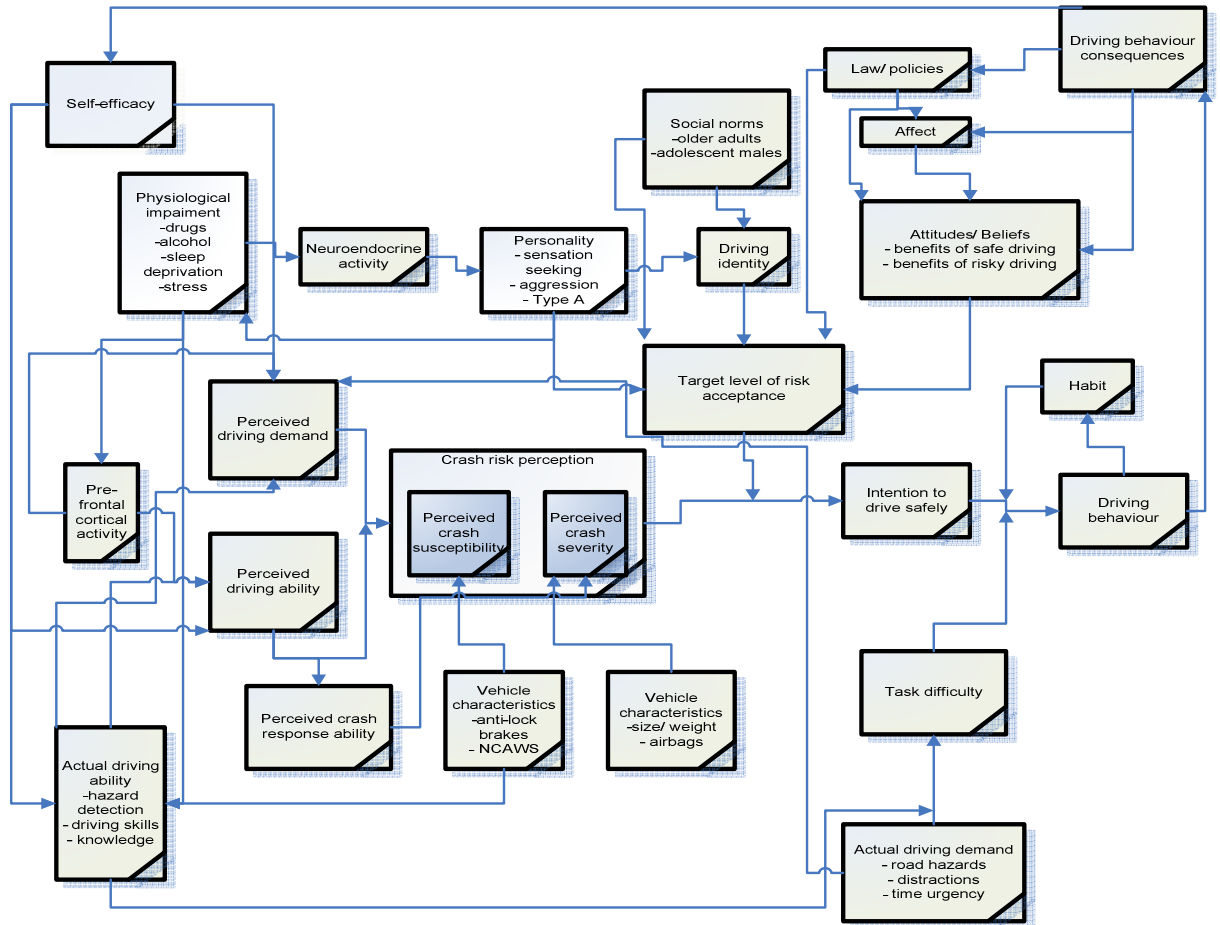
Strecher et al. (2006) generated the conceptual framework of safe driving behaviour with the purpose of organising psychosocial constructs for discussion and review, not aiming to supersede previous models. The framework consists of elements of several theories as well as a physiological perspective that is related to the separate influences of neuroendocrine and pre-frontal cortical activity on judgement, decision-making and psychosocial constructs (see Figure 2-2). Specific models on driving behaviour that are included in the framework are the task-capability interface model (Fuller 2005), an updated version of the theory of risk homeostasis (Wilde, Robertson and Pless 2002), and the model of crash risk perception (Deery 1999). The model also includes elements of the theory of planned behaviour (Ajzen 1991; Ajzen and Madden 1986), and elements of social learning theory (Bandura 1978) and the health belief model (Rosenstock 1974).

This recently developed overarching model seemed the most suitable model for a study with a positive focus on road safety. Although it is based on risk models, and thus focuses on safety from a negative point of view, part of the model (including both the concepts of ‘habit’ and ‘driving behaviour’) is interesting for the present study. After a brief description of the main features, the part of the framework that has contributed to this study is discussed further.

Strecher et al. (2006) consider ‘safe driving behaviour’ to be a set of practices, including obeying the speed limit, non-aggressive manoeuvring, keeping a safe braking distance, use of seat-belts, and avoiding driving when impaired by fatigue, alcohol or other substances. The framework leans heavily on the concepts of behavioural intention and actual behaviour (Ajzen’s (1991) theory of planned behaviour). Crash risk perception and risk acceptance threshold are seen as the main predictors of behavioural intention (Strecher et al. 2006). Strecher et al. suggest that the level of risk that is acceptable for the driver moderates the strength of the relationship between crash risk perception and the intention to drive safely. This target level of risk is influenced by the driver’s attitudes and beliefs, the possibly perceived benefits of unsafe driving, and a range of personality traits (such as sensation seeking), as was found in previous research. Still, as discussed before, drivers

generally do not think about risk while driving (Summala 1985) and so if they do have a ‘target level of risk’, it could be assumed that it is not on a conscious level.

FIGURE 2-2: FRAMEWORK OF SAFE DRIVING BEHAVIOUR



(Following Strecher et al. 2006)

Strecher et al. (2006) identify task difficulty and habit to be the main hindrances in matching driving behaviour with the intention to drive safely. Task difficulty is the central concept in Fuller’s (2005) task-capability interface model, as discussed in section 2.2.1.4. Strecher et al. (2006) state that when task difficulty is low, there will be a strong relationship between the intention to drive safely and the actual driving behaviour, and vice versa.

More relevant to the present study is the second inhibitor of intention-behaviour; habit. Despite putting ‘habit’ into the framework, it is stated that habitual routines that develop with

driving experience may have little to do with the other processes presented in the model (Strecher et al. 2006). An individual may have the intention to drive safely, but habitual processes can override cognitive processing (Yates 1993). Thus, there is some lack of clarity in relation to the box ‘habit’ in the framework. The present study posits it is conceivable that what Strecher et al. (2006) label ‘habit’ may in fact refer to one’s driving style. This study proposes (in section 1.1) that driving style and driving behaviour are different constructs, and has adopted the view that ‘styles’ are one’s preferred way of doing something (see section 2.1). Still, some scholars in both the field of thinking style research and road safety research use ‘habit’ in their definition of a style. The literature in neither field clarifies how a thinking or driving style develops into either a preferred way or a habit. For that reason, a clearer definition of the construct of driving style may help to clarify the ‘habit’ box in the framework for safe driving behaviour. This leads to two sub research questions, *Is a driving style a preferred way or a habitual way of driving?* and *How does a driving style develop?*

2.2.2 YOUNG DRIVER BEHAVIOUR MODELS

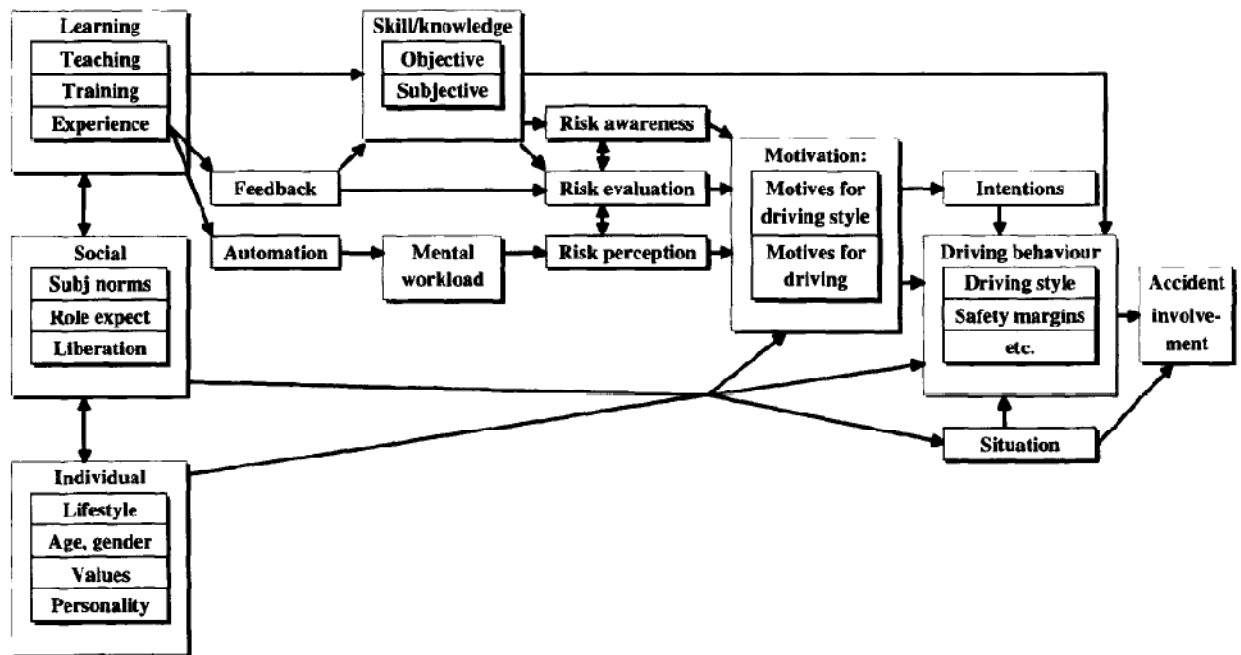
The literature does not offer many models of driving that specifically try to explain young driver behaviour. Shope’s (2006) model (as presented in section 2.2) is more a taxonomy of all factors influencing young drivers’ negative driving behaviour, than a real model. It does not take into account possible cross influences between factors (for instance from parents’ behaviour expectations on the education of the young driver) nor does it relate explicitly to safe driving.

Gregersen and Bjurulf (1996) have presented a young drivers’ model that considers the processes in the development of young drivers’ driving behaviour. Although this model again has a negative focus on crash involvement (not on safe driving), and concentrates on driving behaviour (not driving style), there is an aspect that makes it worth discussing it here. The model (see Figure 2-3) catches the relationships between the learning process, individual characteristics, and social influences, and describes how these factors are related to driving behaviour and crash involvement through processes such as acquisition of skills, self-assessment, processing of information, feedback, and motivation (Gregersen and Bjurulf 1996). These relationships could be related to driver training, which this study aims to inform.

There are some distinct differences between Shope’s (2006) categories and the way factors are grouped in Gregersen and Bjurulf’s (1996) model. For instance, Shope puts ‘knowledge, skill,

and experience' together, while Gregersen and Bjurulf separate 'skill and knowledge' from 'experience', which they combine with 'teaching and training' under the heading 'learning'. Driver training and teaching is not included in Shope's model, or in Strecher et al.'s (2006) framework of safe driving behaviour but the present study posits it is an important factor. Driver training is by no means the sole influence, nor is it proven that it (automatically) leads to safer driving, but driver training is directly related to a young driver's level of experience, skill and knowledge and therefore it should be included in models of young driver behaviour, as is the case in Gregersen and Bjurulf's (1996) model.

FIGURE 2-3: YOUNG DRIVERS' CRASH INVOLVEMENT



(Following Gregersen and Bjurulf 1996)

The young drivers' crash involvement model (Gregersen and Bjurulf 1996) has two main differences with the framework of safe driving behaviour (Strecher et al. 2006) that are of interest for the present study. Firstly, Gregersen and Bjurulf put 'automation' almost at the start but Strecher et al. put 'habit' at the very end of the process, although habitual behaviour can be viewed as a form of (goal directed) automaticity (see for instance Ouellette and Wood 1998; Verplanken and Aarts 1999). This suggests that the first model concentrates on the process of habit forming, while the latter model focuses on already formed habits. It may be useful in explaining young driver behaviour

to put both in the model. An understanding of how and when habits are formed can help with determining “how we can prevent novice drivers from adopting bad habits and bad informal rules in traffic” (Gregersen and Bjurulf 1996: 238). Although with reference to Gregersen and Bjurulf’s remark, it is surprising that their model focuses solely on crash involvement and does not explain how all these factors are related to safe driving behaviour or a safe driving style.

A second point of difference is that the model of young drivers’ crash involvement (Gregersen and Bjurulf 1996) contains the constructs of both driving behaviour and driving style, while the framework of safe driving (Strecher et al. 2006) only uses the concept driving behaviour. The present study has proposed (see section 2.2.1) that driving style is indeed one of the influences on driving behaviour, as theorised in Gregersen and Bjurulf’s (1996) model.

2.2.3 THE HIERARCHICAL NATURE OF DRIVING

All driving behaviour models address different aspects of driving, and disagreement and discussion prevail (Vaa, 2001). However, there is a general acceptance in the field (Fuller, 2005; Summala, 2005) of the hierarchical nature of driver decision making (e.g. Keskinen, 1996; Laapotti et al., 2001; Michon, 1989; Summala, 2005; Van der Molen and Bötticher, 1988). The hierarchical nature of driving is based on the idea that a driver must control the vehicle and the traffic context as well as themselves (Laapotti, Keskinen, Hatakka and Katila 2001). There is interaction between the hierarchical levels and every lower level is part of the higher level (Keskinen 2007).

There are several slightly different hierarchical models in use but generally they all use three separate levels of driving behaviour: operational, tactical and strategical (Laapotti et al. 2001). The operational level is the lowest level, referring to vehicle manoeuvring: controlling the speed, the direction and position of the car. The tactical level is the second level, regarding the way traffic situations are mastered: adaptation of behaviour as required by the situation and knowledge of traffic regulations. The strategical level is the third level, concerned with planning: goals and context for driving. Keskinen (1996) expanded the earlier model with a fourth level on top: goals for life and skills for living. The fourth level connects human behaviour in general with driving behaviour, the importance of driving for the personal development of the driver and self-control skills (Keskinen 1996). Studies at the fourth level are concerned with topics such as the motives a driver satisfies through driving, or how a driver controls him/herself and their motives and emotions while driving

(Keskinen 1996; Laapotti et al. 2001). This fourth level has seen recent interest in relation to young driver research (Bianchi and Summala 2004; Bina 2006; Gregersen and Berg 1994; Sigurdardottir 2009).

The hierarchical nature of driving has been used to explain crashes, because problems at any level of driving behaviour can result in a crash (Laapotti et al. 2001). On a strategic level, a driver can buy a vehicle with specific safety features (e.g. anti-lock braking system), choose a particular route to their destination (e.g. avoid motorways) or a specific time of day (e.g. avoid rush hour or darkness). On a tactical level, a driver could for instance try to influence the behaviour of other road users (e.g. using indicator lights). On an operational level, choice of speed is a big influence on task demand for the driver. Previous research found that females have proportionally more problems with vehicle handling skills and mastering traffic situations (the lower hierarchical levels of driving), while males fail more often at the higher levels, such as habitual speeding (Laapotti et al. 2001).

The concept of different levels of driving behaviour has not directly been linked to a safe driving style in the literature. It did lead to the development of the goals for driving education framework, the GDE-model (Hatakka et al. 2002). However, it is evident from Table 2-3 that the GDE framework is developed from a negative angle on road safety. Highlighted in the framework are 'risk increasing factors' and the self-evaluation column has an emphasis on characteristics as 'risky tendencies' and 'typical risky driving motives'. It has been stated that models should describe not only how conflicts and crashes develop in driving, but also how non problematic, normal driving transpires (Keskinen 2007). This seems especially relevant in relation to the GDE-model as it is used in relation to driver training, and Lethimäki (2001) convincingly argued that crashes cannot be used as a real-time perception in teaching driving.

TABLE 2-3: GDE FRAMEWORK

Hierarchical level of behaviour	Essential contents (examples)		
	Knowledge and skills	Risk-increasing factors	Self-evaluation
Goals for life and skills for living	Knowledge about/control over life goals and personal tendencies affect driving behaviour	Risky tendencies	Self-evaluation/ awareness of
	<ul style="list-style-type: none"> Lifestyle/life situation 	<ul style="list-style-type: none"> Acceptance of risks 	<ul style="list-style-type: none"> Personal skills of impulse control
	<ul style="list-style-type: none"> Group norms 	<ul style="list-style-type: none"> Self-enhancement through driving 	<ul style="list-style-type: none"> Risky tendencies
	<ul style="list-style-type: none"> Motives 	<ul style="list-style-type: none"> High level of sensation seeking 	<ul style="list-style-type: none"> Safety-negative motives
	<ul style="list-style-type: none"> Self-control, other characteristics Personal values 	<ul style="list-style-type: none"> Complying to social pressure Use of alcohol/ drugs Values, attitudes towards society 	<ul style="list-style-type: none"> Personal risky habits
Goals and context of driving (trip related)	Knowledge and skills concerning	Risks connected with	Self-evaluation/ awareness of
	<ul style="list-style-type: none"> Effect of trip goals on driving 	<ul style="list-style-type: none"> Driver's condition (mood, BAC, etc) 	<ul style="list-style-type: none"> Personal planning skills
	<ul style="list-style-type: none"> Planning and choosing routes 	<ul style="list-style-type: none"> Purpose of driving 	<ul style="list-style-type: none"> Typical goals of driving
	<ul style="list-style-type: none"> Evaluation of requested driving time 	<ul style="list-style-type: none"> Driving environment (rural/urban) 	<ul style="list-style-type: none"> Typical risky driving motives
	<ul style="list-style-type: none"> Effects of social pressure in car Evaluation of necessity of trip 	<ul style="list-style-type: none"> Social context and company Extra motives (competing etc) 	
Mastery of traffic situations	Knowledge and skills concerning	Risks caused by	Self-evaluation/ awareness of
	<ul style="list-style-type: none"> Traffic rules 	Wrong expectations	<ul style="list-style-type: none"> Strong and weak point of basic traffic skills
	<ul style="list-style-type: none"> Observation/selection of signals 	<ul style="list-style-type: none"> Risk-increasing driving style (e.g. aggressive) 	<ul style="list-style-type: none"> Personal driving style
	<ul style="list-style-type: none"> Anticipation of course of situations 	<ul style="list-style-type: none"> Unsuitable speed adjustment 	<ul style="list-style-type: none"> Personal safety margins
	<ul style="list-style-type: none"> Speed adjustment 	<ul style="list-style-type: none"> Vulnerable road-users 	<ul style="list-style-type: none"> Strong and weak points for hazard situations
	<ul style="list-style-type: none"> Communication 	<ul style="list-style-type: none"> Not obeying rules/ unpredictable behaviour 	<ul style="list-style-type: none"> Realistic self-evaluation
	<ul style="list-style-type: none"> Driving path Driving order 	<ul style="list-style-type: none"> Information overload Difficult conditions (e.g. darkness) 	
	<ul style="list-style-type: none"> Distance to others/ safety margins 	<ul style="list-style-type: none"> Insufficient automatism/ skills 	
Vehicle manoeuvring	Knowledge and skills concerning	Risks connected with	Awareness of
	<ul style="list-style-type: none"> Control of direction and position 	<ul style="list-style-type: none"> Insufficient automatism/ skills 	<ul style="list-style-type: none"> Strong and weak points of basic manoeuvring skills
	<ul style="list-style-type: none"> Tyre grip and friction 	<ul style="list-style-type: none"> Unsuitable speed adjustment 	<ul style="list-style-type: none"> Strong and weak point of skills for hazard situations
	<ul style="list-style-type: none"> Vehicle properties 	<ul style="list-style-type: none"> Difficult conditions (e.g. low friction) 	<ul style="list-style-type: none"> Realistic self-evaluation
	<ul style="list-style-type: none"> Physical phenomena 	Etc.	Etc.
	Etc.		

(After Hatakka et al. 2002)

Hatakka et al.'s (2002) article was the first scientific publication in a peer reviewed journal on the GDE-model but the framework had been used before in several projects with the aim of using a common way of thinking about driving and to analyse both driver training and driver testing (Keskinen 2007). These earlier studies that used the GDE-model revealed that basic driver training is still concentrated on knowledge and skills, so the two lowest hierarchical levels of driving. On the other hand, rehabilitation courses (e.g. for drivers fined for speeding or drink driving) and driving improvement courses focus more on the two highest levels of driving behaviour (Keskinen 2007). Hatakka et al. (2002) state that the application of a hierarchical approach to basic driver training indicates there should be more emphasis on these highest levels of the driving behaviour hierarchy, such as motivational factors or critical thinking skills.

Knowledge of young drivers' thinking styles may contribute to a better understanding of their driving behaviour on all levels of the hierarchical model, and of the way young drivers develop their driving styles. Furthermore, thinking styles have been found to contribute to students' academic performance, in addition to what can be explained by objectively-tested abilities as well as self-rated abilities (Zhang 2002b). Thinking styles may also contribute to other learning environments, such as driver training. Since the effectiveness of present driver education programmes on driver safety is as yet unproven (Ker, Roberts, Collier, Beyer, Bunn and Frost 2005; Mayhew 2007; Mayhew and Simpson 2002; Senserrick 2001), the present study may aid to improve driver training if any correlations between thinking and driving styles are found. These thoughts on driver training led to the sub research questions, *Is there a relationship between thinking and driving styles?* and *Can thinking styles predict driving styles?*

2.3 DRIVING STYLES

It is evident that driving is a highly complex and multidimensional task (Taubman - Ben-Ari et al. 2004). Empirical research has focused mostly on driving behaviour (not driving style) and studied one or more of the human factors that might influence traffic crashes, such as general personality traits, sociodemographic factors, driving specific skills and drivers' attitudes and behaviours, with mixed results (Taubman - Ben-Ari et al. 2004). As discussed, several models of driving behaviour have been developed in the last decades but testable hypotheses have not been drawn from these theories (Summala 2005).

There is agreement in the field about the importance of driving style (e.g. Elander et al. 1993; Özkan 2006; Taubman - Ben-Ari et al. 2004), but not on its conceptualisation and measurement (Taubman - Ben-Ari et al. 2004). The self-report questionnaires that have been developed to measure driving behaviour and cognition, all tap into very different aspects of driving (Westerman and Haigney 2000). For instance, the Driving Style Questionnaire or DSQ (French et al. 1993) assesses factors as ‘speed’, ‘seat belt use’ and ‘traffic violations’ but also ‘feelings of control’ and ‘risk taking behaviour’. In contrast, the Driving Behaviour Inventory or DBI (Gulian, Matthews, Glendon, Davies and Debney 1989b) studies ‘driving stress’ and ‘dimensions of driving aggression’, such as frustration in overtaking. The well known Driver Behavior Questionnaire or DBQ (Reason, Manstead, Stradling, Baxter and Campbell 1990) has yet another focus; it examines ‘lapses’ (e.g. switch on wrong appliance), ‘error’s (e.g. failing to notice pedestrians crossing) and deliberate ‘violations’ (e.g. speeding or tailgating).

With the Multidimensional Driving Style Inventory (MDSI), Taubman – Ben-Ari et al. (2004) have attempted to develop a conceptual and empirical integration of the various definitions and scales into a single conceptualisation of driving style. The MDSI is a self-report scale distinguishing eight driving styles: risky, high-velocity, angry, patient, careful, anxious, distress reduction, and dissociative. The key characteristics are displayed in Table 2-4. Significant associations were found between these driving styles and ‘sex’, ‘age’, ‘driving history’, personality measures of ‘self-esteem’, ‘need for control’, ‘impulsive sensation seeking’, and ‘extraversion’ (Taubman - Ben-Ari et al. 2004).

TABLE 2-4: KEY CHARACTERISTICS OF THE MDSI EIGHT DRIVING STYLES

Driving Style	Key characteristics
Risky	Excitement from dangerous driving
High-velocity	Speeding, impatient
Angry	Expression of irritation and rage
Patient	Polite, calm, attentive
Careful	Keeping traffic rules, cautious
Anxious	Feelings of alertness and tension
Distress reduction	Meditate, relaxation exercises
Dissociative	Daydreaming, non attentive

(After Taubman – Ben-Ari et al. 2004)

Two aspects make the MDSI a useful instrument for the present study. Firstly, the MDSI presents driving style as different from driving behaviour, which is aligned with the previously discussed difference between driving style and driving behaviour that is a fundamental assumption of the present study. Secondly, the MDSI is the first questionnaire to include positive driving styles (patient and careful), which suits the aim of the present study which is to focus on the development of driving styles in general, regardless of their direct association with traffic crashes. The MDSI is used to answer the sub research questions *What are young drivers' driving styles?* and *Are there any sex differences in young drivers' driving styles?*

It is not clear from the literature how driving styles are actually developed (Miller and Taubman - Ben-Ari 2010). Recent studies explored if parents' driving styles influence the development of their children's driving style. Two Israeli studies found links between the driving styles of parents and their children (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari, Mikulincer and Gillath 2005). An American study found strong links between traffic violations and crashes of parents and their offspring (Ferguson, Williams, Chapline, Reinfurt and De Leonardis 2001). A Brazilian study found that traffic violations and driving errors of parents and their children were related (Bianchi and Summala 2004) and a recent French national survey found that parents' driving practice, driving norms and values were passed on to their children (Lahatte and Le Pape 2008). Parents influence their children's driving records prior to the start of the graduated licensing process (Ferguson et al. 2001), for instance because the children watch their parents drive (Bianchi and Summala 2004) before they actually start learning to drive themselves. During graduated licensing, as is the case in Australia, parents can play a more active role through supervising their children during driving practice but also through imposing (or not imposing) the rules and restrictions on the learner drivers (e.g. not allowing night time driving) (Bianchi and Summala 2004).

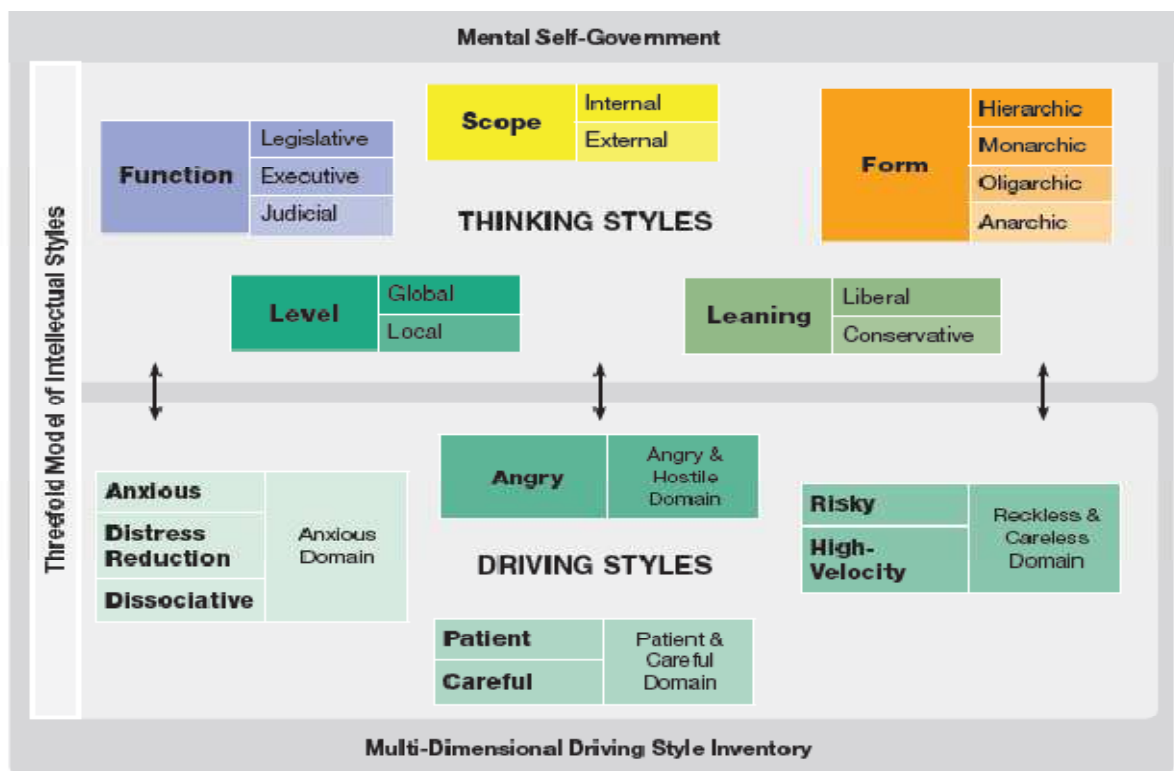
One reason for making young drivers the centre of attention is that it is assumed that young drivers are still developing their driving style, starting from the first driving lesson to at least a year after obtaining their licence (Miller and Taubman - Ben-Ari 2010). This driving style development phase may offer opportunities for positively influencing this process; for instance during driver training (either professional or lay instruction). Although results from previous research found a definite influence by parents on their children's driving style, the mechanism through which this influence is transmitted is not quite clear (Bianchi and Summala 2004). If driving style is transmitted through a learning process rather than, for instance, a genetic disposition, this offers opportunities

“to promote safety-positive transmission” (Bianchi and Summala 2004: 658); in other words safe driving styles. Supervision by parents in graduate licensing systems is currently applied more often (Ferguson 2003; Gregersen, Berg, Engström, Nolén, Nyberg and Rimmö 2000; Shope and Molnar 2003). The group interviews in this study provide more insight into this process of learning to drive.

2.4 INITIAL FRAMEWORK CURRENT STUDY

As discussed in section 2.1.1, the threefold model of intellectual styles functions as the overall framework for the present study. It underpins the proposition that driving style and thinking style may be regarded as cognate constructs with both falling under the umbrella term of intellectual style. It is also proposed that there is a relationship between thinking styles and driving styles in the same way thinking styles are related to other behaviour and activities (such as academic achievement or criminal behaviour). This leads to the initial theoretical framework for the present study, as depicted in Figure 2-4.

FIGURE 2-4: INITIAL THEORETICAL FRAMEWORK FOR THIS STUDY



(Reproduced from Kleisen 2009)

2.5 SUMMARY

This chapter has put the present study into the perspective of both the field of thinking styles and the field of road safety, specifically young driver research. The lack of studies done from a positive view on road safety was highlighted in this chapter. It has drawn attention to several gaps in the literature on road safety: no positively stated definition for road safety exists; there is a lack of driver behaviour models explaining safe driving; there is a lack of models specifically on young driver behaviour; there are no models suggesting how driving styles develop; despite many research findings on sex differences in driving, there are no separate driving models developed for males and females; and there is no unambiguous definition of the construct of driving style.

The threefold model of intellectual styles was used to propose that driving style and thinking style could be cognate constructs. If these concepts are indeed similar this would mean that the literature of styles research can be used to improve the presently ambiguous definition of driving style that is prevalent in the traffic safety literature. Furthermore, since thinking styles are trainable driving styles could be trainable too, which may offer new perspectives for driver training.

An initial theoretical framework is presented based on the threefold model of intellectual styles, the theory of mental self-government, and the multi-dimensional driving style inventory. This framework will be used to answer the overall research question of the present study, *Can knowledge of thinking and driving styles contribute to young driver road safety?*

The extant literature in the fields of thinking styles and road safety fostered the following sub research questions for this study: *Can driving styles and thinking styles both be intellectual styles? What are young drivers' thinking styles, and are there any sex differences in their thinking styles? Are there any sex differences in safe driving, and is it useful to develop separate models of driving for males and females? Is a driving style a preferred way or a habitual way of driving? How does a driving style develop? What are young drivers' driving styles, and are there any sex differences in their driving styles? Is there a relationship between young drivers' thinking and driving styles? Can thinking styles predict driving styles? How can road safety be defined in a positive way?*

The next chapter discusses the epistemology from which this study is undertaken and it presents the methodology and methods used to answer the generated (sub)research questions.

3 RESEARCH DESIGN

Chapter 2 presented this thesis' main and sub research questions, which were derived from gaps in the literature. This chapter introduces the theoretical background of this research, explaining the epistemological stance and theoretical perspective of the researcher. It becomes clear how this study fills a distinct gap in the literature of both fields through combining confirmatory and exploratory knowledge. A justification is given for choosing mixed methods to find a meaningful answer to the main research question. The participants of this study are described, the ethical considerations are addressed, and the used analysis techniques are outlined. The chapter finishes with an overview of the limitations of this research.

3.1 EPISTEMOLOGICAL BELIEFS AND TYPES OF KNOWLEDGE

In every study it is useful to make the researcher's epistemological stance explicit because it presents the philosophical basis on which the researcher decides what kind of knowledge they consider to be adequate and legitimate (Maynard 1994). Epistemological beliefs are convictions about knowledge and knowing, or the sources and organisation of knowledge, that an individual holds (Hofer and Pintrich 1997). This study is undertaken from a constructionist point of view maintaining the idea that 'truth' and 'meaning' are not discovered, but socially constructed (Crotty 1998; Littlejohn and Foss 2005). These social constructions are, however, still real, according to Crotty. He states that constructionism is perfectly compatible with a realist and relativist ontology. Social constructs are not confined to what is in the mind, they exist in reality, and they could be seen as the sense we make of these constructs rather than 'the way things are' (p. 64).

The constructionist stance is unusual in both the field of thinking style research and the field of road safety research where the majority of studies are undertaken from a positivist point of view. Positivism anchors itself in objectivism, holding there is an objective truth that we can discover (Crotty 1998). In contrast, constructionism sees all truth, or meaning, as socially constructed; "not only the social scientist but equally the natural scientist has to deal with realities that, as meaningful realities, are socially constructed. They are on an equal footing in this respect." (Crotty 1998: 55). As Crotty states, there is one human world consisting of both the social and the natural world, and the starting point for any researcher (in natural or social sciences) is the everyday understanding of concepts and theories already existing in their culture. Any conduct and interpretation of positivist

research is affected by the scientist's vision of reality and their personal knowledge (Thorpe 2001). Thus, as there seems to be no fundamental conflict between the basic attributes of positivist and constructionist research (Yardley and Bishop 2008), it makes sense to let the research questions dictate the research methods, rather than have a preconceived notion of the study as either quantitative or qualitative.

As indicated in section 1.4 (Aims and approach), this study focuses on people, rather than crashes, and mixed methods research offers the prospect of a meaningful answer to the main research question, *Can knowledge of young driver's thinking and driving styles contribute to road safety?*. It is in agreement with Patton "that a variety of methodological approaches are needed and credible, that mixed methods can be especially valuable, and that the challenge is appropriately matching methods to questions rather than adhering to some narrow methodological orthodoxy" (Patton 2002: 264). The main research question of this study requires two types of knowledge: confirmatory and explanatory. The first type of knowledge forms the positivist element in this study and it establishes if there are any relationships between thinking and driving styles of young drivers. This part of the study is aligned with the quantitative research that forms the majority of the literature in the field of thinking styles and the field of road safety. The second type of knowledge is necessary to explore if these correlations are meaningful in the everyday world of young drivers, and forms the purely constructionist part of this study. This part of the study draws on a few qualitative studies done in the field of road safety, but is a more novel approach in the field of thinking styles research. Both types of knowledge get equal weight in this study; it is important to know where relationships are, but equally important to know how to understand these relationships.

3.2 RESEARCH METHODS

Following tradition in the field of thinking style research, this study used a questionnaire to investigate young drivers' thinking styles. Academics have researched the roles that styles of thinking play in human performance for more than half a century (Zhang and Sternberg 2005) and research into thinking styles is typically operationalised through self-report inventories (e.g. Borlandoe 2004; Brown and Oakley 1998; Cano-Garcia and Hewitt Hughes 2000; Chen 2001; Hommerding 2002; Okabayashi and Torrance 1984; Sofo 2006; Sternberg 1988; 1997; Walters 2002; Walters and Geyer 2007; Zhang 2004c).

The field of road safety research uses self-reports, simulation of the driving task, and observation to collect data. The downside of using a driving simulator or direct observation is that they can cause the driver to be more disciplined than they would be when on their own (Ulleberg and Rundmo 2002). This thesis argues that both simulation and observation can be useful to examine driving behaviour but they are not very effective to study driving style. Observing some driving behaviour once or twice during a single trip would not lead to a reliable measurement of driving style as one's established way of driving (Lajunen and Summala 2003). Therefore, as in the field of thinking style research, driving is mostly studied through self-report measures (French et al. 1993; Gulian et al. 1989b; Lajunen, Parker and Summala 2004; Lajunen and Summala 2003), and this study follows that tradition because it focuses on young drivers' driving styles, not their driving behaviour.

There are ongoing discussions in road safety research about the validity of self-report measures such as questionnaires in relation to actual behaviour (Ulleberg and Rundmo 2002) but previous research has found that observations of certain driving behaviours, such as driving speed, were well correlated to self-reported normal driving speed (West, French, Kemp and Elander 1993). This finding justifies the use of self-report measures as a surrogate for actual driving (Hatakka, Keskinen, Katila and Laapotti 1997; Ulleberg and Rundmo 2002). From the constructionist perspective of this study, the discussion on how well a questionnaire response matches 'actual driving' (or 'actual thinking process' for that matter) is less important than from a purely positivist point of view. How participants perceive their own way of driving or thinking is just as important as the way they 'really' drive or think, because it shows how they experience their own driving or thinking. In addition, participants in this study complete the questionnaires by themselves without being able to ask any clarification of the researcher. Therefore, they will answer according to their own understanding of the questions, which shows that a certain amount of subjectivity is unavoidable even in the quantitative part of the study. This is perfectly acceptable, and expected, within a constructionist paradigm.

Another problem that has been raised with self-report measures is that of socially desirable responses (Lajunen, Corry, Summala and Hartley 1997), but studies have supported the reliability of self-reported driving habits (Åberg, Larsen, Glad and Beilinsson 1997; Prabhakar et al. 1996; Ulleberg and Rundmo 2002). This study has taken three measures to diminish the chance of socially desirable responses by participants. Firstly, the questionnaires have been administered anonymously,

while stressing this anonymity to participants (Lindeman and Verkasalo 1994). Several participants of the present study asked questions about who was going to have access to the data they provided indicating that anonymity is indeed an important factor in self-report instruments. Secondly, the researcher was not directly present when participants completed the questionnaires (Nederhof 1985). Thirdly, in contrast to many road safety studies, the present study did not ask participants about their history of crashes, crash involvement or traffic fines; topics that represent sensitive information about an individual (Ulleberg and Rundmo 2002) and might be more likely to elicit socially desirable responses.

As explained in section 3.1, it requires two types of knowledge to provide a meaningful answer to the main research question of this study. While the first part of the study consisted of participants answering self-report questionnaires, the second part of the study comprised qualitative group interviews with young drivers. Research integrating quantitative and qualitative methods is mounting in recent years, especially in the social and behavioural sciences (Brannen 2005; Bryman 2006; Collins, Onwuegbuzie and Jiao 2007; Collins, Onwuegbuzie and Sutton 2006). Bryman (2006) found that over 57% of 232 journal articles in five fields (sociology; social psychology; human, social and cultural geography; management and organisational behaviour) published between 1994 and 2003 are based on research using a combination of a survey instrument and a form of qualitative interviewing. Combining questionnaires with group interviews can thus be considered an acceptable mixed methods design and not problematic within a constructionist paradigm (Crotty 1998).

The next section describes the used questionnaires in detail, including their validity and reliability in regards to the participants sample in this study. The complete questionnaire package is included in Appendix D.

3.2.1 THE THINKING STYLE INVENTORY-REVISED

There are two reasons to use the Thinking Style Inventory-Revised (TSI-R) (Sternberg et al. 2003) to examine the thinking styles of young drivers. Firstly, the thinking styles from the theory of mental self-government (MSG) that the instrument tests were easy to imagine as being linked to different ways of driving. Secondly, all existing studies using the TSI-R have demonstrated sufficient reliability and good validity data (Zhang 2004d) and the questionnaire has been validated in both academic and non-academic settings (Zhang 2005b).

Sternberg's theory (1997) isolates thirteen thinking styles, falling within five dimensions, as discussed in section 2.1.3 and shown in Table 3-1. The MSG was originally operationalised through the Thinking Styles Inventory, using 40 questionnaire items. The revised TSI-R has 65 statements (Sternberg et al. 2003), with each five statements falling into one of the thinking styles. Participants rate themselves on a 7-point Likert-type scale: (1) indicates that the statement does not at all represent the way they normally carry out tasks and (7) suggests that the statement characterises extremely well the way they normally carry out tasks.

TABLE 3-1: TSI-R THINKING STYLES

Dimension	Thinking style	Key characteristics
Function	Legislative	Creating rules, likes to do things their own way
	Executive	Implementing, likes to follow established rules
	Judicial	Judging, likes to evaluate rules and procedures
Form	Hierarchic	Multi-tasking, multiple goals with different priorities
	Monarchic	Likes to focus on one task at the time
	Oligarchic	Has multiple goals of equal importance at the same time
	Anarchic	Random approach, does not like systems or rules
Level	Global	Likes abstract thinking, problems of a general nature
	Local	Preference for details and precision in tasks
Scope	Internal	Likes to work independently, alone
	External	Likes to work with other people, interaction
Leaning	Liberal	Allows change, goes beyond existing rules
	Conservative	Prefers familiarity, follows traditions

(Adapted from Zhang 2002a)

Firstly, the internal consistency of the TSI-R was tested for the current sample of Australian young drivers through examining the reliability of the thirteen scales by computing Cronbach's α for each thinking style. Secondly, the internal validity of the TSI-R was established for the present data through exploratory factor analysis for reason of comparison with previous research in other cultures. The Thinking Styles Inventory-Revised (Sternberg et al. 2003) has not been used in any published research in Australia, therefore Cronbach's α coefficients were estimated for the thirteen thinking styles and compared to scores from previous research outside of Australia (Zhang 2004b;

2005b) to test the internal reliability of the scales for the ACT young drivers population (see Table 3-2). All scales consisted of five items.

TABLE 3-2: COMPARISON CRONBACH'S ALPHA CURRENT STUDY WITH PREVIOUS RESEARCH

Thinking Style	Cronbach's α	Zhang 2004b	Zhang 2005b
Legislative	.75	.74	.78
Executive	.74	.65	.60
Judicial	.64	.74	.71
Hierarchic	.71	.75	.77
Monarchic	.66	.65	.68
Oligarchic	.67	.70	.71
Anarchic	.61	.51	.55
Global	.46	.65	.70
Local	.64	.67	.69
Internal	.69	.73	.75
External	.73	.78	.71
Liberal	.76	.83	.82
Conservative	.78	.76	.77

Most alpha estimates were similar to those reported in Zhang's (2004; 2005) studies, while some were slightly higher (e.g. executive and anarchic thinking) and some slightly lower (e.g. judicial and internal). Conventionally a Cronbach's α score of .60 is considered the cut off point for internal reliability (Bartee, Grandjean and Bieber 2004; Miller 1995; Tabachnick, Fidell and Osterlind 2001). Scores higher than this cut-off are considered to have adequate internal consistency (which suggests that the items within that scale measure a single construct), while scores lower than this cut-off are judged to have low internal consistency. Six of the original scales showed sufficient internal consistency (α ranges from .64 to .78), but the patient and distress reduction driving styles scored under the cut-off ($\alpha = .51$ and .46 respectively). However, considering the heterogeneity of the items within each scale and for reason of comparison with previous research, all scales have been retained for further analysis.

Studies using the TSI or the TSI-R mostly report lower reliability scores for at least one of the thinking style scales but it differs per study which scales are least consistent. In the present study the global subscale showed the least consistency (under the cut off point of .06) but some studies reported the anarchic style as least reliable (Zhang 2004b; 2005b), another the executive and oligarchic styles (Tang 2003), and yet another the monarchic, anarchic and local scales (Zhang 1999).

These different results could indicate that the reliability varies in relation to some characteristic of the different samples, which may be cultural differences; Tang examined a Chinese Canadian population, Zhang studied several Hong Kong populations, and the present study used an Australian sample.

For comparative purposes an exploratory factor analysis was conducted using Principal Axis Factoring and an Oblimin rotation with Kaiser normalisation. Visual inspection of the eigenvalues with the scree plot (Cattell 1966) indicated a four factor extraction, that accounted for 67.7% of the variance in the data (as shown in Table 3-3). This is consistent with previous studies using the TSI-R that extracted four factors accounting for 69% of the variance in the data (Zhang 2005b) and accounting for 72.3% of the variance in the data (Zhang and Higgins 2008).

