PREPARING RIDERS TO S.E.E. BETTER:

MSF TOOLS FOR IMPROVING HAZARD PERCEPTION

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ABSTRACT

Research has shown the more experienced operators scan the road better and recognize important clues much earlier than novices. There is also earlier identification by experienced operators that a hazardous situation is developing. This is likely to lead to action before the conflict occurs. The MAIDS study confirmed that one of the main contributing factors to motorcycle crashes is related to perceptual errors. Both the United Kingdom and Australia have added a hazard perception component to their licensing process.

The Motorcycle Safety Foundation (MSF) has been working on several new programs that are designed to provide training in hazard perception. The programs will be available to training providers and government agencies. Dr. Raymond J. Ochs, Director of Training Systems at MSF, will provide an overview of *Street Smart – Rider Perception* program (a 90-minute classroom-only learning experience that includes modern visual technology and classroom activities), its accompanying online hazard awareness activity (a self-paced hazard awareness module called *Rider Perception Challenge!*), and the SMARTrainer Class – *Traffic Awareness* program (SMART stands for Safe Motorcyclist Awareness and Recognition Trainer). The value of hazard perception training has been demonstrated in laboratory settings. The intent of these MSF-developed programs is to not only assist riders in developing their hazard perception skills, but to transcend the straightforward practice of hazard identification by expanding learning activities to

address the human visual characteristics as well as executive functions. The idea of giving riders an awareness of the importance of executive functions like attention, prioritizing and strategizing would mean more meaningful hazard perception training.

INTRODUCTION

Since March 1973, the Motorcycle Safety Foundation (MSF) has set internationally recognized standards of excellence in motorcycle rider education and training. The MSF is a leader in championing the safety of the motorcyclist in many ways. The Foundation develops and maintains a high-quality, research-based rider education and training curricula, establishes national certification standards, provides technical assistance for training and licensing programs, actively participates in government relations, research and public awareness, and works in powerful partnerships with other motorcycling and public organizations toward improving and enhancing the safety and enjoyment of motorcycling.

Late in the 1990s, MSF embarked on a significant renewal endeavor to improve the education and training processes related to motorcyclists and its certified instructors. It reinvented its entire motorcycle safety rider education and training system by significantly updating and improving its curricula and instructor certification programs and processes. Developed over the period of several years and continually analyzed, improved and expanded, the MSF Rider Education and Training System[SM] (MSF RETS) uses proven and cost-effective approaches to promote motorcyclist safety, ensure a positive image of motorcyclists, and enable a superior riding experience.

Preparing Riders to S.E.E. Better: MSF Tools for Improving Hazard Perception is about how the MSF addresses hazard perception in its Rider Education and Training System

programs. S.E.E. specifically means to Search-Evaluate-Execute. Hazard perception is considered to be a significant element in crash prevention. As noted in Groeger (2000):

> It has been suggested that hazard-perception abilities can be trained and it does seem that people who receive rather general road safety training perform better on tests of hazard-perception ability (e.g. McKenna & Crick, 1991, 1994). Precisely what is learned from such training, and how it may generalize to hazard perception or actual driving, remains unclear. It is possible that what can be gained from such training is a general idea of what unexpected events may occur, and what the consequences of these might be, or that people are motivated to become more responsible or cautious.

Haworth and Mulvihill (2006) in their first stage of a program of research to develop hazard perception for motorcyclists, point out that Crick and McKenna (1992) define hazard perception as the ability to identify potentially dangerous traffic situations. Evans and McDonald (2002) define hazard perception as "the process whereby a road user notices the presence of a hazard." For the purposes of this paper and as used in MSF programs, perception is defined as seeing and understanding accurately.

The purpose of this paper is to (1) provide a rationale for hazard perception training, (2) connect the importance of addressing the executive functions of the brain in order to provide the most effective training, and (3) show how MSF has incorporated hazard perception training into its Rider Education and Training System. Several MSF courses, including one specifically designed program titled Street Smart – *Rider Perception*

(SSRP), include hazard perception awareness and training. The SSRP program, which is the primary focus of this paper, has a companion online interactive program called *Rider Perception Challenge!* It is found on the MSF website (msf-usa.org) and is available to anyone with Internet access. (Warning: The training situations use United States signs and all riding is assumed to be on the right side of the roadway.)

This paper addresses how hazard perception training can expand to include the executive functions that are critically important for identifying and prioritizing factors while riding. A safety mindset is an antecedent for effective hazard perception, and hazard perception training that focuses only on select situations may be minimizing potential positive effects for helping riders manage their risks.