The first factor was dominated by loadings from thinking styles of Type II, so norm-favouring and denoting lower levels of cognitive complexity (Zhang and Higgins 2008): executive, local and conservative thinking. The second factor was dominated by loadings from Type I thinking styles, so creativity-generating styles (Zhang and Higgins 2008): legislative, judicial, hierarchic, global and liberal thinking. The third factor contrasted the internal and the external thinking style; both Type III thinking styles. The fourth factor was loaded by the monarchic thinking style (Type II) and the anarchic thinking style (Type III). The first three factors were consistent with, and supportive of, the ones from existing studies (e.g. Zhang 2005b; Zhang and Higgins 2008; Zhang and Sternberg 2006), but the fourth one differed from previous findings. Zhang (2005) found that the fourth factor contrasted the global with the local style and Zhang and Higgins (2008) had the fourth factor loaded by the global and the oligarchic style. Another difference was that the hierarchic thinking style loaded equally high on factor 1 and factor 2. However, the results from the first three factors lent enough support to the internal validity of the TSI-R for assessing the thinking styles of the participants of the present study.

TABLE 3-3: FACTOR ANALYSIS TSI-R

<i>Scales</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>
Legislative		.63	.36	
Executive	.87			
Judicial	.49	.67		
Hierarchic	.50	.46		
Monarchic	.57	.34		.75
Oligarchic	.60	.32		
Anarchic		.57		-.51
Global		.40		
Local	.51	.49		
Internal		.32	.91	
External	.40	.58	-.41	
Liberal		.71		
Conservative	.83			
Note: Variables with factor loadings of less than .30 are omitted.				

3.2.2 THE MULTI-DIMENSIONAL DRIVING STYLE INVENTORY

This study uses the the MDSI to determine young drivers' driving styles. The MDSI has been used in several studies in Israel (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2004; 2005), with driving populations varying in age. All studies used participants from both sexes. In the first two studies participants' ages ranged from 19-70, the third study from 19-74, and the most recent study examined young drivers (17-24). The original study, in which the MDSI was constructed and validated (Taubman - Ben-Ari et al. 2004), revealed eight main factors (the driving styles) clustered in four broad domains of driving style: reckless and careless (risky and high-velocity driving styles), angry and hostile (angry driving style), patient and careful (patient and careful driving styles), and anxious (anxious, dissociative and distress reduction driving styles). The subsequent studies (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari 2006;

Taubman - Ben-Ari et al. 2005) concentrated on these four driving domains rather than the eight separate driving styles. Table 3-4 gives a schematic overview of the driving style domains.

TABLE 3-4: THE MDSI DRIVING STYLES ACCORDING TO DRIVING DOMAINS

Domain	Driving Style	Key characteristics
Reckless and Careless	Risky	Excitement from dangerous driving
	High-velocity	Speeding, impatient
Angry	Angry	Expression of irritation and rage
Patient and Careful	Patient	Polite, calm, attentive
	Careful	Keeping traffic rules, cautious
Anxious	Anxious	Feelings of alertness and tension
	Distress reduction	Meditate, relaxation exercises
	Dissociative	Daydreaming, non attentive

(After Taubman – Ben-Ari et al. 2004)

The usefulness and validity of the MDSI had not been previously examined in regard to an Australian sample of young drivers. In this study, firstly the internal consistency was checked for all eight driving style scales that were used in the original study for the ACT young drivers population by employing Cronbach's α and comparison to the original scores for the general driving population in Israel (Taubman - Ben-Ari et al. 2004). Table 3-5 shows that six driving style scales scored lower on Cronbach's α than in the 2004 study but were still well above the traditional cut off point of 0.6 (Bartee et al. 2004; Miller 1995; Tabachnick et al. 2001).

TABLE 3-5: COMPARISON OF CRONBACH'S ALPHA WITH PREVIOUS RESEARCH

Driving Style	Cronbach's α current	α for Taubman - Ben-Ari et al. 2004
Risky	.77	.83
High-velocity	.78	.76
Angry	.74	.80
Patient	.51	.74
Careful	.64	.76
Anxious	.66	.82
Distress reduction	.46	.75
Dissociative	.76	.82

Considering the lower reliability of the patient and dissociative driving styles, the internal consistency has also been estimated for these broader driving style domains and separated for males and females. As summarised in Table 3-6, all driving style domains showed a higher internal consistency than the eight separate driving styles with 0.7 as the lowest score for Cronbach's α . There were some differences compared to the previous Israeli research using the MDSI. For instance the angry domain had a lower score for both sexes than in both earlier studies, although the angry scale in the present study was similar to the previous research in showing greater internal consistency for males than for females. The present data do not entirely support the reckless and careless driving style domain as stipulated by Taubman - Ben-Ari et al. (2004; 2005; 2006). Combining the elements from risky and high-velocity driving (Cronbach's $\alpha = .85$) shows the same reliability as the combination of angry and high-velocity driving (Cronbach's $\alpha = .85$) and almost the same as risky and angry driving (Cronbach's $\alpha = .82$). Putting all sixteen elements from risky, angry and high-velocity together leads to the greatest internal consistency (Cronbach's $\alpha = .89$) suggesting that for the present study a division into three domains would be fitting the data better than four.

TABLE 3-6: COMPARING CRONBACH'S ALPHA DRIVING STYLE DOMAINS TO PREVIOUS RESEARCH

Driving style domains	Reckless and Careless	Angry	Patient and Careful	Anxious
Current study: total sample	.85	.74	.73	.77
Current study: males	.84	.76	.72	.81
Current study: females	.85	.70	.70	.73
Taubman - Ben-Ari et al. 2005: males	.81	.79	.75	.85
Taubman - Ben-Ari et al. 2005: females	.72	.73	.75	.79
Taubman - Ben-Ari et al. 2006: males	.83	.83	.70	.89
Taubman - Ben-Ari et al. 2006: females	.79	.81	.75	.87

TABLE 3-7: CRONBACH'S ALPHA FOR THREE DRIVING STYLE DOMAINS FITTING PRESENT DATA

Driving style domains	Reckless	Patient and Careful	Anxious
Current study: total sample	.88	.73	.77

For comparative purposes an exploratory factor analysis was conducted using Principal Axis Factoring and an Oblimin rotation with Kaiser normalisation (as shown in Table 3-8). Visual inspection of the eigenvalues with the scree plot (Cattell 1966) indicated a two factor extraction which accounted for 60.22 % of the variance in the data. This finding is inconsistent with previous studies that found a four factor solution (Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2005). Risky, angry and high-velocity driving had high positive loading on the first factor, while patient and careful driving had high negative loading on the first factor. Anxious and dissociative driving loaded highly on the second factor, but dissociative driving also loaded highly on factor 1. The distress reduction driving style did not load on either factor. Considering that this scale also showed a low reliability ($\alpha = .46$) it seems that the questions this scale consists of are not adequately measuring the distress reduction style for the present sample of Australian young drivers.

TABLE 3-8: FACTOR ANALYSIS MDSI

<i>Scales</i>	<i>Factor 1</i>	<i>Factor 2</i>
Risky	.80	
Angry	.66	
High-velocity	.78	
Patient	-.56	
Careful	-.70	
Anxious		.50
Distress reduction		
Dissociative	.69	.66
Note: Variables with factor loadings of less than .30 are omitted.		

In order to make comparisons possible with previous findings, the eight original driving styles (Taubman - Ben-Ari et al. 2004) were retained for analysis, but the data were also analysed using the four broader driving domains (in subsequent studies called driving styles) as stipulated by Taubman - Ben-Ari et al. (2005; 2006). In addition, the three combined driving styles as suggested by the data in this present study were used in the analysis where useful.

3.2.3 ADDITIONAL QUESTIONNAIRE ITEMS

Previous research found several personal characteristics related to driving behaviour and driving style. Some of these factors have been included in the questionnaire package as additional questions to the TSI-R and the DBQ: 'age', 'sex', 'years of driving' (licensed and pre-licensed), 'type of drivers licence', and 'weekly driving' (hours and kilometres). Level of education has also been linked to certain driving behaviour (Braver 2003; Taubman - Ben-Ari et al. 2004) but because all participants of the present study were pursuing tertiary education this was not a very useful factor to include. Previous research found links between certain types of education and specific thinking styles (Sternberg and Zhang 2005). Therefore this study has included the factor field of education.

The present study used a positive focus on traffic safety concentrating on how young drivers may develop adaptive driving styles. Thus, no questions were included on negative aspects of driving such as (deliberate) violations of traffic rules, involvement in crashes, or traffic fines received.

3.2.4 GROUP INTERVIEWS

The interview is a method of data collection that is very suited to a constructionist epistemology because “interviewing is always unavoidably interactional and constructive” (Holstein and Gubrium 2004: 143). One of the problems with traditional interviews is the status difference between interviewer and interviewee with the latter being in the subordinate position (Fontana and Frey 1998). Group interviews and focus groups are more egalitarian because the less controlling moderator allows participants more influence on the flow of the discussion, or “to follow their own agendas” (Wilkinson 2004: 188), which can lead to unexpected data and therefore new insights (Kitzinger 1995). Group members should therefore be encouraged to talk to each other, not to the researcher (Kitzinger 1995). This allows the participants to explore the topics they find important, in their own language (Kitzinger 1995), which offers the researcher insight into the way the group members usually talk and their particular vocabulary, terminology and idioms (Wilkinson 2004).

There were two main reasons for using group interviews rather than individual interviews in this particular study. The first was the point made by Fontana and Frey (1998) on status difference. The researcher is from an older generation than the participants and also a teacher (although not of any of the participants). This could cause the sample to feel less at ease if one-on-one faced with the researcher. Conducting a group interview can overcome this problem because the focus is on interaction between the participants and the participants form a majority in relation to the researcher. The second reason was the possibility to generate data in the language of the participants; a point made by Kitzinger (1995) and Wilkinson (2004). This was important because participants’ own words showed how meaningful (or not) the findings from the questionnaires, regarding thinking style and driving style, were in the everyday lives of young drivers.

This study uses the term group interviews but the format used was a combination of open ended group interviews and a focus group. The term focus group is generally used to describe any kind of group interview, although researchers conduct group interviews that vary greatly in nature and type (Fontana and Frey 1998) under this umbrella term. The fundamental question is if there

should be a distinction between focus groups and other types of group interviews (Morgan 1996) but there is still no definite answer to this question in the literature. According to Morgan (1996), most researchers seem to embrace the inclusive approach that uses the term focus group for most forms of group interview. Wilkinson (2004) states that many of these focus groups are more like open ended group interviews and the collected data are analysed as if extracted from multiple individual interviews. The present study has used open ended group interviews (one hour), segueing into a more focused interview (half hour). However, all data generated by the group interviews (both open and focused) were analysed with the theoretical approach of focus groups. The most important feature of a focus group is the interaction which takes place between participants and this should be taken into account during the analysis of the generated data (Smithson 2000). Interactions between participants are equally (or more) important than interactions between the researcher and participants.

Four group interviews were conducted because topic saturation usually occurs after four sessions with different groups on the same topic (Krueger 1994); which indeed happened in the present study. There were several goals for the group interviews. One goal was to establish areas of contention on the constructs of thinking and driving style in order to put the questionnaire data into a broader perspective. This was done in an open question format during the first hour of the group interviews. Another goal was an exploration of the meaning of the questionnaire outcomes for young drivers which was done in a more focused way during the last half hour of the group interviews. The discussion guide reflected the results from the questionnaires.

3.3 SAMPLING

This study focused on young drivers aged between 18-25 years old, in the Australian Capital Territory (ACT), holding a current drivers licence. The NRMA-ACT Road Safety Trust scholarship that funded this research required that the research was conducted within the boundaries of the ACT. However, while the study was conducted within the ACT many participants have come from other parts of Australia to study in the country's capital. Therefore, it could be said that the study was conducted with Australian young drivers in the ACT.

Convenience sampling was used to recruit participants for the quantitative part of the study (questionnaire package). Convenience sampling is based merely on relatively easy access to the

proposed participants of the study. Although some researchers label this strategy as the least desirable way of selecting cases to study (Patton 2002), others think it is better to do a study with a convenience sample than not at all (Gall, Gall and Borg 2007). Ninety-five percent of the studies in the social sciences uses non-probability sampling methods (Ludbrook and Dudley 1998), such as convenience sampling, although it is more difficult to make valid inferences from the results than if purposeful random sampling is used (Gall et al. 2007). This process of inference is assisted if the researcher provides a careful description of the participants because a fuller description of the convenience sample allows identifying a population to which the results are likely to be generalisable (Gall et al. 2007). This study's participants are described in section 3.4.

After the University of Canberra Committee for Ethics in Human Research and the Canberra Institute of Technology Research Ethics Committee approved this study (see Appendix A), participants were recruited from both the University of Canberra (UC) and the Canberra Institute of Technology (CIT). Participant information sheets and consent forms are attached as Appendix B.

As different fields of study have been linked to the use of different thinking styles (Sternberg and Zhang 2005), this study aimed to recruit participants from a variety of courses. The UC students were from a range of academic disciplines and the CIT students were recruited from trades' courses (such as electricians, car mechanics, beauticians, and chefs). The percentage of youth attending tertiary education in the ACT is almost 2/3 of the total population in that age bracket, which is the highest percentage in Australia (Australian Bureau of Statistics 2004). This makes it not unreasonable to recruit participants in the ACT among students at either university or Technical and Further Education (TAFE) level.

Students were randomly approached on the UC campus by the researcher during class and lunch breaks and asked to complete the questionnaire. Only students unfamiliar to the researcher were approached in order to avoid any unethical pressure on potential participants due to uneven power relations. A payment of A\$5 was offered to compensate participants for the fifteen to twenty minutes it took to complete the questionnaire. Some students accepted the A\$5, others participated without receiving any compensation. UC students completed 244 questionnaires in total.

At CIT participants could only be recruited during their lunch break since the TAFE system requires students to work as if they were in a job. The researcher approached CIT students at

random during lunch breaks at the Fyshwick and Reid campuses that provided access to students from different courses. All participants received the A\$5 compensation in return for completing the questionnaire, which took most of them over half an hour to complete. CIT students completed 65 questionnaires in total.

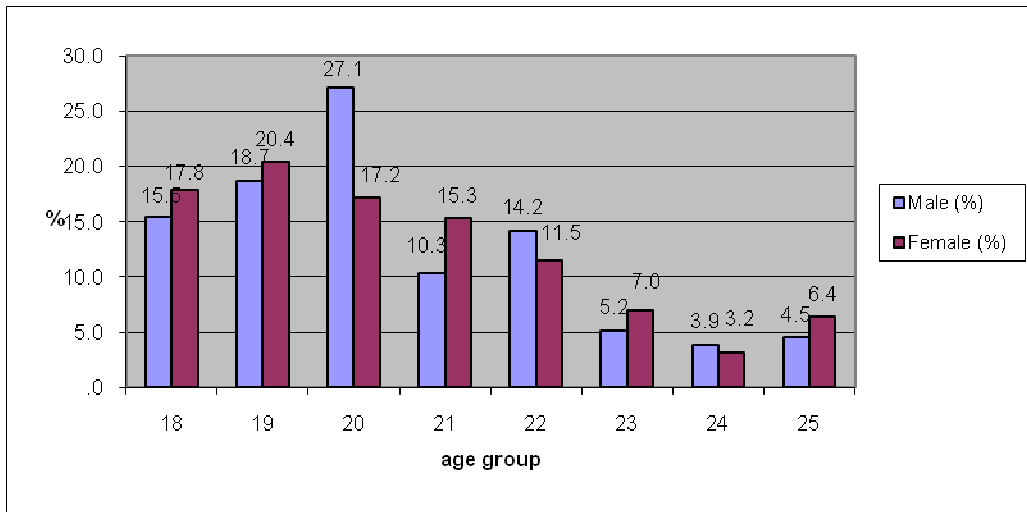
Participants for the qualitative group interviews were recruited through both convenience and nested sampling on the UC campus (see Appendix C for information and consent forms). They received A\$20 as compensation for their time (1.5 hours). Although originally planned, it turned out to be impossible to get group interview participants from CIT within the time and budget constraints of the present study. No limitations were set regarding the cultural background of the participants, nor of field of study. Four group interviews were conducted, in which topic saturation occurred. More than one group interview session is desirable to get more certainty if the data reflect something of a particular group or, indeed, of the segment (Morgan 1996); in other words to make sure the data reflect more than “the idiosyncrasies of a particular group” (Hughes and DuMont 1993: 778).

All four groups consisted of both males and females, with a total of nineteen participants. There is some discussion in the field on the (dis)advantages of homogenous versus heterogeneous groups. Homogenous groups will enable capitalisation of people’s shared experiences, while diverse groups will maximise exploration of different perspectives within a group setting (Kitzinger 1995). This study has opted for diverse groups in the hope of getting a few different perspectives. The group interviews aimed at discussion of participants’ own experiences since this generates better quality data than does a discussion of general opinions (Horner 2000). The researcher acted as moderator, encouraging the group members to talk to each other not to the researcher (Kitzinger 1995). The moderator forms a link between the goals of the study and the quality of the generated data (Hughes and DuMont 1993). All group interviews were audio recorded and an observer was present to note any additional information, such as body language of participants or the researcher, which helped with the interpretation of the data. The group interviews did not exceed the 1.5 hour time limit. All names have been changed in this thesis to ensure anonymity for participants. Participant information sheets and consent forms are presented in Appendix C.

3.4 PARTICIPANTS

This section describes the characteristics of the participants for both the quantitative and the qualitative part of this study. In total, 314 participants completed the questionnaire package: 155 males, 157 females (two did not indicate their sex). Their ages ranged from 18-25 years, with 84.9% between 18-22 years. The mean age was 20.46 years (median 20 years). Figure 3-1 compares male and female participants by age group.

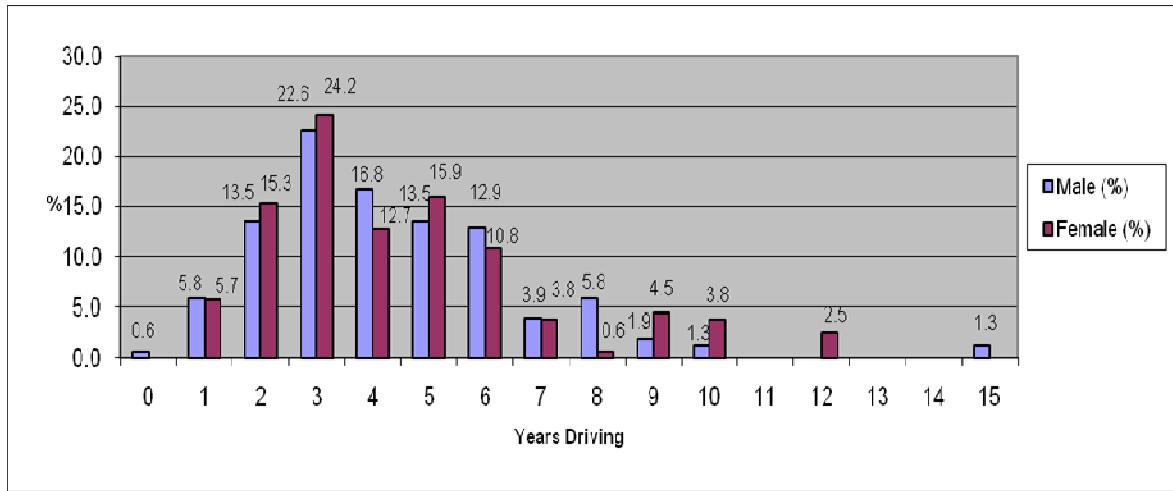
FIGURE 3-1: COMPARISON MALES-FEMALES BY AGE



312 participants had a current Australian drivers licence, 2 participants had their licences suspended. 17 participants were on a learner's permit (L-plates), 161 on a provisional licence (P-plates), and 134 had a full licence. A higher percentage of females held a full drivers licence (40.6% of the males and 45.2% of the females).

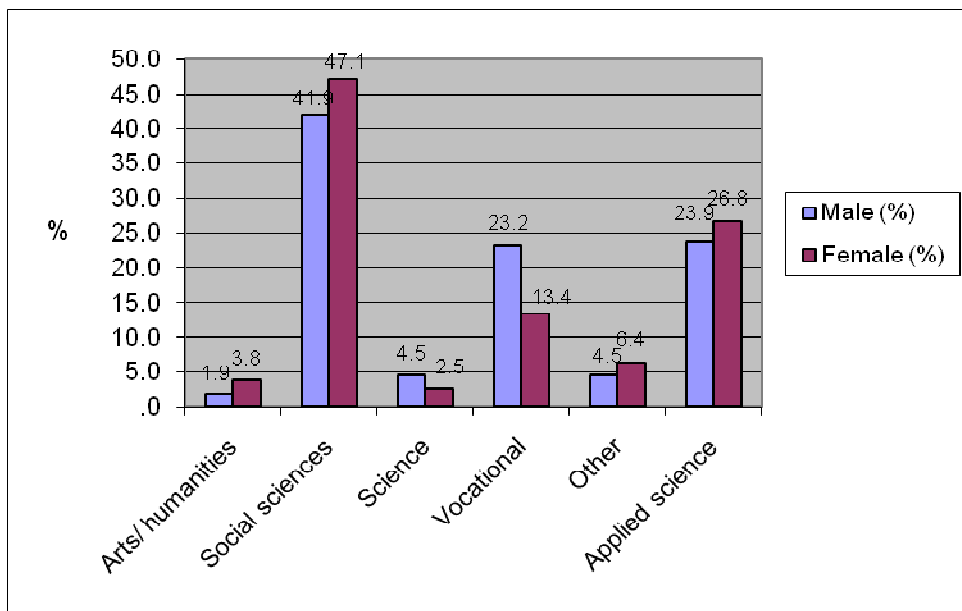
The mean number of years of licensed driving was 3.2 years (median three years). In Australia pre-licensed driving is quite common, especially in rural areas where teenagers often learn driving on their own property (so off road). This explains why the mean for total years of driving (pre-licensed and licensed) was 4.4 years (with a median of four years). Figure 3-2 shows driving years for males and females separately.

FIGURE 3-2: DRIVING EXPERIENCE IN YEARS



79.3% of participants spent between 0 and 10 hours driving per week and 84.7% between 0 and 10 hours on the weekends. 92.1% of participants drove 0-500 kilometres per week and 93.5% drove 0-200 kilometres on the weekend. There was a slight sex difference in weekly driving: 75.2% of the males drove 0-10 hours a week against 83.1% of the females.

FIGURE 3-3: PARTICIPANTS ACCORDING TO FIELD OF STUDY



44.3% of participants were students in social sciences, 25.5% in applied science, 18.2% were pursuing vocational courses, 3.5% were science students, 2.9% were in arts/humanities, 4.1% were

in other fields of study and 1.6% did not indicate their field of study. Figure 3-3 shows how males and females were divided according to field of study.

Nineteen students participated in the four group interviews, with eleven females. Participants were between 18 and 24 years of age. Two participants held a learner's permit, five participants a provisional licence, and twelve participants held a full drivers licence. Eight participants were studying architecture, one arts, three communication, two education, two business administration, one industrial design, one hospitality, and one international studies.

3.5 ANALYSIS OF DATA

This study consisted of two sequential stages. Results from the first stage (questionnaires) have informed part of the discussion guide for the second stage of group interviews.

All demographic data and data from the questionnaires have been entered into SPSS (version 17). Missing values in the raw questionnaire data were replaced with the mean scores for these questions which lead to 314 valid sets of data. Original instructions were followed for the scoring of the thirteen thinking styles from the TSI-R: legislative, executive, judicial, hierarchic, monarchic, oligarchic, anarchic, global, local, internal, external, liberal and conservative. For the MDSI the reverse-worded items were reverse-scored and further original instructions were followed for the scoring of the eight driving styles: risky, angry, high-velocity, patient, careful, anxious, distress reduction and dissociative. The full questionnaire package is attached as Appendix D.

After establishing the internal coherence and validity of both instruments (as reported in section 3.2.1) the questionnaire data were analysed using the following calculations:

- Interscale Pearson correlations for both the TSI-R and the MDSI
- Interscale Pearson correlations for both the TSI-R and the MDSI for males and females separately
- One-way ANOVAs for TSI-R thinking styles and the factors sex, age, licence held, years of driving, weekly driving, field of study
- One-way ANOVAs for MDSI driving styles and the factors sex, age, licence held, years of driving, weekly driving, field of study

- One-way ANOVAs for MDSI driving style domains and the factors sex, age, licence held, years of driving, weekly driving, field of study
- Zero-order correlations between TSI-R thinking styles and MDSI driving styles
- Zero-order correlations between TSI-R thinking styles and MDSI driving style domains
- Partial correlations (controlling for sex and age) between TSI-R thinking styles and MDSI driving styles
- Partial correlations (controlling for sex and age) between TSI-R thinking styles and MDSI driving style domains
- Stepwise multiple regressions to examine the predictive value of the TSI-R thinking styles in relation to the MDSI driving styles
- Stepwise multiple regressions to examine the predictive value of the TSI-R thinking styles in relation to the MDSI driving style domains

The findings from the data analysis informed the answers to several sub research questions: *What are young drivers thinking styles? Are there any sex differences in their thinking styles? What are young drivers driving styles? Are there any sex differences in safe driving? Is it useful to develop separate models of driving for males and females? Is there a relationship between young drivers' thinking and driving styles? Can thinking styles predict driving styles?*

The group interviews loosely followed a group interview discussion guide (see Appendix E); it allowed for the participants to have their own input, both in topic of discussion as in the emphasis on certain questions over others. Only the researcher was aware of the pre-conceived questions, while participants were only aware of the questions that were actually asked during the group interview. The last half hour of the group interviews had a more focused approach aimed at an exploration of the meaning the concepts and the findings from the questionnaires had for young drivers. Participants got a brief explanation of the thinking and driving styles as used in this study and were asked to discuss the following questions:

- Do you identify with any or more of these driving styles?
- Do you identify with any or more of these thinking styles?
- Could you for yourself link any of the thinking styles to any of the driving styles?

The findings from the group interview data informed answers to the following sub research questions: *Can driving styles and thinking styles both be intellectual styles? Is a driving style a preferred way or a habitual way of driving? How can road safety be defined in a positive way?* The group interview data also provided insight into the experience of participants with learning to drive.

All group interviews were transcribed and loaded into NVIVO8. The constructs of the quantitative study (the TSI-R thinking styles and MDSI driving styles) were used as tree nodes in the first coding round of the data. In a second round, the transcribed interviews were also coded according to topics or concepts that were introduced by the group interview participants (free nodes). Because a constructionist epistemology informs this study, the analysis of the data was aimed at preserving the interactive quality of the data through coding parts of discussions rather than individual answers. Other researchers make the analysis easier for themselves by analysing the generated data as if extracted from multiple individual interviews (Wilkinson 2004). However, data generated during a group dialogue are different from data collected during individual interviews because data from participants in a group interview are not independent (Hughes and DuMont 1993); they respond to and build on what other group members have said (Ehigie and Ehigie 2005).

The analysis of group interview data presents unique challenges due to the tension between group and individual data (Morgan 1995). According to Wilkinson (2004), the literature on group interviews pays more attention to how to conduct group interviews than on methods to analyse the generated data. Some researchers propose to use quantitative techniques within the qualitative group interviews, such as closed questions and experiment-like activities, because it makes the data easier to analyse (Grim, Harmon and Gromis 2006). In other words, they use numbers to ‘prove’ the validity of the qualitative data. Analysing the group interview data in this way would be contradictory to the original purpose and the epistemological underpinning of this study. Even if no quantitative techniques are used within the group interviews, a majority of studies use content analysis to make sense of the data, reporting representative instances of some kind (Wilkinson 2004). In doing so, the interactive quality of the data is often not preserved, according to Wilkinson.

The researcher used her background in sociolinguistics to transcribe the data beyond the level of pure text. Spoken language is different from written language in the sense that speakers reveal information through, for instance, linguistic markers (e.g. laughter, using ‘I think’, repeating

words, downtoners). These markers have been transcribed to preserve the richness of the data, and they have contributed to their interpretation.

3.6 LIMITATIONS

This study has some limitations. Firstly, participants were recruited from young drivers pursuing tertiary education. It is unclear in how far the results are generalisable to young drivers not studying. However, students represent a large group of young drivers in the ACT and in that sense they are a meaningful group in themselves to assess in relation to new directions of research, such as the present study, that also could be of value in other young driver populations. In addition, a substantial part of the quantitative findings support previous research on young drivers conducted in several different countries (including Australia). This suggests that the participants of this study are at least not *un*representative of the larger population of young drivers.

Secondly, although participants were recruited from several disciplines, participation was voluntary and the procedure was not statistically random, which may have biased the results. It is judged by the researcher that an important criterion during recruitment (willingness of people to participate) does not correlate with any of the factors under examination in the present study. In addition, much of the published research in the field of thinking styles reports on convenience samples instead of statistically random samples (e.g. Zhang 2004d; Zhang 2005b). Previous research using the MDSI has not used a statistically random sample either (Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2005). This suggests that it is acceptable in both fields of research to report on findings from a non-probability sample and that the results of the present study can be compared to previous research.

Thirdly, the quantitative part of this study relied on self-report measures. Self-report is an appropriate way of examining thinking styles; thinking styles can be seen as an internal condition, which is often best reported by the participant (Deffenbacher et al. 2004). Although driving behaviour could be studied using observational measures, it would be very difficult to study one's habitual way of driving by observing one or a few trips (Lajunen and Summala 2003). Also, self-reports of driving behaviour have been deemed appropriate as a surrogate for actual driving (Hatakka et al. 1997; Ulleberg and Rundmo 2002).

Fourthly, data were collected through group interview sessions. When looking at interviews from a more traditional stance, reliability might be seen as the degree to which the interview questions would lead to the same answers, independent of when and where the interview takes place, and validity as the extent to which the interview answers would be accurate (Kirk and Miller 1986). However, from a constructionist point of view it is not expected that interview questions would ‘always’ yield the same answers since every interview represents different circumstances and the validity of the answers comes from “their ability to convey situated experiential realities in terms that are locally comprehensible” (Holstein and Gubrium 2004: 145). Nevertheless, some of the information generated through the group interviews supports previous qualitative road safety research making it not unlikely that the participants in this study are representative for a larger population of young drivers.

3.7 SUMMARY

It was argued in this chapter that the research questions should dictate the research methods and that a mixed methods research design is needed to find a meaningful answer to this study’s questions. Since no fundamental conflict was found between the basic attributes of positivist and constructionist research, this study combined both confirmatory (positivist element) and exploratory (constructionist element) knowledge.

This chapter presented the methods used to generate data (self-report measures and group interviews) and the methods of data analysis. Reliability and validity of the questionnaires for the current sample of Australian young drivers were asserted. The young drivers that participated in the quantitative or qualitative part of the study were described. Finally, the limitations of this research were discussed. The next chapter presents the data that were collected with the questionnaire package that consists of the Thinking Style Inventory-Revised and the Multi-dimensional Driving Style Inventory.

4 QUANTITATIVE RESULTS

Chapter 3 described the methods used in this study and the reasons for choosing self-report measures. This chapter presents the results from the data that have been collected with these questionnaires: the Thinking Style Inventory-Revised (TSI-R, Sternberg et al. 2003) and the Multidimensional Driving Style Inventory (MDSI, Taubman - Ben-Ari et al. 2004). The quantitative analysis was the first step in answering the sub-research questions of this study: *What are young drivers thinking styles? Are there any sex differences in their thinking styles? What are young drivers driving styles? Are there any sex differences in safe driving? Is it useful to develop separate models of driving for males and females? Is there a relationship between young drivers' thinking and driving styles? Can thinking styles predict driving styles?*

The first section of this chapter presents the results of one-way ANOVAs and calculations of Pearson correlations, establishing young drivers' thinking styles and any sex differences in relation to their thinking styles. The second section introduces the results of one-way ANOVAs and calculations of Pearson correlations, establishing young drivers' driving styles and any sex differences in those driving styles. The third section explores any relationships that were found between thinking and driving styles, based on both zero-order correlations (comparing male and female scores) and partial correlations (while controlling for the variables sex and age). The last section presents the results of stepwise multiple regressions showing that some thinking styles can predict driving styles in the present sample of young drivers. For all calculations, level of significance was set at .05, and the exact p-value is displayed in all tables.

4.1 THINKING STYLES

The theory of MSG suggests that people use clusters of thinking styles rather than just one thinking style (Sternberg 1997). Therefore interscale Pearson correlations were calculated for the thirteen thinking styles, determining which styles were correlated for the present sample of young drivers. The MSG predicts correlations between certain thinking styles. As discussed in section 2.1.3 (and shown in Table 3-1) most of the thinking styles in this theoretical set can be sorted into two groups (Zhang 2001a; Zhang and Huang 2001; Zhang and Sternberg 2000). Thinking styles that require higher levels of cognitive complexity are labelled Type I thinking styles. Type II thinking styles refer to a favouring of norms and denote lower levels of cognitive complexity. Type III thinking styles can display characteristics of both Type I and Type II styles depending on the stylistic

requirements of the task at hand (Zhang 2003). Thinking styles of Type I and II are more likely to show correlations to other thinking styles in the same group than to thinking styles from another group, while the Type III thinking styles are expected to have correlations with either, or both, Type I and Type II thinking styles. Table 4-1 shows the zero-order correlations that were computed for the thirteen thinking styles.

TABLE 4-1: INTERSCALE PEARSON CORRELATIONS TSI-R THINKING STYLES

N=314			1	2	3	4	5	6	7	8	9	10	11	12	
1	Legislative	Pearson													
		Sig.													
2	Executive	Pearson	-.007												
		Sig.	.895												
3	Judicial	Pearson	.346	.355											
		Sig.	.000	.000											
4	Hierarchic	Pearson	.319	.431	.427										
		Sig.	.000	.000	.000										
5	Monarchic	Pearson	.064	.523	.333	.276									
		Sig.	.260	.000	.000	.000									
6	Oligarchic	Pearson	.045	.478	.315	.299	.405								
		Sig.	.423	.000	.000	.000	.000								
7	Anarchic	Pearson	.358	.092	.384	.262	-.104	.229							
		Sig.	.000	.102	.000	.000	.066	.000							
8	Global	Pearson	.290	.140	.282	.189	.261	.231	.251						
		Sig.	.000	.013	.000	.001	.000	.000	.000						
9	Local	Pearson	.277	.411	.518	.341	.348	.311	.388	.030					
		Sig.	.000	.000	.000	.000	.000	.000	.000	.593					
10	Internal	Pearson	.443	.158	.177	.336	.199	.084	.192	.136	.308				
		Sig.	.000	.005	.002	.000	.000	.139	.001	.016	.000				
11	External	Pearson	.245	.232	.436	.325	.235	.392	.363	.261	.284	-.215			
		Sig.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000			
12	Liberal	Pearson	.486	-.039	.452	.241	.144	.099	.416	.265	.306	.238	.321		
		Sig.	.000	.489	.000	.000	.010	.080	.000	.000	.000	.000	.000		

Most correlations found were in the direction predicted by the MSG. Examples within the Type I thinking styles were legislative versus liberal ($r = .49$), judicial versus hierarchic ($r = .43$) and judicial versus liberal ($r = .45$). For the Type II thinking styles, examples were executive versus conservative ($r = .77$) and monarchic versus conservative ($r = .48$). As expected, Type III thinking styles showed correlations with thinking styles from Type I as well as Type II, for example oligarchic versus executive ($r = .53$) and external versus judicial ($r = .44$). However, some correlations were in an unexpected directions, for example judicial versus local ($r = .52$) and

hierarchic versus conservative ($r = .35$). Table 4-2 shows the sex differences in the interscale correlations of the thirteen thinking styles.

TABLE 4-2: SEX DIFFERENCES INTERSCALE PEARSON CORRELATIONS 13 THINKING STYLES

Males / Females			1	2	3	4	5	6	7	8	9	10	11	12	13	
1	Legislative	Pearson		-.002	.375	.460	.088	.041	-.460	.254	.287	.351	.338	.521	-.035	
		Sig.		.983	.000	.000	.272	.609	.000	.001	.000	.000	.000	.000	.000	.667
		N		157	157	157	157	157	157	157	157	157	157	157	157	157
2	Executive	Pearson	-.002		.396	.369	.549	.532	.050	.148	.458	.209	.156	-.081	.803	
		Sig.	.981		.000	.000	.000	.000	.538	.065	.000	.009	.051	.312	.000	
		N	155		157	157	157	157	157	157	157	157	157	157	157	
3	Judicial	Pearson	.315	.307		.465	.412	.337	.344	.304	.538	.110	.437	.448	.312	
		Sig.	.000	.000		.000	.000	.000	.000	.000	.000	.170	.000	.000	.000	
		N	155	155		157	157	157	157	157	157	157	157	157	157	
4	Hierarchic	Pearson	.226	.479	.401		.243	.331	.226	.129	.435	.377	.309	.174	.292	
		Sig.	.005	.000	.000		.002	.000	.004	.108	.000	.000	.000	.030	.000	
		N	155	155	155		157	157	157	157	157	157	157	157	157	
5	Monarchic	Pearson	.044	.500	.228	.318		.431	-.139	.327	.354	.163	.324	.116	.549	
		Sig.	.585	.000	.004	.000		.000	.083	.000	.000	.041	.000	.149	.000	
		N	155	155	155	155		157	157	157	157	157	157	157	157	
6	Oligarchic	Pearson	.056	.428	.292	.273	.360		.166	.194	.369	.121	.341	.008	.508	
		Sig.	.487	.000	.000	.001	.000		.038	.015	.000	.131	.000	.916	.000	
		N	155	155	155	155	155		157	157	157	157	157	157	157	
7	Anarchic	Pearson	.247	.143	.433	.324	-.053	.314		.166	.444	.156	.316	.503	.110	
		Sig.	.002	.075	.000	.000	.510	.000		.037	.000	.051	.000	.000	.168	
		N	155	155	155	155	155	155		157	157	157	157	157	157	
8	Global	Pearson	.312	.157	.252	.313	.175	.275	.348		.007	.063	.296	.272	.126	
		Sig.	.000	.051	.002	.000	.029	.001	.000		.933	.433	.000	.001	.117	
		N	155	155	155	155	155	155	155		157	157	157	157	157	
9	Local	Pearson	.254	.361	.493	.246	.338	.242	.323	.045		.260	.362	.280	.412	
		Sig.	.001	.000	.000	.002	.000	.002	.000	.581		.001	.000	.000	.000	
		N	155	155	155	155	155	155	155	155		157	157	157	157	
10	Internal	Pearson	.521	.114	.252	.325	.254	.051	.221	.209	.356		-.300	.180	.208	
		Sig.	.000	.160	.002	.000	.001	.527	.006	.009	.000		.000	.024	.009	
		N	155	155	155	155	155	155	155	155	155		157	157	157	
11	External	Pearson	.161	.305	.436	.325	.116	.460	.422	.238	.191	-.125		.328	.177	
		Sig.	.046	.000	.000	.000	.152	.000	.000	.003	.017	.122		.000	.026	
		N	155	155	155	155	155	155	155	155	155	155		157	157	
12	Liberal	Pearson	.457	.008	.458	.327	.174	.198	.324	.253	.331	.298	.314		-.117	
		Sig.	.000	.925	.000	.000	.030	.014	.000	.001	.000	.000	.000		.146	
		N	155	155	155	155	155	155	155	155	155	155	155		157	
13	Conservative	Pearson	-.019	.730	.261	.396	.390	.473	.200	.252	.235	.172	.235	-.048		
		Sig.	.811	.000	.001	.000	.000	.000	.013	.002	.003	.033	.003	.550		
		N	155	155	155	155	155	155	155	155	155	155	155	155		

The interscale Pearson correlations showed slightly different associations for males and females separately. For instance, within the Type I thinking styles the correlation legislative versus hierarchic is much stronger for females ($r = .46$) than for males ($r = .23$) ($p < .01$ for both correlations) while hierarchic versus global is significant for males ($r = .31$) ($p < .01$), but not for females ($r = .13$) ($p = .11$). For the Type II thinking styles conservative versus local has a stronger

correlation for females ($r = .41$) than for males ($r = .24$) and conservative versus local is also stronger for females ($r = .55$) than for males ($r = .39$) ($p < .01$ for all correlations).

There are also differences in correlations between Type I and Type II thinking styles. For instance, the correlation between executive and hierarchic thinking is stronger for males ($r = .48$) than for females ($r = .37$), as is the correlation between conservative and hierarchic thinking: $r = .40$ for males and $r = .29$ for females ($p < .01$ for all correlations).

4.1.1 THINKING STYLES AND PERSONAL CHARACTERISTICS

Previous studies had mixed results in regards to the effects of certain personal characteristics on thinking styles such as ‘sex’, ‘age’, and ‘field of study’ (Sternberg and Grigorenko 1995; Tang 2003; Zhang 1999; 2001b; c; Zhang and Postiglione 2001). One-way ANOVAs were conducted to identify possible differences in thinking styles for the present sample, based on the factors ‘sex’, ‘age’, ‘field of study’, ‘type of drivers licence’, ‘years of driving’, and ‘exposure’ (hours/week).

SEX

There was significant evidence of sex differences for both the legislative and hierarchic thinking styles. Males were more likely to use legislative thinking, while females scored higher on the hierarchic thinking style. Table 4-3 shows the significance for both thinking styles, and Table 4-4 displays the means.

TABLE 4-3: SEX DIFFERENCES IN LEGISLATIVE AND HIERARCHIC THINKING

		Sum of Squares	df	Mean Square	F	Sig.
Legislative	Between Groups	4.527	1	4.527	5.191	.023
	Within Groups	270.325	310	.872		
	Total	274.851	311			
Hierarchic	Between Groups	8.614	1	8.614	9.736	.002
	Within Groups	274.264	310	.885		
	Total	282.878	311			

TABLE 4-4: MEANS ACCORDING TO SEX

		N	Mean	Std. Deviation	Std. Error
Legislative	Male	155	4.90	0.95	0.08
	Female	157	4.65	0.91	0.07
	Total	312	4.77	0.94	0.05
Hierarchic	Male	155	4.57	0.91	0.07
	Female	157	4.90	0.97	0.08
	Total	312	4.74	0.95	0.05

AGE

Previous research found significant evidence for differences in participants' thinking styles by 'age' (Tang 2003; Zhang 1999; 2001b) but this is not supported by any results from this study. One-way ANOVAs did not find any significant effect for age-related differences in the thinking styles of the present sample, nor did the calculation of Pearson correlations result in any significant relationships between age and thinking style.

FIELD OF STUDY

As shown in Table 4-5, one-way ANOVAs only yielded a significant effect for the hierarchic thinking style in relation to field of study: $F(6, 307) = 2.36$ ($p = .03$). Applied science student scored highest on hierarchic thinking ($M = 4.92$, $SD = .86$) and science students lowest ($M = 4.02$, $SD = .83$) (see Table 4-6). Pearson correlations did not find any significant relationships between field of study and the MSG thinking styles.

TABLE 4-5: FIELD OF STUDY IN RELATION TO HIERARCHIC THINKING

		Sum of Squares	df	Mean Square	F	Sig.
Hierarchic	Between Groups	12.526	6	2.088	2.353	.031
	Within Groups	272.353	307	.887		
	Total	284.879	313			

TABLE 4-6: MEANS HIERARCHIC THINKING STYLE AND FIELD OF STUDY

	Study	N	Mean	Std. Deviation	Std. Error
Hierarchic	Arts/humanities	9	4.79	0.90	0.30
	Social sciences	139	4.78	1.00	0.09
	Science	11	4.02	0.83	0.25
	Vocational	57	4.53	0.98	0.13
	Other	13	4.45	0.70	0.20
	Applied science	80	4.92	0.86	0.10
	Missing	5	5.00	0.68	0.30
	Total	314	4.74	0.95	0.05

TYPE OF DRIVERS LICENCE

Table 4-7 displays the only significant result of a series of one-way ANOVAs for thinking styles based on the factor 'type of drivers licence'. The means for hierarchic thinking are shown in Table 4-8.

TABLE 4-7: RELATIONSHIP BETWEEN DRIVERS LICENCE AND HIERARCHIC THINKING

	Sum of Squares	df	Mean Square	F	Sig.
Between	10.355	2	5.177	5.831	.003
Within	274.372	309	.888		
Total	284.727	311			

TABLE 4-8: MEANS FOR HIERARCHIC THINKING IN RELATION TO DRIVERS LICENCE

		N	Mean	Std. Deviation	Std. Error
Hierarchic	Learners	18	4.01	1.021	.241
	Provisional	160	4.75	.927	.073
	Full	134	4.81	.950	.082
	Total	312	4.73	.957	.054

Participants on a learner’s permit scored lowest on the hierarchic thinking style and young drivers holding a full licence scored highest on this style. When examining the sexes separately, the effect only remained for males ($F(2, 151) = 4.75, p = .01$), showing the same trend; young male drivers on a learners permit were least likely to use hierarchic thinking and young male drivers holding a full licence most likely. Table 4-9 shows the means for hierarchic thinking for males based on the licence they held.

TABLE 4-9: MEANS FOR HIERARCHIC THINKING AND TYPE OF DRIVERS LICENCE FOR MALES

		N	Mean	Std. Deviation	Std. Error
Hierarchic	Learners	10	3.85	.903	.286
	Provisional	81	4.52	.919	.102
	Full	63	4.75	.854	.108
	Total	154	4.57	.914	.074

Table 4-10 shows the results of Pearson’s correlation computed for the thirteen thinking styles in relation to type of drivers licence. They indicated a statistically significant linear relationship between drivers licence type and the hierarchic thinking style. However, when calculating Pearson’s correlation coefficient separately for males and females, this relationship was only found for males ($r(154) = 0.23, p = .005$).

TABLE 4-10: PEARSON CORRELATIONS FOR LICENCE TYPE - 13 THINKING STYLES

N = 312 (males/females)		Leg	Exe	Jud	Hie	Mon	Oli	Ana	Glo	Loc	Int	Ext	Lib	Con
Licence type	Pearson	.002	.066	.005	.131	-.009	.044	.054	.051	.009	-.024	.048	.027	.023
	Sig.	.974	.245	.937	.021	.874	.440	.339	.365	.879	.676	.394	.639	.680
N = 154 (males)		Leg	Exe	Jud	Hie	Mon	Oli	Ana	Glo	Loc	Int	Ext	Lib	Con
Licence type	Pearson	.078	.140	.126	.225	.101	.079	.117	.146	.054	.062	.065	.090	.136
	Sig.	.339	.083	.119	.005	.213	.329	.148	.071	.509	.444	.427	.267	.093

4.1.2 THINKING STYLES AND SELF-REPORTED DRIVING BEHAVIOUR

This study proposes that thinking style and driving style are cognate constructs. Therefore the correlations between thinking style and certain self-reported driving behaviours were tested, with the aim of uncovering any similarities between the two concepts of thinking and driving style. One-way ANOVAs were conducted to examine significant differences in thinking styles in relation to self-reported driving behaviours: years driving (pre-licensed and licensed), and exposure (hours/week). Pearson correlations were computed for all factors in relation to all thinking styles. Sex differences were examined for all results.

YEARS OF DRIVING

The factor type of drivers licence cannot be considered as a straightforward equivalent to driving experience because it does not specify the amount of time a participant has taken to obtain the licence. Because experience (or inexperience) is a factor that is deemed important in the field of traffic safety (see for instance Åberg and Rimmö 1998; Christie 2001), the factor 'years of driving' has also been examined in this study. Years of driving refers to both pre-licensed and licensed driving. Table 4-11 displays the results for driving years in relation to legislative thinking.

TABLE 4-11: RELATIONSHIP BETWEEN LEGISLATIVE THINKING AND DRIVING YEARS

		Sum of Squares	df	Mean Square	F	Sig.
Legislative	Between Groups	30.226	12	2.519	3.073	.000
	Within Groups	246.693	301	.820		
	Total	276.919	313			

TABLE 4-12: MEANS FOR THE FACTOR YEARS OF DRIVING AND LEGISLATIVE THINKING

	Driving years	N	Mean	Std. Deviation	Std. Error
Legislative	<1	1	1.20	.	.
	1	18	4.54	0.81	0.19
	2	45	4.63	0.90	0.13
	3	74	4.66	0.95	0.11
	4	47	4.98	1.06	0.15
	5	46	4.76	0.78	0.11
	6	37	5.10	0.76	0.12
	7	12	4.98	0.94	0.27
	8	10	4.68	0.77	0.24
	9	10	5.40	1.13	0.36
	10	8	4.13	0.76	0.27
	12	4	4.35	1.15	0.57
	15	2	4.50	0.71	0.50
	Total	314	4.77	0.94	0.05

One-way ANOVAs found a significant effect for the number of years participants were driving and the legislative thinking style ($F(12, 301) = 3.07, p = .000$). Between zero and six years of driving, participants scored cumulatively higher on legislative thinking. After seven or more years of driving the trend is not as clear but there were substantially fewer participants within those categories, therefore these results should be interpreted with caution. Again, when splitting the sample into males and females, significant effects were only yielded for young male drivers. The strongest effect was still for legislative thinking ($F(11, 143) = 3.74, p = .000$) but significant evidence was also found for differences in the judicial ($F(11, 143) = 1.91, p = .042$), monarchic ($F(11, 143) = 1.97, p = .036$) and internal thinking styles ($F(11, 143) = 2.01, p = .032$). There was no clear trend for judicial, monarchic, and internal thinking in relation to ‘years of driving’. An analysis using Pearson’s correlation coefficient for the factor ‘years of driving’ in relation to thinking styles did not find any significant linear relationships.

EXPOSURE

Table 4-13 shows the results of one-way ANOVAs ran for the factor ‘exposure’ (hours driven per week) in relation to the thirteen thinking styles. A significant effect was found for both the hierarchic thinking style ($F(2, 292) = 5.734, p = .004$) and the internal thinking style ($F(2, 292) =$

3.31, $p = .038$). Participants driving between six and ten hours per week were most likely to use hierarchic thinking and internal thinking, while participants who drove fewer (0-5) or more hours (>10) per week scored lower on both styles.

TABLE 4-13: CORRELATIONS BETWEEN EXPOSURE (HOURS/WEEK) AND THINKING STYLES

		Sum of Squares	df	Mean Square	F	Sig.
Hierarchic	Between Groups	10.142	2	5.071	5.734	.004
	Within Groups	258.236	292	.884		
	Total	268.377	294			
Internal	Between Groups	6.123	2	3.062	3.313	.038
	Within Groups	269.884	292	.924		
	Total	276.007	294			

TABLE 4-14: MEANS FOR TWO THINKING STYLES IN RELATION TO EXPOSURE

	Exposure (hrs/wk)	N	Mean	Std. Deviation	Std. Error
Hierarchic	0-5	132	4.67	1.00	0.09
	6-10	103	4.99	0.86	0.09
	>10	60	4.51	0.94	0.12
	Total	295	4.75	0.96	0.06
Internal	0-5	132	4.46	0.91	0.08
	6-10	103	4.59	1.00	0.10
	>10	60	4.18	1.00	0.13
	Total	295	4.45	0.97	0.06

When examining the sexes separately, different significant effects were found. Young male drivers showed similar results to the combined sample, with significant differences in the use of hierarchic thinking ($F(2, 142) = 5.31, p = .006$) and internal thinking ($F(2, 142) = 4.15, p = .018$) in relation to the factor ‘weekly driving hours’. However, for young female drivers significant differences were found for ‘exposure’ in relation to anarchic thinking ($F(2, 145) = 4.56, p = .012$), local thinking ($F(2, 145) = 3.40, p = .036$), and conservative thinking ($F(2, 145) = 3.37, p = .037$). Both sexes showed the same trends; the highest scores for each thinking style were for the participants driving between six and ten hours per week. An evaluation was made of the linear

relationship between exposure and the thirteen thinking styles using Pearson’s correlation, but found no statistically significant correlations.

One-way ANOVAs showed significant effects for the factors sex, field of study, type of drivers licence, years of driving, and exposure on several thinking styles. Since thinking styles and driving styles are proposed to be similar constructs, the next section explores the effects of the same factors on both the driving styles and the driving style domains of the MDSI.

4.2 DRIVING STYLES

The eight MDSI driving styles have been clustered into four driving style domains (Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2004; 2005). The interscale Pearson correlations have been computed for all driving styles, whereby it was expected that associations would be found between driving styles within a domain. Table 4-15 shows these relationships.

TABLE 4-15: PEARSON INTERCORRELATIONS MDSI DRIVING STYLES

N=295			1	2	3	4	5	6	7
1	Risky	Pearson							
		Sig.							
2	Angry	Pearson	.529						
		Sig.	.000						
3	HighVelocity	Pearson	.617	.678					
		Sig.	.000	.000					
4	Patient	Pearson	-.460	-.399	-.447				
		Sig.	.000	.000	.000				
5	Careful	Pearson	-.613	-.365	-.473	.537			
		Sig.	.000	.000	.000	.000			
6	Anxious	Pearson	-.093	-.058	-.034	.035	-.090		
		Sig.	.099	.308	.548	.537	.113		
7	Distress Reduction	Pearson	.271	.138	.216	-.021	-.140	.102	
		Sig.	.000	.014	.000	.715	.013	.070	
8	Dissociative	Pearson	.443	.337	.396	-.217	-.494	.383	.316
		Sig.	.000	.000	.000	.000	.000	.000	.000

Significant evidence was found for positive associations between risky, angry, high-velocity, distress reduction and dissociative driving styles. Significant positive associations were also found between the patient and careful driving styles, and between the dissociative, anxious and distress reduction driving styles. Significant evidence for negative associations were found between the patient and careful driving styles versus risky, angry, high-velocity and dissociative driving styles. These findings support the findings of the original study by Taubman-Ben-Ari et al. (2004). The interscale intercorrelations were slightly different when examining males (n = 155) and females (n = 157) separately (see Table 4-16).

TABLE 4-16: PEARSON INTERCORRELATIONS MDSI DRIVING STYLES SPLIT FOR SEX

Males / Females			1	2	3	4	5	6	7	8
1	Risky	Pearson		.582	.610	-.332	-.548	-.056	.366	.565
		Sig.		.000	.000	.000	.000	.490	.000	.000
		N		157	157	157	157	157	157	157
2	Angry	Pearson	.451		.674	-.365	-.323	.014	.220	.412
		Sig.	.000		.000	.000	.000	.866	.006	.000
		N	155		157	157	157	157	157	157
3	HighVelocity	Pearson	.584	.661		-.374	-.451	-.073	.297	.444
		Sig.	.000	.000		.000	.000	.365	.000	.000
		N	155	155		157	157	157	157	157
4	Patient	Pearson	-.501	-.389	-.467		.459	-.022	.064	-.190
		Sig.	.000	.000	.000		.000	.783	.427	.017
		N	155	155	155		157	157	157	157
5	Careful	Pearson	-.624	-.357	-.447	.567		-.173	-.111	-.494
		Sig.	.000	.000	.000	.000		.030	.167	.000
		N	155	155	155	155		157	157	157
6	Anxious	Pearson	.018	-.041	.107	-.011	-.125		-.008	.300
		Sig.	.828	.616	.186	.893	.121		.923	.000
		N	155	155	155	155	155		157	157
7	Distress Reduction	Pearson	.131	.013	.080	-.052	-.125	.310		.218
		Sig.	.103	.877	.321	.518	.120	.000		.006
		N	155	155	155	155	155	155		157
8	Dissociative	Pearson	.363	.273	.345	-.221	-.492	.524	.411	
		Sig.	.000	.001	.000	.006	.000	.000	.000	
		N	155	155	155	155	155	155	155	

Intercorrelations between driving styles were different for males and females. For example, the negative correlation for risky versus patient driving was stronger for males ($r = -.50$) than for females ($r = -.33$), while the positive correlation for risky versus dissociative driving was stronger for

females ($r = .57$) than for males ($r = .36$). The present data also suggested stronger correlations for males compared to females for the dissociative versus the anxious driving style ($r = .52$ versus $r = .30$) and for the dissociative versus the distress reduction driving style ($r = .41$ versus $r = .22$). For the total sample, statistically significant correlations have been found for the distress reduction driving style versus all other driving styles except anxious driving. When the sample was split for sex, only anxious driving showed a significant correlation for males ($r = .31$, $p < 0.01$), while risky, angry and high-velocity driving styles showed significant correlations with the distress reduction driving style for females (respectively $r = .37$, $.22$ and $.30$, $p < 0.01$).

TABLE 4-17: PEARSON INTERCORRELATIONS MDSI DRIVING STYLE DOMAINS

N= 314		1	2	3
1	Reckless and Careless			
2	Angry	.676		
3	Patient and careful	-.632	-.434	
4	Anxious	.309	.203	-.279
All correlations are significant at the 0.001 level				

The interscale associations of the four broader driving style domains, as developed by Taubman-Ben-Ari et al. (2004), were in the same direction as the interscale correlations of the eight driving styles. The patient and careful driving style domain was negatively correlated to reckless and careless driving, to angry driving, and to anxious driving. The anxious driving style was positively correlated to reckless and careless, and angry driving. The angry and reckless and careless driving styles were positively correlated (see Table 4-17).

TABLE 4-18: PEARSON INTERSCALE CORRELATIONS MDSI DRIVING STYLE DOMAINS, SPLIT FOR SEX

Males / Females			1	2	3	4
1	Reckless and Careless	Pearson		.705	-.554	.411
		N		157	157	157
2	Angry	Pearson	.629		-.402	.325
		N	155		157	157
3	Patient and Careful	Pearson	-.646	-.419		-.308
		N	155	155		157
4	Anxious	Pearson	.277	.133	-.288	
		N	155	155	155	
All correlations are significant at the 0.001 level						

As Table 4-18 shows, the MDSI driving style domains' associations were also slightly different for males and females. The positive correlation between the reckless and careless driving style and the angry and anxious driving styles is stronger for females ($r = .71$ and $.41$) than for males ($r = .63$ and $.28$). For females there is a positive correlation between the anxious and angry driving styles ($r = .33$), but not for males.

TABLE 4-19: PEARSON INTERSCALE CORRELATIONS EMERGING DRIVING STYLE DOMAINS

N =314			1	2
1	Reckless	Pearson		
		Sig.		
2	Patient and Careful	Pearson	-.611	
		Sig.	.000	
3	Anxious	Pearson	.295	-.279
		Sig.	.000	.000

As discussed in Chapter 3, the present data support a solution of three driving style domains, rather than the four domains identified by Taubman - Ben-Ari et al. (2004): the reckless driving style (comprising the risky, angry and high-velocity driving styles), the anxious driving style (combining the anxious, dissociative and distress reduction driving styles) and the patient and careful driving style (consisting of the patient and careful driving styles). Interscale correlations showed a negative correlation between the patient and careful driving style, and the reckless and anxious driving styles. There was a positive correlation between the anxious driving style and the reckless driving style. When examining the interscale correlations for the emerging domains, the correlation between the anxious and reckless driving style domains were stronger for females than for males (see Table 4-20).

TABLE 4-20: PEARSON INTERSCALE CORRELATIONS FOR EMERGING DOMAINS, SPLIT FOR SEX

Males / Females			1	2	3
1	Reckless	Pearson		-.539	.410
		Sig.		.000	.000
		N		157	157
2	Patient and Careful	Pearson	-.622		-.308
		Sig.	.000		.000
		N	155		157
3	Anxious	Pearson	.249	-.288	
		Sig.	.002	.000	
		N	155	155	

4.2.1 DRIVING STYLES AND PERSONAL CHARACTERISTICS

Previous research has found significant effects of personal characteristics (such as ‘sex’, ‘age’ and ‘educational level’) on driving styles (e.g. Glendon et al. 1996; Harré 2000; Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2004; 2005). This study has used Pearson’s correlation coefficient to evaluate any linear relationships between ‘sex’, ‘age’, ‘field of study’, and ‘type of drivers licence’.

SEX

Table 4-21 displays the results of a series of one-way ANOVAs that were conducted to assess any differences in driving styles between males and females for all MDSI driving styles.

TABLE 4-21: 1-WAY ANOVAS FOR MDSI DRIVING STYLES AND SEX

		Sum of Squares	df	Mean Square	F	Sig.
Risky	Between	37.289	1	37.289	37.830	0.000
	Within	305.565	310	0.986		
	Total	342.854	311			
Angry	Between	11.976	1	11.976	11.621	0.001
	Within	319.469	310	1.031		
	Total	331.444	311			
HighVelocity	Between	12.610	1	12.610	13.532	0.000
	Within	288.878	310	0.932		
	Total	301.488	311			
Patient	Between	10.593	1	10.593	12.708	0.000
	Within	258.417	310	0.834		
	Total	269.010	311			
Careful	Between	7.331	1	7.331	11.191	0.001
	Within	203.069	310	0.655		
	Total	210.400	311			
Anxious	Between	9.090	1	9.090	16.244	0.000
	Within	173.461	310	0.560		
	Total	182.550	311			
DistressReduction	Between	4.258	1	4.258	6.504	0.011
	Within	202.958	310	0.655		
	Total	207.216	311			
Dissociative	Between	0.509	1	0.509	0.867	0.353
	Within	182.078	310	0.587		
	Total	182.587	311			

TABLE 4-22: DRIVING STYLE MEANS ACCORDING TO SEX

		N	Mean	Std. Deviation	Std. Error
Risky	Male	155	2.64	1.10	0.09
	Female	157	1.95	0.88	0.07
	Total	312	2.29	1.05	0.06
Angry	Male	155	2.85	1.08	0.09
	Female	157	2.46	0.95	0.08
	Total	312	2.66	1.03	0.06
HighVelocity	Male	155	3.07	0.98	0.08
	Female	157	2.67	0.95	0.08
	Total	312	2.87	0.98	0.06
Patient	Male	155	3.92	0.91	0.07
	Female	157	4.29	0.91	0.07
	Total	312	4.11	0.93	0.05
Careful	Male	155	4.25	0.86	0.07
	Female	157	4.55	0.76	0.06
	Total	312	4.40	0.82	0.05
Anxious	Male	155	2.26	0.75	0.06
	Female	157	2.60	0.75	0.06
	Total	312	2.43	0.77	0.04
DistressReduction	Male	155	2.75	0.76	0.06
	Female	157	2.51	0.86	0.07
	Total	312	2.63	0.82	0.05
Dissociative	Male	155	2.18	0.79	0.06
	Female	157	2.10	0.74	0.06
	Total	312	2.14	0.77	0.04

Significant main effects were yielded for ‘sex’ in seven of the eight driving styles. There was significant evidence that males scored higher on the risky, angry, and high-velocity driving styles, while females were more likely to use the patient, careful and anxious driving styles. Males also scored higher on the distress reduction driving style but it has to be noted that this style was not very reliable (Cronbach’s $\alpha = .46$) (see Table 3-5) and was only retained for reasons of comparison.

TABLE 4-23: 1-WAY ANOVAS FOR MDSI DRIVING STYLE DOMAINS AND SEX

		Sum of Squares	df	Mean Square	F	Sig.
Reckless and Careless	Between	18.674	1	18.674	26.169	0.000
	Within	221.216	310	0.714		
	Total	239.889	311			
Angry	Between	11.976	1	11.976	11.621	0.001
	Within	319.469	310	1.031		
	Total	331.444	311			
Patient and Careful	Between	8.707	1	8.707	15.693	0.000
	Within	171.996	310	0.555		
	Total	180.702	311			
Anxious	Between	0.141	1	0.141	0.428	0.513
	Within	102.316	310	0.330		
	Total	102.458	311			

TABLE 4-24: MEANS FOR DRIVING STYLE DOMAINS ACCORDING TO SEX

		N	Mean	Std. Deviation	Std. Error
Reckless and Careless	Male	155	2.87	0.88	0.07
	Female	157	2.38	0.80	0.06
	Total	312	2.62	0.88	0.05
Angry	Male	155	2.85	1.08	0.09
	Female	157	2.46	0.95	0.08
	Total	312	2.66	1.03	0.06
Patient and Careful	Male	155	4.10	0.78	0.06
	Female	157	4.44	0.71	0.06
	Total	312	4.27	0.76	0.04
Anxious	Male	155	2.33	0.62	0.05
	Female	157	2.37	0.53	0.04
	Total	312	2.35	0.57	0.03

One-way ANOVAs for the MDSI driving style domains in relation to the factor ‘sex’ found significant main effects for three of the four domains (as shown in Table 4-23). As shown in Table 4-24, there was significant evidence that males were more likely to use the reckless and careless driving style domain (consisting of risky and high-velocity driving) and the angry driving style.

Females scored higher on the patient and careful driving style domain. The previous result of males scoring higher on the distress reduction style disappeared when examining the combined anxious domain (consisting of anxious, distress reduction and dissociative driving).

TABLE 4-25: 1-WAY ANOVAS FOR EMERGING DRIVING STYLE DOMAINS AND SEX

		Sum of Squares	df	Mean Square	F	Sig.
Patient and Careful	Between Groups	8.707	1	8.707	15.693	.000
	Within Groups	171.996	310	.555		
	Total	180.702	311			
Anxious	Between Groups	.141	1	.141	.428	.513
	Within Groups	102.316	310	.330		
	Total	102.458	311			
Reckless	Between Groups	18.674	1	18.674	26.169	.000
	Within Groups	221.216	310	.714		
	Total	239.889	311			

TABLE 4-26: MEANS FOR EMERGING DRIVING STYLE DOMAINS AND SEX

		N	Mean	Std. Deviation	Std. Error
Patient and Careful	Male	155	4.1031	.78150	.06277
	Female	157	4.4372	.70684	.05641
	Total	312	4.2712	.76226	.04315
Anxious	Male	155	2.3283	.61612	.04949
	Female	157	2.3709	.53023	.04232
	Total	312	2.3497	.57397	.03249
Reckless	Male	155	2.8671	.88493	.07108
	Female	157	2.3778	.80311	.06410
	Total	312	2.6209	.87826	.04972

Significant evidence was found for a sex difference in the use of the reckless and the patient emerging driving style domains; males had a higher score on the reckless domain, while females scored higher on the patient domain (see Table 4-25 and Table 4-26).

AGE

A series of one-way ANOVAs initially yielded significant effects for ‘age’ in relation to five driving styles: risky, patient, careful, distress reduction, and dissociative. Only two of the four driving style domains generated significant effects for ‘age’: reckless and careless, and patient and careful. ANOVAs for the three domains that have emerged from the present data also found two significant effects: reckless, and patient and careful. However, when examining males and females separately a significant effect only remained for males for the careful driving style ($F(7, 146) = 2.32, p = .029$) and for the patient and careful driving domain ($F(7, 146) = 2.35, p = .027$). The trend showed that males scored higher on careful or patient and careful driving when they got older, with 25-year olds attaining the highest means: $M = 5.06, SD = .57$. It has to be noted that participants were not spread evenly across age groups, with 84.9% being between 18-22 years. The findings for 24-year olds seem to divert from the trend, which may be due to specific characteristics of this sample considering the low number of participants in this age group.

An analysis using Pearson’s correlation coefficient indicated statistically significant positive linear relationships between ‘age’ and the patient and the careful driving styles, and a negative relationship between ‘age’ and the risky and the high-velocity driving styles. When examining males and females separately, the associations only remained for males (as shown in Table 4-27).

TABLE 4-27: PEARSON'S CORRELATIONS FOR AGE AND DRIVING STYLES

N= 311		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Age (years)	Pearson	-.147	-.085	-.113	.162	.139	.040	-.044	-.086
	Sig.	.009	.133	.047	.004	.014	.487	.434	.132

N =154 (males)		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Age (years)	Pearson	-.144	-.060	-.158	.226	.236	-.039	-.012	-.118
	Sig.	.075	.459	.050	.005	.003	.633	.881	.144

FIELD OF STUDY

One-way ANOVAs produced significant evidence for differences in four driving styles in relation to the factor 'field of study': risky ($F(6, 303) = 4.67, p = .000$), angry ($F(6, 303) = 2.75, p = .030$), careful ($F(6, 303) = 2.88, p = .015$) and dissociative ($F(6, 303) = 4.19, p = .001$). Vocational students scored highest on the risky ($M = 2.81, SD = 1.17$) and angry ($M = 3.09, SD = 1.27$) driving styles. Social science students scored highest on the careful driving style ($M = 4.53, SD = .74$) and lowest on risky ($M = 2.08, SD = .88$) and angry driving ($M = 2.53, SD = .96$). Applied science students also scored high on careful driving ($M = 4.46, SD = .81$) and lowest on dissociative driving ($M = 1.97, SD = .69$). Science students scored highest on dissociative driving ($M = 2.57, SD = .71$).

When splitting the sample for sex, for males two significant effects remained in relation to 'field of study': risky ($F(6, 148) = 2.21, p = .045$) and dissociative driving ($F(6, 148) = 2.32, p = .036$). Students for 'other' studies score highest on risky driving ($M = 3.23, SD = .64$). Vocational students scored second highest on risky driving ($M = 3.03, SD = 1.16$) and highest on dissociative driving ($M = 2.56, SD = .98$). For females only dissociative driving showed a significant difference ($F(6, 150) = 2.40, p = .031$) with science students scoring highest ($M = 2.94, SD = .58$), 'other' students scoring lowest ($M = 1.67, SD = .89$), and applied science students scoring second lowest ($M = 1.94, SD = .62$).

When repeating the ANOVAs for the four driving style domains, significant effects were obtained for 'field of study' in relation to the reckless and careless driving style ($F(6, 307) = 2.43, p = .026$), the angry driving style ($F(6, 307) = 2.37, p = .030$) and the anxious driving style ($F(6, 307) = 2.15, p = .048$). Vocational students scored highest on the reckless and careless driving style ($M = 2.98, SD = 1.01$) and on the angry driving style ($M = 3.09, SD = 1.27$). Science students had the highest score on the anxious driving style ($M = 2.60, SD = .66$). ANOVAs for the three emerging driving styles had similar results, with significant effects for the reckless ($F(6, 307) = 2.81, p = .011$) and anxious driving styles ($F(6, 307) = 2.15, p = .048$). Vocational students scored highest on the emerging reckless domain ($M = 3.02, SD = 1.01$).

Separating for males and females, one-way ANOVAs for all driving domains in relation to 'field of study' resulted in one significant effect for males on the anxious driving style domain ($F(5, 149) = 2.36, p = .043$), with vocational students scoring highest ($M = 2.59, SD = .84$).

An analysis using Pearson's correlations coefficient indicated a statistically significant relationship between 'field of study' and the risky driving style, but only for males, as shown in Table 4-28.

TABLE 4-28: PEARSON'S CORRELATION FOR DRIVING STYLES AND FIELD OF STUDY (MALES)

N =155 (males)		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Study	Pearson	.186	.063	.006	-.149	-.075	-.073	-.017	.037
	Sig.	.021	.436	.941	.064	.354	.370	.835	.647

TYPE OF DRIVERS LICENCE

A series of one-way ANOVAs for the factor 'type of drivers licence' in relation to the eight driving styles and to the four driving style domains did not yield any significant effects, nor for the complete sample, nor for males and females separately. Analysis using Pearson's correlation coefficient showed weak significant relationships between positive driving styles and type of licence (see Table 4-29), but these correlations disappeared when examining males and females separately.

TABLE 4-29: PEARSON'S CORRELATION FOR DRIVING STYLES AND TYPE OF LICENCE (SAMPLE)

N = 312		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Type of drivers licence	Pearson	-.054	-.002	.001	.126	.119	-.081	-.030	-.099
	Sig.	.340	.975	.981	.026	.036	.154	.593	.080

4.2.2 DRIVING STYLES AND SELF-REPORTED DRIVING BEHAVIOUR

One-way ANOVAs were conducted to examine significant differences in driving styles and driving style domains in relation to self-reported driving behaviours: 'years driving' (pre-licensed and licensed), and 'exposure' (hours/week). Sex differences have been examined for all results.

YEARS OF DRIVING

One-way ANOVAs for the factor 'years of driving' found significant effects for three driving styles: patient driving ($F(12, 301) = 2.33, p = .007$), careful driving ($F(12, 301) = 1.80, p = .046$), and anxious driving ($F(12, 301) = 1.80, p = .047$). The patient driving style showed a trend of diminishing after the first year, after which the mean score gradually inclined back to a higher score in the seventh year of driving. For careful driving, the dip in the trend was after the second year

going up again after the fourth year. The anxious driving style showed an increasing mean for the first three years followed by a decline with the lowest score in the seventh year.

When examined separately, a significant effect was found for young male drivers in relation to the careful driving style ($F(11, 143) = 1.91, p = .043$), with the means changing in a trend similar to the complete sample. For young female drivers significant effects were obtained for angry driving ($F(10, 146) = 1.93, p = .046$) and dissociative driving ($F(10, 146) = 2.12, p = .027$). The means for the angry style have a peak at four years of driving, after which the mean diminishes again, but there is not a clear trend. Females score lowest on the dissociative style after seven years of driving.

One-way ANOVAs for the four MDSI driving style domains resulted in significant effects for the patient and careful driving domain ($F(12, 301) = 2.25, p = .010$) and the anxious driving domain ($F(12, 301) = 1.96, p = .028$). Again, splitting the sample for sex showed a different result. No significant effects were found for young males, while for young females there were significant effects for the anxious domain ($F(10, 146) = 2.30, p = .015$) and the angry domain ($F(10, 146) = 1.93, p = .046$). Neither domain showed a clear trend.

For the three emerging driving style domains, one-way ANOVAs obtained the same significant effects as the MDSI domains (patient and careful, anxious) with no effects remaining for males, and for females a significant effect only for the anxious domain ($F(10, 146) = 2.31, p = .015$). The lowest scores for the anxious domain were at seven years of driving, but there was no obvious trend.

TABLE 4-30: PEARSON CORRELATIONS DRIVING STYLES AND YEARS DRIVING (SAMPLE)

N = 314		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Years driving	Pearson	-.034	.027	-.023	.084	.092	-.121	.032	-.056
	Sig.	.550	.636	.680	.139	.104	.032	.570	.325

Analysis with Pearson's correlation coefficient (Table 4-30) found only a weak correlation for 'years of driving' and the anxious driving style but this correlation disappeared when examining the sexes separately.

EXPOSURE

Exposure has been measured in driving hours per week. Table 4-31 shows the results of one-way ANOVAs for the factor ‘exposure’: significant effects were found for all driving styles except anxious, and distress reduction driving.

TABLE 4-31: ONE-WAY ANOVA FOR EXPOSURE (HRS/WK) IN RELATION TO DRIVING STYLES

		Squares	df	Square	F	Sig.
Risky	Between Groups	23.843	2	11.922	11.654	0.000
	Within Groups	298.717	292	1.023		
	Total	322.560	294			
Angry	Between Groups	23.147	2	11.573	12.134	0.000
	Within Groups	278.518	292	0.954		
	Total	301.665	294			
High Velocity	Between Groups	20.505	2	10.252	11.739	0.000
	Within Groups	255.011	292	0.873		
	Total	275.516	294			
Patient	Between Groups	8.460	2	4.230	4.918	0.008
	Within Groups	251.158	292	0.860		
	Total	259.619	294			
Careful	Between Groups	9.666	2	4.833	7.450	0.001
	Within Groups	189.434	292	0.649		
	Total	199.101	294			
Anxious	Between Groups	1.104	2	.552	.988	0.374
	Within Groups	163.152	292	0.559		
	Total	164.256	294			
Distress Reduction	Between Groups	2.077	2	1.038	1.627	0.198
	Within Groups	186.377	292	0.638		
	Total	188.453	294			
Dissociative	Between Groups	5.981	2	2.990	5.270	0.006
	Within Groups	165.700	292	0.567		
	Total	171.681	294			

Table 4-32 shows the means for six driving styles in relation to ‘exposure’. There are two clear trends visible. More hours of driving per week make it more likely that young drivers use negative driving styles (risky, angry, high-velocity, and dissociative), especially when driving for over ten hours. At the same time there is a direct correlation between fewer driving hours and the use of positive driving styles (patient, careful) with the highest mean scores when driving less than five hours per week.

TABLE 4-32: MEANS FOR DRIVING STYLES IN RELATION TO EXPOSURE (HRS/WK)

		N	Mean	Std. Deviation	Std. Error
Risky	0-5	132	2.0836	.95243	.08290
	6-10	103	2.1690	1.02099	.10060
	>10	60	2.8211	1.11657	.14415
	Total	295	2.2634	1.04745	.06098
Angry	0-5	132	2.3594	.87477	.07614
	6-10	103	2.7210	1.04514	.10298
	>10	60	3.0888	1.06451	.13743
	Total	295	2.6340	1.01295	.05898
HighVelocity	0-5	132	2.6410	.90246	.07855
	6-10	103	2.8850	.94805	.09341
	>10	60	3.3453	.97983	.12650
	Total	295	2.8694	.96805	.05636
Patient	0-5	132	4.1839	.90974	.07918
	6-10	103	4.2049	.85798	.08454
	>10	60	3.7730	1.07084	.13824
	Total	295	4.1077	.93971	.05471
Careful	0-5	132	4.5450	.78858	.06864
	6-10	103	4.4518	.72059	.07100
	>10	60	4.0663	.96558	.12466
	Total	295	4.4151	.82293	.04791
Dissociative	0-5	132	2.0334	.66953	.05827
	6-10	103	2.1479	.72287	.07123
	>10	60	2.4141	.95383	.12314
	Total	295	2.1508	.76416	.04449

There were some differences between male and female young drivers. Significant effects were found for males in relation to risky driving ($F(2, 142) = 4.35, p = .015$), high-velocity driving ($F(2, 142) = 4.34, p = .015$), and dissociative driving ($F(2, 142) = 3.12, p = .047$). Young males who drove for more than ten hours a week scored highest on all three driving styles, so participants with the highest number of driving hours were most likely to employ risky, high-velocity and dissociative driving. No significant correlations were found with any positive driving style. For females, significant effects were found for risky ($F(2, 145) = 8.77, p = .000$), angry ($F(2, 145) = 10.69, p = .000$), high-velocity ($F(2, 145) = 6.34, p = .002$), patient ($F(2, 145) = 4.13, p = .018$), and careful driving ($F(2, 145) = 4.55, p = .012$). Young females driving for more than ten hours a week scored highest on the negative driving styles (risky, angry, high-velocity) and lowest on the positive driving styles (patient, careful).

A series of one-way ANOVAs for ‘exposure’ in relation to the driving style domains found significant differences for all domains, as displayed in Table 4-33 and Table 4-34.

TABLE 4-33: 1-WAY ANOVAS FOR FOUR DRIVING STYLE DOMAINS AND EXPOSURE

		Sum of Squares	df	Mean Square	F	Sig.
Reckless and Careless	Between Groups	21.536	2	10.768	14.171	0.000
	Within Groups	221.883	292	0.760		
	Total	243.420	294			
Angry	Between Groups	23.147	2	11.573	12.134	0.000
	Within Groups	278.518	292	0.954		
	Total	301.665	294			
Patient and Careful	Between Groups	8.941	2	4.470	7.815	0.000
	Within Groups	167.024	292	0.572		
	Total	175.964	294			
Anxious	Between Groups	2.103	2	1.052	3.307	0.038
	Within Groups	92.849	292	0.318		
	Total	94.952	294			

TABLE 4-34: MEANS FOR EXPOSURE AND DRIVING STYLE DOMAINS

		N	Mean	Std. Deviation	Std. Error
Reckless and Careless	0-5	132	2.39	0.83	0.07
	6-10	103	2.56	0.89	0.09
	>10	60	3.11	0.92	0.12
	Total	295	2.59	0.91	0.05
Angry	0-5	132	2.36	0.87	0.08
	6-10	103	2.72	1.05	0.10
	>10	60	3.09	1.06	0.14
	Total	295	2.63	1.01	0.06
Patient and Careful	0-5	132	4.38	0.76	0.07
	6-10	103	4.34	0.67	0.07
	>10	60	3.94	0.89	0.11
	Total	295	4.28	0.77	0.05
Anxious	0-5	132	2.32	0.49	0.04
	6-10	103	2.33	0.55	0.05
	>10	60	2.53	0.71	0.09
	Total	295	2.37	0.57	0.03

The ANOVA results from the driving style domains in relation to ‘exposure’ showed the same trends as the separate driving styles; more hours of driving related to a higher use of negative driving styles and less use of positive driving styles. When examined separately, for males there was only a significant difference on the factor ‘exposure’ for the reckless and careless domain ($F(2, 142) = 4.90, p = .009$). The trend showed an upwards incline in the use of the reckless and careless driving style in correspondence with an upwards incline in driving hours; males who drove for more than ten hours a week scored highest on this negative domain. For females, significant differences were found for the angry domain ($F(2, 145) = 10.69, p = .000$), the patient and careful domain ($F(2, 145) = 6.04, p = .003$), and the reckless and careless domain ($F(2, 145) = 9.23, p = .000$). The trend showed that the more hours participants drove per week, the higher they scored on negative driving style domains and the lower on positive driving style domains. One-way ANOVAs for the emerging driving style domains showed similar results.

TABLE 4-35: PEARSON CORRELATIONS FOR EIGHT DRIVING STYLES AND EXPOSURE

N= 295		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Exposure wkly	Pearson	.241	.277	.268	-.142	-.204	-.009	.094	.181
	Sig.	.000	.000	.000	.015	.000	.877	.106	.002

N =145 (males)		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Exposure wkly	Pearson	.162	.192	.234	-.047	-.162	.074	.075	.181
	Sig.	.052	.021	.005	.572	.052	.380	.369	.030

N= 148 (females)		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Exposure wkly	Pearson	.324	.357	.281	-.215	-.224	-.060	.098	.181
	Sig.	.000	.000	.001	.009	.006	.466	.237	.028

Pearson correlations for the eight driving styles showed that, for all participants, more exposure was positively related to the maladaptive driving styles (risky, angry, high-velocity, dissociative) and negatively related to the adaptive driving styles (patient, careful). However, for males there was no correlation between ‘exposure’ and risky driving or for patient and careful driving. All correlations were stronger for females than for males with the exception of dissociative driving.

4.3 THINKING AND DRIVING STYLES

This section presents results related to the sub research question, *Is there a relationship between young drivers' thinking and driving styles?* Firstly, Pearson's correlation coefficients were computed to determine any zero-order correlations between the MSG thinking styles, the MDSI driving styles, and the MDSI driving style domains. Any sex differences in these relationships were examined. Secondly, partial correlations were calculated, controlling for the factors of sex and age.

4.3.1 ZERO-ORDER CORRELATIONS BETWEEN THINKING AND DRIVING STYLES

Table 4-36 shows the results of the evaluation of the linear relationships between thinking and driving styles using Pearson's correlations.

TABLE 4-36: PEARSON'S CORRELATIONS FOR 13 THINKING STYLES AND EIGHT DRIVING STYLES

N= 314		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Legislative	Pearson	-.055	-.022	-.054	.172	.135	-.179	-.034	-.145
	Sig.	.332	.697	.341	.002	.017	.001	.553	.010
Executive	Pearson	-.183	-.078	-.102	.272	.248	.050	-.107	-.035
	Sig.	.001	.169	.071	.000	.000	.379	.057	.537
Judicial	Pearson	-.025	-.066	-.067	.155	.127	.066	-.041	.001
	Sig.	.660	.241	.238	.006	.025	.240	.472	.992
Hierarchic	Pearson	-.233	-.116	-.112	.333	.300	-.011	-.072	-.147
	Sig.	.000	.041	.047	.000	.000	.848	.202	.009
Monarchic	Pearson	-.056	-.117	-.112	.233	.093	-.001	-.099	-.027
	Sig.	.323	.038	.047	.000	.100	.983	.079	.639
Oligarchic	Pearson	-.059	-.069	-.019	.195	.145	-.057	-.052	-.016
	Sig.	.297	.222	.741	.001	.010	.318	.355	.781
Anarchic	Pearson	.111	.125	.109	.010	.052	-.011	.086	.086
	Sig.	.049	.027	.054	.858	.362	.848	.130	.128
Global	Pearson	.016	.026	.045	.118	.055	-.037	.058	.061
	Sig.	.784	.644	.422	.037	.332	.510	.304	.281
Local	Pearson	-.015	-.075	-.077	.181	.135	.042	.031	-.010
	Sig.	.794	.187	.175	.001	.017	.457	.582	.864
Internal	Pearson	-.011	-.009	-.042	.146	.054	-.119	-.083	-.063
	Sig.	.843	.879	.454	.009	.339	.034	.142	.267
External	Pearson	-.083	-.054	-.089	.178	.218	-.084	-.036	-.144
	Sig.	.140	.343	.116	.002	.000	.138	.525	.011
Liberal	Pearson	.010	.003	.010	.072	.084	-.077	-.036	-.012
	Sig.	.861	.959	.858	.202	.136	.173	.521	.829
Conservative	Pearson	-.146	-.086	-.164	.246	.229	.058	-.093	-.038
	Sig.	.010	.129	.003	.000	.000	.309	.100	.505

When examining the complete sample ($N = 314$), legislative thinking was significantly and positively correlated to patient ($r = .172, p = .002$) and careful driving ($r = .135, p = .017$), and negatively correlated to anxious ($r = -.179, p = .001$) and dissociative driving ($r = -.145, p = .010$). Executive thinking was significantly inversely correlated to risky driving ($r = -.183, p = .001$) and positively correlated to patient ($r = .272, p = .000$) and careful driving ($r = .248, p = .000$). The judicial thinking style was significantly positively related to the patient ($r = .333, p = .006$) and careful ($r = .127, p = .025$) driving styles. Hierarchic thinking was found inversely related to risky driving ($r = -.233, p = .000$), angry driving ($r = -.116, p = .041$), high-velocity driving ($r = -.112, p = .047$) and dissociative driving ($r = -.147, p = .009$) while it was positively correlated to patient ($r = .333, p = .000$) and careful driving ($r = .300, p = .000$). Monarchic thinking was negatively correlated to angry ($r = -.117, p = .038$) and high-velocity driving ($r = -.112, p = .047$), and positively to patient driving ($r = .233, p = .000$). The oligarchic thinking style was positively related to patient ($r = .195, p = .001$) and careful driving ($r = .145, p = .010$). Anarchic thinking was positively correlated to risky ($r = .111, p = .049$) and angry driving ($r = .125, p = .027$). Global thinking showed a positive relationship with patient driving ($r = .118, p = .037$). The local thinking style was positively related to both patient ($r = .181, p = .001$) and careful driving ($r = .135, p = .017$). External thinking was significantly and inversely related to dissociative driving ($r = -.144, p = .011$) and positively to patient ($r = .178, p = .002$) and careful driving ($r = .218, p = .000$). Conservative thinking was negatively correlated to risky ($r = -.146, p = .010$) and high-velocity driving ($r = -.164, p = .003$), and positively to patient ($r = .246, p = .000$) and careful driving ($r = .229, p = .000$).

Table 4-37 displays the relationships between thinking and driving styles separately for males and Table 4-38 shows the relationships for females, using Pearson's correlations. There are some similarities but also some differences in these relationships; some correlations are found only for males or only for females, and similar relationships between certain thinking and driving styles differ in strength.

TABLE 4-37: PEARSON'S CORRELATIONS FOR THINKING AND DRIVING STYLES FOR MALES

N = 155 (males)		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Legislative	Pearson	-.106	-.086	-.158	.191	.166	-.241	-.155	-.285
	Sig.	.190	.289	.049	.017	.039	.003	.054	.000
Executive	Pearson	-.152	-.077	-.039	.294	.211	.028	-.075	-.054
	Sig.	.059	.339	.632	.000	.008	.734	.357	.501
Judicial	Pearson	-.041	-.099	-.118	.212	.180	.067	-.028	-.112
	Sig.	.615	.220	.143	.008	.025	.404	.734	.166
Hierarchic	Pearson	-.139	-.071	-.024	.263	.234	-.058	-.019	-.122
	Sig.	.085	.380	.763	.001	.003	.471	.815	.130
Monarchic	Pearson	-.038	-.112	-.032	.229	.069	.053	-.096	.008
	Sig.	.635	.167	.692	.004	.390	.516	.233	.923
Oligarchic	Pearson	-.058	-.155	-.034	.202	.157	-.018	-.053	-.010
	Sig.	.474	.054	.672	.012	.051	.820	.510	.901
Anarchic	Pearson	.146	.083	.105	-.057	.006	.004	.114	-.005
	Sig.	.069	.304	.195	.483	.940	.962	.159	.951
Global	Pearson	-.073	.032	.014	.203	.132	.002	.089	-.024
	Sig.	.364	.694	.867	.011	.103	.977	.273	.763
Local	Pearson	.055	-.123	-.066	.074	.058	.050	.030	.019
	Sig.	.499	.126	.412	.361	.476	.535	.709	.815
Internal	Pearson	-.001	-.052	-.097	.147	.028	-.126	-.221	-.152
	Sig.	.988	.521	.230	.068	.726	.119	.006	.059
External	Pearson	-.065	-.028	-.096	.171	.226	-.112	-.037	-.070
	Sig.	.420	.730	.235	.033	.005	.166	.648	.389
Liberal	Pearson	-.058	-.083	-.120	.100	.154	-.017	-.165	-.134
	Sig.	.475	.306	.136	.217	.056	.830	.040	.095
Conservative	Pearson	-.118	-.103	-.068	.270	.168	.007	-.009	-.055
	Sig.	.145	.201	.401	.001	.037	.928	.914	.498

For young males (n = 155), legislative thinking was significantly and inversely related to high-velocity ($r = -.158$, $p = .049$), anxious ($r = -.241$, $p = .003$) and dissociative driving ($r = -.285$, $p = .000$) and positively related to patient ($r = .191$, $p = .017$) and careful driving ($r = .166$, $p = .039$). Five thinking styles were positively related to both the patient and careful driving styles: executive thinking ($r = .294$, $p = .000$) and ($r = .211$, $p = .008$), judicial thinking ($r = .212$, $p = .008$) and ($r = .180$, $p = .025$), hierarchic thinking ($r = .263$, $p = .001$) and ($r = .234$, $p = .003$), external thinking ($r = .171$, $p = .033$) and ($r = .226$, $p = .005$) and conservative thinking ($r = .270$, $p = .001$) and ($r = .168$, $p = .037$). Three thinking styles were only significantly and positively related to patient driving: monarchic thinking ($r = .229$, $p = .004$), oligarchic thinking ($r = .202$, $p = .012$) and global

thinking ($r = .203, p = .011$). Two thinking styles were inversely related to the distress reduction driving style: internal thinking ($r = -.221, p = .006$) and liberal thinking ($r = -.165, p = .040$).