IDENTIFICATION OF THE PROBLEM

Traffic safety experts have long known that motorcycling is a complex psychomotor task that includes mental, physical and social competencies and abilities. Motorcycling is a mental task because a rider must process information and make decisions; motorcycling is a physical task because it requires simple and complex motor skills; and motorcycling is a social task because it requires interaction with other highway users.

The MSF characterizes the riding task as more a skill of the eyes and mind than of the hands and feet. This means that once basic skills are acquired, safety on the road is more about using the eyes well and using the brain to sort, organize and prioritize factors in the

traffic environment. Quality rider education and training must transcend the notion that safe riding is to solely focus on skill development.

Dorn (2005) suggested that a focus on skills training may explain why research results have been disappointing for driver training. He noted:

> In contrast to engineering and enforcement interventions, education has received comparatively little attention as a method to alter driver behaviour. Hitherto, much of the research on driver behavior is disappointing in not providing sound practical solutions to bring about a desired change in driver behaviour. It seems common sense then that training drivers would reduce the risk of collisions; yet studies to evaluate whether driver training delivers a safety benefit have been largely unsuccessful. However, driver training takes a skills-based approach and little attention is paid to the behavioural aspects of driving known to be a major factor in collision risk. This could explain why existing methods have frequently failed to reduce accidents.

When reviewing crash causation studies, conclusions contain little emphasis on a lack of skills as the primary cause of crashes. The Motorcycle Accident In-Depth Study (MAIDS) (2004) reported: “In about 1/3 of accidents PTW riders and other vehicle (OV) drivers failed to account for visual obstructions and engaged in faulty traffic strategies.” Another MAIDS finding states that among the secondary contributing factors, PTW riders “failed to see the OV and they also made a large number of faulty

decisions; i.e., they chose a poor or incorrect collision avoidance strategy. In 13% of all cases, there was a decision failure on the part of the PTW rider." In the same vein, the Hurt Report released in the United States, officially known as *Motorcycle Accident Cause Factors and Identification of Countermeasures* (1981), recommended that a priority for rider education and training programs would be to emphasize the rider's capabilities to see and be seen.

That distributions of attention within the visual field play an important role for safe driving behaviour is confirmed by several studies Dorn (2005); the link between attention and traffic accidents was the subject of a study of Hendricks, Fell and Freedman (1999) who found by analyzing 723 crashes that 37.8 percent were due to driver inattention or perceptual errors. In an earlier investigation by Treat, Tumbas, McDonald, Shinar and others (1979), 2258 traffic accidents were evaluated and the authors concluded that improper outlook and inattention were the two leading causes of traffic accidents. More recently, the 100 Naturalistic Car Study found driver inattention as a primary contributing factor in most crashes.

Today, it is important for motorcyclists to be more vigilant and perceptive than ever. Devices that distract other drivers are on the increase, from cell phones that can be used for talking or texting to video devices and navigation systems that create inattention to the driving task. And what has been learned about driver distraction has implications for riders who may not give due attention to their capacities while riding.

Yet, would training that focuses on identification of possible hazards alone improve hazard perception on the road? Can training initiatives shape executive functions? Can hazard perception training cause greater overall attention when riding?

There is little doubt that developing one's executive functions better will lead to better functioning in driving and other areas of life. Meltzer (2007) stated:

> …life success depends increasingly on the mastery of executive function processes such as goal setting, planning, organizing, prioritizing, memorizing, initiating, shifting, and self-monitoring. Executive function is a cognitive process involved in controlling behavior and readying the person for situations. More important in real-life decision making and everyday reasoning than in responding to questions on standardized tests, executive function comprises the ability to be mentally and behaviorally flexible to changing conditions and to provide coherence and smoothness in one's responses.

Caine and others (2009) state that the primary key to learning is *developing the ability to make good decisions in the real world, based on the knowledge that people have and the sense they have made of experience.* In short, at the heart of great teaching is the development of the executive functions of learners. They additionally note that the "notion of thinking about one's own thinking is called *metacognition,* and it has been studied extensively (see, for example, Perfect & Schwartz, 2002). In fact, working with metacognition is essential for enhancing the executive functions, all of which are

strengthened as people become aware of their own behaviors, capacities, and predispositions."