TABLE 4-38: PEARSON'S CORRELATIONS FOR THINKING AND DRIVING STYLES FOR FEMALES

N = 157 (females)		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Legislative	Pearson	-.091	-.007	.004	.206	.150	-.080	.046	.005
	Sig.	.258	.935	.961	.010	.060	.320	.565	.948
Executive	Pearson	-.166	-.047	-.122	.221	.255	.023	-.109	.006
	Sig.	.037	.558	.127	.005	.001	.780	.173	.941
Judicial	Pearson	-.019	-.045	-.029	.116	.086	.073	-.053	.107
	Sig.	.810	.573	.720	.146	.285	.364	.506	.183
Hierarchic	Pearson	-.242	-.105	-.127	.344	.319	-.055	-.067	-.146
	Sig.	.002	.190	.113	.000	.000	.492	.401	.069
Monarchic	Pearson	-.068	-.125	-.184	.244	.125	-.051	-.091	-.053
	Sig.	.395	.120	.021	.002	.117	.524	.256	.510
Oligarchic	Pearson	-.073	.016	-.011	.203	.155	-.089	-.047	-.024
	Sig.	.366	.847	.893	.011	.052	.266	.555	.768
Anarchic	Pearson	.062	.159	.108	.083	.110	-.014	.054	.184
	Sig.	.437	.046	.178	.303	.172	.861	.503	.021
Global	Pearson	.033	-.023	.030	.093	.032	-.025	.012	.134
	Sig.	.683	.776	.709	.245	.693	.758	.881	.096
Local	Pearson	-.114	-.046	-.103	.294	.235	.047	.033	-.027
	Sig.	.155	.565	.201	.000	.003	.556	.685	.741
Internal	Pearson	-.064	.018	-.006	.170	.102	-.101	.025	.034
	Sig.	.425	.826	.937	.033	.206	.209	.755	.674
External	Pearson	-.062	-.061	-.057	.160	.192	-.098	-.015	-.202
	Sig.	.438	.450	.479	.045	.016	.221	.849	.011
Liberal	Pearson	.083	.088	.131	.054	.023	-.132	.072	.114
	Sig.	.303	.273	.102	.504	.771	.100	.369	.154
Conservative	Pearson	-.152	-.047	-.238	.209	.280	.077	-.146	-.012
	Sig.	.058	.558	.003	.008	.000	.335	.068	.881

For young female drivers ($n = 157$), four thinking styles were significantly and positively related to the patient driving style: legislative thinking ($r = .206, p = .010$), monarchic thinking ($r = .244, p = .002$), oligarchic thinking ($r = .203, p = .011$) and internal thinking ($r = .170, p = .033$). The executive thinking style was inversely related to risky driving ($r = -.166, p = .037$) and positively to patient ($r = .221, p = .005$) and careful driving ($r = .255, p = .001$). Hierarchic thinking was also negatively correlated to risky driving ($r = -.242, p = .002$) and positively related to patient ($r = .344,$

$p = .000$) and careful driving ($r = .319, p = .000$). The anarchic thinking style was positively related to dissociative driving ($r = .184, p = .021$). Local thinking was positively related to patient driving ($r = .294, p = .000$) and careful driving ($r = .235, p = .003$). The external thinking style was positively related to patient ($r = .160, p = .045$) and careful driving ($r = .192, p = .016$) and conversely related to dissociative driving ($r = -.202, p = .011$). Conservative thinking was negatively correlated to high-velocity driving ($r = -.238, p = .003$) and positively to patient ($r = .209, p = .008$) and careful driving ($r = .280, p = .000$).

TABLE 4-39: PEARSON'S CORRELATIONS FOR THINKING STYLES AND DRIVING STYLE DOMAINS

N =314		Reckless and Careless	Angry	Patient and Careful	Anxious
Legislative	Pearson	-.060	-.022	.174	-.180
	Sig.	.286	.697	.002	.001
Executive	Pearson	-.156	-.078	.296	-.027
	Sig.	.006	.169	.000	.629
Judicial	Pearson	-.052	-.066	.160	.021
	Sig.	.355	.241	.005	.712
Hierarchic	Pearson	-.188	-.116	.360	-.110
	Sig.	.001	.041	.000	.052
Monarchic	Pearson	-.095	-.117	.182	-.045
	Sig.	.092	.038	.001	.424
Oligarchic	Pearson	-.042	-.069	.192	-.052
	Sig.	.459	.222	.001	.355
Anarchic	Pearson	.122	.125	.036	.069
	Sig.	.030	.027	.520	.224
Global	Pearson	.035	.026	.096	.033
	Sig.	.538	.644	.088	.556
Local	Pearson	-.053	-.075	.179	.025
	Sig.	.350	.187	.001	.664
Internal	Pearson	-.031	-.009	.112	-.119
	Sig.	.586	.879	.048	.035
External	Pearson	-.096	-.054	.227	-.133
	Sig.	.090	.343	.000	.018
Liberal	Pearson	.011	.003	.090	-.056
	Sig.	.844	.959	.113	.325
Conservative	Pearson	-.173	-.086	.270	-.021
	Sig.	.002	.129	.000	.714

Table 4-39 displays the correlations between the thirteen thinking styles and the four driving style domains, for the whole sample (N = 314). Legislative thinking was positively correlated to patient and careful driving ($r = .174, p = .002$) and inversely related to anxious driving ($r = -.180, p$

= .001). The executive thinking styles was negatively correlated to reckless and careless driving ($r = -.156, p = .006$) and positively to patient and careful driving ($r = .296, p = .000$). The judicial, monarchic, oligarchic and local thinking styles showed a positive relationship with patient and careful driving ($r = .160, p = .005$), ($r = .182, p = .001$), ($r = .192, p = .001$) and ($r = .179, p = .001$). Hierarchic thinking was inversely related to reckless and careless driving ($r = -.188, p = .001$) and angry driving ($r = -.116, p = .041$) and positively related to patient and careful driving ($r = .360, p = .000$). The anarchic thinking styles was positively correlated to reckless and careless driving ($r = .122, p = .030$) and angry driving ($r = .125, p = .027$). Internal thinking was significantly positively related to patient and careful driving ($r = .112, p = .048$) and inversely to anxious driving ($r = -.119, p = .035$). The external thinking styles related positively to patient and careful driving ($r = .227, p = .000$) and negatively related to anxious driving ($r = -.133, p = .018$). Conservative thinking was negatively related to reckless and careless driving ($r = -.173, p = .002$) and positively to patient and careful driving ($r = .270, p = .000$).

Table 4-40 shows the relationships between thinking styles and driving style domains for males and Table 4-41 displays the results of the same analysis for females. For males, none of the thinking styles were significantly related to either the reckless and careless driving style or to the angry driving style. For females, executive thinking ($r (157) = -.57, p = .049$), hierarchic thinking ($r (157) = -.197, p = .013$) and conservative thinking ($r (157) = -.223, p = .005$) were all inversely related to reckless and careless driving. The anarchic thinking style was positively correlated to angry driving ($r (157) = .159, p = .046$) for females only. For males, the internal thinking style showed a significant negative correlation to anxious driving ($r (155) = -.196, p = .015$) while for females the external thinking style was inversely related to anxious driving ($r (157) = -.175, p = .028$). Legislative thinking was positively related to patient and careful driving for males ($r (155) = .201, p = .012$) and females ($r (157) = .208, p = .009$) and, only for males, negatively correlated to anxious driving ($r (155) = -.302, p = .000$). Only for males, judicial thinking ($r (155) = .219, p = .006$) and global thinking ($r (155) = .185, p = .021$) were positively related to patient and careful driving. Only for females, the local thinking style was positively related to patient and careful driving ($r (157) = .309, p = .000$). Both for males and females there were positive correlations between executive, hierarchic, monarchic, oligarchic, external and conservative thinking and patient and careful driving. The largest difference was for the hierarchic thinking style where the relationship was substantially stronger for females ($r (157) = .388, p = .000$) than for males ($r (155) = .279, p = .000$).

TABLE 4-40: PEARSON'S CORRELATIONS THINKING STYLES AND DRIVING STYLE DOMAINS (MALES)

N = 155 (males)		Reckless and Careless	Angry	Patient and Careful	Anxious
Legislative	Pearson	-.149	-.086	.201	-.302
	Sig.	.064	.289	.012	.000
Executive	Pearson	-.105	-.077	.281	-.036
	Sig.	.193	.339	.000	.652
Judicial	Pearson	-.091	-.099	.219	-.037
	Sig.	.261	.220	.006	.644
Hierarchic	Pearson	-.089	-.071	.279	-.097
	Sig.	.269	.380	.000	.229
Monarchic	Pearson	-.039	-.112	.161	.003
	Sig.	.626	.167	.045	.973
Oligarchic	Pearson	-.051	-.155	.201	-.028
	Sig.	.526	.054	.012	.734
Anarchic	Pearson	.140	.083	-.026	.029
	Sig.	.082	.304	.751	.725
Global	Pearson	-.032	.032	.185	.011
	Sig.	.694	.694	.021	.893
Local	Pearson	-.009	-.123	.074	.041
	Sig.	.912	.126	.363	.617
Internal	Pearson	-.057	-.052	.093	-.196
	Sig.	.481	.521	.247	.015
External	Pearson	-.091	-.028	.227	-.097
	Sig.	.260	.730	.005	.229
Liberal	Pearson	-.101	-.083	.146	-.123
	Sig.	.210	.306	.071	.126
Conservative	Pearson	-.103	-.103	.242	-.029
	Sig.	.201	.201	.002	.724

TABLE 4-41: PEARSON'S CORRELATIONS THINKING STYLES - DRIVING STYLE DOMAINS (FEMALES)

N= 157 (females)		Reckless and Careless	Angry	Patient and Careful	Anxious
Legislative	Pearson	-.041	-.007	.208	-.023
	Sig.	.606	.935	.009	.778
Executive	Pearson	-.157	-.047	.279	-.022
	Sig.	.049	.558	.000	.785
Judicial	Pearson	-.027	-.045	.118	.083
	Sig.	.732	.573	.141	.304
Hierarchic	Pearson	-.197	-.105	.388	-.137
	Sig.	.013	.190	.000	.086
Monarchic	Pearson	-.149	-.125	.215	-.089
	Sig.	.063	.120	.007	.269
Oligarchic	Pearson	-.042	.016	.209	-.077
	Sig.	.602	.847	.008	.341
Anarchic	Pearson	.098	.159	.113	.120
	Sig.	.221	.046	.159	.136
Global	Pearson	.035	-.023	.073	.070
	Sig.	.666	.776	.366	.385
Local	Pearson	-.120	-.046	.309	.020
	Sig.	.136	.565	.000	.803
Internal	Pearson	-.035	.018	.158	-.024
	Sig.	.663	.826	.048	.766
External	Pearson	-.066	-.061	.206	-.175
	Sig.	.412	.450	.010	.028
Liberal	Pearson	.122	.088	.045	.023
	Sig.	.127	.273	.577	.772
Conservative	Pearson	-.223	-.047	.287	-.016
	Sig.	.005	.558	.000	.838

4.3.2 PARTIAL CORRELATIONS BETWEEN THINKING AND DRIVING STYLES

The literature often reports 'sex' and 'age' as variables that influence driving behaviour and driving style (e.g. Blockley and Hartley 1995; Boyce and Geller 2001; Elliott et al. 2001; Harré 2000; Turner and McClure 2003). The present study found sex differences in both thinking and driving styles, but results for the factor 'age' were less obvious. To establish if it is likely that the

relationships found between thinking and driving styles are real, partial correlations were computed between thinking and driving styles while controlling for the factors ‘age’ and ‘sex’.

Table 4-42 shows the results of this analysis using Pearson’s correlation coefficient. Similar associations were found as when not controlling for the factors ‘sex’ and ‘age’ with five exceptions; four significant correlations disappeared, while one significant correlation emerged. No relationships remained between hierarchic thinking and the angry and high-velocity driving styles, no significant correlations remained between monarchic thinking and angry and high-velocity driving, and a correlation between anarchic thinking and high-velocity driving emerged but was only just significant ($r(305) = .113, p = .049$). The remaining correlations are similar in strength to the zero-order correlations as shown in Table 4-36.

TABLE 4-42: PEARSON’S CORRELATIONS BETWEEN THINKING AND DRIVING STYLES, CONTROLLING FOR SEX AND AGE

N=305		Risky	Angry	High Velocity	Patient	Careful	Anxious	Distress Reduction	Dissociative
Legislative	Pearson	-.092	-.040	-.072	.187	.155	-.167	-.052	-.134
	Sig.	.108	.488	.209	.001	.007	.003	.367	.019
Executive	Pearson	-.149	-.058	-.075	.251	.228	.018	-.092	-.023
	Sig.	.009	.312	.191	.000	.000	.750	.108	.686
Judicial	Pearson	-.026	-.065	-.065	.152	.128	.075	-.042	.018
	Sig.	.655	.255	.258	.008	.025	.188	.463	.754
Hierarchic	Pearson	-.182	-.081	-.070	.299	.272	-.053	-.044	-.120
	Sig.	.001	.158	.223	.000	.000	.355	.446	.036
Monarchic	Pearson	-.042	-.109	-.103	.223	.085	.006	-.088	-.003
	Sig.	.466	.057	.070	.000	.137	.922	.126	.959
Oligarchic	Pearson	-.070	-.073	-.026	.212	.166	-.064	-.057	-.022
	Sig.	.220	.202	.648	.000	.004	.266	.323	.696
Anarchic	Pearson	.114	.123	.113	.008	.052	-.007	.083	.095
	Sig.	.046	.031	.049	.887	.362	.901	.145	.096
Global	Pearson	.002	.013	.044	.129	.066	-.029	.058	.059
	Sig.	.974	.821	.446	.024	.249	.613	.313	.304
Local	Pearson	-.027	-.080	-.085	.186	.147	.062	.029	.018
	Sig.	.641	.160	.137	.001	.010	.275	.610	.749
Internal	Pearson	-.029	-.020	-.053	.162	.064	-.118	-.092	-.065
	Sig.	.614	.721	.359	.005	.263	.040	.108	.253
External	Pearson	-.058	-.034	-.069	.153	.205	-.100	-.025	-.116
	Sig.	.311	.555	.230	.007	.000	.080	.659	.042
Liberal	Pearson	.017	.005	.011	.068	.080	-.074	-.034	-.007
	Sig.	.773	.933	.855	.232	.162	.194	.556	.908
Conservative	Pearson	-.129	-.072	-.149	.235	.222	.042	-.083	-.027
	Sig.	.024	.206	.009	.000	.000	.463	.148	.641

TABLE 4-43: PEARSON'S CORRELATIONS BETWEEN THINKING STYLES AND DRIVING STYLE DOMAINS, CONTROLLING FOR SEX AND AGE

N= 305		Reckless and Careless	Angry	Patient and Careful	Anxious
Legislative	Pearson	-.091	-.040	.196	-.171
	Sig.	.112	.488	.001	.003
Executive	Pearson	-.122	-.058	.276	-.032
	Sig.	.032	.312	.000	.578
Judicial	Pearson	-.052	-.065	.161	.034
	Sig.	.360	.255	.005	.557
Hierarchic	Pearson	-.136	-.081	.328	-.106
	Sig.	.017	.158	.000	.064
Monarchic	Pearson	-.084	-.109	.173	-.025
	Sig.	.141	.057	.002	.659
Oligarchic	Pearson	-.052	-.073	.217	-.060
	Sig.	.363	.202	.000	.294
Anarchic	Pearson	.127	.123	.036	.075
	Sig.	.026	.031	.528	.190
Global	Pearson	.027	.013	.110	.037
	Sig.	.632	.821	.053	.523
Local	Pearson	-.065	-.080	.190	.049
	Sig.	.254	.160	.001	.392
Internal	Pearson	-.047	-.020	.127	-.121
	Sig.	.415	.721	.026	.034
External	Pearson	-.072	-.034	.208	-.121
	Sig.	.211	.555	.000	.034
Liberal	Pearson	.015	.005	.086	-.050
	Sig.	.795	.933	.133	.387
Conservative	Pearson	-.157	-.072	.263	-.020
	Sig.	.006	.206	.000	.731

Table 4-43 shows the results for an analysis using Pearson's correlation coefficient of the linear relationships between thinking styles and driving style domains while controlling for 'sex' and 'age'. Again, the pattern of associations remains the same as for the zero-order correlations, with one exception; the negative correlation between hierarchic thinking and angry driving has disappeared. All correlations are very similar in strength to the zero-order correlations as depicted in Table 4-39.

4.3.3 PREDICTING DRIVING STYLES FROM THINKING STYLES

Stepwise multiple regressions were performed in relation to the sub research question, *Can thinking styles predict driving styles?* Regressions were calculated for the eight driving styles and the four driving style domains as the dependent variable and the thirteen thinking styles, sex, age (years), time driving (years), and hours driving (per week) as the independent variables. A stepwise multiple regression will start with the most powerful predictor of the criterion variable (driving style), and then select the next best predictors based on how well it improves upon the prediction achieved by the first variable. Second and subsequent predictors should correlate as little as possible with the first predictor variable and as highly as possible with the criterion variable (Coolican 2004; Gall et al. 2007). For this study, new predictor variables could only be added by SPSS if the contribution to the multiple regression analysis was statistically significant. Predictors that accounted for more than 1% of the variance, which is the lower limit of a small effect size (Cohen 1988), were regarded as meaningful.

For all eight driving styles the suggested prediction model will be given, displaying the correlations between variables; R (the larger is R, the better the prediction of the driving style), R² (the amount of variance in the driving style that is explained by a predictor variable or combination of predictor variables) and R² adjusted (which will adjust an artificially high score of R² when N is very small) (Coolican 2004). R² will be used to report on the variance accounted for by the regression model because the sample size is sufficient. In addition to the statistical significance of the model, the standardised regression coefficients (β) are given because the variables have different units of measurement.

DEPENDENT VARIABLE RISKY DRIVING

Table 4-44 displays the model summary for stepwise multiple regressions with the risky driving style as the dependent variable and the thirteen thinking styles, 'sex', 'age', 'time driving' (years), and 'hours driving' (per week) as the independent variables.

TABLE 4-44: MODEL SUMMARY FOR RISKY DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.327a	.107	.104	.99564
2	.371b	.137	.132	.97999
3	.402c	.162	.154	.96762
4	.424d	.180	.169	.95859

a. Predictors: (Constant), Sex
 b. Predictors: (Constant), Sex, Hierarchic
 c. Predictors: (Constant), Sex, Hierarchic, Anarchic
 d. Predictors: (Constant), Sex, Hierarchic, Anarchic, Age (years)

The variables ‘sex’, hierarchic thinking, anarchic thinking, and ‘age’ significantly predicted the risky driving style. These variables combined explained 18% of the variance in risky driving scores. Table 4-45 shows that the variables sex, hierarchic thinking and age were all negatively correlated to the risky driving style, while anarchic thinking was positively related to risky driving. This means that a person is more likely to use risky driving when they are male and when they use anarchic thinking and less likely to employ the risky driving style when they utilise the hierarchic thinking style and when they are older.

TABLE 4-45: COEFFICIENTS FOR PREDICTORS OF RISKY DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.322	.179		18.527	.000		
	Sex	-.686	.113	-.327	-6.055	.000	1.000	1.000
2	(Constant)	4.150	.307		13.518	.000		
	Sex	-.618	.113	-.294	-5.454	.000	.967	1.034
	Hierarchic	-.196	.059	-.178	-3.299	.001	.967	1.034
3	(Constant)	3.532	.367		9.615	.000		
	Sex	-.586	.112	-.279	-5.212	.000	.958	1.043
	Hierarchic	-.245	.061	-.223	-4.024	.000	.896	1.116
	Anarchic	.197	.066	.162	2.979	.003	.924	1.082
4	(Constant)	4.982	.665		7.489	.000		
	Sex	-.584	.111	-.278	-5.238	.000	.958	1.044
	Hierarchic	-.241	.060	-.218	-3.979	.000	.895	1.117
	Anarchic	.200	.065	.165	3.055	.002	.924	1.082
	Age (years)	-.073	.028	-.135	-2.603	.010	.998	1.002

Collinearity statistics were computed for all predictive models for risky driving to determine the correlations between the independent variables. Tolerance and variance inflation factor (VIF) values show that collinearity was not present for the predictor variables, as all tolerance values were $>.20$ and all VIF values are <5 (Coolican 2004). This means that the independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the risky driving style.

DEPENDENT VARIABLE ANGRY DRIVING

Table 4-46 displays the results of stepwise multiple regressions with the angry driving style as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables. The variables ‘sex’, anarchic thinking, and local thinking significantly predicted the angry driving style. These variables combined explained 7% of the variance in angry driving scores.

TABLE 4-46: MODEL SUMMARY FOR ANGRY DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.192a	.037	.034	1.01917
2	.225b	.051	.044	1.01342
3	.263c	.069	.060	1.00506

a. Predictors: (Constant), Sex
 b. Predictors: (Constant), Sex, Anarchic
 c. Predictors: (Constant), Sex, Anarchic, Local

TABLE 4-47: COEFFICIENTS FOR PREDICTORS OF ANGRY DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.251	.184		17.712	.000		
	Sex	-.397	.116	-.192	-3.420	.001	1.000	1.000
2	(Constant)	2.658	.334		7.958	.000		
	Sex	-.386	.115	-.186	-3.341	.001	.998	1.002
	Anarchic	.141	.067	.118	2.120	.035	.998	1.002
3	(Constant)	3.123	.381		8.197	.000		
	Sex	-.386	.114	-.186	-3.369	.001	.998	1.002
	Anarchic	.211	.072	.176	2.933	.004	.846	1.182
	Local	-.185	.075	-.148	-2.471	.014	.847	1.180

Table 4-47 shows that sex and the local thinking style were negatively correlated to angry driving and that anarchic thinking was positively correlated to angry driving. This means that males and individuals using the anarchic thinking styles are more likely to display angry driving and people using the local thinking styles are less likely to use an angry driving style. Collinearity statistics were computed for all predictive models for angry driving. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the angry driving style.

DEPENDENT VARIABLE HIGH-VELOCITY DRIVING

Table 4-48 shows the results for stepwise multiple regressions with the high-velocity driving styles as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-48: MODEL SUMMARY FOR HIGH-VELOCITY DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.204a	.042	.039	.96717
2	.251b	.063	.057	.95785
3	.283c	.080	.071	.95072
4	.316d	.100	.088	.94207
a. Predictors: (Constant), Sex				
b. Predictors: (Constant), Sex, Conservative				
c. Predictors: (Constant), Sex, Conservative, Anarchic				
d. Predictors: (Constant), Sex, Conservative, Anarchic, Legislative				

The variables ‘sex’, conservative thinking, anarchic thinking, and legislative thinking all predicted the high-velocity driving style. The four variables combined predicted 10% of the variance in high-velocity driving scores.

TABLE 4-49: COEFFICIENTS FOR PREDICTORS OF HIGH-VELOCITY DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.470	.174		19.925	.000		
	Sex	-.403	.110	-.204	-3.658	.000	1.000	1.000
2	(Constant)	4.053	.280		14.486	.000		
	Sex	-.383	.109	-.195	-3.510	.001	.996	1.004
	Conservative	-.143	.054	-.147	-2.646	.009	.996	1.004
3	(Constant)	3.503	.362		9.679	.000		
	Sex	-.369	.109	-.187	-3.401	.001	.993	1.007
	Conservative	-.162	.054	-.167	-2.992	.003	.973	1.028
	Anarchic	.150	.063	.132	2.368	.019	.975	1.025
4	(Constant)	4.105	.428		9.590	.000		
	Sex	-.398	.108	-.202	-3.680	.000	.982	1.018
	Conservative	-.175	.054	-.179	-3.240	.001	.965	1.036
	Anarchic	.213	.067	.187	3.162	.002	.847	1.181
	Legislative	-.159	.062	-.152	-2.574	.011	.855	1.170

Table 4-49 shows that ‘sex’, conservative thinking, and legislative thinking had a negative relationship with high-velocity driving and anarchic thinking was positive correlated to high-velocity driving. This means that being male and the use of the anarchic thinking style made the use of the high-velocity driving style more likely, while using the conservative or legislative thinking styles made high-velocity driving less likely. Collinearity statistics were computed for all predictive models for high-velocity driving. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the high-velocity driving style.

DEPENDENT VARIABLE PATIENT DRIVING

Table 4-50 displays the results of stepwise multiple regressions with the patient driving style as the dependent variable and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-50: MODEL SUMMARY FOR PATIENT DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.326a	.106	.103	.88153
2	.358b	.128	.123	.87193
3	.386c	.149	.141	.86277
4	.410d	.168	.157	.85464
a. Predictors: (Constant), Hierarchic				
b. Predictors: (Constant), Hierarchic, Monarchic				
c. Predictors: (Constant), Hierarchic, Monarchic, Sex				
d. Predictors: (Constant), Hierarchic, Monarchic, Sex, Age (years)				

The variables hierarchic thinking, monarchic thinking, ‘sex’, and ‘age’ all predicted the high-velocity driving style. The four variables combined predicted 17% of the variance in patient driving scores.

Table 4-51 shows that the variables hierarchic thinking, monarchic thinking, ‘sex’, and ‘age’ were all positive correlated to patient driving. This means that individuals using the hierarchic thinking style, the monarchic thinking style, who are female, and who are older were more likely to demonstrate a patient driving style. Collinearity statistics were computed for all predictive models for patient driving. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the patient driving style.

TABLE 4-51: COEFFICIENTS FOR PREDICTORS OF PATIENT DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.607	.255		10.244	.000		
	Hierarchic	.317	.053	.326	6.036	.000	1.000	1.000
2	(Constant)	2.173	.296		7.344	.000		
	Hierarchic	.277	.054	.284	5.119	.000	.927	1.079
	Monarchic	.148	.053	.155	2.792	.006	.927	1.079
3	(Constant)	1.880	.312		6.032	.000		
	Hierarchic	.250	.054	.257	4.604	.000	.898	1.114
	Monarchic	.150	.052	.157	2.855	.005	.927	1.079
	Sex	.274	.100	.147	2.744	.006	.967	1.034
4	(Constant)	.592	.581		1.019	.309		
	Hierarchic	.247	.054	.253	4.587	.000	.897	1.115
	Monarchic	.143	.052	.149	2.746	.006	.924	1.082
	Sex	.272	.099	.146	2.750	.006	.967	1.034
	Age (years)	.065	.025	.137	2.614	.009	.996	1.004

DEPENDENT VARIABLE CAREFUL DRIVING

Table 4-52 displays the results of stepwise multiple regressions with the careful driving style as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-52: MODEL SUMMARY FOR CAREFUL DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.298a	.089	.086	.78606
2	.328b	.107	.102	.77935
3	.353c	.124	.116	.77322
4	.373d	.139	.128	.76796
5	.389e	.151	.137	.76379

a. Predictors: (Constant), Hierarchic

b. Predictors: (Constant), Hierarchic, Conservative

c. Predictors: (Constant), Hierarchic, Conservative, Sex

d. Predictors: (Constant), Hierarchic, Conservative, Sex, Age (years)

e. Predictors: (Constant), Hierarchic, Conservative, Sex, Age (years), External

The variables hierarchic thinking, conservative thinking, ‘sex’, ‘age’, and external thinking all predicted the careful driving style. All variables combined predicted 15% of the variance in careful driving scores.

TABLE 4-53: COEFFICIENTS FOR PREDICTORS OF CAREFUL DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.187	.227		14.042	.000		
	Hierarchic	.257	.047	.298	5.477	.000	1.000	1.000
2	(Constant)	2.887	.255		11.337	.000		
	Hierarchic	.214	.050	.249	4.328	.000	.882	1.133
	Conservative	.117	.047	.144	2.513	.012	.882	1.133
3	(Constant)	2.661	.269		9.875	.000		
	Hierarchic	.194	.050	.225	3.891	.000	.857	1.166
	Conservative	.117	.046	.144	2.522	.012	.882	1.133
	Sex	.217	.089	.132	2.422	.016	.967	1.034
4	(Constant)	1.637	.523		3.131	.002		
	Hierarchic	.190	.050	.220	3.833	.000	.856	1.168
	Conservative	.117	.046	.144	2.542	.012	.882	1.133
	Sex	.215	.089	.131	2.423	.016	.967	1.034
	Age (years)	.051	.022	.121	2.279	.023	.998	1.002
5	(Constant)	1.426	.530		2.692	.007		
	Hierarchic	.162	.051	.189	3.184	.002	.799	1.252
	Conservative	.106	.046	.131	2.312	.021	.872	1.147
	Sex	.212	.088	.129	2.395	.017	.967	1.034
	Age (years)	.048	.022	.115	2.172	.031	.995	1.005
	External	.095	.046	.117	2.080	.038	.886	1.128

Table 4-53 shows that the thinking styles hierarchic, conservative and external, as well as the variables ‘sex’ and ‘age’ all were positively correlated to careful driving. This means that individuals using the hierarchic, conservative, and external thinking styles, who are female and who are older, were more likely to use a careful driving style. Collinearity statistics were computed for all predictive models for patient driving. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of careful driving.

DEPENDENT VARIABLE ANXIOUS DRIVING

Table 4-54 displays the results of stepwise multiple regressions with the anxious driving style as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-54: MODEL SUMMARY FOR ANXIOUS DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.228a	.052	.049	.73952
2	.278b	.077	.071	.73077
3	.310c	.096	.087	.72454
4	.334d	.112	.100	.71932
5	.354e	.125	.111	.71490
6	.379f	.144	.127	.70865
7	.396g	.157	.137	.70429
8	.416h	.173	.151	.69879

a. Predictors: (Constant), Sex
 b. Predictors: (Constant), Sex, Legislative
 c. Predictors: (Constant), Sex, Legislative, Judicial
 d. Predictors: (Constant), Sex, Legislative, Judicial, Hours driving
 e. Predictors: (Constant), Sex, Legislative, Judicial, Hours driving, Time driving
 f. Predictors: (Constant), Sex, Legislative, Judicial, Hours driving, Time driving, Age (years)
 g. Predictors: (Constant), Sex, Legislative, Judicial, Hours driving, Time driving, Age (years), External
 h. Predictors: (Constant), Sex, Legislative, Judicial, Hours driving, Time driving, Age (years), External, Internal

The independent variables ‘sex’, legislative thinking, judicial thinking, ‘weekly driving hours’, ‘years of driving’, ‘age’, and both external and internal thinking all predicted the anxious driving style. The combined variables accounted for 17% of the variance in anxious driving scores.

Table 4-55 shows the correlations for the eight independent variables and anxious driving. The variables ‘sex’, judicial thinking, and ‘age’ had positive relationships with anxious driving, while legislative thinking, hours driving, years driving, external thinking, and internal thinking were all negatively correlated to anxious driving. This means that being female, the use of the judicial thinking style, and being older, made the use of the anxious driving style more likely. Using the legislative thinking style, driving more hours, having driven for more years, and the use of both the external and internal thinking styles, made anxious driving less likely. Collinearity statistics were computed for all predictive models for anxious driving. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the anxious driving style.

TABLE 4-55: COEFFICIENTS FOR PREDICTORS OF ANXIOUS DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.899	.133		14.259	.000		
	Sex	.345	.084	.228	4.097	.000	1.000	1.000
2	(Constant)	2.561	.264		9.709	.000		
	Sex	.316	.084	.209	3.775	.000	.986	1.014
	Legislative	-.130	.045	-.160	-2.897	.004	.986	1.014
3	(Constant)	2.214	.296		7.479	.000		
	Sex	.309	.083	.204	3.718	.000	.985	1.015
	Legislative	-.170	.047	-.210	-3.600	.000	.872	1.146
	Judicial	.130	.052	.145	2.508	.013	.885	1.131
4	(Constant)	2.187	.294		7.439	.000		
	Sex	.302	.083	.200	3.661	.000	.984	1.017
	Legislative	-.166	.047	-.205	-3.539	.000	.871	1.148
	Judicial	.139	.051	.156	2.706	.007	.879	1.138
	Hours driving	-.001	.000	-.127	-2.333	.020	.987	1.013
5	(Constant)	2.310	.298		7.762	.000		
	Sex	.309	.082	.204	3.765	.000	.982	1.018
	Legislative	-.159	.047	-.196	-3.398	.001	.867	1.154
	Judicial	.137	.051	.154	2.686	.008	.879	1.138
	Hours driving	-.001	.000	-.123	-2.265	.024	.986	1.014
	Time driving	-.036	.017	-.118	-2.183	.030	.992	1.008
6	(Constant)	1.165	.541		2.152	.032		
	Sex	.309	.081	.204	3.795	.000	.982	1.018
	Legislative	-.164	.046	-.203	-3.543	.000	.865	1.156
	Judicial	.135	.051	.151	2.655	.008	.878	1.139
	Hours driving	.000	.000	-.115	-2.147	.033	.983	1.017
	Time driving	-.066	.020	-.213	-3.256	.001	.661	1.512
	Age (years)	.064	.025	.165	2.524	.012	.661	1.513
7	(Constant)	1.308	.542		2.414	.016		
	Sex	.327	.081	.216	4.019	.000	.972	1.029
	Legislative	-.153	.046	-.190	-3.314	.001	.855	1.169
	Judicial	.179	.054	.201	3.297	.001	.753	1.329
	Hours driving	.000	.000	-.111	-2.071	.039	.982	1.019
	Time driving	-.065	.020	-.212	-3.258	.001	.661	1.512
	Age (years)	.066	.025	.170	2.612	.009	.660	1.515
	External	-.097	.045	-.129	-2.179	.030	.797	1.254
8	(Constant)	1.692	.561		3.016	.003		
	Sex	.334	.081	.220	4.134	.000	.971	1.030
	Legislative	-.092	.052	-.114	-1.762	.079	.655	1.527
	Judicial	.207	.055	.232	3.746	.000	.721	1.388
	Hours driving	-.001	.000	-.123	-2.314	.021	.972	1.029
	Time driving	-.066	.020	-.214	-3.309	.001	.661	1.512
	Age (years)	.064	.025	.166	2.569	.011	.660	1.516
	External	-.145	.048	-.193	-2.987	.003	.663	1.508
	Internal	-.122	.051	-.155	-2.399	.017	.656	1.524

DEPENDENT VARIABLE DISTRESS REDUCTION DRIVING

Table 4-56 displays the results of stepwise multiple regressions with the distress reduction driving style as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-56: MODEL SUMMARY FOR DISTRESS REDUCTION DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.138a	.019	.016	.81041
a. Predictors: (Constant), Sex				

The variable ‘sex’ was the only predictor of the distress reduction driving style and it explained 2% of the variance in the distress reduction driving scores.

TABLE 4-57: COEFFICIENTS FOR PREDICTORS OF DISTRESS REDUCTION DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.966	.146		20.328	.000		
	Sex	-.225	.092	-.138	-2.444	.015	1.000	1.000

Table 4-57 shows that the variable ‘sex’ had a negative correlation to distress reduction driving, which means that females were more likely to use this driving style.

DEPENDENT VARIABLE DISSOCIATIVE DRIVING

Table 4-58 displays the results of stepwise multiple regressions with the dissociative driving style as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables. The variables legislative thinking, anarchic thinking, external thinking, and global thinking all predicted the dissociative driving style. The combined variables explained 8% of the variance in dissociate driving scores.

TABLE 4-58: MODEL SUMMARY FOR DISSOCIATIVE DRIVING

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.131a	.017	.014	.75482
2	.201b	.040	.034	.74713
3	.251c	.063	.054	.73939
4	.274d	.075	.063	.73593

a. Predictors: (Constant), Legislative
 b. Predictors: (Constant), Legislative, Anarchic
 c. Predictors: (Constant), Legislative, Anarchic, External
 d. Predictors: (Constant), Legislative, Anarchic, External, Global

TABLE 4-59: COEFFICIENTS FOR PREDICTORS OF DISSOCIATIVE DRIVING

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.638	.223		11.810	.000		
	Legislative	-.107	.046	-.131	-2.323	.021	1.000	1.000
2	(Constant)	2.282	.257		8.869	.000		
	Legislative	-.154	.049	-.189	-3.160	.002	.873	1.146
	Anarchic	.142	.053	.163	2.711	.007	.873	1.146
3	(Constant)	2.595	.279		9.291	.000		
	Legislative	-.138	.048	-.171	-2.860	.005	.861	1.161
	Anarchic	.188	.055	.215	3.448	.001	.789	1.267
	External	-.123	.045	-.163	-2.728	.007	.857	1.167
4	(Constant)	2.324	.310		7.491	.000		
	Legislative	-.160	.049	-.197	-3.239	.001	.818	1.222
	Anarchic	.178	.055	.203	3.250	.001	.781	1.280
	External	-.140	.046	-.186	-3.060	.002	.827	1.209
	Global	.125	.063	.118	1.969	.050	.851	1.175

Table 4-59 shows that the legislative and external thinking styles had a negative correlation with dissociative driving and anarchic and global thinking had a positive correlation with dissociative driving. Thus individuals using legislative or external thinking are less likely to drive dissociatively, while individuals using anarchic or global thinking are more likely to demonstrate dissociative driving. Collinearity statistics were computed for all predictive models for dissociative driving. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the dissociative driving style.

DEPENDENT VARIABLE RECKLESS AND CARELESS DRIVING DOMAIN

Table 4-60 displays the model summary for stepwise multiple regressions with the reckless and careless driving style domain as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-60: MODEL SUMMARY FOR RECKLESS AND CARELESS DOMAIN

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.291a	.085	.082	.87502
2	.328b	.107	.102	.86559
3	.357c	.127	.119	.85733
4	.393d	.154	.143	.84533
5	.412e	.170	.156	.83896
a. Predictors: (Constant), Sex				
b. Predictors: (Constant), Sex, Conservative				
c. Predictors: (Constant), Sex, Conservative, Anarchic				
d. Predictors: (Constant), Sex, Conservative, Anarchic, Legislative				
e. Predictors: (Constant), Sex, Conservative, Anarchic, Legislative, Age (years)				

The variables ‘sex’, conservative thinking, anarchic thinking, legislative thinking, and ‘age’ all predicted the reckless and careless driving style domain. The combined variables explained 17% of the variance in scores on this domain.

Table 4-61 shows that the variables ‘sex’, conservative thinking, legislative thinking, and ‘age’ had a negative correlation to the reckless and careless driving domain, while anarchic thinking had a positive relationship with reckless and careless driving. Thus males and individuals who used anarchic thinking were more likely to display this driving style, while people using conservative or legislative thinking and individuals who were older, were less likely to use the reckless and careless driving style domain. Collinearity statistics were computed for all predictive models for the reckless and careless style. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the reckless and careless driving domain.

TABLE 4-61: COEFFICIENTS FOR PREDICTORS OF RECKLESS AND CARELESS DOMAIN

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.403	.158		21.595	.000		
	Sex	-.531	.100	-.291	-5.337	.000	1.000	1.000
2	(Constant)	3.956	.253		15.646	.000		
	Sex	-.513	.099	-.281	-5.199	.000	.996	1.004
	Conservative	-.136	.049	-.150	-2.780	.006	.996	1.004
3	(Constant)	3.405	.326		10.433	.000		
	Sex	-.499	.098	-.274	-5.097	.000	.993	1.007
	Conservative	-.155	.049	-.172	-3.171	.002	.973	1.028
	Anarchic	.150	.057	.143	2.632	.009	.975	1.025
4	(Constant)	4.059	.384		10.567	.000		
	Sex	-.530	.097	-.291	-5.463	.000	.982	1.018
	Conservative	-.168	.048	-.187	-3.484	.001	.965	1.036
	Anarchic	.218	.060	.207	3.619	.000	.847	1.181
	Legislative	-.173	.056	-.178	-3.117	.002	.855	1.170
5	(Constant)	5.187	.609		8.513	.000		
	Sex	-.525	.096	-.288	-5.448	.000	.981	1.019
	Conservative	-.167	.048	-.185	-3.474	.001	.965	1.036
	Anarchic	.218	.060	.207	3.635	.000	.847	1.181
	Legislative	-.162	.055	-.167	-2.935	.004	.849	1.178
	Age (years)	-.058	.025	-.125	-2.374	.018	.992	1.008

DEPENDENT VARIABLE PATIENT AND CAREFUL DRIVING DOMAIN

Table 4-62 displays model summary for stepwise multiple regressions with the patient and careful driving style domain as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’ (years), and ‘hours driving’ (per week) as the independent variables. The variables hierarchic thinking, conservative thinking, ‘sex’, ‘age’, legislative thinking, anarchic thinking, and external thinking all predicted the patient and careful driving domain. The combined variables explained 23% of the variance in scores on this domain.

TABLE 4-62: MODEL SUMMARY FOR PATIENT AND CAREFUL DOMAIN

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.356a	.127	.124	.71330
2	.389b	.151	.145	.70437
3	.418c	.175	.167	.69545
4	.445d	.198	.187	.68689
5	.459e	.211	.198	.68241
6	.471f	.221	.206	.67896
7	.482g	.233	.215	.67525
a. Predictors: (Constant), Hierarchic				
b. Predictors: (Constant), Hierarchic, Conservative				
c. Predictors: (Constant), Hierarchic, Conservative, Sex				
d. Predictors: (Constant), Hierarchic, Conservative, Sex, Age (years)				
e. Predictors: (Constant), Hierarchic, Conservative, Sex, Age (years), Legislative				
f. Predictors: (Constant), Hierarchic, Conservative, Sex, Age (years), Legislative, Anarchic				
g. Predictors: (Constant), Hierarchic, Conservative, Sex, Age (years), Legislative, Anarchic, External				

With the exception of anarchic thinking, all predictor variables were positively correlated to the patient and careful domain. This means individuals using the hierarchic, conservative, legislative or external thinking styles, that were female, and that were older, are more likely to use the patient and careful driving style domain. Individuals employing the anarchic thinking style were less likely to use this driving style. Collinearity statistics were computed for all predictive models for the patient and careful driving style domain. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the patient and careful driving domain.

TABLE 4-63: COEFFICIENTS FOR PREDICTORS OF THE PATIENT AND CAREFUL DOMAIN

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.929	.206		14.223	.000		
	Hierarchic	.284	.043	.356	6.669	.000	1.000	1.000
2	(Constant)	2.609	.230		11.335	.000		
	Hierarchic	.238	.045	.299	5.324	.000	.882	1.133
	Conservative	.125	.042	.167	2.972	.003	.882	1.133
3	(Constant)	2.358	.242		9.730	.000		
	Hierarchic	.216	.045	.270	4.812	.000	.857	1.166
	Conservative	.125	.042	.166	2.996	.003	.882	1.133
	Sex	.240	.080	.158	2.984	.003	.967	1.034
4	(Constant)	1.176	.468		2.515	.012		
	Hierarchic	.211	.044	.264	4.763	.000	.856	1.168
	Conservative	.125	.041	.166	3.037	.003	.882	1.133
	Sex	.238	.079	.157	3.000	.003	.967	1.034
	Age (years)	.059	.020	.151	2.941	.004	.998	1.002
5	(Constant)	.836	.489		1.709	.088		
	Hierarchic	.172	.047	.215	3.623	.000	.738	1.354
	Conservative	.140	.041	.186	3.382	.001	.859	1.165
	Sex	.272	.080	.179	3.389	.001	.933	1.072
	Age (years)	.055	.020	.142	2.776	.006	.992	1.008
	Legislative	.101	.045	.124	2.236	.026	.843	1.186
6	(Constant)	1.017	.495		2.056	.041		
	Hierarchic	.183	.047	.229	3.854	.000	.728	1.373
	Conservative	.150	.041	.200	3.616	.000	.846	1.181
	Sex	.266	.080	.175	3.324	.001	.931	1.074
	Age (years)	.055	.020	.142	2.779	.006	.992	1.008
	Legislative	.130	.047	.160	2.756	.006	.765	1.307
	Anarchic	-.099	.049	-.112	-2.021	.044	.835	1.198
7	(Constant)	.929	.494		1.881	.061		
	Hierarchic	.167	.048	.209	3.493	.001	.710	1.409
	Conservative	.141	.041	.187	3.388	.001	.836	1.196
	Sex	.255	.080	.168	3.201	.002	.927	1.079
	Age (years)	.053	.020	.137	2.695	.007	.990	1.010
	Legislative	.122	.047	.150	2.586	.010	.760	1.317
	Anarchic	-.127	.050	-.145	-2.518	.012	.774	1.292
	External	.089	.043	.118	2.080	.038	.798	1.253

DEPENDENT VARIABLE ANXIOUS DRIVING DOMAIN

Table 4-64 displays the model summary for stepwise multiple regressions with the anxious driving style domain as the dependent variable, and the thirteen thinking styles, ‘sex’, ‘age’, ‘time driving’(years), and ‘hours driving’ (per week) as the independent variables.

TABLE 4-64: MODEL SUMMARY FOR ANXIOUS DOMAIN

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.177 ^a	.031	.028	.55944
2	.228 ^b	.052	.046	.55427
3	.264 ^c	.070	.061	.55000
4	.289 ^d	.083	.071	.54685
5	.315 ^e	.099	.084	.54295
a. Predictors: (Constant), Legislative				
b. Predictors: (Constant), Legislative, Anarchic				
c. Predictors: (Constant), Legislative, Anarchic, External				
d. Predictors: (Constant), Legislative, Anarchic, External, Internal				
e. Predictors: (Constant), Legislative, Anarchic, External, Internal, Judicial				

The variables legislative thinking, anarchic thinking, external thinking, internal thinking, and judicial thinking all predicted the anxious driving style domain. The combined variables explained 10% of the variance in anxious domain scores.

Table 4-65 shows that the legislative, the external, and the internal thinking styles had a negative correlation to the anxious domain, while anarchic and judicial thinking were positively correlated to the anxious driving style domain. This means that individuals using legislative, external or internal thinking were less likely to demonstrate driving behaviour fitting into the anxious domain and participants employing anarchic and judicial thinking were more likely to use the anxious driving style domain. Collinearity statistics were computed for all predictive models for the anxious driving style domain. The independent variables were not highly correlated with each other and therefore contributed something unique to the prediction of the anxious driving domain.

TABLE 4-65: COEFFICIENTS FOR PREDICTORS OF ANXIOUS DOMAIN

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.851	.166		17.218	.000		
	Legislative	-.107	.034	-.177	-3.143	.002	1.000	1.000
2	(Constant)	2.597	.191		13.608	.000		
	Legislative	-.140	.036	-.232	-3.891	.000	.873	1.146
	Anarchic	.101	.039	.155	2.598	.010	.873	1.146
3	(Constant)	2.802	.208		13.490	.000		
	Legislative	-.130	.036	-.215	-3.621	.000	.861	1.161
	Anarchic	.131	.041	.201	3.233	.001	.789	1.267
	External	-.081	.034	-.143	-2.403	.017	.857	1.167
4	(Constant)	3.061	.240		12.772	.000		
	Legislative	-.089	.041	-.148	-2.195	.029	.667	1.499
	Anarchic	.146	.041	.224	3.567	.000	.766	1.305
	External	-.112	.036	-.198	-3.066	.002	.720	1.389
	Internal	-.083	.039	-.142	-2.127	.034	.672	1.487
5	(Constant)	2.971	.241		12.321	.000		
	Legislative	-.099	.041	-.164	-2.446	.015	.659	1.517
	Anarchic	.129	.041	.198	3.124	.002	.742	1.348
	External	-.144	.039	-.256	-3.714	.000	.627	1.594
	Internal	-.099	.040	-.169	-2.509	.013	.653	1.532
	Judicial	.101	.043	.151	2.320	.021	.703	1.423

4.4 SUMMARY

This chapter presented the results of the quantitative analysis of the data collected with the questionnaire package. From the outcomes the following conclusions may be drawn.

The present findings reinforce the theory that people tend to use clusters of thinking styles (Sternberg 1997) and that some thinking styles in the theory of MSG are more closely related to each other than are others. The finding that some correlations between thinking styles are in directions not predicted by the theory of MSG supports previous research (e.g. Zhang and Sachs 1997; Zhang and Sternberg 2000). Significant evidence was found for sex differences in the thinking styles of the participants; males scored higher on the legislative style, while females scored higher on the hierarchic style. This study found no age-related differences in thinking styles. This supports some earlier research (Zhang 2002a) although other studies have found ‘age’ linked to certain thinking styles (Nielsen 2005; Zhang 1999; 2001b; 2005b). There is some evidence for a relationship between

participants' field of study and their thinking styles, with applied science students scoring highest on hierarchic thinking and science students lowest. However, considering the uneven division of participants across the different studies, this result can only be viewed as indicative.

Young male drivers holding a full drivers licence scored highest on the hierarchic thinking style. During the first six years of driving (pre-licensed and licensed) young males scored cumulatively higher on the legislative thinking style, while no significant effect was found for females. Significant evidence was also found that males driving between six and ten hours per week are most likely to use the hierarchic and internal thinking styles, while females driving the same amount of hours scored highest on the anarchic, local and conservative thinking styles. No previous studies exist with which to compare these results.

The interscale correlations for the MDSI driving styles were all in the anticipated directions, confirming findings of previous research (Taubman - Ben-Ari et al. 2004). The present study found sex differences in the strength of the significant correlations between different driving styles, which is supported by an earlier study (Taubman - Ben-Ari 2006). This study found significant evidence for sex differences in the use of the eight driving styles; young male participants were more likely to use the negative driving styles (risky, angry, high-velocity) and young females were more likely to use the positive driving styles (patient, careful) and the anxious driving style. This sex difference was even clearer when examining the four driving style domains. There is significant evidence that males use the reckless and careless driving style domain more and females use the patient and careful driving style domain more. Previous research using the MDSI had mixed results in relation to sex differences (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2004) but the present results support other studies that found male drivers were more likely to use a risky driving style, while females were more oriented on safety (Özkan 2006; Özkan and Lajunen 2005; Zimbardo et al. 1997).

The present study found that for males 'age' is significantly related to the careful driving style and the patient and careful domain; males score higher on these positive driving styles as they get older. Although it has to be noted that the age range in this study was limited (18-25 years), the findings support previous research (Åberg and Rimmö 1998; Mayhew, Simpson and Pak 2003).

Significant evidence was found for study-related differences in driving style, and these are different for males and females. Male vocational students scored high on risky and dissociative

driving. Female science students were most likely to use the dissociative style, while applied science students scored low. Previous studies examined 'level of education' rather than 'field of study' (e.g. Braver 2003; Taubman - Ben-Ari et al. 2004) so the present findings indicate a possible new area of interest in relation to driving.

This study has not found any links between type of drivers licence and any driving styles. There is some significant evidence for differences in driving style in relation to the number of driving years (pre-licensed and unlicensed), but no clear trend is present. The scores on the positive driving styles seemed to increase following an initial dip after the first year of driving, especially for males. For females, the trend shows a positive incline in angry driving during the first four years and they score lowest on dissociative driving after seven years.

The present study found significant effects for 'exposure' and several driving styles. Young males driving over ten hours a week are most likely to use the risky, high-velocity and dissociative driving styles. Young females who drive more than ten hours per week score highest on the negative driving styles (risky, angry, high-velocity) and are least likely to use the patient and careful driving styles. These findings support previous research (Elander et al. 1993).

Significant evidence was found for correlations between thinking styles and driving styles and for some sex differences in these relationships. Since this study focused on 'normal' safe driving, the most important findings are the positive correlations for both males and females between the executive, hierarchic, monarchic, oligarchic, external, and conservative thinking styles and patient and careful driving. The relationship between hierarchic thinking and the positive driving styles is substantially stronger for females than for males. When controlling for the variables 'sex' and 'age' most correlations between thinking and driving styles remain and they are similar in strength to the earlier findings.

The next chapter presents the findings from the group interviews.

5 QUALITATIVE RESULTS

Chapter 4 presented the quantitative analysis of the data that were obtained using self-report measures (TSI-R, MDSI) as a first step in answering the research questions of this study. The quantitative data provided confirmatory knowledge on the existence of relationships between young drivers' thinking styles and driving styles. The present chapter concentrates on exploratory knowledge, focusing on the meaning of both constructs for young drivers, as well as on themes that emerged from the qualitative data. The findings are related to all sub research questions, but particularly to the following: *Can driving and thinking styles both be intellectual styles? Is a driving style a preferred way or a habitual way of driving? How does a driving style develop? How can road safety be defined in a positive way?*

The findings from four group interviews with young drivers are presented. Throughout the chapter, examples illustrate the analysis of the group interview data. Where possible, these examples are in the form of blocks of conversation rather than a series of individual answers, in order to preserve the context of the information and the interactive quality of the data (Ehigie and Ehigie 2005; Wilkinson 2004). Presenting the data in this way also demonstrates the way in which the young drivers, as a group, construct meaning for the concepts of thinking and driving style. The group interview data are essential in the development of a clearer definition of driving style and also to get a better understanding of the effect of either a negative or a positive focus on road safety.

This chapter consists of three sections. The first section discusses the meaning that the constructs of thinking style and driving style have for young drivers in relation to the proposition made in this thesis that both styles can be regarded as cognate constructs. The second section focuses on the alignment between the quantitative and qualitative data. The correlations between thinking and driving styles that were found in the quantitative results indicate that this study's findings present an opportunity to improve driver training. Therefore, the second section also presents the experience of group interview participants with learning to drive. The third section discusses the main themes that emerged from the group interview data.

5.1 THE CONSTRUCTS OF THINKING AND DRIVING STYLE

This study proposed that thinking style and driving style could be seen as similar constructs; therefore they can both be regarded as intellectual styles as defined in the threefold model of intellectual styles (Zhang and Sternberg 2005). This section examines the way in which group interview participants talk about both concepts in order to determine if the proposition of thinking and driving style as cognate constructs is meaningful. Thinking style is discussed first, followed by driving style.

5.1.1 THINKING STYLE CONSTRUCT

A thinking style is seen as a (preferred) way of thinking (Sternberg 1997) so it is more concerned with the process or strategy of thinking than with the content or actual thoughts. Without mentioning the actual term ‘thinking style’, participants were asked about their thinking in relation to their driving. In response, participants in all groups tended to discuss what they were thinking about (content) while driving, rather than the way they were thinking (process). Driving experience was a factor that influenced what participants were thinking about in the car, with less experienced participants thinking more about technical details (e.g. changing gears) and more about the road rules (e.g. sticking to the speed limit) than participants who had been driving for longer. This is illustrated in Example 5-1, where Kaitlin’s (2.5 years driving) thinking was still quite focused on the act of driving, while the more experienced participants (8 and 6 years driving) agreed this concentration on technique wears off over time.

EXAMPLE 5-1: WHAT YOUNG DRIVERS THINK ABOUT WHILE DRIVING

Kaitlin: (...) I try to follow the rules, but at the same time I’m not thinking about all sorts of different things at once. Like, maybe I think about the rules as they come up? Oh traffic light, I should stop. Or a give way sign, I should have looked? It’s a roundabout, I should slow down. Like I follow all the rules, but maybe I’m not concentrating on multiple things at once? I tend to get very focused on one.

(...)

Peter: I wonder if people think very consciously about ... like you’re describing that ‘oh there’s a traffic light, I need to stop’, or whether it’s kind of an intuitive thing in your

subconscious. Like you're going with the flow, but maybe that's different the longer you've been driving?

Anna: I'd say so, yeah.

Peter: You know, if you have just been ... I assume all L-plates would be thinking very consciously about each rule and about each of the different things, the controls in their car that they have. Uhm, you know, but maybe ten years out, or twenty years out, whether some people are still thinking quite consciously about all of those things?

When this 'driving focused' thinking diminishes over time, participants admitted to thinking about other things than driving while in the car, such as university assignments or anticipating being home (which will be discussed more extensively in relation to the dissociative driving style). However, without prompting, participants in all groups mentioned the importance of concentrating on the driving itself instead of thinking about other things, in order to stay safe. For example, according to participants it is easy to speed when you are not thinking about what you are doing. Example 5-2 illustrates how participants discussed their thinking while driving and what they considered to be the 'right frame of mind' for driving.

EXAMPLE 5-2: THE RIGHT FRAME OF MIND FOR DRIVING

Elaine: Well that's why people like when they're angry they drive and they go too fast and stuff.

Karin: And they get distracted thinking about other stuff.

Elaine: Yeah, and Stephen said when he was distracted he obviously made a few errors. So yeah, you've got to be in the right frame of mind.

Facilitator: So what do you think is the right frame of mind as Elaine puts it so neatly?

What is the right frame of mind to drive?

Mavis: Just normal. [all laugh]

Facilitator: Can you explain normal?

Mavis: Normal, just like you can think, think, think clearly. Not so many things in your mind.

Elaine: Just a normal day.

Mavis: Just a normal day, most of the day.

Elaine: Not too busy.

Near the end of each group interview the facilitator provided participants with a brief written explanation of the thirteen thinking styles of the theory of Mental Self-Government (MSG, Sternberg 1997) as shown in Table 3-1.

Most participants could identify with one or more thinking styles, especially in relation to specific contexts. This supports previous research which suggests that “thinking styles ... appear to be the products of one’s interactions with their environment” (Bernardo et al. 2002: 152). Participants talked about using different thinking styles in different circumstances, which demonstrated that they were capable of switching between styles and adapting their thinking style to, for instance, different task demands. This supports earlier research postulating that thinking styles are psychological states rather than traits (Zhang and Sternberg 2005; 2006). Other studies found that students were able to adapt their thinking styles to the type of assessment that was used in their university course (e.g. essay writing versus a multiple choice exam) (Grigorenko and Sternberg 1997; Zhang and Sternberg 2000).

EXAMPLE 5-3: THINKING STYLES AS STATES

Donald: I don't know if this suits the guys, but legislative [both guys chuckle] a little bit yeah

...

Facilitator: They do tend to be more legislative.

Donald: It's just, I don't know, it sort of sticks to the way you like to think, for driving. So again, like judicial as well. Uhm, if the rule makes sense - even a road rule makes sense - then I'm going to like stick with it. But if it's - like road works and there's nowhere, I'm just going to stick to the standard speed limit as it was. Like if I was in that situation, I'm not going to risk it. But if it's obvious, like I like to be - I know it doesn't say here - but logical.

A lot of stuff that's how, I don't know, I approach it, but local as well. So like you said parking space. I know me and my friend used to be really like - it would get to the stage where you'd be like - you'd call him over and go like say 'the same gap from the gutter'. Like you make it as difficult as you can and then the day you pull it off, I don't know it's just precision, especially in parking, I don't know, especially that, that sort of stands out. But yes that's ...

Facilitator: So it's like a skill thing?

Donald: Yeah, yeah in terms of skills.

Example 5-3 shows how one participant explained how he tends to use the legislative or judicial thinking style while driving, but switches to the local thinking style when parking the car. Discussions in the other group interviews supported this idea of switching thinking styles for different driving tasks. However, participants did not mention any element of choice on their part in relation to the use of different thinking styles in different circumstances. They described any style switches as a consequence of changing contexts or task demands, rather than acknowledging their own role as actors, deciding to use a different style for a different purpose.

The analysis of the questionnaire data, as presented in Chapter 4, found hierarchic thinking to be the most influential style in relation to patient and careful driving. Therefore the researcher was especially interested how the groups would construct meaning for this thinking style without being prompted to talk about any thinking style in particular. Several participants in all groups identified with the hierarchic thinking style. In line with the theory of MSG (Sternberg, Grigorenko and Zhang 2008) they considered hierarchic thinking to be a way of planning their day or planning a route to run several errands in order to be time efficient, as is evident from Example 5-4.

EXAMPLE 5-4: YOUNG DRIVERS CONSTRUCTING HIERARCHIC THINKING

Renee: I think in our case as well, like with the multiple things like doing it at the same time, it's with how you - how your lifestyle is. So if you've got a really busy lifestyle, you sort of plan everything out so that you - because you have to fit it in, you have to do that to ...

Sylvia: Yeah.

Renee: ... fit everything in. That's - and that follows in with your driving. How sort of busy you make your life, because you generally make your life very busy.

Nigel: Yeah. I think that my car and lack of car, again, encourages that sort of thinking. Like if I'm going to the city, for example, I want to get four things done at once rather than take four individual trips, so yeah.

Where the questionnaire data showed that females were more likely to use the hierarchic thinking style this sex difference was not directly evident in the group interview sessions. Those participants, of both sexes, identified with the hierarchic thinking style, specifically the ones studying

architecture and creative writing. One participant stated that in architecture students are trained to use hierarchic thinking through the use of project based learning. Another participant confirmed that this teaching style was also used in their creative writing studies. Two participants (one male, one female) in another group interview both had parents who worked as teachers and taught them to think hierarchically.

5.1.2 DRIVING STYLE CONSTRUCT

The driving styles of the MDSI have been conceptualised as the way an individual habitually drives (Taubman - Ben-Ari et al. 2004) which is in alignment with the widely used definition in traffic safety research stating that the way drivers choose to drive, or their habitual way of driving, can be seen as their driving style (Elander et al. 1993). Participants in the group interviews were asked if they could describe the way they drove, without the researcher mentioning the actual term 'driving style'. In response, all participants described their driving within a contextual framework rather than simply describing the way they chose to drive or habitually drove. As Example 5-5 shows, the participant characterises her driving as 'fast' or 'speeding', but 'just' on the highway, while 'in town' her driving is 'fine'.

EXAMPLE 5-5: DRIVING DESCRIBED IN A CONTEXTUAL FRAMEWORK

Elaine: Okay I'll start. How do I drive? Probably too fast on the highway, but I think usually all right, I try to be careful, but yes I probably speed a little bit on the highway. But it's just because I get bored and sleepy so I want to get to my destination.

Stephen: You do follow too closely.

Elaine: Yeah all right, I only tailgate a little as well. But yeah, in town like - yes I think I'm fine in town. It's just on the highway that I like to be slightly irresponsible. You?

Analogous with the definition of thinking style as a preferred way of thinking, participants were prompted to describe their 'preferred way of driving', which this study posits as driving style. In response, participants mainly referred to a preference for external contextual elements, such as long stretches of empty road, night time, or the absence of traffic lights. Even participants who at other times during the group interview in effect had described how they generally liked to drive (e.g. speeding, driving defensively) did not refer to this when asked about their preferred way of driving. Thus it emerged from the data that participants' awareness was centred on their driving behaviour in

specific contexts and that they were not aware of their underlying preferences for certain driving styles.

Towards the end of the group interview the researcher presented the participants with a short description of the eight driving styles of the MDSI (Taubman - Ben-Ari et al. 2004) as shown in Table 3-4. Most participants identified with one or more driving styles and they linked different styles to different contexts, in a similar fashion to their identification with certain thinking styles in specific contexts. Participants described how they would change driving styles depending on the circumstances, as Example 5-6 illustrates, in which a participant describes how he uses different driving styles depending on their feelings or mood (e.g. being in a hurry) or the driving context (e.g. in a big city). This supports this thesis' proposition that thinking style and driving style could be cognate constructs.

EXAMPLE 5-6: FLEXIBILITY IN USE OF DRIVING STYLES

Eric: I'm usually pretty patient, I think. But I can do them all.

Facilitator: So when, when would you do what?

Eric: When I'm in a hurry, when I'm working to a deadline or something I'm usually pretty irritated and stuff if the traffic's not moving very quickly.

Facilitator: So you'd be angry?

Eric: Yeah, yeah. It's always a funny angry, but uhm, it's always anxious when you're driving in the middle of Sydney or something like that. And you do a lot of daydreaming when you're on a long drive, I guess.

While it was proposed that a driving style can be a 'preferred way of driving' in the same way as a thinking style is a 'preferred way of thinking', the group interview data showed that participants were mostly not aware that they may choose different options for their driving. Only a few participants acknowledged that they made conscious decisions in relation to their driving style, for instance choosing to drive patiently because they did not want to hurt anybody, or choosing to speed because they could not think of any negative consequences. Most participants however described their driving style as a more or less direct consequence of the driving environment.

In the present study it was proposed that thinking style and driving style are both intellectual styles. The data showed that participants in the group interviews constructed meaning for both

concepts in a similar way. Participants discussed both thinking and driving style in a contextual framework, and they indicated they would use different styles in adaptation to a changing context and/or different task demands. The data demonstrated that participants were focused on the manifestation of their use of certain thinking or driving styles in specific circumstances. The discussions showed that participants were generally not aware of their underlying preferences (the way they like to think or drive), nor of their own role as actors in these situations and being able to make choices as to which thinking or driving style to use.

5.2 GROUP INTERVIEW DATA COMPARED TO QUESTIONNAIRE RESULTS

This section examines if the group interview data reflected this study's findings on young drivers' thinking and driving styles from the quantitative data. This section is structured in a similar way to Chapter 4, discussing thinking styles first, followed by driving styles, and concludes with findings on the correlations between thinking and driving styles.

5.2.1 THINKING STYLES

There was significant evidence in the questionnaire data of a correlation between the factor 'sex' and the use of certain thinking styles. Young male drivers scored higher on the legislative thinking style and young female drivers were more likely to use the hierarchic thinking style. These sex differences were not evident from the group interview data.

The quantitative data of the present study did not yield any evidence for a correlation between age and thinking styles, and neither did the group interview data.

There was significant evidence in the questionnaire data for relationships between field of study and the hierarchic, internal, and liberal thinking styles. As discussed in section 5.1.1, the group interview data suggested that hierarchic thinking may be linked to both architecture and creative writing studies, which is consistent with the results of the quantitative data.

In the questionnaire data statistically significant relationships were found between 'exposure' (hours driving/week) and the hierarchic and internal thinking styles for males, and between 'exposure' and the anarchic, local and conservative thinking styles for females. This was not directly evident in the group interviews.

Participants more easily talked about driving and their way of driving (driving style and driving behaviour) than they discussed their thoughts or thinking processes (thinking styles) while driving. Discussions on driving flowed much more readily and without much probing from the researcher, while any talk on thinking was less fluid and required a bit more querying. While not all correlations found in the quantitative data are reflected in the group interview data, this does not necessarily mean the relationships are not there; only that the group interviews in this format were not able to reveal them.

5.2.2 DRIVING STYLES

This study's quantitative data analysis found that young females were more likely to use the patient, careful, and anxious driving styles, while young males tended to use the risky, angry, and high-velocity driving styles. Similar to the thinking styles, these sex differences in the use of positive and negative driving styles were not as evident in the group interviews. For instance, both male and female participants identified with the patient or careful driving styles for most of the time but said they would use other styles when they were in a hurry, were in a bad mood, or when someone would annoy them on the road. The finding that participants would be less patient and careful when under time pressure is supported by previous research (Summala 1985).

Only one (male) participant identified with the patient driving style as their most used style regardless of their mood. He was one of the older participants (24 years) of the group interviews, and he had more driving experience than the majority of participants. This is consistent with the findings of the questionnaire data from the present study, as well as with previous research (see for instance Arnett et al. 2002), that males scored higher on the positive driving styles when they were older and when they had been driving for longer.

Significant evidence was found in the questionnaire data for correlations between 'age' and several driving styles although no clear trend was present. The group interview data, on the other hand, emphasised a relationship between 'driving experience' and driving rather than between 'age' and certain driving styles. Participants in all groups talked about experience as an important element of 'actual' driving, as is illustrated in Example 5-7, while 'age' was not mentioned by participants in any of the group interviews.

EXAMPLE 5-7: THE IMPORTANCE OF EXPERIENCE IN DRIVING

Linda: I wasn't driving well enough, I wasn't experienced enough before the car accident. In the ACT it's different to New South Wales. We only have like 60 hours mandatory driving, nobody made sure I hit that on my Ls. I had a good driving instructor, but it was more about technique than actual driving.

Facilitator: And so like driving skills?

Linda: Yeah like doing three-point turns. But yeah, I learnt more about driving when I actually started ... on my Ps than I did when I was on my Ls.

Facilitator: Because then you were really driving?

Linda: Yeah, like my mum was too scared to drive with me in the rain. [chuckles] So, I had to do that one on my own.

The quantitative results did not yield a clear trend in the correlations between experience and driving style, although some sex differences were found that were not reflected in the group interview data. Several participants of the group interviews pinpointed the transition from driving under supervision with L-plates to driving by oneself with P-plates (which can only take place when a young driver has enough experience on the road) as a major influence on changing one's driving style. This is illustrated in Example 5-8 where a participant describes how one's driving style changes when switching to P-plates, and another participant indicates to someone presently on L-plates that their driving will change over time.

EXAMPLE 5-8: INFLUENCE OF EXPERIENCE ON CHANGE IN DRIVING STYLE

Renee: I think you learn a lot when you do start driving by yourself as well. uhm, like I learnt to drive with a lot of different people so I can sort of - they were very different in all their styles but then once you get out by yourself, at first it's sort of very intimidating. You're like "my goodness. I feel so naughty taking the car out by myself" [others laugh] and then you get into like the little phase where you can go sort of - not as fast as you want, but you can sort of take corners a lot faster without someone telling you off and you tend to be very reckless sort of, I guess, the first year. That's why red P-platers have such a bad reputation, because even sort of I, the first sort of year, was probably - always went a bit faster than I should've and took risks a little bit more than I do now and then you

sort of get over driving by yourself. [Sylvia chuckles] It's not as sort of exciting as you thought it was and you sort of tone it down and sort of a lot more responsible when you sort of realise what your car's capable of and how little it takes to actually have an accident.

Nigel: Yeah.

...

Facilitator: Right. Liam, have you any idea about your driving style?

Liam: Mainly careful and patient, I suppose.

Jonathan: I reckon we should interview you again when you're a P-plater. [chuckles]

Sylvia: Yeah.

Renee: It changes.

The quantitative analysis of this study found that participants were more likely to use a patient or careful driving style if they drove fewer hours per week. The more they drove, the more likely it was they would use negative driving styles (risky, angry, high-velocity and dissociative). The group interview data reflected some of these relationships. For instance, participants in all group interviews mentioned how, during long(er) drives, they would have a tendency to use a dissociative driving style. They would also use a high-velocity driving style more frequently during long drives in order to either make a boring drive more interesting or, at least, to shorten the drive as much as possible.

5.2.3 THE RELATIONSHIPS BETWEEN THINKING AND DRIVING STYLES

Participants discussed the relationship between thinking and driving styles through the use of several words that refer to thinking: 'thinking', 'consciously', 'focus', 'concentration', 'pay attention' or a combination of these words such as 'consciously thinking'. The strongest theme that emerged from all group interviews on this topic was 'not thinking/thinking about other things while driving' rather than 'thinking while driving'. Participants agreed that 'thinking while driving' was preferable from the point of safety for self and others, as was illustrated in Example 5-2 where participants described 'clear thinking' as the right frame of mind for driving. Nevertheless, most participants expressed that they would regularly experience not-thinking-while-driving; so driving as automatic behaviour (Ouellette and Wood 1998; Radovic 1998; Summala 1985).

Several subthemes emerged from the data in relation to participants not concentrating on their driving and thinking about other things: getting bored during long drives, driving a very familiar route, feeling time pressured (e.g. being late for work), experiencing strong emotions (e.g. after an argument with someone) or being distracted by passengers in the car. Participants employed various strategies to regain focus on their driving in relation to boredom. Some participants indicated they preferred to drive an automatic car because then they could pay less attention to the technicalities of driving (e.g. gear changing) and concentrate more on the driving environment. However, other participants (both males and females) used the opposite argument. They stated that they would rather drive a manual car than an automatic because it gave them something to do. Thus, they did not get bored as quickly and, therefore, they would stay more focused on their driving. As mentioned in section 5.2.2, some participants used speeding as a strategy against boredom while driving, both to make the journey more interesting as well as to shorten the drive as much as possible.

Participants in all groups mentioned that driving a familiar route would cause them to start thinking about things other than their driving or the driving environment, such as assignments due or errands they have to run. Example 5-9 is a typical illustration of automated driving, or using a dissociative driving style in the terms of the MDSI, while taking a familiar way home. None of the participants talked about a strategy they used to counter the negative effects of route familiarity.

EXAMPLE 5-9: NOT-THINKING WHILE DRIVING

Karin: One thing is when I'm driving home is that I know the road and I do it often enough that I could have been driving for half an hour and I'll suddenly realise that I can't remember the last 15 minutes of my drive. Just that I'm like, because I'm so used to the road have I even been paying attention? Because I've just been thinking about stuff and I realise how far I've got and I'm like, I wasn't paying enough attention.

Feeling time pressured was the third strong subtheme emerging in relation to losing concentration due to being preoccupied with other things. Participants explained that time pressure could have external causes (e.g. being late for work or class) but also internal causes (e.g. wanting to get home quickly). Time pressure made participants think about being late, the possible consequences of being late, and about how to get to the destination as quickly as possible instead of focussing on their driving. Although they realised that hurrying made them drive less safely, as is

shown in Example 5-10, only one participant mentioned he employed a counter strategy, which consisted of leaving early in order to avoid any time pressure.

EXAMPLE 5-10: TIME PRESSURE CAUSING DISTRACTED DRIVING

Nigel: Yeah. I think definitely being in a hurry is a bad thing that has caused me a problem, a major problem, before and yeah like just sort of the distraction as well. Like I need to get there can throw you off a lot which ...

Facilitator: Throw you off what?

Nigel: Concentrating on driving, I guess you could say.

Facilitator: Right.

Nigel: Like I don't think that I drive aggressively but I think that at times I've driven inconsistently or with a bit of a lack of experience, which uhm - yeah. What am I trying to say? It's a bit hard to ...

Facilitator: You were saying that if you're- that if you're ...

Nigel: Say what I mean.

Facilitator: Probably if you were rushed or - yeah.

Nigel: So if you're in a bit of a hurry, that's when uh, you know, things can get a bit sketchy with my driving, I think.

Facilitator: Okay.

Renee: I think it's also because you think - like you've got other things on your mind. You're thinking you're going to be late for this thing, what am I going to miss, the consequences ...

Nigel: Yeah.

Renee: of that and you just want to get there in a hurry. You're not really ...

Nigel: Yeah.

Facilitator: You're not really what?

Renee: Well I don't know. Safety - like you're not driving along being like 'I hope I get there safe'.

Jonathan: Your priorities change.

Renee: You just want to get there, yeah.

James: Yeah. You just want to get there - yeah.

The question if and when participants' way of driving would change resulted in a fourth subtheme on the topic of 'thinking about other things while driving', which was emotions. Participants discussed negative emotions about three times as often as positive emotions. These responses indicated that negative emotions may have had a stronger impact on participants' driving than positive emotions. Previous studies have also been more focused on the effect of negative emotions on driving, although positive emotions could also play an important role (Redshaw 2004). Participants did not differentiate between emotions elicited by an event before or during driving. In both scenarios the emotion caused participants to lose concentration and to think about things other than the driving task or to 'lose their mind' as one participant put it. Some participants would stop driving as soon as they realised they were not concentrating due to strong emotions and wait until they would feel better again, but most participants did not mention any strategy to counter this negative effect of their emotions. Example 5-11 shows how participants describe how their emotions or their mood cause them to lose concentration while driving.

EXAMPLE 5-11: EMOTIONS AND MOOD CAUSING DISSOCIATIVE DRIVING

Nina: I got the same feeling as hers. Mostly I'm just like follow the rules, but if I'm getting upset, upset only, not happy, like upset I feel I want to crash this car and then I feel really, really - well, pressed. [others chuckle] That thing like out of control sometimes, so I have to pull over, like think about it.

Facilitator: So does that happen sometimes while you're driving?

Nina: Yeah, like ...

Facilitator: Does something upset you?

Nina: Mm.

Facilitator: Can you say what kind of - there'd be something happening or what?

Karin: Stress or maybe arguing?

Nina: Yeah, maybe arguing

Facilitator: With someone else?

Nina: Yeah arguments - Yeah, with someone else and that make you feel, oh my God. You just lose your mind sometimes.

Mavis: Like if you like have arguments between your relationship, that is really uh, easy to get upset and then just other family and then you just drive. Because I think I'm really - like doing everything, follow the rules when I driving. But by that time I just like can't

concentrate and then all I think about is arguments over and over again and then make you crazy, so ...

Facilitator: So that would be something that happened before you get in the car or while you're in the car driving?

Mavis: Ah, if the argument is before I drive the car is still effect on my mood or something.

Stephen: Often you get time to think about it when you know that you're sitting there there's nothing else to do. [Mavis: yeah yeah]

Mavis: It doesn't matter it's happening before or while I'm driving, it's just ...

Stephen: Because I had a similar experience as well. I was like, I was told my grandfather died and then I was driving a car and that was, yeah I was really sad, I had to pull over. It wasn't just that it was something else as well, but ... [hub] [attempts to make it sound less severe]

Facilitator: So what did you notice in your driving when that happened?

Stephen: I wasn't really paying attention to my driving so I had to pull over.

Facilitator: Okay so you had that state of mind to realise that you were not ...

Stephen: Yeah, I was like, I'm not, I shouldn't be driving right now, I need a moment, so I pulled over.

Elaine: Not fit to drive.

Getting distracted by passengers was the fifth subtheme in all group interviews that emerged in relation to 'thinking about other things while driving' and it was considered a major stressor by participants, evoking annoyance or even anger. Although passengers' behaviour elicited negative emotions in participants, so this theme is related to the previous theme, the difference was that participants were more definite in discussing the effects of passengers' behaviour on their driving than in discussing other causes of negative emotions. Participants judged both having peer passengers and having children in the car as being very distracting. In addition, participants mentioned that their parents, especially their mothers, would regularly execute 'backseat driving' even when participants already had quite some driving experience. The term backseat driving refers to passengers commenting on actions or the driving style of the driver. Participants found it stressful when a passenger was second guessing their actions and they found that it distracted them from their driving and increase their risk of crashing, as is illustrated in Example 5-12. Several participants

indicated they would demand their passengers to be silent in order to be able to concentrate on their driving when it proved impossible to ignore them.

EXAMPLE 5-12: PARENTS DISTRACTING PARTICIPANTS WITH BACKSEAT DRIVING

Peter: Uh, I did remember before I came out, and I forgot to say: my mum is an awful back seat driver.

Facilitator: [laughs] How do you mean that?

Peter: That's really really stressful for me. That's one of the times I get the most stressed.

Facilitator: She'll be sitting in the car with you, and then?

Peter: Yeah, and she is always second guessing, particularly, like she can't see the speedo at the correct angle, so she thinks I'm speeding, or that I should keep my hands on the wheel, you know, or whatever it is.

Kaitlin: My mum actually would slap my fingers, if I have my hand on the gear stick for too long, she'd snap me and say 'both hands on the wheel please'. Yeah. That is really annoying.

Facilitator: Does she still do that too?

Kaitlin: Not anymore, cause I did actually say 'look, you're distracting me really badly. I'm probably gonna crash, because you just hit me'. And she went 'oh, okay, I'll stop' and she hasn't done it since, so.

Facilitator: Your mother is still doing that, you say?

Peter: She can't help herself. [all chuckle]

All five subthemes discussed indicated that participants attributed the way they drove predominantly to circumstances and not to their own choices to drive in a certain manner, for instance being in a hurry or other people annoying them. This supports the conclusion from section 5.1, stating that participants used a contextual framework to describe their driving and that their underlying driving style was generally subconscious.

5.3 EMERGING THEMES FROM THE GROUP INTERVIEWS

Three themes emerged from the group interview data: safe driving, driving context, and driver training. These themes offered more insight into the experiences of young drivers in relation to both thinking and driving styles, and they put the quantitative results into a broader perspective.

This section firstly presents the findings on safe driving, followed by reporting on the driving context. It concludes with group interview data on driver training.

5.3.1 SAFE DRIVING

Since this study is focused on positive driving styles, it was interesting that participants in all group interviews spontaneously talked about safe driving. There was some consensus in all groups on the definition of safe driving; sticking to the things they were told when learning to drive, adhering to the road rules, keeping proper gaps, not overtaking as much, driving defensively, and being in the right frame of mind (as demonstrated in Example 5-2, in section 5.1.1). Although it seems contradictory, the three most mentioned subthemes in relation to safe driving all had a *negative* focus. Participants were talking about having a fear of other drivers' (dangerous) behaviour, a fear of getting fined, and a fear of crashing and/or hurting someone, which were all reasons for them to use a safe driving style.

Participants disclosed how they would worry, while driving, about the way other drivers behave on the road. Participants in all group interviews expressed that they drove more carefully in busy driving environments, such as a city, because they did not trust other drivers to obey the traffic rules and drive safely, as is illustrated in Example 5-13. Other words participants used to refer to safe driving styles were driving 'defensively', 'observant', 'maturely' and 'cautiously'.

EXAMPLE 5-13: FEAR OF OTHER DRIVERS' BEHAVIOUR REASON TO DRIVE SAFELY

James: Yes. I tend to be more a defensive driver because I've lived in Sydney almost all my life. And when I came to Canberra, I tend - people are more laid back. So Sydney you have to - you can't trust nobody on the road and that's what - that's how I feel. So - and I know people who have like - who have insured their car, like they have comprehensive insurance on their car. Like - and they tend to take more risks because they know they're insured but yes. So I tend to be more defensive so - which means because I - sometimes like you'd be trying to run the green light and the light will just go all of a sudden yellow and if you're not careful, especially in Sydney, some will - some drivers will go through but others will stop. So just in - if you do trust them, which means you try and speed up and smash their car. [hm hm] Yeah. So I have a few friends who've got into an accident that way, so. Yeah.

Facilitator: All right. So always check your rear-view mirror before you brake, or whatever. Is that what you're saying?

James: Yeah you - exactly. You just don't trust nobody. Just make sure you defend yourself and make sure you're safe on the road.

Sylvia: And I think you don't assume what the other drivers are doing.

James: Exactly, yeah.

Sylvia: Like you don't assume - if I was them, I would go through the orange light or I would stop.

James: Yeah.

Sylvia: You - because they could go either way.

James: Yeah.

Facilitator: So how do you decide?

Sylvia: You watch them. [laughs]

James: Just have to watch them.

Sylvia: Yeah. You'd be ready to handle both scenarios.

This fear of other drivers' behaviour was also expressed through participants' discussion of unsafe driving as something that mainly other drivers do. This supports previous research stating that drivers are generally distrustful of other drivers and consider their own driving to be safer (Redshaw 2004) and themselves to be better than the average driver (Job 1990b; Näätänen and Summala 1976; Parker and Malone 2004; Svenson 1981). When participants talked about themselves demonstrating dangerous driving behaviour they did not consider this behaviour as unsafe at the time, for instance because they were focused on other things such as getting somewhere before their friends when racing to the shops. Participants' responses suggested that their unsafe driving happened more or less unintentionally, while other drivers were thought to drive riskily on purpose.

Another negatively focused theme in relation to safe driving was participants' fear of getting fined or losing their licence, for instance when getting caught speeding. This suggested that enforcement of road rules has a positive effect on driving behaviour, as Example 5-14 illustrates.

EXAMPLE 5-14: ENFORCEMENT OF ROAD RULES

Stephen: Less chance of being caught. Where I'm from there's probably less chance of being caught than in the city, for sure.

Facilitator: Less chance of getting caught. So you reckon that when there's police everywhere that's a more important influence on how people drive than ideas about safety?

Elaine: Yes, I think it does impact on people's driving. Like yeah, if they know that there's going to be cops out then they will slow down for sure, when they should be slowing down for safety reasons, they'll probably slow down in order to not get caught. So it's probably like the wrong priority.

However, previous research has found that although law enforcement can change people's driving behaviour, it does not alter the underlying motivational factors (Rothengatter 1988). Example 5-15 illustrates this with a participant who mentions that he thought about the chance of getting caught when speeding (small) and decided it was a risk worth taking. This example highlights as well that some participants did not see the real value of safe driving other than avoiding negative outcomes such as fines.

EXAMPLE 5-15: EFFECT OF LAW ENFORCEMENT ON DRIVING STYLE CHOICE

Eric: (...) You've thought about all the consequences of doing 120 and you've decided that there really aren't any, except for getting a speeding fine, which you probably won't get.

The third emerging theme in relation to safe driving was participants' fear of crashes. Every group interview had at least one participant who had been involved in a crash. This experience caused those participants to stick more to the traffic rules than before, to drive more cautiously, and to be more wary of other drivers. All participants acknowledged experiencing a crash as an understandable reason to change driving styles, and one participant even stated that having a minor crash could be beneficial for a driver because it might teach them to adhere to the road rules. At the same time the data showed participants did not learn much from other people's experiences and would continue using unsafe driving styles (e.g. speeding) as long as nothing had happened to them personally. Example 5-16 illustrates both how a participant did change his way of driving after a crash, and how another participant did not learn from that experience.

Stephen:(...) I used to be pretty, not lax, but I used to feel a lot more confident in my driving until I accidentally ran into the back of someone. Well, I didn't actually run into the back of them there was a drunk person that pulled up in the front of - this was just in Canberra actually - they pulled up in the middle of the road because someone wanted to get out of the car. And then we were driving to one our friend's, like this birthday party kind of thing in a restaurant and the first car stopped, like pretty suddenly and we kind of all just like backed up into each other.

Facilitator: So you had like a chain collision?

Stephen:Yeah, so I was the one at the back so my insurance had to cover the car in front of them and the bad thing was that I knew the person in front and, yeah.

Elaine: And you obliterated their car.

Stephen:I didn't obliterate it, I hit the back bumper and the front bumper. Because my car was bigger so I kind of like - I was slowing up, but I was probably only going five Ks an hour when I actually nudged them forward, the next one. But still after that I was more cautious about like gaps following people in and out of town, like a three-second gap, all that kind of thing. Like I think it sits there and I don't think I've been as confident driving so yeah, I'm much more cautious now.

Elaine: Yeah, I'm probably not as cautious as I should be because I haven't had something bad happen to me, but that's probably the wrong attitude because I was obviously with them when he crashed and I was like oh, did that just happen? But I haven't ever like really hit - well I haven't hit anyone or had any kind of bad things happen. So I'm probably like maybe too confident, but yeah.

Participants clearly showed knowledge of safe driving. However, knowing how to drive safely did not automatically entail an understanding of why they should drive safely. For example, when in a hurry participants would change their driving style and drive at higher speeds. This indicates that when participants found something else more important than safe driving they would ignore what they have learned and drive less safely, as is illustrated in Example 5-17. In addition, the participant stated that they never did anything really dangerous, at least not on purpose.

EXAMPLE 5-17: IGNORING KNOWLEDGE ON SAFE DRIVING

Kaitlin: I'm probably the same. Uhm - most of the time I drive pretty safe, I keep the proper gaps between cars and all that, but if I'm in a hurry, sometimes I do ignore some of the stuff that they tell you when you're learning to drive, like going through yellow lights a little bit late. And, yeah, driving too close to other cars. I don't think I ever do anything really dangerous. Definitely not on purpose.

Peter: If you thought it was really dangerous, you probably wouldn't be doing it.

Kaitlin: Yeah, I suppose not.

While participants acknowledged what safe driving consisted of, as taught during driving training, at the same time they did not judge their own driving behaviour as unsafe, even if it clearly ignored what they were taught. For instance, although speed is generally viewed as risky driving behaviour (Begg and Langley 2004; Mitsopoulos, Regan, Anderson, Salmon and Edquist 2005), participants in all group interviews talked about 'safe speeding'. They argued that if a person had sufficient driving skills and 'were careful' they could speed safely, which contradicts participants' theoretical knowledge on safe driving. Although previous studies have found this to be especially a problem for young male drivers (Harrison, Triggs and Pronk 1999), in the group interviews participants of both sexes talked in a similar way about safe driving and speeding. Example 5-18 shows how, according to participants, you can speed but still drive cautiously.

EXAMPLE 5-18: SAFE SPEEDING

Renee: I don't feel that people who necessarily drive fast are unsafe. Like even if someone is speeding sort of quite excessively, I'll often just sort of move to the side and let them go and I don't feel they're being unsafe if you can tell that they're being cautious.

5.3.2 DRIVING CONTEXT

A second main theme that emerged from the group interview data was the driving context in relation to participants' driving. As discussed previously, participants spoke only within a contextual framework about their driving. For participants, an important part of the driving context consisted of the behaviour of other road users, specifically other drivers, which was partly discussed under the heading 'safe driving' in section 5.3.1. Traffic flow was an element related to other drivers' behaviour

that participants raised as a major influence on their own driving. Participants in all group interviews talked about the pressure they feel when driving to keep up with the traffic flow, notably when that means going over the speed limit set for their licence. This was especially a problem for young drivers who learned to drive outside of the ACT; for instance in NSW there is a maximum speed of 90 km/hr for P-platers, even on a road with a 100 km/hr speed limit or on dual carriage ways which have speed limit of 110 km/hr. Participants mentioned they would feel very anxious and torn between not wanting to annoy other drivers and elicit road rage and also not wanting to lose their licence because of speeding. Considering the feelings of anxiety that participants experienced in relation to other drivers' behaviour, it is not surprising that they generally preferred to drive at quiet times (outside of rush hour, at night) and in quiet places (country, small town).

Only a few participants stated that they would choose to drive in a certain manner regardless of what other drivers were doing, because they want to stick to the rules. As Example 5-19 illustrates, this participant is not only aware that she makes the choice to drive in a certain way (she does not care what other people do), but also gives a positive reason for doing so (sticking to the rules is safe).

EXAMPLE 5-19: NOT ADAPTING TO OTHER DRIVERS' BEHAVIOUR

Nina: I don't care about the other people when I'm driving. If they're like beeping, you go yours, I go my way, so I don't care what they do while I'm driving.

Facilitator: So when do you reckon people do that? You said that you always stick to the rules yourself.

Nina: Yes, but some people maybe want to go faster, like the main or even on highway, like that Ginninderra, the way to uni. That is limitation is 80. I always go like 75 or 82, never over 85. So some people beep. When I really go the other way, the other lane you know, I don't care.

Facilitator: Okay, so you just stick to your own - yeah, to the rules?

Nina: Yes, I think it's the safe way to drive always.

Facilitator: So you think that's important, the safe driving?

Nina: Yes.

In addition to speaking about the impact of other drivers on their own driving, participants discussed the influence of having passengers in their car. Passengers can be seen as part of the social

context of a young driver (Hatakka et al. 2002). As discussed in section 5.2.3, participants talked about getting distracted by passengers who actively commented on their driving (backseat driving). However, passengers can have an impact regardless of their comments on the driver's actions. For instance, participants discussed how young male passengers would have a distinctly negative impact on their driving style, as is illustrated in Example 5-20. This finding is supported by previous research (Laapotti 1994; Lewis 1985).

EXAMPLE 5-20: YOUNG MALE PASSENGERS IMPACT ON DRIVING

Jonathan: When I first got my Ps, I was always with a whole bunch of boys in the back of the car and, yeah, you do drive like that because they're very, very, very distracting.

Renee: Yeah.

Facilitator: Yeah? How are they distracting? What do they do? I never have a car full of boys. Tell me.

Jonathan: Well they don't like the music you're playing. One of them's probably drinking. One of them doesn't like the other and then just general things like that and like what's - they - someone will always backseat drive and tell you the quickest way to get somewhere that isn't the quickest way to get somewhere.

Facilitator: It's their quickest way?

Jonathan: Yeah, and so you just multiply the distractions in the back of the car and P-platers full of ...

Renee: Be yelling at ...

Jonathan: ... cars shouldn't ever happen, so.

Renee: other people out of the window and ...

Sylvia: Yeah.

Jonathan: Yeah.

Renee: Too doing all sorts of things.

Jonathan: It's a testosterone thing.

Renee: Singing songs really loud.

Jonathan: The more boys in the car, the worse it's going to be, so.

James: Like a bunch of girls wouldn't speak as well?

Jonathan: Yeah. I've had ...

Sylvia: Yeah.

James: They're more reckless, so.

The car one drives can also be seen as part of the driving context. Participants in all group interviews spoke of the influence their car had on their driving style. Several participants mentioned that an unfamiliar car would cause them to drive more carefully than usual. In addition, participants generally agreed they would drive more riskily in a better quality or more powerful car. For instance, participants would easily exceed the speed limit when driving a powerful car because the car would still feel safe and smooth at high speeds and so they would not notice they were driving too fast. However, when driving a 'crappy car' participants would be holding back more, as is illustrated in Example 5-21. The finding that participants would drive less safely in a better quality car supports previous research that has found indications of drivers adapting their driving style when their car had extra safety features. Examples are braking later when the car had an Anti-lock Brake System (Jonah et al. 2001), or driving faster and more closely following other cars when the car had Adaptive Cruise Control Systems (Hoedemaeker and Brookhuis 1998).

EXAMPLE 5-21: CAR QUALITY INFLUENCES DRIVING STYLE

Renee: I think the kind of car you drive has a big influence as well on how you drive it.

Facilitator: Yeah? How?

Renee: Like my - I learnt to drive in a very sort of powerful car that was sort of fairly sporty and so I used to sort of - not show off but you feel that you can do whatever you want because you have a nicer car and then I got a very, very - pretty much the worst car that you can have on the road. Like really old, rusty paint, nothing - like little wheels. Everyone tends to look down on you so you just sort of try keep out of everyone's way and then when you get sort of a nicer car, then you feel you can be bossy again [all laugh] and you can sort of like take over the - like overtake all the crappier cars and ...

Sylvia: Because you feel like you should be able to anyway ...

Renee: Yeah.

Sylvia: So yeah.

Renee: Yeah because their car's crappier and you have the right [laughs].

The way participants in Example 5-21 spoke about the effect of the type of car on their driving disclosed their thoughts when interpreting the driving context. When one drives a 'crappy

car' other drivers 'look down on you', therefore they should stay out of the way in their inferior vehicle, but when one drives a 'nice car' they can do what they want on the road. Since participants cannot know what 'everyone' thinks, their interpretation of the context must be based on their own ideas on the relationship between cars and driving styles. This finding indicated that participants used stereotyping when making sense of the driving environment; the car type reveals how people will drive.

The use of stereotypes was also evident from participants' discussions in all group interviews on sex differences in relation to driving. Participants spoke about males possessing better driving skills than females, concluding that therefore males would be safer when using a reckless driving style than females. Some participants said they were more scared of 'girl drivers' than of 'male drivers' for this reason. In contradiction, participants stated that females drive more carefully than males. Participants discussed as well how female drivers were less able to 'multi-task' when driving, while male drivers were capable of doing this, as is illustrated in Example 5-22. This finding is in contrast with the results of the questionnaire data that indicated that females were more likely to use the hierarchic thinking style (prioritising between multiple goals at the same time) than males.

EXAMPLE 5-22: FEMALES CANNOT MULTITASK WHILE DRIVING (AND MEN CAN)

Jonathan: No. There is - there's one type of driver I can't stand in the morning when I'm going for a ride. It's that girl who is late, who's looking in the mirror, doing her hair and then takes off and then hits me on my bike. Guaranteed there's one ...

Nigel: Doing her hair.

Jonathan: Every morning, who just misses you ...

Renee: And ...

Nigel: And possibly talking on a phone

Facilitator: It's not the same one every morning?

Jonathan: No, no, no, no, but ...

Renee: There was someone who was painting her toenails ...

Jonathan: There is that one type of driver who just - it's ...

Renee: and on the phone. I don't know how you can do that.

Jonathan: They're not even focussing on driving. They're focussing on how they look ...

Renee: She never crashed.

Jonathan: So when they go to work, they look good and in no way you should be driving in that situation ever, but I always come across that one driver in the morning.

Sylvia: Stupid girls thinking they can multi-task.

Jonathan: Yeab. Women can't multi-task in cars. And men can.

Other stereotypes that participants spoke about were older drivers ('hat drivers' or 'old ladies') who drive too slowly, people in better cars who are 'confident' and speed more, parents with kids in big four wheel drives who drive 'like maniacs' in order to get their kids on time to their various activities, young male drivers who are 'cocky', young female drivers who are 'distracted', Canberrians who are 'bad drivers' that cannot handle the traffic, country drivers who are too 'laid back' and slow, city drivers who are too time pressured and 'inconsiderate', and tourists who do not adapt to the road conditions. However, participants in all group interviews discussed most passionately the stereotypes that other people hold about young drivers on P-plates. Participants talked about how police will stop cars with P-plates expecting them to do something wrong, and about other drivers always wanting to overtake a car with P-plates as a matter of pride (as illustrated in Example 5-23). While participants did not refer to their own interpretation of other drivers' (expected) behaviour as stereotyping, they did classify the ideas other people held about P-plates as stereotypes and their subsequent behaviour towards P-plate drivers as unfair.

EXAMPLE 5-23: STEREOTYPING P-PLATERS

Karin: Yes, but notice how people overtake P platers, no matter how fast they're going.

Stephen: True.

Elaine: Yeab, it's like a pride thing.

Karin: You could be doing over the speed limit. Like when I was on my red Ps I'd be doing the speed limit or over and people were still overtaking me and I'm sure it was just because I had a P plate on my car.

Stephen: Definitely that's exactly why, yeab.

Karin: And even when my mum was driving my car if we had P plates on the car people would be overtaking us when you wouldn't normally do it.

Elaine: Because they just think like I'm obviously like got to go faster than them. Got to be better than them. Yeab, P platers get a bit of a wrap.

The majority of participants did not refer to any element of choice in the way they responded to the driving context and their own role as actors in relation to their driving behaviour (with Example 5-19 as an obvious exception to the rule). Although they clearly made choices when adapting to the traffic context (e.g. choose to speed because other people are too) this seemed to happen mostly subconsciously, as is illustrated in Example 5-24. The participant stated they drove differently in the city than in the country, not because they chose to change driving styles in order to adapt to the driving environment, but because that is ‘just how it is’.

EXAMPLE 5-24: ADAPTING TO TRAFFIC CONTEXT

Jonathan: In Sydney I would drive a lot faster just because that's the flow of things than if I drove like I would in the country. In the city, everyone would get impatient with me and I'll be that one target. Like everyone'll be honking at me and, yeah. So if you drive like you would in the country in the city, you're gonna crash a car and that's just how it is.

The way participants discussed their driving in relation to the driving environment again supports the conclusion of section 5.1 that participants use a contextual framework to describe their driving and are generally unaware of the choices they make that lead to their use of certain driving styles. However, there was another exception to being unaware of one's own role in relation to the driving context; two participants discussed how their own thinking and their own mood would contribute both to the driving context and to their own choice of driving style. Example 5-25 shows how participants explain their own role in the creation of their driving experience, which they refer to as ‘car karma’.

EXAMPLE 5-25: THINKING AND FEELING IN RELATION TO DRIVING

James: Yeah. Yeah, I'm more like - yeah, hm, it's all about what I'm thinking? Uhm ...
Facilitator: Could you explain that?
James: Uhm, when I'm happy, I'm more - I mean, I respect other drivers, you know, and my aim is to be safe on the road because of the other - I mean, happy thinking attract more happy situations but when I'm angry, what happens is, you know, you - you do attract situations where it makes you more angry. Like people overtaking you, you know, or someone stopping unexpectedly or - so it's all about what you're thinking and how you're feeling, yeah.

Facilitator: Yeab. I see you nodding. Do you recognise that?

Liam: Yeab. Definitely, like just on the weekend when I was in Sydney, if someone's let you in, you feel quite obliged to let someone else in and you always have that karma situation and then as soon as someone cuts you off, you don't want to let them in at all but then they find that gap and it's not a gap and they'll go for it and it'll just irritate you more. So yeah, I believe there's car karma. [all chuckle] So yeah.

Facilitator: Car karma?

Liam: If you start the day with letting somebody in, the rest of the drive should be fine ...

Jonathan: Yeab, should be fine.

Liam: But if you start the day with not letting anyone in, I don't know. [laughs]

This section can be summarised by signalling a lack of self awareness in most participants of the group interviews in relation to their driving style choices; the driving context was discussed as causing them to drive in a certain way (e.g. other drivers cause them to speed up or passengers cause them to drive dissociatively). In light of the positive focus on road safety of this thesis, it was interesting that the participants who did show more awareness of themselves making choices as a driver actually had positive reasons for their behaviour, such as wanting to drive safely or aiming to create a positive atmosphere on the road.

5.3.3 DRIVER TRAINING

During the group interviews, participants often mentioned their driver training in their responses, or preceded their replies with a reference to when they were learning to drive. The quantitative part of this study had revealed correlations between thinking and driving styles, which may contribute to driver training. Therefore, the researcher probed participants a bit more on their driver training experiences whenever the topic surfaced in the group interviews.

Not all participants had learned driving in the ACT, so there were some differences in the legal requirements, such as the number of hours they had to drive on L-plates before being able to go to P-plates. Participants spoke about the differences between learning to drive in a country town and in a city, whereby participants who had driving lessons in the country found it more stressful to drive in the city where 'you always have to watch what you're doing', as is illustrated in Example 5-27.

EXAMPLE 5-26: LEARNING TO DRIVE IN THE COUNTRY

Kaitlin: I learned to drive up there. So I learned to drive with no traffic lights, maybe one roundabout, and sort of some old people in cars, and that's about it. But down here, yeah, you always have to watch what you're doing. It's a lot different.

All participants were taught driving by their parents, more often by their fathers than by their mothers. Several participants mentioned that their mothers were too afraid to get in the car with them, or their mothers thought their technical skills were not good enough to teach their children (e.g. reverse parking or driving on the motorway). The group interview data indicated that fathers who trained their children stressed the importance of driving skills, for instance they made them lose control of the vehicle on a dirt road in order to practise how to regain control in a skid. Participants said that fathers put more emphasis on these skills while teaching male young drivers than when teaching female young drivers. Mothers who taught driving put more emphasis on 'defensive' driving and 'being aware of everything around you'. The data showed that participants themselves viewed learning to drive as the learning of vehicle handling skills rather than the observational skills as stressed by the mothers. This point is illustrated in Example 5-27, where participants discuss learning how to drive safely and only talk about technical skills such as driving in the rain.

EXAMPLE 5-27: LEARNING TO DRIVE SAFELY

Karin: I don't think we're taught how to drive safely. Like when you learn to drive, it's like this is how - like no one actually teaches you how to drive - no one teaches you. If it's wet you don't get taught how to drive in the rain.

Stephen: Yeah you do, I do because ...

Karin: Well like some people do and that's what everyone should get. Like I think in the country you get taught more too, but like, I think people should have to do the courses where you get taught to like if you're spinning out this is how you would correct yourself. Or if it's wet - because a lot of people don't know how to fix it and I think it also depends, like a lot of people just get their parents and they might not go anywhere they might just do laps of their street. Like you might not have any experience.

Elaine: They could pass on their bad habits.

Karin: Yeah.

Elaine: Like my dad probably wasn't the most like yeah, he was probably too like lax, like he'd sort of like fall asleep and I'd just be driving.

Karin: But some people do get way better like driver education than other people.

Elaine: Yeah, I think it would be an idea to make it like mandatory to learn what to do in those situations. Because I'd have no idea what to do if like my tyre blew out. Obviously I know you're not supposed to slam on the brakes, but it would be completely different - if it actually happened.

Stephen: You do get taught to an extent if you do read the actual handbook and things like that. There is ...

Karin: Yeah, but you're not actually trying it so it's like ...

Elaine: It's not hands on.

Karin: Yeah.

Participants discussed how their parents lacked teaching experience and how some parents, for instance, found it difficult to take a step back from their own internalised knowledge of driving and determine what to teach the learner driver. Some participants mentioned that their parents were afraid to 'pass on bad habits', therefore participants had some 'proper' lessons from a qualified driving instructor after which their parents would provide supervision for the required amount of actual driving hours. One participant mentioned how her father developed his teaching skills on her two older siblings, so he taught her 'quite well', as is illustrated in Example 5-28.

EXAMPLE 5-28: PARENT AS DRIVING TEACHERS

Sylvia: Yeah. I think also - cause I'm - there's four of us kids and I'm number three. So my dad had taught my oldest brother and my older sister how to drive before he taught me and so he obviously - like I think his scariest experiences was with my older brother, which was obviously the first, and so as a teacher and a student, they were, you know, first timers but by the time it got to me, he knew - like I got taught quite well because he knew all of the experiences of actually teaching someone. Like, I think a lot of parents struggle with remembering what you don't know as a kid and what reactions and things to actually teach your kids? But yeah, I don't know. My dad had had some practice, I guess.

Some participants spoke about role models that shaped their own driving. Some mention their parents as good role models, while others based their driving style on an older sibling or a professional driving instructor because they viewed their parent(s) as bad role models and did not want to adopt their driving style. Speaking of modelling their own driving on someone else's driving style indicated that these participants were aware (at least on some level) that they could make choices in relation to the way they drove. This is illustrated in Example 5-29, where a participant explains how as a driver, he does not 'want to be anything like my dad'.

EXAMPLE 5-29: ROLE MODELS FOR DRIVING

Jonathan: Yeab. With my - my dad mainly taught me how to drive and he's a city driver and I don't want to do any traits of his, because he scares me sometimes when he's driving. So then my mum's worse, because she's very short-sighted. So I just sort of aimed at more at my older brother and then - so I've pretty much gathered everything from him, because we always used to drive together when we were younger and then, yeab, I just don't want to be anything like my dad. [chuckles]

5.4 SUMMARY

This chapter presented the results of the thematic analysis of the qualitative data collected in four group interviews. The following conclusions could be drawn from the findings.

Participants of the group interviews constructed meaning for the concepts of thinking style and driving style in a comparable way. They used a contextual framework to discuss both thinking and driving style and they spoke about the use of different styles in relation to different contexts and/or task demands. These findings support the proposition of this study that thinking style and driving style are similar constructs and could both be considered as intellectual styles.

Some results of the quantitative analysis of this study were reflected in the group interview data. The qualitative data indicated a relationship between field of study and thinking styles; specifically the studies of architecture and creative writing were linked to the hierarchic thinking style. The sex differences in driving styles that emerged quite strongly from the quantitative data

were not as evident from the group interview data. The group interview data did reflect some quantitative results in relation to exposure and the use of certain driving styles, with participants indicating they would be more prone to using negative driving styles when driving more hours per week.

In contrast with the quantitative results that showed significant evidence for relationships between thinking and driving styles, in their discussions the group interview participants emphasised ‘not thinking/thinking about other things’ while driving. The qualitative data indicated that several factors contribute to participants getting distracted from the driving task. Participants tended to attribute their driving style to the influence of the driving context, rather than to the choices they made in relation to their driving.

The group interview data showed three themes that provided a better understanding of the experiences of young drivers: safe driving, driving context and driver training. Participants discussed safe driving mainly from a negative point of view because they would drive safely in order to avoid negative consequences instead of to create positive results. The data indicated that participants had knowledge about what safe driving consists of but that, in practice, this did not necessarily lead to safe driving. Participants spoke about the driving context as a factor that caused them to use certain driving styles, showing a lack of awareness of their own role as an actor making choices in the driving situation. Participants discussed driver training in terms of mastering vehicle handling skills while they did not acknowledge the role that, for instance, situational awareness might play in driving. Some participants showed an awareness of their capability of making choices in relation to their driving, for instance in relation to choosing a role model for their own driving style or when attempting to create a positive driving environment (car karma).

The next chapter connects the findings of both the quantitative and qualitative results of this study in order to answer the sub-research questions of this research and this will lead to an answer to the main research question.

6 DISCUSSION OF FINDINGS

In this chapter the results that were presented in Chapter 4 and 5 are drawn together in a discussion of the findings in light of the extant literature. Whereas the quantitative results confirm there are relationships between thinking and driving styles, the qualitative data provide an explanation of these links and contribute to the understanding of road safety in a novel way.

The (sub) research questions that were developed in Chapter 2 form the structure for the discussion in this chapter: starting with the theoretical questions; continuing with the applied research questions; following with a model for the development of a driving style and an emerging theoretical framework; and finishing with the implication of this study's results for driver training. Both the qualitative and the quantitative findings are used in the discussion of these research questions.

6.1 THEORETICAL RESEARCH QUESTIONS

This section discusses the three theoretical questions that the literature review prompts. Firstly, Zhang and Sternberg's (2005; 2006) description of intellectual styles sparked this thesis' proposition that thinking style and driving style are cognate constructs. In turn, this leads to questioning if thinking and driving styles could both be intellectual styles. Secondly, the ambiguity of Elander et al.'s (1993) definition of driving style inspires consideration of whether a driving style is a preferred way or a habitual way of driving. Thirdly, Lethimäki's (2001) work emphasises both the need for a positive definition of road safety, and the lack of such a definition. This prompts the question on how road safety can be defined in a positive way, unrelated to crashes or crash risk.

6.1.1 ARE DRIVING STYLE AND THINKING STYLE BOTH INTELLECTUAL STYLES?

Zhang and Sternberg (2005; 2006) attribute five aspects to their construct of intellectual style: cognitive, affective, physiological, psychological, and sociological. Since all these aspects have been found to play a role in driving, this thesis proposes that driving style and thinking style may be cognate constructs and both qualify as intellectual styles. Findings from the group interviews support this proposition.

Without any prompting, participants discussed both their driving and thinking (style) in an identical manner, that is, in relation to certain contexts. Participants described their use of specific ways of driving or thinking in particular circumstances; for instance, the use of the anxious driving style when in the middle of Sydney or the use of the hierarchic thinking style when they have a number of tasks to perform. This finding supports the theory of mental self-government which states that “everyone possesses every style to some degree, and what differs across individuals is strength of preferences and the kinds of tasks and situations that evoke various preferences” (Sternberg and Grigorenko 1997: 707).

The literature on the MDSI does not discuss individuals using different driving styles at different times. However, other research states that there are many ways in which individuals change or adapt their driving to environmental circumstances (af Wählberg 2003b; Fuller 1981). Findings from the group interviews support this. A number of participants explicitly stated they would use all driving styles at one time or another, depending on the situation. Furthermore, participants mentioned that they sometimes switch to a different driving style during a trip as a result of changing circumstances (e.g. they are running late due to delays in traffic). Thus, a second point of similarity that emerged from the group interview data is that for both thinking styles and driving styles individuals are capable of using different styles according to the (demands of the) situation.

Group interview participants emphasised the context in relation to both their way of thinking and driving. While Sternberg (1997) does refer to the role context plays in the use of thinking styles, Taubman – Ben-Ari et al. (2004) are not very explicit about it in relation to their driving styles. Yet, because the group interview data clearly showed that context was an important aspect, the self-report instruments (MDSI and TSI-R) were re-examined specifically on this characteristic.

It appears that the MDSI and the TSI-R consider driving style and thinking style respectively to be an individual’s regular behaviour in a certain context. Both instruments indicate that participants should rate the statements with their most common behaviour in mind. The MDSI uses the phrase ‘often’ (e.g. ‘I often purposely tailgate other drivers’) which, although imprecise, does point towards behaviour that happens regularly. In later studies the MDSI is described as a self-report scale of driving habits (Taubman - Ben-Ari 2006). The TSI-R asks participants to respond according to the way they ‘typically do things’. Thus, one aspect of both styles is that they refer to

behaviour that an individual regularly displays, rather than occasionally. In addition, both instruments indicate a context that participants should keep in mind while responding. For the MDSI the context is driving, while the TSI-R mentions the context of school, home or work. The thinking style statements are more general than are the driving style statements, probably because they have to be applicable to different contexts. Thus, according to the questionnaires, both driving and thinking styles are considered to be context related.

In summary, both theory (the questionnaires) and practice (group interview participants) show that driving and thinking style may be cognate constructs and could both be qualified as intellectual styles as defined by Zhang and Sternberg (2005). Without having seen the MDSI or the TSI-R, and without prior knowledge of driving and thinking styles, the group interview participants continuously used a contextual framework to talk about driving and thinking styles. This observation supports the theoretical idea of the importance of the context as is implied in the instruments used to measure young drivers' thinking and driving styles.

There are two implications of placing both thinking and driving style under the umbrella of intellectual styles. Firstly, as discussed in section 2.1.1, Zhang and Sternberg (2005) argue that intellectual styles are value-laden and that generally Type I styles (associated with cognitive complexity and creativity) are seen as more valuable than Type II styles (associated with cognitive simplicity and blind favouring of existing norms). However, in light of the present study it makes sense to value thinking styles in regard to their correlation with certain driving styles and this gives a different picture. For instance, executive thinking is a Type II thinking style so commonly seen as less valuable, but this study has found executive thinking related to the patient and careful driving style. Therefore it could be considered as a positive thinking style for driving. By the same token, determining the value of driving styles is not entirely straightforward either.

Taubman – Ben-Ari et al. (2004) suggest that some driving styles are more adaptive than others and therefore safer. Thus these could be seen as having more positive value than less adaptive driving styles. On the other hand, the group interview data suggest that young drivers may have different ideas about driving styles than road safety researchers do. For instance, while academics see the high-velocity driving style as a negative and unsafe style, group interview participants stated that speeding in itself was not unsafe as long as the driver was 'being careful' or had sufficient driving skills. So, while the driving style and thinking style constructs both seem value-laden, the actual value

that different styles hold for people will differ according to context (including (sub) culture, task demands, and individual preferences).

Secondly, another implication of treating thinking and driving style as intellectual styles is their trainability. Zhang and Sternberg argue convincingly for the trainability and/or socialisation of intellectual styles, based on both their own research into thinking styles (Sternberg 1997; Zhang 1999; 2001c; Zhang and Sachs 1997), as well as other studies into a variety of intellectual styles. Their argument is supported by research stating that individuals can change their thinking “with hard work, determination, and the right learning experiences” (Halpern 1989: XV). Other research found that people can learn to use different thinking styles or other intellectual styles (Balkis and Isiker 2005; Brandt 1998; Harrison and Bramson 1982; Hsu 1999; McClanaghan 2000; Spicer 2004; Walters et al. 2002). The group interview participants confirmed they could indeed change their thinking or driving style, stating that they would use different thinking or driving styles depending on the context (e.g. using local thinking for parking the car, or anxious driving in Sydney). The present study therefore argues that driving styles, as intellectual styles, are trainable as well and that both thinking and driving styles should be taken into account during driving training.

6.1.2 IS A DRIVING STYLE A PREFERRED OR HABITUAL WAY OF DRIVING?

As discussed in sections 1.1 and 2.1, the widely cited definition of driving style is ambiguous: “driving style concerns the way individuals choose to drive or driving habits that have become established over a period of years” (Elander et al. 1993: 279). As this thesis proposed that driving style was a cognate construct of thinking style, it was suggested that a driving style could be seen as a preferred way of driving, just as a thinking style is defined as a preferred way of thinking (Sternberg 1997). Since the discussion in section 6.1.1 showed that the idea of thinking and driving styles being similar concepts is indeed plausible, it would be logical to define a driving style as one’s preferred way of driving. However, the group interview data indicate the definition could be a bit more complex.

One complicating factor is that participants in all group interviews talked about ‘not thinking or thinking about other things while driving’. This is what the MDSI labels as using a dissociative driving style (as discussed in section 5.2.3). Participants mentioned several factors causing them to drive dissociatively: getting bored, route familiarity, time pressure, experiencing strong (negative)

emotions, and getting distracted by passengers. They talked about taking exactly the same route when going from home to the university every day, and about regularly speeding without giving it a thought. This suggests that at least part of their driving could be classified as habitual or automated behaviour (Ouellette and Wood 1998; Radovic 1998; Summala 1985), which would advocate driving style conceptualised as habitual driving.

Another complicating factor is that, generally, participants described the circumstances as *causing* them to drive in a certain way. In addition, when asked to describe their 'preferred way of driving', participants talked about their preferred contexts for driving (e.g. night time) instead of about their driving style (e.g. speeding). Although there were a few participants who spoke about making conscious choices for certain driving styles (e.g. choosing to speed because they could not think of any negative consequences), most participants did not demonstrate an awareness of being able to choose which driving style to use regardless of the circumstances. This lack of self-awareness of their own role as actors in the driving situation was also evident from participants' use of the word 'accident' when referring to a 'crash'. As was discussed in section 1.1, the road safety field generally uses the word 'crash' to signify that traffic accidents are a human-made problem and largely preventable. In contrast, the group interview participants only spoke about 'accidents' they had been in, largely ignoring how their own actions or choices may have contributed to the event. However, participants spoke in the same way about thinking styles, which the most recent research has defined as 'one's preferred way of thinking' (Sofa 2006; Sternberg 1997; Zhang and Sternberg 2005). This suggests that participants may have an underlying preference for certain thinking and driving styles, but that these preferences are mostly on a subconscious level and only come to the forefront in relation to certain contexts.

It seems that Elander et al.'s (1993) definition of driving style, although ambiguous, does capture two important characteristics of the construct of driving style. So, how could the notions of 'preferred' and 'habitual' relate to each other? From the group interview data it is evident that young drivers think more consciously about their driving during the act of driving when they are inexperienced and that their driving becomes more automated (i.e. dissociative) over time (see, for instance, Example 5-1: What young drivers think about while driving). This finding supports Miller and Taubman – Ben-Ari's (2010) suggestion that driving styles develop with experience. Although the authors do not specify how this process works, their idea is aligned with Zhang and Sternberg's (2005) claims that people's thinking styles can be modified through their life experiences. Based on

the findings from the group interviews, and claims of previous studies, this thesis proposes the following amended definition:

A driving style is one's preferred way of driving that, over time, develops into driving habits.

6.1.3 HOW CAN ROAD SAFETY BE DEFINED IN A POSITIVE WAY?

This study has aimed to focus on road safety from a positive perspective in contrast to much road safety research that is more focused on the prevention of negative outcomes (crashes), than on the stimulation of patient and careful driving (see for instance af Wählberg 2007; Arthur and Graziano 1996; Berg 2006; Catchpole et al. 1994). In accordance with the majority of road safety studies, many road safety campaigns also have a negative focus, using mainly 'threat' or 'fear' appeals (Bird and Tapp 2008). For instance, the New South Wales Centre for Road Safety campaign on P-plate speeding aims to increase awareness about police enforcement targeting young drivers who speed. The campaign communicates that speeding young drivers can expect to get fined, whereas it could have communicated positive reasons for adopting a patient and careful driving style instead (e.g. creating a relaxed driving environment for all road users) especially since the fear and threat appeals can be easily rebutted (Bird and Tapp 2008).

The majority of participants seem to have internalised this negative focus on road safety. Group interview participants discussed safe driving predominantly with a negative focus (as discussed in section 5.3.1). They spoke about using a safe driving style because they had a fear of something (e.g. other drivers), or they tried to avoid negative consequences of their driving (e.g. getting fined, crashing their car). Participants mentioned several aspects of safe driving such as following the road rules, driving defensively, and being in the right frame of mind. Yet, despite clearly knowing *how* to drive safely, in their discussions on safe driving most participants did not demonstrate a real understanding of *why* they should use a safe driving style other than the negative reasons mentioned before. Factors such as feeling under time pressure could easily make participants ignore their knowledge on safe driving and, for instance, start speeding. This finding suggests a lack of real understanding by participants of what is safe and what is unsafe driving behaviour. Previous research has stated that young drivers tend to underestimate risk in hazardous situations while overestimating their own driving skills (e.g. Deery 1999; Finn and Bragg 1986) and this was evident from the group interview data. As discussed in section 5.3.1, participants expressed

their conviction that one could speed safely when one possessed adequate driving skills and were being ‘cautious’.

This thesis suggests that young drivers’ failure to grasp *why* they should drive safely may be influenced by the negatively focused messages they receive in relation to road safety, such as in communication campaigns with threat and fear appeals (Bird and Tapp 2008). The majority of the group interview participants discussed negative reasons (fear and avoidance) for using a safe driving style and if they did not expect any negative consequences (as demonstrated in Example 5-15: Effect of law enforcement on driving style choice) they would be more likely to choose unsafe driving styles, such as high-velocity. Nevertheless, there were some participants with positive arguments for driving safely.

Group interview participants who showed more awareness of themselves as actors in the driving situation, and therefore awareness of their ability to make choices in their driving style, did mention positive reasons for their behaviour (as discussed in section 5.3.2). These participants thought that it was important to always drive safely, or they aimed to create positive ‘car karma’ for themselves (see Example 5-25: Thinking and feeling in relation to driving). As it has been found that negative messages do not have a very positive effect on road safety (Bird and Tapp 2008), which the findings of the current study support, this thesis proposes the first positively stated definition of road safety that seeks to create this positive ‘car karma’ for all road users:

Road safety is a state of well-being for all road users, in which every individual can negotiate the traffic effectively, can cope with the normal stresses of the traffic environment, and is able to contribute to a positive traffic culture.

6.2 APPLIED RESEARCH QUESTIONS

The road safety literature inspired several questions in relation to the way young drivers think, drive, and think about driving. This section discusses these questions in light of the quantitative and qualitative findings from this study, as well as in relation to the literature. Firstly, results concerning young drivers’ thinking styles are discussed as are any sociodemographic factors that have correlations to their thinking styles. Secondly, young drivers’ driving styles are reviewed, also in relation to any relevant sociodemographic factors. Thirdly, the relationships that this study found between young drivers’ thinking and driving styles are examined. Fourthly, the findings on the

prediction of young drivers' driving styles from their thinking styles are discussed. Lastly, because of the positive focus of the current study, this section specifically focuses on any sex differences in safe driving, and discusses the usefulness of separate theoretical models for male and female young drivers.

6.2.1 WHAT ARE YOUNG DRIVERS' THINKING STYLES?

As presented in section 4.1, the participants (male and female combined) of the quantitative study scored the highest mean for legislative thinking and the lowest mean for the global thinking style. This can be interpreted as meaning young drivers are more likely to do things their own way and less likely to use abstract thinking or think about problems of a more general nature. In section 6.1.1 it was discussed how participants in the group interviews only spoke about their thinking and driving styles in direct relation to specific contexts. This could be seen as a manifestation of their lower preference for the use of the global thinking style, linking their thinking and driving directly to certain circumstances or tasks instead of engaging in a more general discussion of their preferred ways of thinking or driving.

For reasons of comparison with previous road safety research, this study has examined the factors 'sex', 'age', 'field of study', 'type of drivers licence', 'years of driving', and 'exposure' (hours driving per week) in relation to young drivers' thinking styles. Significant evidence was found for differences in thinking styles based on 'sex'. Young males were more likely to use the legislative thinking style and so do things in their own way, while young females were more likely to use the hierarchic thinking style and so work on multiple goals at the same time giving them different priorities. These findings support present research in the medical field stating that males and females indeed do think differently due to a different biological make-up (Legato 2005) but the field of thinking style research has not produced any clear result yet in regard to sex differences. Some examples will illustrate the disparate findings in relation to sex differences from thinking styles research.

Previous research using the theory of MSG shows mixed results in regards to the effects of 'sex' on thinking styles. One study found sex differences for the judicial, anarchic, liberal, internal, and external thinking styles but it does not elaborate on which sex scored highest on which thinking styles (Zhang 2001c). Subsequent studies uncovered that male students either tended to be more

legislative, liberal, monarchic and internal in their thinking styles than female students (Zhang 2004c), or that male students used the judicial, global and liberal thinking styles more than their female counterparts (Zhang 2004d). A study in Turkey found that male students tended to adopt the judicial and external thinking styles more often, while the female students were more likely to use the executive style (Balkis and Isiker 2005). Even though there are some similarities in the findings, the results do not lead to a solid conclusion on the matter of sex differences in thinking styles. To complicate the picture further, one study found no significant differences in thinking styles based on sex (Zhang 2005b).

Considering the very incongruent results from previous research, it would be impossible to support all of them with the present study. Getting yet another result is therefore not surprising and is probably due to specific characteristics of the samples. For instance, it could be that any sex differences found are (at least partly) related to the cultural background of participants. Different societies consider different traits acceptable or valuable for either males or females (Bem 1974), societies differ in the specific tasks they assign to the sexes (Bem 1981), and males and females are socialised into these culturally constructed roles (Lorber and Farrell 1991). Previous studies were conducted in diverse societies. The first and the third studies discussed earlier used university students from Hong Kong, the second study secondary school students in Hong Kong, the fourth study university students in Turkey, and the fifth study examined employees from a variety of business sectors in Guangzhou (China), while the present study has focused on tertiary students in the Australian Capital Territory. The disparate findings suggest that caution should be taken in generalising from each specific sample to a larger population, especially to populations with other cultural backgrounds.

There were no significant correlations found between 'age' and thinking styles, but the factor 'field of study' did have correlations with the MSG thinking styles. Applied science students were most likely to use the hierarchic thinking style and so work on multiple goals at the same time while setting priorities. Social science students scored highest on the internal thinking style, meaning they like to work independently or alone. Vocational students most often utilised the liberal thinking style and so they prefer to go beyond existing rules and procedures. The group interview data showed that participants studying architecture or creative writing especially identified with the hierarchic thinking style. As with the sex differences, there are no consistent findings from previous studies on thinking style differences based on field of study.

Although there is a substantial body of research studying thinking styles in relation to education (e.g. Sternberg and Zhang 2005; Zhang 2001a; 2005a; Zhang and Sternberg 2001), these are mainly aimed at improving students academic achievement. There are limited results to be found on significant correlations between certain thinking styles and fields of study or educational level of the participants. Although Zhang and Sternberg (2005: 14) state that “the nature of an academic discipline modifies people's thinking styles”, they do not provide specific evidence for this, nor explain how the process would work. They base their argument on the result of one study that found that students majoring in natural science and technology were more likely to use the global thinking style than students working towards a degree in social sciences or humanities (Zhang and Sachs 1997). However, this finding does not prove that the different studies actually modified students' thinking styles. Students may have chosen these studies because it suited the thinking styles they were already using. A group interview participant in this study stated that the project based learning that is used in the study of architecture, trains students in the hierarchic thinking style. However, this was not explicitly confirmed by any other architecture students in the group interviews.

A rather small study, 151 participants, reported no differences in thinking styles in relation to field of study or, for the same students, in relation to their class levels (Zhang 1999). A later study found that social sciences and humanities students used more executive and external thinking styles than do students majoring in natural sciences (Zhang 2004d). Yet another study reported that social science students are more inclined to use the conservative thinking style and that arts students tend to use the oligarchic style (Balkis and Isiker 2005). The results are somewhat similar in the sense that conservative and executive thinking are both Type II thinking styles. In summary, there is little consistency in the results other than that several studies found that students from different disciplines do think differently, but without an agreement on which study is related to which thinking styles. The present study does confirm this point, but the disparate results from mentioned studies suggest that other variables, not included in this study, are influencing the relationship between fields of study and thinking style.

This study found that the type of driver's licence young male drivers held was significantly related to the hierarchic thinking style; male participants with a full licence were most likely to use hierarchic thinking, and male participants on learners permit least likely. The same connection was not found for young female drivers. This is an interesting result because this study linked hierarchic

thinking to safe driving styles and found young female drivers to be more likely to use the hierarchic thinking style than young male drivers. The finding suggests that for young male drivers something changes in their thinking in the period between obtaining their learners permit and their full drivers licence and that this process is different for young female drivers. Group interview participants talked about experience (not age) as an important influence on their driving style but did not mention any links between 'experience' and the way they were thinking. Participants also did not mention any sex differences in the relationship between 'experience' and their driving. There is no previous research with which to compare these results.

No clear trend was found for 'years of driving' in relation to the MSG thinking styles but there was a significant effect for the factor 'exposure' (hours/week) in relation to thinking. The main findings were that fewer driving hours per week made it more likely that young drivers would use positive driving styles (patient, careful) while more hours of driving were related to the use of negative driving styles (risky, angry, high-velocity, dissociative). The group interview participants did indeed talk about using more negative driving styles (e.g. high-velocity, dissociative) during long drives and they linked this to either 'not-thinking-while-driving' (so dissociative) or to getting bored with the driving (so speeding to get more stimulus or just to shorten the driving time). The questionnaire data showed some differences between young male and young female drivers in relation to the factor exposure. No significant correlations were found between 'exposure' and any positive driving styles for males but the young males who drove more than ten hours per week scored highest on three negative driving styles (risky, high-velocity, dissociative). Young female drivers who exceeded ten driving hours per week scored lowest on positive driving styles (patient, careful), and highest on risky, angry, and high-velocity driving. There are no previous studies with which to compare these findings.

Sternberg (1988; 1997) has theorised that people tend to use clusters of thinking styles and therefore it is important to examine if, and how, certain thinking styles are correlated. The theory of MSG predicts correlations between certain types of thinking styles. As discussed in section 2.1.3, thinking styles in this theory can be sorted Type I, Type II, and Type III (Zhang 2001a; Zhang and Huang 2001; Zhang and Sternberg 2000). Thinking styles of Type I and II are more likely to show correlations to other thinking styles in the same group than to thinking styles from another group, while the Type III thinking styles are expected to have correlations with either or both Type I and Type II thinking styles.

Most correlations found in this study were in accordance with the MSG. All moderate to strong correlations supported findings from previous research (Zhang 1999) with the strongest positive relationships between executive and conservative thinking and between executive and monarchic thinking. These are all Type II thinking styles and so these correlations were expected. They can be interpreted as people who prefer to follow the rules when performing a task tend to feel comfortable with familiarity, like to follow tradition and prefer to focus on one task at a time. In contrast, an earlier study in the Philippines (Bernardo et al. 2002) using Sternberg's thinking styles found the strongest correlation between the judicial (Type I) and executive (Type II) thinking styles and are thus not in line with expectations; Filipino participants who preferred to judge the rules also liked to follow the rules. In Bernardo's study the correlation between executive and conservative thinking and between executive and monarchic thinking was less strong than emerged from the present data and Zhang's (1999) study. The present study found two moderately strong relationships not predicted by the theory of mental self-government, but supporting results from earlier studies (Zhang 1999; Zhang and Sachs 1997) between judicial (Type I) and local (Type II) thinking, and between hierarchic (Type I) and executive (Type II) thinking.

When the questionnaire data were split according to 'sex', some correlations emerged for males or females only while others were considerably stronger for one sex than for the other. Within the Type I thinking styles, the correlation between legislative and hierarchic thinking was much stronger for females than for males. This finding indicates that females who prefer to do things their own way, also tend to work on multiple goals at the same time and they are able to prioritise these goals. Only for males did a relationship between hierarchic and global thinking emerge, while the correlation between hierarchic and liberal thinking was stronger for males than for females. Thus males who prefer to work on multiple goals at the same time have a preference for abstract thinking and tend to go beyond existing rules in order to solve problems of a more general nature. Within the Type II thinking styles there was a stronger correlation between conservative and monarchic thinking and between conservative and local thinking for females than there was for males. This can be interpreted as females who feel comfortable to follow traditions and prefer familiarity tend to focus on one task at the time which they execute with precision and attention to detail.

Sternberg (1997) theorised that people use clusters of thinking styles and the data suggest that the male and female young drivers in the present study preferred different clusters. This difference in preference could be an indication of different sociocultural processes at work in the

development of males and females in Australia. Previous studies did not report on sex differences in interscale correlations and so no comparisons can be made. However, regardless of the cause of these differences (e.g. socialisation into culture) it seems important to be aware of them, especially for training purposes.

6.2.2 WHAT ARE YOUNG DRIVERS' DRIVING STYLES?

This section discusses the outcomes of both the questionnaires and the group interviews to answer the sub-research question, *What are young drivers' driving styles?* It examines young drivers' driving styles in relation to sociodemographic factors (sex, age, field of study), in relation to participants' self-reported driving behaviours (weekly driving: hours; weekly driving: km; time driving: years, including unlicensed driving) and the relationships amongst driving styles.

As presented in section 4.2, young drivers (male and female combined) were more likely to use the careful driving style and least likely to use the dissociative driving style. This could be due to participants' limited driving experience (on average 3-4 years) which means they would have less automated driving behaviour. Group interview participants talked about how more driving experience would cause them to think less about the actual driving while in the car, which could lead to a more dissociative driving style.

Six of the MDSI driving styles showed significant differences according to sex; males were more likely to use the risky, angry and high-velocity driving styles, while females were more likely to use the patient, careful and anxious driving styles. Very similar results were found when considering the four driving style domains (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari et al. 2005); males scored higher on the reckless and careless and on the angry driving styles (maladaptive or negative styles) while females had a higher score on the patient and careful driving styles (adaptive or positive styles). These findings are in contrast with the results from previous studies using the MDSI.

Taubman - Ben-Ari et al. (2004) found that males scored higher than females on the careful driving style while females scored higher on dissociative and anxious driving. The findings are only partly in correspondence with a subsequent study, which focussed on the four driving style domains, that found men using the reckless and angry driving styles more than women, that women displayed the anxious driving style more, and where no significant differences were found for the careful

driving style (Taubman - Ben-Ari 2006). The most recently published study using the MDSI (Miller and Taubman - Ben-Ari 2010) found that young male drivers (17-24) scored higher on the reckless and careless driving style domain and the angry domain than did young female drivers. Miller found no significant sex differences for the patient and careful domain and the anxious domain. On the other hand, this study's findings are in accordance with previous research in which female drivers were found to be more safety-oriented while male drivers were more likely to use a risky general driving style (Özkan 2006; Özkan and Lajunen 2005; Zimbardo et al. 1997).

Reckless and careless driving, as well as angry driving, has been found to contribute significantly to involvement in road crashes and to the committing of driving offenses (Taubman - Ben-Ari et al. 2004). The present finding, that males scored higher on these negative driving styles, therefore supports earlier research that found young males to be more likely to commit risky traffic offenses (Catchpole and Styles 2005) and to commit more violations of traffic rules (Åberg and Rimmö 1998), actions that have also been proven to also increase the risk of a crash (e.g. Parker and Stradling 2000). Young males are indeed more often involved in crashes (e.g. Laapotti and Keskinen 2004; Whissell and Bigelow 2003).

Previous findings of women displaying more anxiety and driving stress than men (Taubman - Ben-Ari et al. 2004; Westerman and Haigney 2000) could not be confirmed by the present results. In contrast with expectations, males initially scored higher on the distress reduction driving style (a result not further analysed due to the low reliability of this scale) although females did score highest on the anxious driving style. However, for the anxious driving style domain (combining the anxious, distress reduction and dissociative driving) no significant results were found for either sex. In addition, the group interview participants linked anxious driving more to inexperience (e.g. not been driving for long, driving in a city for the first time) than specifically to being female or male. This finding confirms the findings from Miller (2010) which also did not find any significant sex differences in the anxious domain for young drivers. Since the combined anxious domain scale showed sufficient reliability (Cronbach's $\alpha = .77$), the discrepancy with previous findings (Taubman - Ben-Ari et al. 2004; Westerman and Haigney 2000) might be specific to the present sample. Possible explanations might be found in the different age group of the sample (18-25 in comparison to 18-91 and 18-72) or in cultural differences (Australian sample versus British and Israeli participants). Of these interpretations the different ages of the samples seems the most likely, since the present research does support the findings from Miller (2010) who studied Israeli young drivers of similar

ages as the Australian sample. This finding could indicate that there are stronger differences between the driving styles of young males and females than between the driving styles of older males and females.

Significant differences were found in relation to 'age' for the risky, patient, careful, and dissociative driving styles. The main trends in relation to age were a diminishment of the risky and dissociative driving styles and an increase of the patient and careful driving styles; when participants were older they were less likely to drive dangerously or distractedly and more likely to drive calmly, patiently and attentively. These results are in line with the findings of the first study using the MDSI (Taubman - Ben-Ari et al. 2004). The present study supports previous results in which increasing age is related to a diminishing of violations of traffic rules (Åberg and Rimmö 1998), and with a consistent and rapid decline of crash rates (Mayhew et al. 2003). Both traffic violations and crashes are known effects of using a risky driving style (Taubman - Ben-Ari et al. 2004). The 24-year olds clearly deviated from the main trends which could be due to the uneven spread of participants amongst ages. Only eleven 24-year old young drivers participated and therefore any divergence from the trend could be due to characteristics specific to this small group, rather than to a characteristic inherent to 24-year olds.

Participants in this study were all pursuing tertiary education and therefore 'field of study' was examined in relation to driving styles instead of 'level of education'. It has to be noted beforehand that there were not equal numbers of participants from each field of study and this may have skewed the results. Vocational students were more likely to demonstrate risky and angry driving styles, social science and applied science students were more likely to use a careful driving style and science students were more prone to dissociative driving. Some sex differences existed for the different fields of study. Male vocational students scored high on risky driving and also on dissociative driving but not on angry driving. Female science students were most likely to use a dissociative driving style and female applied science students least likely. The finding that applied science students scored highest on the careful driving style seems logical, considering they also had the highest score on the hierarchic thinking style, and hierarchic thinking showed a significant positive relationship to patient and careful driving.

Three of the four driving style domains showed significant results in relation to 'field of study': the reckless and careless, the angry, and the anxious driving style domain. Vocational students

remained the most likely to use negative driving styles (reckless and careless, angry) and science students scored highest on the anxious driving style, probably due to the dissociative driving style being part of that combined domain on which they scored highest. There is little research available with which to compare these results. Crashes have been linked to a driver's level of education; people with less education had higher mortality rates per number of kilometres travelled, even after controlling for self-reported seat-belt use (Braver 2003). Taubman - Ben-Ari et al. (2004) found that education level was related to certain driving styles; the higher the level of education, the more the participant had a tendency to feel stressed during driving and to utilise the distress-reduction driving style. Since the distress-reduction driving style did not show sufficient reliability in the present study it was not retained for further analysis. Furthermore, even when 'vocational' is seen as a less advanced level of study than the university level-study in order to compare 'level of education' the results are still not in line with the findings from Taubman – Ben-Ari et al. (2004). As discussed before, these dissimilar results could be due to an uneven spread of participants across fields of study. Nevertheless, it could be interesting to explore the relationships between study and driving further as this may lead to insights that can be used to improve driver training; if certain studies use training methods that result in certain ways of thinking, these methods could be employed when teaching driving to young people. A group interview participant mentioned that architecture students were trained to use hierarchic thinking and this was confirmed by other participants studying architecture. Participants identified project based learning, with lots of feedback rounds, discussion and self-reflection, as a good way of training hierarchic thinking.

When examining 'weekly driving' (measured both in hrs/wk and km/wk) in relation to driving styles, the major trend was that an increase in weekly driving made it more likely that participants would use a negative driving style (risky, angry, high-velocity, anxious, dissociative) and less likely that they would use a positive driving style (patient, careful). All significant correlations were moderate to small in magnitude. These results support previous research that found higher mileage related to faster driving (Elander et al. 1993). Some caution has to be taken in interpreting these findings since it is questionable how reliable these self-reports are on the amount of weekly driving, both in hours and distance. Firstly, several participants seem to have given quite incongruent answers to 'hours of driving' and 'number of kilometres driven' (e.g. a total of 60 km driven in 10 hours). Secondly, there were 19 missing values for 'weekly driving' and 37 missing values for 'kilometres driven'. This could indicate that participants had trouble making a realistic estimate of

their amount of driving. Since the questions about weekly driving were put at the start of the questionnaire package, 'running out of time' when answering them seems an unlikely explanation for the omissions.

Even when making a cautious interpretation, the present results have some inherent logic; the more time people spend on the road, the more frustrated they can get with the traffic environment (e.g. other road users, traffic jams, road works, delays, and boring long drives). Therefore they become less patient and careful and more risky, angry, stressed and dissociative. Several studies on driver stress support this interpretation. Traffic congestion was found to be one of the most common contributors to driver stress (Gulian, Debney, Glendon, Davies and Matthews 1989a; Hennessy and Wiesenthal 1999) and people who judge driving to be a stressful task have been found to report higher incidences of speeding (Matthews, Dorn and Glendon 1991) and they tend to have more minor crashes (Gulian, Glendon, Matthews, Davies and Debney 1990; Selzer and Vinokur 1974). These studies indicate that young people use less safe driving styles, such as risky, high-velocity, and dissociative driving.

Findings from the group interviews also support the interpretation that drivers get more frustrated with the traffic environment the longer time they spend on the road. Participants mentioned they got bored on long drives, which made them either drive dissociatively or made them speed up in order not to fall asleep. Participants also discussed that they got stressed and nervous by other road users' behaviour, mainly because they do not trust other people to drive safely and cautiously. This view supports previous research stating that drivers are, in general, wary of other drivers and consider their own driving as more safe (Redshaw 2004). Thus driving for longer would prolong a stressful period and makes it more likely that participants would use an anxious or angry driving style (and even a high-velocity driving style) just to get out of the situation as quickly as possible. Earlier research has concluded that young drivers need to get more experience early on in their driving career in order to be safer drivers (Engström et al. 2003; Nyberg 2007). The findings of this study indicate that this necessary experience should be built up during more frequent shorter drives rather than during long driving sessions. This finding supports previous research stating that driving experience should be gained in a structured way (Engström et al. 2003).

Previous research using the MDSI reported a significant association on driving exposure; the volume of weekly driving was significantly and inversely related to the anxious driving style. This

finding was explained with "as expected, persons who tend to feel driving stress tend to avoid driving" (Taubman - Ben-Ari et al. 2004: 329). The opposite explanation, persons who don't drive often tend to feel more stressed while driving, could be equally true but, either way, the finding is contradicted by the present results. Subsequent research based on the MDSI found that women who drove more kilometres per week and who had more years of driving experience reported more involvement in traffic violations (Taubman - Ben-Ari 2006). This result does not contradict the interpretation that people tend to use more negative driving styles when they spend more time on the road per week.

Besides the hours of driving participants undertook per week, the total amount of driving experience (years) was found to have an effect on their driving style as well; young drivers who had more years of driving experience (either licensed or unlicensed) were more likely to use a patient and careful driving style. The finding that drivers become more patient and careful when they get more driving experience was expected. Previous research found that especially young novice drivers underestimate the risks associated with a range of driving situations due to inexperience (Machin and Sankey 2006) so they might not (yet) see the need for a patient and careful driving style. The idea that young drivers might not see the need to drive carefully is supported by the group interview data from which it was evident that while participants knew *how* to drive safely, they did not really know *why* they should do it (other than avoiding negative consequences such as a fine).

The present study also found that the more years participants had been driving, the least likely they were to display an anxious driving style. Again, this has some inherent logic; with more experience you get less anxious and stressed while driving because you would know better what to expect on the road. In addition, your driving skills (handling the vehicle) would improve with more experience (Elander et al. 1993). Findings from the group interviews support this logic. Participants said that experience had made them more aware of what they could and could not do and this made them more relaxed when driving because they felt more comfortable that they could handle the driving task. Some participants also mentioned that experiences of self and others (e.g. having seen someone skid out in the rain or have an accident) had made them drive more carefully. The present findings support previous research stating that experience has a positive effect on young people's safety on the road (Engström et al. 2003; Gregersen, Nyberg and Berg 2003).

In summary, several factors in this study have been found to influence a young adult's driving style: sex, age, field of study, exposure, and driving experience. In addition, the eight driving styles showed a relationship between each other.

6.2.2.1 DRIVING STYLE CLUSTERS

The eight MDSI driving styles were intercorrelated for the young drivers completing the questionnaires in directions consistent with previous research (Taubman - Ben-Ari et al. 2004). The risky, angry, high-velocity, and dissociative driving styles were positively correlated which means that a young driver who tends to speed and drive impatiently is also more likely to get excited by dangerous driving, to express their irritation or anger while driving, and to not pay enough attention when driving. These associations could be expected since all these driving styles have been labelled as maladaptive or negative styles (Taubman - Ben-Ari et al. 2004). The patient and the careful driving styles were also positively correlated, meaning that a young driver who is calm and attentive while driving is more likely to also drive cautiously and stick to the traffic rules. Since both driving styles are adaptive driving styles, these associations were expected. The two remaining maladaptive driving styles (dissociative and anxious) showed an anticipated positive correlation with each other. Furthermore, significant evidence was found for an inverse association between both positive driving styles (patient and careful) and the negative driving styles risky, angry, high-velocity and dissociative driving. This could indicate that young drivers either tend to use the negative spectrum of driving styles or the positive range of driving styles, although the data showed differences between males and females in this respect.

When examining the associations between driving styles for males and females separately, there were some differences. The negative relationship between risky and patient driving was stronger for males than for females. This could imply that young male drivers display more definite or consistent choices in their driving style (either risky or patient), while young female drivers might be more flexible in their use of different styles (sometimes risky and sometimes patient). Adapting one's driving behaviour to changing circumstances makes crashes less probable (e.g. slowing down when it starts raining) so if young male drivers are less flexible in the use of different driving styles this may be part of the explanation for their greater involvement in crashes (e.g. because they persist with speeding when it starts raining).

Males showed a stronger positive correlation for dissociative and anxious driving while females showed a stronger positive correlation for dissociative and risky driving. This finding can be interpreted as young male drivers who drive non-attentively tend to feel alert and tense, and young female drivers who drive distractedly are more likely to drive dangerously. These intercorrelations for young male drivers were in the anticipated directions because the dissociative and anxious (and distress reduction) driving styles all fall within the anxious driving domain. The connection between dissociative and risky driving for young female drivers was more unexpected. The finding may be explained from previous research (Laapotti and Keskinen 1998; 2004) that found that females tend to have more problems than males with handling the car (driving skills). Hence, if females are not concentrating on the driving task (dissociative driving) they may become riskier drivers than males utilising the same driving style. Some findings from the group interviews support this. Only female participants mentioned they prefer to drive a familiar car, an automatic, or to drive the same route; all ways of diminishing the demands of the driving task. Female participants also expressed that they expected 'girls' to have less driving skill than 'boys', saying they saw females as more dangerous than males when using risky driving styles. Previous research has found that young male drivers consider young female drivers to be less confident and therefore not as good a driver as males (Redshaw 2004) and the group interview data show that young female drivers share this opinion with young male drivers.

Later studies using the MDSI (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2005) focused more on the four broad driving style domains instead of the eight driving styles from the first study (Taubman - Ben-Ari et al. 2004). The present data show stronger intercorrelations between domains than previously reported by Taubman - Ben-Ari et al. (2005) but they did not report on the specific scores and so no further comparison can be made. In the present study the driving style domains show similar correlations to the eight driving styles. The strongest negative correlation was between the patient and careful domain and the reckless and careless domain; young drivers, who prefer to drive calmly and cautiously are less likely to drive impatiently, speed or get excited from dangerous driving. The strongest positive correlation was between the angry domain and the reckless and careless domain; young drivers who tend to express their irritation and anger on the road are more likely to also drive impatiently and dangerously. All correlations were in the expected directions.

Some differences between males and females emerged in the correlations between driving style domains. The relationship between the angry domain and the reckless and careless domain is stronger for female young drivers than for male young drivers. Only for females is there a moderately strong correlation between the angry domain and the anxious domain. This could signal that young females who feel tension while driving or who drive distractedly are more likely to express their irritation and rage in the car. The correlation between reckless and careless driving and the anxious domain is moderate for females and only weak for males. This could point to young female drivers getting more stressed when using negative driving styles than do young males. A possible explanation could be that, as discussed before, female drivers have been found to have more problems with handling a car (technical driving skills) than do young males (Laapotti and Keskinen 2004). Therefore, they might feel, for instance, when speeding that their driving skills are not quite sufficient and as a consequence feel stressed. It could also be that young female drivers tend to drive faster when they already feel stressed. Female participants in the group interviews mentioned they were more likely to speed when stressed; for instance after having an argument with their family or partner before getting in the car. Another explanation could be that there are different societal expectations for the way males and females drive and young drivers may feel they should live up to these 'informal rules'. For instance, group interview participants mentioned they presumed males explore the limits of their driving and their cars at an early stage of driving more than females do, which suggests different expectations for both sexes. This supports previous research that found that (especially young) males have a different relationship to cars than females do (Redshaw 2006). According to Redshaw (2006) masculinity in the forms related to cars is not a fixed characteristic of the biology of males but rather a social construct, although many people see this relationship between males and cars as a natural phenomenon.

Summarising the relationships between the driving styles, it can be said that the correlations found in this study were mostly as could be expected and they supported previous research. A new finding was that the strengths of some correlations are dissimilar for males and females and that only for females did a correlation emerge between the angry and the anxious domain. It is suggested that this difference could be related to social-cultural variety rather than to biological differences.

6.2.3 IS THERE A RELATIONSHIP BETWEEN YOUNG DRIVERS' THINKING AND DRIVING STYLES?

Significant correlations were found between twelve of the thirteen thinking styles and seven of the eight driving styles; so 34 relationships in total. No correlations were found for the liberal thinking style. When controlling for the variables 'sex' and 'age', 30 of the 34 correlations remained and they were of similar magnitude as when not controlling for these factors. These findings show that there is an actual association between thinking styles and driving styles. One new significant correlation emerged when controlling for sex and age; anarchic thinking versus high-velocity driving. All significant correlations are discussed in relation to both the findings from the group interviews as well as to the extant literature on both thinking styles and traffic safety.

The legislative thinking style was positively correlated to the patient and careful driving styles, and negatively to anxious and dissociative driving. People who adopt the legislative thinking style like tasks that allow them to do things in their own way and they have a tendency for risk-taking (welcoming new and challenging tasks) (Zhang 2009). It was expected that this way of thinking might be related to negative driving styles because the road rules could be experienced as too dictating for someone who wants to follow their own ideas and likes to take risks. Still, this contrasting outcome can be interpreted from results of previous research.

A qualitative Australian study found that young males experience being alone in the car as a situation in which they can do anything they want, while young females see being alone in a car as time to themselves (Redshaw 2006). Both experiences correspond with legislative thinking and doing things in your own way, which can then be related to any driving style that you choose to maintain which, in this study, was patient or careful driving. The negative correlations between legislative thinking and anxious and dissociative driving support Zhang's (2009) study that found a similar inverse relationship between the legislative thinking style and state- and trait-anxiety. A possible interpretation of the negative correlation to anxious and dissociative driving is that if a driver feels in control, they might be more relaxed and able to concentrate better on the task at hand (driving the car). On the other hand, Taubman - Ben-Ari et al. (2004) suggested that a desire for control could work positively as well as negatively. While it could lead to more careful driving, frustration of that control might lead to angry driving. Redshaw (2004) mentions this frustration aspect too, stating that people get annoyed when other drivers obstruct their free flow through traffic. Findings from the

group interviews support these previous studies, with participants reporting that they get irritated by people in front of them driving too slowly. The contrasting findings from the questionnaires and the group interviews suggest that a desire for control (e.g. legislative thinking style) can indeed work positively as well as negatively in a driving context.

Executive thinkers have a preference for tasks with clear instructions and structures and they like to work within established guidelines. As expected, this thinking style was positively related to the patient and careful driving styles and negatively to the risky driving style. This result from this study further illustrates the argument, discussed in section 6.1.1, on the value of thinking styles. Executive thinking is classified by Zhang and Sternberg (2005) as a Type II thinking style and Type II styles are commonly less valued than Type I thinking styles (for instance in an academic context). However, in the context of driving, executive thinking is a style with a positive value since it is connected to patient and careful driving; both adaptive and positive (safe) driving styles.

Judicial thinking will be used by people who like to work on tasks that allow for one's evaluation and for them to evaluate and judge the performance of other people. The judicial thinking style was also positively related to patient and careful driving. This finding supports previous research that found a positive correlation between judicial thinking and the personality trait of conscientiousness (Zhang and Huang 2001). Higher levels of conscientiousness have a correlation with less involvement in traffic crashes (Arthur and Graziano 1996; West, Elander and French 1992). In contrast, the group interview findings suggest that judicial thinking can also have a negative effect in relation to driving. In several group interviews, participants mentioned that they judge the road rules such as speed limits when driving. If they deem them to be unnecessary (e.g. a lower speed limit when there are road works) some will choose to still obey the rules, while others will choose to ignore them. Thus, the correlation between judicial thinking and patient and careful driving, as found from the questionnaire data, could be a characteristic of this specific sample and requires further research.

Hierarchic thinking had a positive relationship with patient and careful driving. The correlation was stronger for males than for females. The hierarchic thinking style refers to people who like to distribute attention to several tasks at the same time while prioritising them according to one's valuing of these tasks. The correlation with positive driving styles was expected because careful driving incorporates an element of planning and problem solving (Taubman - Ben-Ari et al. 2004)

and hierarchic thinking would be helpful for that facet of driving. Furthermore, as for judicial thinking, previous research has found a positive correlation between the hierarchic thinking style and conscientiousness (Fjell and Walhovd 2004; Zhang and Huang 2001) which corresponds with the patient and careful way of driving.

Before the construct of thinking styles was mentioned or explained in the group interviews, participants spoke about feeling the need to pay attention to several things at the same time when driving, such as the behaviour of other road users and changing gears. If participants found it difficult to cope with the combined tasks they tried to diminish the mental load by driving an automatic car for instance. These strategies support the theory of the task-capability interface model (Fuller 2005), as discussed in section 2.2.1.4. After a brief explanation of the thirteen thinking styles, a participant who identified as a hierarchic thinker mentioned that he enjoyed it when several things were happening simultaneously while driving; it kept him concentrated and therefore he would drive more safely. In contrast, many participants interpreted hierarchic thinking as prioritising tasks or juggling tasks (e.g. making a to-do list for the trip) but not as paying attention to several tasks at the same time (e.g. during driving take into account road rules, other road users and handling own car). This finding signals that although participants understand the multiple dimensions of the driving task, the concept of hierarchic thinking in relation to driving requires further clarification.

The hierarchic thinking style showed an inverse correlation with negative driving styles: risky, angry, high-velocity, and dissociative driving. It may seem logical that if a thinking style is endorsing a positive driving style, it would be discouraging negative driving styles. However, when controlling for the factors 'sex' and 'age' the correlation between hierarchic thinking and the angry and high-velocity driving styles disappeared completely. These negative driving styles may be more influenced by 'sex' and 'age' than by any thinking style, as suggested by the hierarchical regression (see section 4.3.3). The only remaining negative correlation looks sound; people who are able to pay attention to several tasks at the same time are less likely to get distracted from the driving task.

Monarchic thinking was positively related to patient driving. People who adopt the monarchic thinking style prefer to focus completely on one thing at the time. In relation to driving focusing on one thing may be a double edged sword, despite the results from the questionnaires. When a driver focuses completely on driving without paying attention to distracting factors such as passengers talking or turning on music, this could lead to safe driving. On the other hand, since

driving is a complex task with several factors demanding attention, focusing on the 'wrong' task (e.g. changing gears) could lead to unsafe situations (e.g. not noticing a changing traffic light). Findings from the group interviews support the interpretation that monarchic thinking can be both positive or negative for driving. For instance, participants mentioned getting strongly focused on one specific other road user while not paying much attention to the other cars after a driver had cut in front of them. Monarchic thinking has, however, been linked to conscientiousness (Zhang and Huang 2001) which, as mentioned, leads to less crash involvement. Therefore, it is plausible that monarchic thinking could indeed be linked to a safe driving style such as patient driving.

Monarchic thinking showed a negative relationship to angry and high-velocity driving. However, the inverse relationship with the angry and high-velocity driving styles disappeared when controlling for the factors 'sex' and 'age', just as with the hierarchic thinking style.

The oligarchic thinking style showed a positive relationship to the patient and careful driving styles. Oligarchic thinkers prefer to work on multiple tasks in the service of multiple objectives, without setting priorities. There are no results from previous research with which to compare this finding. Oligarchic thinking has been linked to artistic personality types and this style tends to be used more often by art students (Balkis and Isiker 2005) but this does not really offer an explanation of how it would lead to positive driving styles. Being able to multi-task is obviously useful for driving, since driving is a complex task with multiple things going on at the same time, but not setting priorities seems counterproductive. In another study, the oligarchic thinking style was negatively correlated to conscientiousness, which is contradictory to the findings from the present study, and positively correlated to neuroticism (Fjell and Walhovd 2004), which has been found to contribute to aberrant driving behaviour and a higher crash risk (Sümer, Lajunen and Özkan 2005). None of the participants in the group interviews identified with the oligarchic thinking style, nor did they discuss thinking in a way that could be interpreted as using the oligarchic style. Thus, at the moment, this result cannot be interpreted other than that it might be a specific characteristic of the questionnaire sample.

People who use anarchic thinking prefer flexibility in their tasks so they can decide on what, when, where, and how they work. This thinking style was positively related to risky and angry driving. This result could be explained by Taubman - Ben-Ari et al.'s (2004) suggestion that a desire for control, which is obvious in the anarchic thinking style, when frustrated can lead to maladaptive

driving styles, such as angry and risky driving. When examining males and females separately, no correlations remained for males, while for females anarchic thinking was related to the angry and dissociative driving styles. Since for females dissociative driving and risky driving have been linked, this result is still in line with the previous findings. When controlling for sex and age another positive correlation emerged between anarchic thinking and high-velocity driving. This is in accordance with expectations because the present data suggest that the risky, angry and high-velocity driving styles are very closely related. In fact, they could be considered as one driving style domain, rather than two domains as previous research proposes (Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari 2006; Taubman - Ben-Ari et al. 2004; 2005). In contrast, previous research has linked the anarchic thinking style to conscientiousness (Nielsen 2005) which is related to safe driving rather than to unsafe driving styles. These findings from the present study and previous research could indicate that for drivers using the anarchic thinking style the importance and usefulness of obeying the traffic rules should be very clear, because otherwise they will easily revert to negative driving styles.

The global and the local thinking styles both had positive correlations with patient driving, which remained after controlling for the factors of 'sex' and age'. Although they are opposing ways of working on a task (focusing on the overall picture versus on concrete details), it is easy to see how both thinking styles can lead to adaptive ways of driving. During driving it is important to keep an eye on the environment (overall picture) but also to pay attention to details and so to elements within that environment (such as a traffic light changing colour) and car handling tasks. After splitting the sample for sex, it emerged that for males, global thinking was linked to patient driving, but for females, it was local thinking. During the group interviews nobody identified with the global thinking style but several participants said they used the local thinking style. Both male and female participants linked local thinking to their driving skills, for instance in relation to precision parking (wanting to precision park as well as being able to). Since the relationship between driving skills and safe driving has already been established for females, this finding may explain the found sex differences for global and local thinking. Apparently for females it is important to have sufficient driving skills to be safe drivers, while males have to be able to keep an overview of their environment in order to drive safely.

External thinking had a positive relationship with patient and careful driving and was inversely related to dissociative driving. People using the external thinking styles prefer to work

collaboratively on tasks so work in a team. Driving takes place in a complex environment full of other road users (motorists, cyclists, pedestrians), so it follows that a preference for collaborating with other people would lead to patient and careful driving styles. Group interview participants indeed interpreted external thinking as cooperating with others in the driving environment. In addition, a positive correlation was found for external thinking and conscientiousness (Zhang and Huang 2001) and conscientiousness was linked to patient and careful driving (Arthur and Graziano 1996; West et al. 1992). A focus on collaboration would require being alert to your surroundings which explains why external thinking was inversely related to the dissociative driving style.

As expected, the conservative thinking style was positively correlated to the patient and careful driving styles and negatively to risky and high-velocity driving. Conservative thinkers like working on tasks that allow them to adhere to existing rules and procedures when performing them. This makes conservative thinking congruent with adhering to the traffic rules while driving and, thus, to demonstrating a patient and careful driving style. That conservative thinkers are less likely to use negative driving styles can be expected as well; risky and high-velocity driving styles are related to committing traffic offenses (Taubman - Ben-Ari et al. 2004), which implies that the driver is not keeping the traffic rules so the opposite of a conservative thinker's preference.

From the preceding discussion it can be concluded that the following thinking styles are most beneficial for normal, safe driving for males: hierarchic, executive and conservative thinking. For females the hierarchic, local, monarchic, and executive thinking styles are the most positive in regards to driving: For males there are no specific thinking styles that directly endorse negative driving styles; if males do not deliberately use thinking styles that lead to patient or careful driving they would be more likely to use unsafe driving styles. In contrast, the anarchic thinking style shows for females a direct link to angry and dissociative driving and so this is a thinking style that probably should be discouraged during driving training.

6.2.4 CAN THINKING STYLES PREDICT DRIVING STYLES?

After establishing the discussed correlations between thinking styles and driving styles, consideration was given to whether certain thinking styles might be able to predict certain driving styles since this would offer opportunities for driver training. Several factors have been examined in relation to certain ways of driving and the results have suggested that different predictors were

relevant to different driving styles. The group interview data also indicated that certain ways of thinking can predict certain ways of driving.

As presented in section 5.2.3, group interview participants mentioned that being in the right frame of mind would have a positive effect on their driving, suggesting that thinking does influence driving. They also demonstrated how certain ways of thinking had a negative effect on their driving, for instance by using a judicial thinking style (thinking about all possible consequences of speeding and judging the likelihood of their occurrence), which led to speeding (because they thought there would not be any negative consequences).

The results of the questionnaires showed that ‘sex’ was the strongest predictor of the risky driving style. This was followed by a higher amount of ‘weekly driving’, a lower preference for the hierarchic thinking style, a higher endorsement of the anarchic thinking style and a lower age. The first predictor of risky driving, being male, is in accordance with the literature; males, especially young males, are more likely to use a negative driving style than are females (e.g. Catchpole and Styles 2005; Evans 1991; Groeger and Brown 1989; Ho and Yong Gee 2008; Hurrelmann 1990; Laapotti and Keskinen 1998; 2004; Özkan 2006). ‘Age’ was found as the weakest significant predictor but being younger is also a known factor in predicting risky driving behaviour (e.g. Bingham and Shope 2004; Catchpole and Styles 2005; Harris and Houston 2010; Harrison et al. 1999). Neither ‘sex’ nor ‘age’ can be influenced but the second predictor ‘weekly driving’ may offer opportunities to improve road safety.

‘Weekly driving’, either in hours or kilometres, can be considered as being similar to the factor exposure. ‘Exposure’ has been examined in many road safety studies (Bianchi and Summala 2004; Hutchinson, Wundersitz, Anderson and Kloeden 2009) but mainly in relation to crashes. The higher crash involvement of some drivers could be a result of their greater exposure to potentially risky situations. There is considerably less research examining the links between weekly driving and driving styles instead of between exposure and crashes. No evidence was found that indicated that the ‘amount of driving’, seen as driving experience, has a direct influence on higher hierarchical levels of driver behaviour (Laapotti and Keskinen 2004). On the other hand, Brown (1982) suggested that exposure alone cannot account for individual differences in crash rates, but rather it is the way people drive during the hours they spend on the road. “It would thus be possible for two individuals to exhibit radically different accident rates, if one always drove at the average speed of

the traffic around him and one always drove erratically; sometimes faster and sometimes slower than the average of the flow. But their "exposure to risk", in terms of driving time or distance driven per year, could be identical" (Brown 1982: 346). Thus any relationships between weekly driving and specific driving styles could be important especially when these links are between two negative driving styles that are known to enhance crash risk. The two thinking styles could therefore be the most interesting factors in relation to risky driving. Training drivers in the use of the hierarchic thinking style during driving, at the same time as discouraging anarchic thinking, could contribute to the development of a safer driving style.

Angry driving was predicted by a higher amount of weekly driving. This was followed by being male and a lower preference for the monarchic thinking style. The total variance accounted for by the regression model is sizeably smaller than for the risky driving style suggesting that the angry driving style is harder to predict from the variables used in this study than is the risky driving style. Previous research has found correlations between trait anger, trait driving anger, and aggression on the road, but also with angry thoughts (Burns and Katovich 2003; Deffenbacher et al. 2004; Van Rooy, Rotton and Burns 2006). Deffenbacher et al. (2004) found that some angry thought processes were correlated to certain ways of expressing anger, one of which may be angry driving (acting out anger with a vehicle). Angry thinking also added to the prediction of aggressive and risky behaviour beyond predictions from trait anger (angry personality) and trait driving anger. Although Deffenbacher et al.'s research was focused solely on angry driving the findings support this study's assumption that thought processes (thinking styles) influence a person's driving style. That the results from the present study are less strong for the angry driving style may be caused by the fact that the TSI-R does not account for a thinking style specifically related to angry thoughts which is in contrast to the Driver's Angry Thoughts Questionnaire (Deffenbacher et al. 2004).

The high-velocity driving style was predicted by more driving hours, followed by being male, a lower use of the conservative and external thinking styles, and a higher preference for the anarchic thinking style. The first predictor, exposure, turned out to be an even stronger predictor for high-velocity driving than for risky driving. Findings from the group interviews supported this with participants admitting to more speeding during long drives in an attempt to stave off boredom as well as just to get somewhere as quickly as possible. A positive element in relation to weekly driving is that this factor could possibly be manipulated. Middle-aged drivers' main motive to drive is commuting to work, but for young drivers leisure-time driving is the most typical form of driving

(about 30% of all their driving) (Laapotti, Keskinen, Hatakka, Hernetkoski, Katila, Peräaho and Salo 2006). It seems that the external factors are the main influence for middle-aged drivers' amount of driving, while young drivers' exposure is most often controlled by internal factors. If internal factors control young drivers' exposure, this means that young drivers' amount of time on the road might decrease if, for instance, young drivers found other ways of spending their leisure-time than driving around for fun.

The second predictor of high-velocity driving was being male. A previous study found no significant predictors for females in relation to speeding but found that, for males, persistent speeding was predicted by the personality measure of low constraint and by aggressive behaviour (Begg and Langley 2004). Speeding has also been positively linked to the personality trait of excitement-seeking, and negatively to altruism, an aversion of risk-taking and the driver's belief of their own likelihood to be in a crash (Machin and Sankey 2006; Machin and Sankey 2008). Young males have been found to score higher on excitement-seeking and thus to be more likely to take risks (Jonah 1997). Overconfidence has also been linked to speeding (Catchpole and Styles 2005) and young males are more often overconfident than are young females (Brown 1982) because, for instance, they tend to overestimate their own driving skills (Gregersen 1996). In addition, young males scored higher on the Speeding Attitude Scale, which was linked to getting more speeding tickets (Whissell and Bigelow 2003). Taking into account all previous research, it can be concluded that the present data support that being a young male is indeed a predictor of the high-velocity driving style.

Novel findings were the third, fourth and fifth predictors of high-velocity driving, which were all thinking styles; less inclination for conservative and external thinking and more liking for anarchic thinking. As discussed in paragraph 6.4, an individual who prefers the conservative thinking style likes to do things according to existing rules, which does not correspond with speeding since that implies breaking the traffic rules. The external thinking style is related to collaboration with other people, which does not correspond with speeding either because speeding is connected to a higher crash risk (West et al. 1993) and thus to a traffic environment that is less safe for other road users. A preference for the anarchic thinking style could lead to more speeding and is possibly caused by the need for controlling one's own actions that is inherent to anarchic thinking. As discussed in section 6.4, only for females was a significant correlation found between anarchic thinking and negative driving styles (angry driving, which is linked closely to both risky and high-

velocity driving according to the present results) and so this predictor may be more important for females. Since thinking styles are considered trainable, these findings offer opportunities for intervention.

When examining the predictors for the reckless and careless driving style domain, there was a slight difference when compared to the risky and high-velocity driving styles separately. Contrary to expectations stemming from the literature, the first predictor for reckless and careless driving was 'weekly driving hours' rather than being male. Being male was the second predictor of this driving domain, while less inclination to use the conservative thinking style was the third predictor. The fourth significant predictor was a preference for anarchic thinking. The fifth predictor was less use of the hierarchic thinking style (which was found to be a strong predictor of the positive driving styles). The last predictor was 'age'; older drivers are less likely to use the reckless and careless driving style than are younger drivers. The variables accounted for in this study predicted more of the variance when considering the driving style domain (24.8%) than the separate risky and high-velocity driving styles (23.6% and 18.1% respectively). This finding would suggest examining the domain over the original two driving styles in hierarchical regressions.

The five predictors for the patient driving style were a stronger preference for the hierarchic and executive thinking styles, driving fewer hours a week, being older and being female. The first two predictors, hierarchic and executive thinking, were stronger and more significant indicators of patient driving than the two well known predictors age and sex. Considering this study focused on normal, safe driving, this is a very promising result. If the first predictors of a positive safer driving style are factors that can be trained or influenced (e.g. during driver training), this could contribute to enhanced road safety for young drivers.

The finding of less 'weekly driving' (less exposure) as the third predictor of patient driving supports the previously discussed outcomes from the questionnaires where more hours on the road predicted maladaptive driving styles (risky, angry and high-velocity). This relationship between more driving and negative driving styles was also suggested by findings from the group interviews where participants mentioned they would speed more and get more annoyed during longer drives. Although weaker, the fourth and fifth predictors, 'age' and 'sex', correspond with previous research. As discussed before, increasing age was linked to a decrease in the use of maladaptive driving styles

(Åberg and Rimmö 1998; Catchpole and Styles 2005; Taubman - Ben-Ari et al. 2004) and being female was linked to a higher use of safe driving styles (Özkan and Lajunen 2005).

The four significant predictors for careful driving were a greater use of the hierarchic thinking style, driving fewer hours per week, and the use of the executive and external thinking styles. So hierarchic thinking was found as the strongest predictor for both positive driving styles, patient driving and careful driving, which is promising for intervention opportunities. Fewer driving hours also predicted careful driving, which corresponds with the earlier opposite result in which more exposure predicted negative ways of driving (risky, high-velocity and angry). Group interview findings support this result, as discussed previously.

'Sex' and 'age' did not enter into the regression model for careful driving because they were not significant as predictors. This supports the idea that different driving styles are predicted by different factors and that 'sex' and 'age' may be more important as predictors of maladaptive driving styles than as predictors for normal safe driving styles. The regression model for the combined patient and careful driving domain did show sex and age as predictors but only as the fourth and fifth predictors. The strongest predictors were the use of the hierarchic and executive thinking styles, followed by a lower amount of weekly driving. As with the reckless and careless driving style domain, the driving style domain predictors accounted for a greater percentage of the variance (26.4%) than either the patient or careful driving styles (19.3% and 19.9% respectively). This would favour researching the driving style domain over the separate driving styles when attempting to make predictions from the variables accounted for in this study.

Anxious driving was predicted firstly by being female, followed by a lower preference for legislative thinking, a greater inclination for judicial thinking, and a lower liking for oligarchic thinking. This result reinforces the idea that 'sex' could be the best predictor for negative driving styles, although not for positive driving styles. However, the predictive value of this regression model is not very strong and might be due to the lack of correlations found between any of the thinking styles and the anxious driving style.

Lastly, dissociative driving was predicted by more weekly driving, less use of the hierarchic thinking style, a preference for anarchic thinking and a lower inclination for external thinking. Group interview findings were consistent with more hours of driving resulting in more dissociative driving, especially when making long distance drives (so many hours on the same day). The results in

regards to the thinking styles support previous findings, where more hierarchic and external thinking and less anarchic thinking predicted positive driving styles.

Against expectation, dissociative driving is the only negative driving style that is not predicted by sex. Previous research has found that women are more likely to experience harmless lapses (e.g. switching on the wrong appliance) in their concentration while driving (Åberg and Rimmö 1998; Reason et al. 1990) which would fall under the dissociative driving style. In contrast, results from the present study's group interviews suggest that there is no difference in the use of the dissociative driving style between males and females. Both sexes admitted equally to dissociative driving, mainly due to long drives or to being preoccupied with something other than the driving task (e.g. being angry with someone or thinking about work or study). That participants of both sexes spoke about dissociative driving is in contrast with Reason et al.'s (1990) suggestion that females more frequently think about other things than the driving task than do males. The different results could be due to a variation in the ages of the respective samples. Reason et al. (1990) had participants in an age range of under 20 to over 56 years old. It could be that sex differences in dissociative driving develop with age and this is also suggested by the results from Åberg and Rimmö (1998). In a group of participants 18 to 70 years old they found no sex differences for the factor 'inattention' (which is similar to dissociative driving) in the age group 18-25, although there were differences in older age groups. For the present study, both quantitative and qualitative findings were consistent on the point of sex differences in relation to dissociative driving.

The predictors for the anxious driving style domain were a combination of the predictors for the anxious, dissociative and distress reduction driving styles; more weekly driving hours, less use of the legislative, external and internal thinking styles and a greater preference for the anarchic and judicial thinking styles all predict anxious driving. As with the other driving domains, the total variance explained by this model (13.6%) is higher than for the separate anxious (10.6%), distress reduction (6.2%) and dissociative (11.5%) driving styles, but the percentage was still not very high. That a larger percentage of the variance is explained by the driving domain could be due to the insufficient reliability of the separate distress reduction driving style (that is part of the domain). Nevertheless it is interesting that although being female did predict anxious driving and, to some degree, distress reduction driving, the variable 'sex' was not significant for the anxious driving style domain. The finding that more hours of weekly driving predict the anxious driving style domain is in sharp contrast with previous research which has found an inverse relationship between weekly

driving and the use of the anxious driving style (not the anxious domain) (Taubman - Ben-Ari et al. 2004). In contrast, the group interview findings from the present study do offer an explanation. Participants, both males and females, discussed that they get anxious during driving. They mentioned worry about other drivers' behaviour as an important cause of anxiety, especially in a busy context such as a big city. This worrying about other road users could explain why more hours on the road predicted the anxious driving style. Thus, the more hours a person spends on the road, the more hours they are exposed to this anxiety causing environment, so they will be more likely to use an anxious driving style.

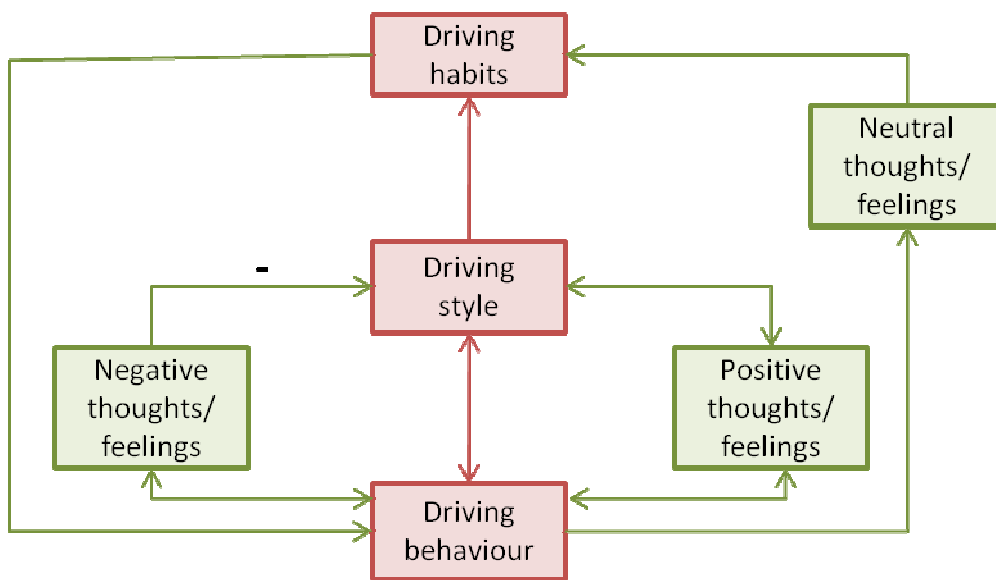
Considering the positive focus of this study, the most relevant finding in relation to the prediction of driving styles from thinking styles is that hierarchic thinking is the first predictor of both patient and careful driving. While 'sex' is a predictor for most negative driving styles, it is not predicting careful driving or the patient and careful driving domain. That hierarchic thinking predicts safer driving styles offers opportunities for driver training, because, according to the literature (e.g. Balkis and Isiker 2005; Brandt 1998; Harrison and Bramson 1982; Hsu 1999; McClanaghan 2000; Spicer 2004; Walters et al. 2002), it is possible to train people in the use of specific thinking styles for specific tasks.

6.3 PROPOSED THEORETICAL MODELS OF DRIVING STYLE

Section 2.2.1.6 presented the conceptual framework of safe driving behaviour by Strecher et al. (2006). The present study suggested that an improved definition of the driving style construct may help in clarifying the 'habit' box in this framework of safe driving behaviour, which Strecher et al. claim may have little to do with the rest of the processes that are presented in their model. Based on the literature, it was proposed that 'habit' may be referring to 'driving style'. However, as discussed in section 6.1.2, the group interview data underpin the idea of driving style as a preferred way of driving which, over time, may turn into driving habits. Figure 6-1 shows how this notion of driving style could be incorporated into Strecher et al.'s safe driving model. The original framework (see Figure 2-2) depicts driving behaviour as directly influencing 'habit', and vice versa. Based on the idea of 'driving style' as a preferred way of driving, this thesis proposes that an individual's driving behaviour can develop into their driving style, which can over time grow into their habitual way of driving. Both one's driving style and one's driving habits can influence one's actual driving behaviour, in addition to the other elements in the Strecher et al.'s framework (intention to drive

not want to repeat driving actions that resulted in them feeling stressed or having negative thoughts (e.g. driving in the city) but would replicate behaviour that either had no negative impact or had a positive impact on their thinking and emotions (e.g. drive the same route everyday). This supports previous research which has found that past driving behaviour influenced a driver's future driving behaviour if the past behaviour had led to a positive experience (Forward 2006). Based on the group interview data, this thesis proposes the following model (Figure 6-2) for the development of driving styles.

FIGURE 6-2: MODEL FOR THE DEVELOPMENT OF DRIVING STYLES



This model suggests that driving behaviour that results in positive thoughts and/or feelings can develop into one's preferred way of driving, or one's driving style. On the other hand, behaviour that causes negative thoughts and/or feelings will not develop into one's preferred way of driving, which is shown as a negative influence on driving style (not leading to). Over time, one's driving style can grow into one's habitual way of driving and both driving style and driving habits will influence the actual driving behaviour. The group interview data indicated that behaviour resulting in neutral thoughts or 'no thoughts' and/or feelings could also develop into driving habits. For instance speeding without negative consequences or feelings of anxiety can turn into habitual speeding (without further thinking about it).

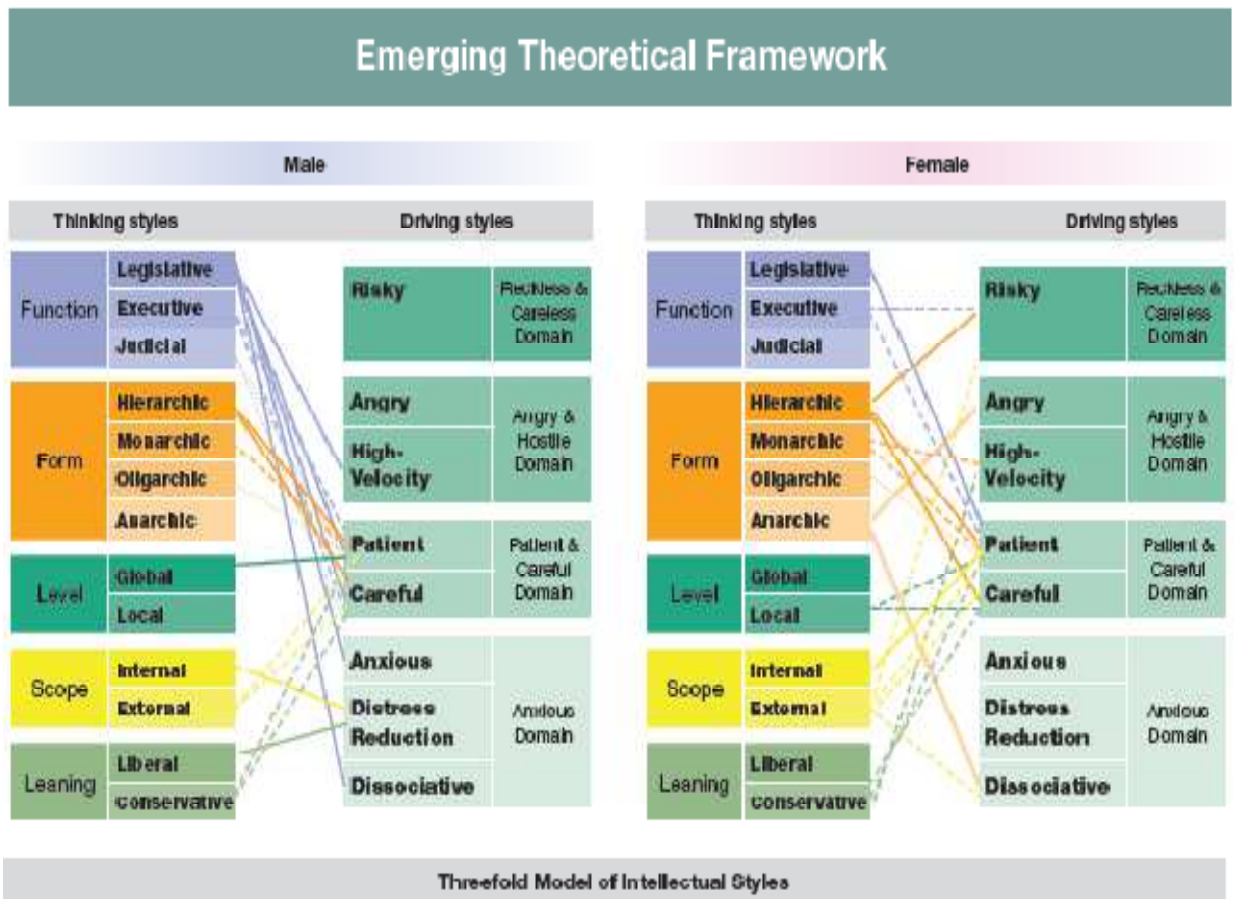
It has to be noted that only some aspects based on the group interview data of this study are selected for the proposed model. Previous research has found that other aspects attributed to the

construct of intellectual style are also important in road safety; studies examining hazard perception deal with the cognitive aspect (Benda and Hoyos 1983), research into response time to visual signals examines the physiological aspect (Beh and Hirst 1999), studies of any personality characteristics in relation to driving deal with the psychological aspect (Arnett et al. 1997; Matthews et al. 1991), and research into the relationships between parents' and children's' driving styles focus on the sociological aspect (Ferguson et al. 2001; Miller and Taubman - Ben-Ari 2010; Taubman - Ben-Ari et al. 2005). All these aspects are likely to have an influence on the development of one's driving style (e.g. the way society thinks about speeding may influence one's thoughts and/or feelings about doing it) but they are outside the scope of this study.

6.3.1 EMERGING THEORETICAL FRAMEWORK FOR THIS STUDY

In section 2.4 an initial theoretical framework was presented for this study proposing that thinking and driving style could be cognate constructs (both being intellectual styles) and that there may be a relationship between young drivers' thinking and driving styles. The quantitative and qualitative results of this research have both confirmed and refined the proposed framework which is presented in section 2.4 (Figure 2-4). As discussed in section 6.1.1, thinking and driving style can both be considered as intellectual styles, so Zhang and Sternberg's (2005; 2006) threefold model of intellectual styles has remained as the overall theory. The findings from the questionnaire data indicated sex differences in the correlations between young drivers' thinking and driving styles; there were dissimilar relationships, or similar relationships had different strengths. The emerging framework, therefore, presents separate models for young male and female drivers. Although thinking styles predict some driving styles and not the other way round, it is not possible to determine any causality in these relationships from the present findings. The lines between both constructs therefore indicate correlations, not causal relationships.

FIGURE 6-3: REFINED THEORETICAL MODEL FOR THIS STUDY



(Reproduced from Kleisen 2009)

6.4 IMPLICATIONS FOR DRIVER TRAINING

The hierarchical nature of driving and the goals for driving education (GDE) framework were presented in section 2.2.3 (Hatakka et al. 2002). As discussed, previous research using the GDE model found basic driver training too focused on the lowest hierarchical levels of driving: vehicle manoeuvring, and mastery of traffic situations (Keskinen 2007). Hatakka et al. (2002) stated that driver training should be concentrating more on the two highest levels of driving (goals and context of driving, and goals for life/skills for living), for instance training of critical thinking skills. The current findings support more emphasis in driver training on those higher hierarchical levels of driving as a possible means to enhance young drivers' safety on the road. The present study focused on uncovering factors that could contribute to the development of a normal, safe driving style. The

quantitative data results indicated that young drivers' thinking styles are one of those factors. In particular, the hierarchic and executive thinking styles were positively correlated to patient and careful driving for males and females, and they were found to be the strongest predictors for safe driving styles; stronger than the well-known factors 'sex' and 'age'. Training young drivers in the use of hierarchic and executive thinking during driver training may contribute to the acquisition of a positive driving style.

The group interview findings from the present study supported links found in previous research between parents' driving and the driving style their children develop although these links were not straight forward and suggested an element of choice on the part of the young driver. Some participants admitted to having taken on the characteristics of their parents in driving without realising it. Other participants consciously choose to develop a different driving style because they do not appreciate the way their parent(s) drive (see Example 5-29: Role models for driving). Young drivers appear to adopt a role model when learning to drive. This can be subconscious (e.g. drive like your parents without recognising it) or conscious (e.g. participants who choose an older sibling or a driving instructor to model their driving on). The findings suggest that the young drivers who intentionally choose a role model are more aware of the fact that different styles of driving exist because they mention that their choice is based on the role models being 'safe' or 'defensive' drivers.

This study supports previous research stating that professional instruction in both the practice and theory of driving should be a more important part of driver training (Nyberg 2007). Firstly, professional training prevents parents, who may be unsafe drivers and/or ineffective instructors, from being the sole influence on their children's driving style development. As group interview participants discussed, some parents have unsafe driving styles or lack the skills to be effective driving instructors (see for instance Example 5-12: Parents distracting participants with backseat driving). Secondly, professional training makes it more likely during the licensing phase to include the training of thinking styles that are effective for safe driving (specifically hierarchic and executive thinking). Thirdly, a professional instructor is trained to teach and, therefore, they are more likely to be able to adapt their style of training to the young driver's thinking style. An individual's preferred thinking styles are linked to their preferred way of learning (Cano-Garcia and Hewitt Hughes 2000; Zhang and Sternberg 2000). Adapting driving training to the learner's preferred thinking style may prove to be more effective than a 'one size fits all' approach, in the same way that teaching for one's preferred thinking styles offers students a possibility to capitalise

on their strengths and compensate for weaknesses, leading to better academic results (Sternberg et al. 2008; Sternberg and Zhang 2005).

The findings from this study also support the idea of differentiation of driver training according to sex (Laapotti and Keskinen 1998). Laapotti and Keskinen suggest this because they found different factors behind loss-of-control crashes for male and female drivers; males had more risky driving habits (so a risky driving style) and females had more often problems with vehicle handling. However, also from a positive point of view on road safety (not directly crash related) there is a case to be made for sex-differentiated driver training. The present study found that males were less likely to use the hierarchic thinking style while driving and that males were more likely to use risky driving styles. Therefore for males, in driver training the emphasis would have to be on safe thinking styles (hierarchic and executive thinking) in relation to driving behaviour in order to develop safe driving styles. For females, the emphasis would be on driving skills and reinforcement of hierarchic and executive thinking. Additionally, Miller (2010) and Taubman – Ben-Ari et al. (2005) found that fathers mainly influenced male young drivers while both parents influenced female young drivers. This difference in influence by fathers and mothers on young drivers is supported by this study's group interview findings in which males mentioned only their fathers in relation to driving training while females mentioned both parents as influences on their own driving. It could indicate that differentiated driver training might have to go a step further. Besides different types of instruction for male and female young drivers, male instructors may be more effective for young male drivers and both male and female instructors could work for young female drivers.

6.5 SUMMARY

This chapter has presented a discussion of this study's findings, using the results of the self-report questionnaires, the group interviews, and the latest insights from the literature in the fields of road safety and thinking styles.

Based on the group interview data, it was posited that driving style and thinking style can both be regarded as intellectual styles. This thesis proposes an amended definition of driving style as *one's preferred way of driving that, over time, develops into habitual driving*. The group interview data also led to the first positive definition of road safety which is:

Road safety is a state of well-being for all road users in which every individual can negotiate the traffic effectively, can cope with the normal stresses of the traffic environment, and is able to contribute to a positive traffic culture.

Sex differences were found in relation to thinking styles, and also in the clusters of thinking styles that individuals tend to use. This thesis argues it is important to be aware of these preferences, especially in relation to driver training, regardless of how they are developed (e.g. socialisation into culture).

The relationships that this study found between field of study and driving styles could contribute to the improvement of driver training; driver training could incorporate training for the 'right' thinking styles for safe driving. It is argued that it may be more effective for young drivers to gain the necessary driving experience in more frequent shorter periods of time, since long drives are related to the use of riskier driving styles (e.g. speeding). Young drivers with more driving experience (licensed and pre-licensed) are more likely to use a positive driving style, and least likely to demonstrate an anxious driving style. It was found that young males may be less flexible in their use of different driving styles than are young females and therefore they are less likely to adapt sufficiently to the actual driving circumstances (e.g. slow down when it is raining). Only females showed a relationship between angry and anxious driving and it is suggested this might be due to a feeling that they lack sufficient driving skills for an aggressive driving style, or an idea of not fitting into the societal expectations of the way males and females *should* drive.

This study found that using the hierarchic, executive, and conservative thinking styles make it more likely for males to use normal, safe driving styles. For females, the hierarchic, local, monarchic, and executive thinking styles are the most positive in relation to driving. The only thinking style that should be actively discouraged when driving is the anarchic thinking style for females, because for females it has a link to both angry and dissociative driving (not for males). Hierarchic thinking was discovered as the first predictor of the patient and careful driving styles rather than the expected predictors of 'sex' and 'age'. This is an important finding because thinking styles can be trained. Training learner drivers in hierarchic thinking may lead to the development of safe driving styles.

The construct of driving style was incorporated in Strecher et al.'s (2006) framework of safe driving behaviour. In addition, this thesis proposes a model for the development of driving styles.

Based on the group interview data it is suggested that driving behaviour eliciting positive thoughts or feelings could develop into one's preferred way of driving. Driving behaviour evoking negative thoughts or feelings are more likely to lead to a change in driving style than to establishment of that style. Driving behaviour that does not lead to any thoughts, or leads to neutral thoughts, could develop directly into habitual driving, without being established as one's 'preferred way' of driving first.

The proposed theoretical framework is confirmed by this study, with the threefold model of intellectual styles as the overarching theory and thinking and driving styles (as intellectual styles) correlated to each other in several ways. Two models were developed to capture the differences between young males and young females.

Previous research has suggested sex differentiated driver training because of different causes of crashes for males and females. From the viewpoint of normal, safe driving this study supports different ways of training for males and females. It is suggested that driver training should incorporate professional instruction.

The next chapter recaptures the main and sub research questions and highlights the contributions this study makes to the fields of thinking styles and road safety. Suggestions for future research are made.

7 CONCLUSION

The introduction of this thesis highlighted the generally negative focus of road safety research resulting in the majority of studies concentrating on crashes; in other words road *unsafety*. Building on the existing extensive body of negatively focused literature, the present study contributes with its focus on safe driving to the creation of a more complete picture of young drivers and the development of their driving styles.

In examining the question, *Can knowledge of thinking and driving styles contribute to young driver road safety?* this dissertation developed an argument in which young drivers are more central than ‘the young driver problem’ and makes case for a positive focus on road safety (research) in general and, more specifically, on driver training. This concluding chapter reviews the development of that argument with reference to its contribution to road safety and thinking styles research and to implications for future research.

7.1 RESEARCH QUESTIONS

This study answers three theoretical questions that were derived from the literature. Firstly, the data provide a confirmation of the proposition that thinking and driving style could be cognate constructs. The constructs of thinking and driving style can both be seen as intellectual styles as defined by Zhang and Sternberg (2005; 2006) in their threefold model of intellectual styles. This thesis argues that driving styles are value-laden, just as thinking styles are, and that for both constructs the actual value of different styles is determined by the context (including culture, task demands, and individual preferences). It also argues that driving styles are trainable, just as thinking styles are, and that both thinking and driving styles should be taken into account for driver training.

Secondly, based on the group interview data and the answer to the first questions, this thesis argues that a driving style is a preferred way of driving. An amended definition of driving style is proposed and, based on the group interview data, the present study proposes a model for the development of a driving style (see Figure 6-2: Model for the development of driving styles), because according to the traffic safety literature it is unclear how driving styles develop (Miller and Taubman - Ben-Ari 2010) and the thinking styles literature also lacks any models that explain how a certain style becomes one’s preferred way of doing something.

Thirdly, the extant literature does not provide a positive definition of road safety but participants in the group interviews brought up the notion of ‘car karma’. Car karma referred to being nice to other road users (e.g. letting them get into your lane) in order to improve their own driving experience. The idea of ‘car karma’ resulted in the first positive definition of road safety.

In relation to the sub research question, *What are young drivers’ thinking styles?* it has been found that young males more often use the legislative thinking style, while young females are more likely to use a hierarchic thinking style. Sex differences have also been found in the relationships amongst the thirteen thinking styles, which was a new finding. The correlations were mostly between thinking styles of the same type (either Type I or Type II) but it was surprising that some correlations emerged either for males or for females and that some relationships were considerably stronger for one sex than for the other. Apparently the young male and young female drivers participating in the study preferred to use different clusters of thinking styles. It is proposed that the result could be influenced by cultural differences in the socialisation of males and females in Australia, and that it may be useful to take these differences into account during driver training.

This study has also found sex differences in young drivers’ driving styles, as measured by the MDSI, which answers the sub research question, *What are young driver’s driving styles?* Young females scored higher on the positive driving styles (patient and careful) and young males were more likely to use negative driving styles (risky, angry, high-velocity). A new finding is that there are sex differences in the strength of the correlations between driving styles. Based on findings of previous studies (Redshaw 2006) this thesis suggests that social-cultural distinctions between females and males in Australia may be of more influence here than are biological differences but this cannot be confirmed by the current data. Considering the found differences, it may be useful to develop separate models of driving for males and females, following from the proposed theoretical framework of this study.

This research answers the sub research question, *Are there any relationships between young drivers’ thinking and driving styles?* Significant correlations between young drivers’ thinking and driving styles do exist, and these correlations remain when controlling for the factors ‘sex’ and ‘age’. However, sex differences in these correlations are informative. Using the hierarchic, executive and conservative thinking styles makes it more likely for males to demonstrate a normal, safe driving style. Females are more likely to use positive driving styles when utilising the hierarchic, local, monarchic, and executive thinking styles. While for females a direct link was found between anarchic thinking and

some negative driving styles, it seems that males are more likely to use unsafe driving styles when they do not purposely use the thinking styles that are linked to positive driving styles. These findings could be helpful in driver training, and support the idea of different ways of training for young females and young males (as suggested in previous research).

The sub research question, *Can thinking styles predict driving styles?* was also answered positively. Hierarchic and executive thinking were found as the first predictors of the patient and careful driving styles, so more important than the often cited factors of 'sex' and 'age'. This suggests that training learner drivers in hierarchic and executive thinking (while driving) could lead to the development of safer driving styles.

The main research question of this study, *Can knowledge of young drivers' thinking and driving styles contribute to road safety?* was answered. The findings in relation to young drivers' thinking and driving styles could add to road safety in several ways. The focus of this research was on the patient and careful driving style, or safe driving, and thinking styles predict this driving style over well known predicting factors such as 'sex' and 'age'. Since thinking styles are trainable, training learner drivers in the 'right' thinking styles during driver training may assist in the development of a safe driving style as one's preferred way of driving. In addition, the findings indicate that there are significant sex differences in both the correlations between thinking or driving styles, as in the relationships between thinking and driving styles. This suggests that different methods of driver training, more specifically targeted at young female or young male drivers, might positively affect the development of safe driving styles for both sexes. Knowledge of young drivers' thinking styles may also contribute to the development of these suggested targeted ways of driver training since thinking styles are related to the way individuals learn.

The theoretical framework for this study that was derived from the literature was confirmed by this study's data. In section 2.4. an initial theoretical framework was presented for this study proposing that thinking and driving style could be cognate constructs (both being intellectual styles) and that there may be a relationship between young drivers' thinking and driving styles. This thesis suggests it may be useful to develop separate models for males and females in relation to driving instead of (or in addition to) the current unisex models.

Lastly, the combined findings from the questionnaires and the group interviews have some implications for driver training. This study supports the view a professional driving instructor should

be part of driver training. The findings also support sex differentiated driver training from a positive point of view. Driver training should aim to develop hierarchic and executive thinking skills during driving for males, and put more emphasis on driving skills for females while reinforcing their hierarchic and executive thinking styles. This study posits that male professional instructors may be more effective for male young drivers, while both male and female instructors can be valuable for female young drivers.

7.2 CONTRIBUTIONS

This section highlights the significant contributions that the present study makes to the fields of road safety and thinking styles research.

This study makes an important practical contribution to traffic safety research through its positive focus on safe driving because there is a lack of road safety studies from a positive viewpoint.

This thesis makes several theoretical contributions to the field of road safety. Based on the findings of the group interviews, the study proposes a positive definition of road safety which has not previously existed. Furthermore, the findings of this study empirically support an improved definition of the constructs of driving style and driving behaviour which can enhance the academic discourse in road safety. This research also proposes a model for the development of driving styles, that fits within the conceptual framework for safe driving behaviour (Strecher et al. 2006).

The study makes a practical contribution to the road safety field by establishing the validity and reliability of the Multi-dimensional Driving Style Inventory (Taubman - Ben-Ari, Mikulincer and Gillath, 2004) for the first time with an Australian sample of young drivers.

This research makes a theoretical contribution to the field of styles research, since the findings of the study support a classification of driving style as a cognate construct to thinking style, positing that driving style can be considered to be an intellectual style as well. Furthermore, it expands the literature on thinking styles in relation to teaching and learning with the environment of driver training.

This study makes a contribution to the thinking styles field with its new finding that there are sex differences in the way thinking styles correlate with each other. Young females were found to

use different clusters of thinking styles than are used by young males. It is expected that culture and socialisation are of influence in these differences.

The findings of this thesis contribute to the traffic safety field through their support of sex differentiated driver training from a positive focus on road safety which was previously only suggested by crash concentrated research.

The present study makes a significant contribution to the field of road safety through its empirical findings in relation to the connections between thinking and driving styles. Essential is the finding that certain thinking styles are more important to the prediction of safe driving styles than are factors such as 'sex' and 'age'.

This research is significant in its use of mixed methodology, which is unusual in both the field of road safety as well as in the field of thinking styles, but it does honour the constructionist epistemology from which this research is undertaken .

7.3 FURTHER RESEARCH

While this study goes some way to providing more insight into sex differences in thinking, in driving, in thinking while driving, and the development of driving styles, a number of issues arise from this research which call for further exploration. These issues centre on the notions of culture, socialisation, and driver training in relation to road safety. They are presented here as future research questions.

How are sex differences in driving shaped by the socialisation of males and females into the current driving culture? How gendered is the current driver training by professional or lay instructors, intentionally or unintentionally?

What part do parents' thinking styles play in the development of their offspring's thinking styles? Do parents and children show similar correlations between their thinking and driving styles? Do older people (>25 years) show similar correlations between their thinking and driving styles?

Would a replication of this study in a different culture or country show the same relationships between thinking and driving styles?

What are the constraints in establishing a positive driving culture and how might these be overcome? What are the differences between countries in their driving culture? Do positive driving cultures exist and, if so, how do they work? What part can the notion of ‘car karma’ play in this?

How can general principles of modern education be incorporated into driver training, including a positive focus on learning instead of concentrating on risk and crashes?

7.4 FINAL REMARKS

This thesis aims to contribute to a switch in focus from road *unsafety* to road *safety*. It presents the first positive definition of road safety and a refined definition of the concept of driving style. A model for the development of driving styles is proposed. It is argued that the constructs of thinking style and driving style can both be regarded as intellectual styles. This research examined the relationships between young drivers’ thinking and driving styles focusing on patient and careful driving. Certain thinking styles have been found to be more conducive to safe driving than are others and this was different for young male and young female drivers. The findings support the idea of driver training tailored for males or females that incorporates training of the thinking styles that are related to (and predict) safe driving styles.

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APPENDIX A: ETHICS APPROVAL

From: Bronwyn.Low [mailto:Bronwyn.Low@canberra.edu.au]
Sent: Thursday 28 August 2008 10:08
Subject: Committee for Ethics in Human Research

Project number 08-69

Drs. Lucienne Kleisen
15 Mandurah Place
Ngunnawal ACT 2913

APPROVED

Dear Drs. Kleisen

The Committee for Ethics in Human Research has considered your application to conduct research with human subjects for the project entitled 'Do young drivers' thinking styles impact on their driving styles?' The Committee made the following evaluation:

Approval is granted until 01/08/09 the anticipated completion date stated in the application.

Please Note: approval is subject to receipt of a copy of the written approval from CIT.

Your official letter is attached.

Bronwyn

Mrs Bronwyn Low
Secretary
Committee for Ethics in Animal Experimentation
Committee for Ethics in Human Research
Research Services Office
University of Canberra
Ph: (02) 6201 5870
Email: bronwyn.low@canberra.edu.au
Australian Government Higher Education
Registered Provider (CRICOS): #00212K
DO YOU NEED ETHICS APPROVAL? www.canberra.edu.au/research

Project No 08-69

Drs. Lucienne Kleisen
15 Mandurah Place
Ngunnawal ACT 2913

Dear Drs. Kleisen

The Committee has agreed to extend the approval for your project titled Do young drivers' thinking styles impact on their driving styles? until 31 July 2011, the anticipated completion date for the project.

Your official letter is attached.

Bronwyn

Mrs Bronwyn Low
Secretary
Committee for Ethics in Animal Experimentation
Committee for Ethics in Human Research
Research Services Office
University of Canberra
Ph: (02) 6201 5870
Email: bronwyn.low@canberra.edu.au
Australian Government Higher Education
Registered Provider (CRICOS): #00212K
DO YOU NEED ETHICS APPROVAL? www.canberra.edu.au/research

APPROVAL NOTIFICATION

CIT Research Ethics Committee

Title of Research Proposal: Do young drivers' thinking styles impact on their driving styles?

Proponent: Lucienne Kleisen
Organisation: University of Canberra
Phone: 6201 2466
Email: l.kleisen@student.canberra.edu.au

The CIT Research Ethics Committee reviewed the proposal as submitted to Sarah Sutcliffe, Acting Manager of CIT Research, by Lucienne Kleisen in August 2008. The Committee has determined that this proposal complies with the requirements of the CIT Research Code of Ethics.

The CIT Research Ethics Committee grants approval for the conduct of this research subject to the following provisos:

The research is conducted in full accordance with the details outlined in the proposal (any variations in procedure from the details outlined in the proposal would nullify the Committees current approval and would require a resubmission of the proposal for further consideration by the CIT Research Ethics Committee)

The research proposal is approved by the University of Canberra Research Ethics Committee and the Manager of CIT Research is provided with a copy of their approval notification and recommendations prior to the commencement of the research

CIT is provided with a copy of the resulting research report

Regards

Sue

Sue Maslen
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APPENDIX B: INFORMATION SHEET QUESTIONNAIRE

Project: “Do young drivers’ thinking styles impact on their driving styles?”

Invitation and information for participants

Dear student,

My name is Lucienne Kleisen and I am a PhD candidate at the University of Canberra, under the supervision of Dr. Monica Kennedy, Senior Lecturer at the Faculty of Business and Government. Our contact details are at the bottom of this document.

I would like to invite you to participate in a study which I am conducting. The aim of this study is to explore the relationships between thinking styles and driving styles of young drivers. Research in this field is important, because young drivers are over represented in vehicle crashes in Australia and overseas. Results of this project will help us to better understand how different thinking styles might influence one’s driving style (or habitual way of driving). It is hoped that this understanding may contribute to developing ways for improving young driver safety in the future.

I am looking for approximately hundred persons between 18 and 25 years old, holding a current drivers licence, to participate in this study. This project has been approved by the University of Canberra Committee for Ethics in Human Research and by the CIT Research Ethics Committee.

What will you be asked to do?

Should you agree to participate, you will be asked to complete a survey package, consisting of two questionnaires. The first questionnaire will ask you about your driving behaviour and experiences, for instance if you get impatient while driving during rush hour. The second questionnaire will ask you about the ways you like to think, for instance if you like to brainstorm with friends when starting a task. It is estimated that the total time commitment required of you to complete these questionnaires would not exceed 20 minutes.

Are there any risks?

Although this study does not attempt to cause participants any distress, there is a small risk that participating in this research may trigger unpleasant thoughts. An example of this would be, if you have previously experienced a traumatic event associated with driving, thinking about driving experiences may stir up memories. Please be aware that all participation in this research is completely voluntary. You can decide to withdraw from participating at any time, or withdraw any unprocessed data that you have supplied, without providing an explanation. If you feel uncomfortable with certain questions, just leave the question blank. If you feel upset in anyway because of participating in this study, free counselling is available from the University of Canberra Health and Counselling Centre (ph. 6201 2351) or from the 24 hours telephone counselling service Lifeline (ph. 131114).

How will my confidentiality be protected?

Your contribution in this study will be confidential. Names will not be recorded on the completed questionnaires. Only the research student and her primary supervisor will have access to the data collected. The data collected will be kept securely in a locked filing cabinet or a in a password-

protected computer file at the university. On completion of the research, all material will be stored in a locked facility at the University of Canberra for five years, and then destroyed.

How will I receive feedback?

Once the thesis resulting from this research has been completed, a brief summary of the findings can be emailed to you, by electing so on the informed consent form. Alternatively, the findings will be available to you on application at the Faculty of Business and Government, University of Canberra ACT 2601.

Further information, concerns and complaints

I would be very happy to answer any questions or concerns you may have, so please do not hesitate to ask me. I am contactable by emailing: lucienne.kleisen@canberra.edu.au. If I am unavailable or unable to satisfy your concern, my supervisor Dr. Monica Kennedy can be contacted by emailing monica.kennedy@canberra.edu.au. If you wish to discuss with an independent person a complaint about this study, please contact the Secretary of the University Research Committee, Room 1D112, Office of Research and Research Degrees, University of Canberra ACT 2601, or phone 6201 2466.

What do I do now? (acceptance to participate in this study)

If you have read this information and are willing to participate in this study, please complete the Informed Consent Form and the questionnaires. Please drop the completed consent form and the questionnaires in Monica Kennedy's mailbox 47 (groundfloor building 6).

Informed Consent Form

“Project: Thinking Styles and Driving Behaviours of Young Drivers”

Yes, I have read and understood the information about the research. I agree to complete the questionnaires, and I am not aware of any condition that would prevent my participation. I have had the opportunity to ask questions about my participation in the research. All questions I have asked have been answered to my satisfaction. I understand that my participation in the study is purely voluntary and that I am able to withdraw from the study at any time and without stating a reason.

Name: _____

Age: _____

Signature: _____

Date: _____

A summary of the research findings can be emailed to you. If you would like to receive a copy of this report, please include your email address below.

Email Address (optional): _____

APPENDIX C: INFORMATION SHEET GROUP INTERVIEWS

Invitation and information for participants - group interviews

Dear student,

I would like to invite you to participate in a study exploring the way young people (18-25) drive. We hope that if we understand more about young drivers, this may contribute to advance driver training and improve young driver safety in the future.

My name is Lucienne Kleisen and I am a PhD student at the University of Canberra, under the supervision of Dr. Monica Kennedy, Associate Professor in the Faculty of Business and Government. Our contact details are at the bottom of this document. This project has been approved by the University of Canberra Committee for Ethics in Human Research.

Can you help?

I am looking for approximately twenty persons between 18 and 25 years old, holding a current drivers licence, to participate in a group interview.

What will you be asked to do?

An interview group will consist of 6-8 students, who will spend 1 hour to 1 hour and 15 minutes discussing topics related to driving. The group will consist of male and female students. You will get paid \$20 for your time at the end of the interview.

How does it work?

I will be present as facilitator of the group interview. The discussion will be audio recorded, but recorded data will not be retraceable to individuals to ensure anonymity. It is estimated that the total time commitment required of you to take part in this group interview will not exceed 1.5 hours. Refreshments will be available during the session.

What do you do now?

If you are interested in participating in a group interview, please complete the Expression of Interest form and put the completed form in the sealed box labelled "Expression of Interest forms". This is only an expression of interest, so you can change your mind on participating in this research at any time. You will be asked to complete an actual consent form on the day that the group interview will take place.

Contact details

Please don't hesitate to contact me if you need more information or if you have any concerns.

Lucienne Kleisen
lucienne.kleisen@canberra.edu.au
room 6B9
phone: 6201 5896
mobile: 0437 726355

Dr. Monica Kennedy
monica.kennedy@canberra.edu.au
room 6D16
phone: 6201 2738
mobile: 0414 251732

Expression of interest in participation of a group interview

“Project: Thinking Styles and Driving Styles of Young Drivers”

Yes, I have read and understood the information about the research. I am interested to participate in this project, and I am not aware of any condition that would prevent my participation.

Name: _____

Study: _____

Age: _____

I'm holding an Australian (please tick box): Full drivers licence
 Provisional drivers licence
 Learners permit

Please provide your phone number and email address, so I can contact you:

Phone: _____

Email: _____

Preferred interview times (you may tick more than one box)

- Friday 19 Feb, around lunchtime
- Monday 22 Feb, around lunchtime
- Tuesday 23 Feb, afternoon
- Thursday 4 Mar, morning
- Friday 5 Mar, around lunchtime

Signature: _____

Date: _____

Thank you for completing this expression of interest. You will be contacted by the research student, Lucienne Kleisen, with information on a date, place and time when the group interview will take place.

APPENDIX D: QUESTIONNAIRES

Dear student,

Thank you for taking the time to take part in this research by completing these questionnaires. The package consists of two questionnaires. The first questionnaire will ask you about the ways you like to think, for instance if you like to brainstorm with friends when starting a task. The second questionnaire will ask you about your driving behaviour and experiences, for instance if you get impatient while driving during rush hour. It is estimated that the total time commitment required of you to complete these questionnaires would not exceed 20 minutes.

Please be aware that the answers you provide on this questionnaire are **voluntary** and **confidential**. The data you will provide cannot be linked back to you, so your anonymity is assured. Before you start on the questionnaires, please complete an Informed Consent form.

Please answer honestly to the best of your ability. If there are any questions you don't want to, or feel you can't answer, please just leave them blank.

Please put the consent form and the completed questionnaires **either** in Monica Kennedy's **mailbox 47 (groundfloor building 6)** or **hand in to your tutor** (place in separate envelopes). Thank you very much for your contribution!

Demographics

Age: _____

Sex: 1 – male 2 – female (please circle one)

Currently I'm studying at (please tick one): UC CIT

My field of study: _____

What sort of drivers licence do you hold (please tick 1 box):

- None
- Learners Permit
- Provisional Licence
- Full Licence

How long have you held your drivers licence: _____

How many years have you been driving: _____

How many hours do you drive a week: _____

How many hours do you drive on the weekends: _____

How far do you drive in a week: _____ (km)

How far do you drive in weekends: _____ (km)

Questionnaire 1: Multidimensional Driving Style Inventory (MDSI)

Taubman - Ben-Ari, O., Mikulincer, M. & Gillath, O. (2004).

The following statements are concerned with the way people drive. Please read each statement carefully and indicate, on the following 6-point scale, to what extent the statement fits your feelings, thoughts and behaviour during driving. Rate your answers by the following scale:

1- not at all, 2 - very little, 3 - little, 4 - moderate, 5 - much, 6- very much

- | | | | | | | |
|--|---|---|---|---|---|---|
| 1. I often do relaxing activities while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. I often purposely tailgate other drivers | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. I often blow my horn or 'flash' the car in front as a way of expressing my frustration | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. I feel I have control over my driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. I often drive through traffic lights that have just turned red | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. I usually enjoy the sensation of driving on the limit (dangerously) | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. On a clear freeway, I usually drive at or a little below the speed limit | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. While driving I try to relax myself | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. When I am in a traffic jam and the lane next to mine starts to move, I try to move into that lane as soon as possible | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. Driving usually makes me feel frustrated | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. I often daydream to pass the time while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 12. I often swear at other drivers | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. When a traffic light turns green and the car in front of me doesn't get going, I just wait for a while until it moves | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. I drive cautiously | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. Sometimes lost in thought or distracted, I fail to notice someone waiting at a zebra crossing/pedestrian | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. In a traffic jam, I think about ways to get through the traffic faster | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. When a traffic light turns green and the car in front of me doesn't get going immediately, I try to urge the driver to move on | 1 | 2 | 3 | 4 | 5 | 6 |
| 18. At an intersection where I have to give right-of-way to oncoming traffic, I simply wait patiently for cross-traffic to pass | 1 | 2 | 3 | 4 | 5 | 6 |
| 19. When someone tries to skirt in front of me on the road I drive in an assertive way in order to prevent it | 1 | 2 | 3 | 4 | 5 | 6 |
| 20. I often fix my hair and/or make-up while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 21. I am often distracted or preoccupied, and suddenly realise that the vehicle ahead has slowed down, and I have to slam on the brakes to avoid a collision | 1 | 2 | 3 | 4 | 5 | 6 |
| 22. I like to take risks while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 23. I base my behaviour on the motto "better safe than sorry" | 1 | 2 | 3 | 4 | 5 | 6 |
| 24. I like the thrill of flirting with death and disaster | 1 | 2 | 3 | 4 | 5 | 6 |
| 25. It worries me when driving in bad weather | 1 | 2 | 3 | 4 | 5 | 6 |
| 26. I often meditate while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 27. Lost in thoughts I often forget that my lights are on full beam until flashed by another motorist | 1 | 2 | 3 | 4 | 5 | 6 |
| 28. When someone does something on the road that annoys me, I flash | 1 | 2 | 3 | 4 | 5 | 6 |

- them with the high beams
- | | | | | | | |
|---|---|---|---|---|---|---|
| 29. I get a thrill out of breaking the law | 1 | 2 | 3 | 4 | 5 | 6 |
| 30. I often misjudge the speed of an oncoming vehicle when passing | 1 | 2 | 3 | 4 | 5 | 6 |
| 31. I feel nervous while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 32. I get impatient during rush hour | 1 | 2 | 3 | 4 | 5 | 6 |
| 33. I feel distressed while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 34. I often intend to switch on the windscreen wipers, but switch on the lights instead, or vice versa | 1 | 2 | 3 | 4 | 5 | 6 |
| 35. I often attempt to drive away from traffic lights in third gear (or on the neutral mode in automatic car) | 1 | 2 | 3 | 4 | 5 | 6 |
| 36. I often plan my route badly, so that I hit traffic that I could have avoided | 1 | 2 | 3 | 4 | 5 | 6 |
| 37. I often use muscle relaxation techniques while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 38. I plan long journeys in advance | 1 | 2 | 3 | 4 | 5 | 6 |
| 39. I often nearly (or actually) hit something due to misjudging my gap in a parking lot | 1 | 2 | 3 | 4 | 5 | 6 |
| 40. I feel comfortable while driving | 1 | 2 | 3 | 4 | 5 | 6 |
| 41. I am always ready to react to unexpected manoeuvres by other drivers | 1 | 2 | 3 | 4 | 5 | 6 |
| 42. I tend to drive cautiously | 1 | 2 | 3 | 4 | 5 | 6 |
| 43. I often honk my horn at others | 1 | 2 | 3 | 4 | 5 | 6 |
| 44. I usually enjoy the excitement of dangerous driving | 1 | 2 | 3 | 4 | 5 | 6 |

Questionnaire 2: Thinking Styles Inventory—Revised II (TSI-R2)

Sternberg, R. J., Wagner, R. K. & Zhang, L. F. (Tufts University, 2007)

This questionnaire is about the different strategies and ways people use to solve problems, to carry out tasks or projects, and to make decisions.

To respond to this questionnaire, read each statement carefully and decide how well the statement fits the way that you typically do things at school, at home, or on a job. For each statement, circle one of the 7 numbers next to the corresponding item number on the answer sheet. **Circle 1** if the statement **does not fit you at all**, that is, you never do things this way. **Circle 7** if the statement **fits you extremely well**, that is, you almost always do things this way. Use the values in between to indicate that the statement fits you in varying degrees.

1=Not At All Well, 2=Not Very well, 3=Slightly Well, 4= Somewhat Well, 5=Well, 6=Very Well, 7=Extremely Well

There are, of course, no right or wrong answers. Please read each statement and circle the number on the scale next to the statement that best indicates how well the statement describes you.

Please proceed at your own pace, but do not spend too much time on any one statement.

- | | | | | | | | |
|--|---|---|---|---|---|---|---|
| 1. I prefer to deal with problems that require me to attend to a lot of details. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. When talking or writing about ideas, I prefer to focus on one idea at a time. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3.	When starting a task, I like to brainstorm ideas with friends or peers.	1	2	3	4	5	6	7
4.	I like to set priorities for the things I need to do before I start doing them.	1	2	3	4	5	6	7
5.	When faced with a problem, I use my own ideas and strategies to solve it.	1	2	3	4	5	6	7
6.	In discussing or writing on a topic, I think that the details and facts are more important than the overall picture.	1	2	3	4	5	6	7
7.	I tend to pay little attention to details.	1	2	3	4	5	6	7
8.	I like to figure out how to solve a problem following certain rules.	1	2	3	4	5	6	7
9.	I like to control all phases of a project, without having to consult with others.	1	2	3	4	5	6	7
10.	I like to play with my ideas and see how far they go.	1	2	3	4	5	6	7
11.	I am careful to use the proper method to solve any problem.	1	2	3	4	5	6	7
12.	I enjoy working on things that I can do by following directions.	1	2	3	4	5	6	7
13.	I stick to standard rules or ways of doing things.	1	2	3	4	5	6	7
14.	I like problems where I can try my own way of solving them.	1	2	3	4	5	6	7
15.	When trying to make a decision, I rely on my own judgment of the situation.	1	2	3	4	5	6	7
16.	I can switch from one task to another easily, because all tasks seem to me to be equally important.	1	2	3	4	5	6	7
17.	In a discussion or report, I like to combine my own ideas with those of others.	1	2	3	4	5	6	7
18.	I care more about the general effect than about the details of a task I have to do.	1	2	3	4	5	6	7
19.	When working on a task, I can see how the parts relate to the overall goal of the task.	1	2	3	4	5	6	7
20.	I like situations where I can compare and rate different ways of doing things.	1	2	3	4	5	6	7
21.	When working on a project, I tend to do all sorts of tasks regardless of their degree of relevance to the project undertaken.	1	2	3	4	5	6	7
22.	When I'm in charge of something, I like to follow methods and ideas used in the past.	1	2	3	4	5	6	7
23.	I like to check and rate opposing points of view or conflicting ideas.	1	2	3	4	5	6	7
24.	I prefer to work on projects that allow me to put in a lot of detailed facts.	1	2	3	4	5	6	7
25.	In dealing with difficulties, I have a good sense of how important each of them is and in what order to tackle them.	1	2	3	4	5	6	7
26.	I like situations where I can follow a set routine.	1	2	3	4	5	6	7

27. When discussing or writing about a topic, I stick to the points of view accepted by my colleagues.	1	2	3	4	5	6	7
28. I like tasks and problems that have fixed rules to follow in order to complete them.	1	2	3	4	5	6	7
29. I prefer to work on a project or task that is acceptable to and approved by my peers.	1	2	3	4	5	6	7
30. When there are several important things to do, I do those most important to me and to my colleagues.	1	2	3	4	5	6	7
31. I like projects that have a clear structure and a set plan and goal.	1	2	3	4	5	6	7
32. When working on a task, I like to start with my own ideas.	1	2	3	4	5	6	7
33. When there are many things to do, I have a clear sense of the order in which to do them.	1	2	3	4	5	6	7
34. I like to participate in activities where I can interact with others as a part of a team.	1	2	3	4	5	6	7
35. I tend to tackle several problems at the same time because they are often equally urgent.	1	2	3	4	5	6	7
36. When faced with a problem, I like to solve it in a traditional way.	1	2	3	4	5	6	7
37. I like to work alone on a task or a problem.	1	2	3	4	5	6	7
38. I tend to emphasize the general aspect of issues or the overall effect of a project.	1	2	3	4	5	6	7
39. I like to follow definite rules or directions when solving a problem or doing a task.	1	2	3	4	5	6	7
40. I tend to give equal attention to all of the tasks I am involved in.	1	2	3	4	5	6	7
41. When working on a project, I like to share ideas and get input from other people.	1	2	3	4	5	6	7
42. I like projects where I can study and rate different views or ideas.	1	2	3	4	5	6	7
43. I tend to give full attention to one thing at a time.	1	2	3	4	5	6	7
44. I like problems where I need to pay attention to details.	1	2	3	4	5	6	7
45. I like to challenge old ideas or ways of doing things and to seek better ones.	1	2	3	4	5	6	7
46. I like situations where I interact with others and everyone works together.	1	2	3	4	5	6	7
47. I find that when I am engaged in one problem, another comes along that is just as important.	1	2	3	4	5	6	7
48. I like working on projects that deal with general issues and not with nitty-gritty details.	1	2	3	4	5	6	7
49. I like situations where I can use my own ideas and ways of doing things.	1	2	3	4	5	6	7
50. If there are several important things to do, I focus on the one most important to me and disregard the rest.	1	2	3	4	5	6	7

51. I prefer tasks or problems where I can grade the designs or methods of others.	1	2	3	4	5	6	7
52. When there are several important things to do, I pick the ones most important to my friends and colleagues.	1	2	3	4	5	6	7
53. When faced with a problem, I prefer to try new strategies or methods to solve it.	1	2	3	4	5	6	7
54. I like to concentrate on one task at a time.	1	2	3	4	5	6	7
55. I like projects that I can complete independently.	1	2	3	4	5	6	7
56. When starting something, I like to make a list of things to do and to order the things by importance.	1	2	3	4	5	6	7
57. I enjoy work that involves analysing, grading, or comparing things.	1	2	3	4	5	6	7
58. I like to do things in new ways not used by others in the past.	1	2	3	4	5	6	7
59. When I start a task or project, I focus on the parts most relevant to my peer group.	1	2	3	4	5	6	7
60. I have to finish one project before starting another one.	1	2	3	4	5	6	7
61. In talking or writing down ideas, I like to show the scope and context of my ideas, that is, the general picture.	1	2	3	4	5	6	7
62. I pay more attention to parts of a task than to its overall effect or significance.	1	2	3	4	5	6	7
63. I prefer situations where I can carry out my own ideas, without relying on others.	1	2	3	4	5	6	7
64. I like to change routines in order to improve the way tasks are done.	1	2	3	4	5	6	7
65. I like to take old problems and find new methods to solve them.	1	2	3	4	5	6	7

Please put the consent form and the completed questionnaires either in Monica Kennedy's mailbox 47 (groundfloor B building 6) or hand in to your tutor (place in separate envelopes). Thank you very much for your contribution!

APPENDIX E: GROUP INTERVIEW DISCUSSION GUIDE

1. Welcome and intro: introduce self, observer, get drinks etc
 - a. Explain purpose
 - b. Procedure: read info sheet, sign consent form
 - i. Give participants no's
 - ii. Draw seating
 - c. Answer any Qs
 - d. Collect consent forms
2. Group discussion (see guide below) for 1 hr-1 hr 15 mins
3. Debrief
 - a. Answer any Qs
 - b. Opinions on discussion
 - c. Pay participants

- Could you describe the way you drive?
- Do you drive differently at different times?
- When do you drive differently?
- How do you drive differently?
- Which way of driving do you feel most comfortable with?
- How are you driving mostly?
- Are you aware of any changes in your driving during a trip?
- If so: what kind of trips (e.g. longer than 30 mins)?
- How does your driving change, when/if it changes?
- What do you think makes you change your driving?
- How would you describe 'safe driving'?
- When do you drive safely?
- How did you learn to drive safely?
- What does 'safe driving' mean to you?
- Do you think other people on the road drive safely?
- What do you think about that?

After hand-out of thinking and driving styles description:

- Do you identify with any or more of these driving styles?
- Do you identify with any or more of these thinking styles?
- Could you for yourself link any of the thinking styles to any of the driving styles?