Connecting the two areas, executive function and hazard perception, The National Safety Council's white paper report (2010) alludes to the fact that hazard perception needs to be preceded by executive functions. The brain handles tasks sequentially, switching between one task and another. A person's brain can juggle tasks very rapidly, which leads to erroneously belief that we are doing two tasks at the same time. In reality, the brain is switching attention between tasks – performing only one task at a time. From the report:

> In addition to "attention switching," the brain engages in a constant process to deal with the information it receives:
>
> 1. **Select** the information the brain will attend to
> 2. **Process** the information
> 3. **Encode,** a stage that creates memory
> 4. **Store** the information.
>
> Depending on the type of information, different neural pathways and different areas of the brain are engaged. Therefore, the brain must communicate across its pathways. Furthermore, the brain must go through two more cognitive functions before it can act on saved information. It must:
>
> 5. **Retrieve** stored information
> 6. **Execute** or act on the information.
>
> When the brain is overloaded, all of these steps are affected. But people may not realize this challenge within their brains.

It is important for hazard perception training to address the antecedents of good hazard identification: the executive functions. Most people recognize when they are visually or mechanically distracted and seek to disengage from these activities as quickly as possible. However, people typically do not realize when they are cognitively distracted, such as taking part in a phone conversation; therefore, the risk lasts much, much longer (National Safety Council, 2010).

Riding safely requires more than good physical skills and attention to the riding task. It requires respect and a healthy attitude that puts safety as a top-of-mind matter when riding. As noted in Forbes (1972), the question remains "Will an outright attempt to change driver skills help solve the problem or is the continued accident problem symptomatic of a deeper private and public issue? What assurance do we have that more skilled drivers will use their skills to avoid accidents, rather that slice the margin of safety more closely?"

At a more practical level, improved skills would seem to be of value only to those drivers who are already predisposed to drive safely. Add to this what Vanderbilt (2008) related about a real-time functional magnetic resonance imaging study: "That small peek into the brain of the driver revealed a simple, if underappreciated truth about driving: When we are in traffic, we all become on-the-fly risk analysts. We are endlessly having to make snap decisions in fragments of moments, about whether it is safe to turn in front of an

oncoming car, about the right speed to travel on a curve, about how soon we should apply the brakes when we see a cluster of brake lights in the distance."

Education and training programs that address the human functions of the riding task, including hazard perception, must provide awareness and development of the executive functions, or at least instill an appreciation for the value of making attention to safety a priority when riding. It is from this perspective that rider education and training can become more effective. As noted in Vanderbilt (2008): "Human attention, in the best circumstances, is a fluid but fragile entity, prone to glaring gaps, subtle distortions, and unwelcome interruptions. Beyond a certain threshold, the more that is asked of it, the less well it performs. When this happens in a psychological experiment, it is interesting. When it happens in traffic, it can be fatal."

DEVELOPMENT OF THE S.E.E. STRATEGY

In the MSF Rider Education and Training System, Search-Evaluate-Execute (SEE) is the terminology used to address the human functions of the riding task. Over the years, many similar methods have been used. Most ubiquitous is Identify-Predict-Decide-Execute, which was adopted by many traffic safety agencies and promulgated in several driver and traffic safety education textbooks.

IPDE and *SIPDE* (*S* adds Search or Scan) are decision-making processes for motor vehicle operators that have been around the driver and traffic safety education community for many years. Although no one person or entity has been credited with their

development, the source most often cited was reported in Traffic Safety Research Review (1967), where Lawrence E. Schlesinger stated:

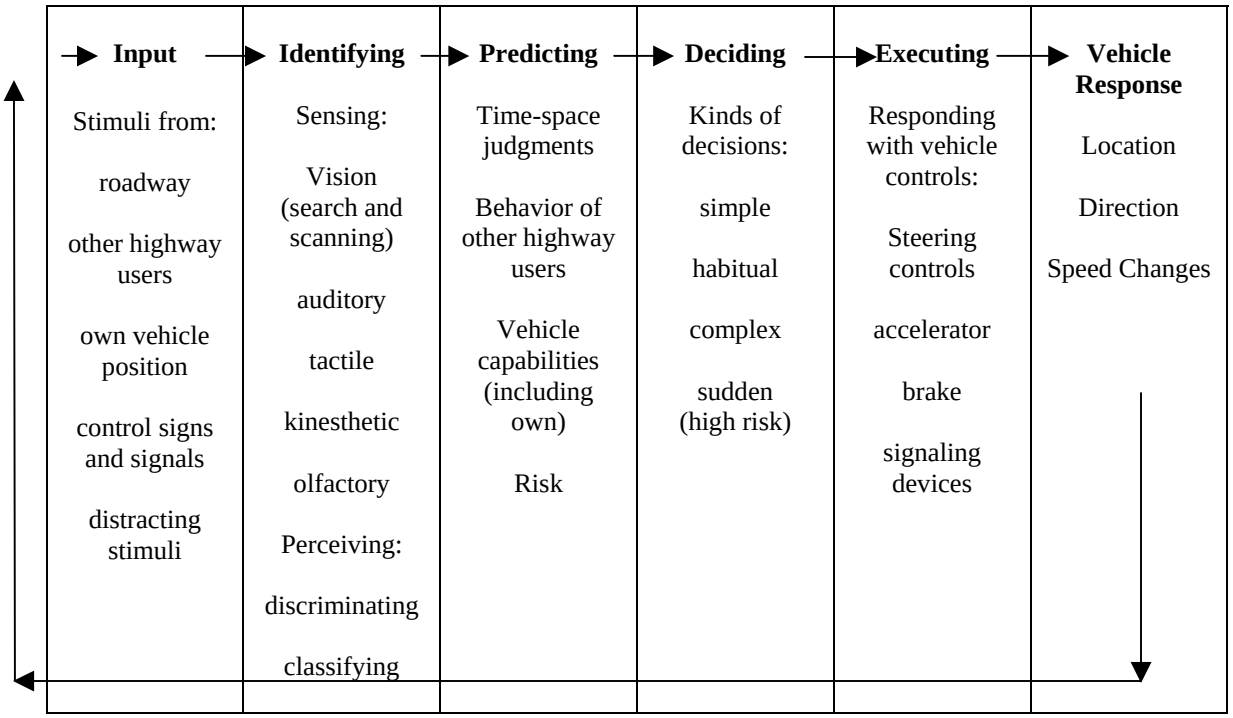
> …the skilled driver is one who accurately processes and organizes the information of the driving scene in terms of the field of safe travel and minimum stopping zone, and who maintains a safe field-zone ratio over time. The skills required to accomplish this task are observation of the changes in the driving scene, identification of the change and estimation of its consequences, decision-making and executing the decision. These are assumed to be learnable and measurable.

One of the early uses of IPDE is provided in an Automotive Safety Foundation (1970) publication. In explaining a curriculum rationale, the authors named as one of the aspects pervading the curriculum the "human functions." In a section titled *Human Functions—Basic Points of Contact and Connection for the Curriculum*, it states:

> Performance depends upon the efficiency and effectiveness of human functions applied to the task, so educational efforts should be directed toward the quality of these functions. Although researchers have classified these functions somewhat differently, these analyses appear to agree in substance. The terms of the study follow closely those proposed by Schlesinger. They are: 1) *identify* the relevant cues; 2) *predict* their significance; 3) *decide* what to do; and 4) *execute* your decision.

This resource curriculum provided a chart titled "Man-Machine-Environment Analysis: Human Functions." The chart named six categories: input, identifying, predicting, deciding, executing, and vehicle responses (see Chart 1 below).

Chart 1. MAN-MACHINE-ENVRONMENT ANALYSIS
Human Functions



The Maryland State Department of Education (1972) under a grant for the Division of Transportation Safety, Maryland Department of Transportation, and the Highway Traffic Safety Administration, U.S. Department of Transportation developed an *Instructor's Guide for the IPDE System.* In its preface, the authors state: "In creating The IPDE System, the driver education staff of the Maryland State Department of Education sought counsel from several sources. Throughout this search, one over-riding fact became

apparent: There is a great 'gap' between what on-road driving task requirements appear to be and those instructional materials that are generally available or used. For example: if one were to ask each individual involved in developing The IPDE System for an unconditional endorsement of the entire program of instruction, one would have a difficult time getting a consensus. This was a major concern to the authors. In an attempt to accommodate this fact, a certain degree of flexibility has been provided in The IPDE System. In essence, each teacher will find his own way to handle The IPDE System."

There are several examples of how the basic IPDE system or similar processes or systems have been utilized. … (1971) Learning to Drive: Skills, Concepts, and Strategies used the five-step process of See, Understand, Predict, Evaluate, Control. The 1972 text Let's Drive Right used IPDA (Identify, Predict, Decide, Act). The 1975 driver education text Driving: A Task Analysis Approach used SIPDE, and where the "S" stood for Sensing. AAA for many years has used SIPDE, with the "S" meaning Search. The Washington State curriculum Guide has adopted WEA (Watch, Evaluate, Action). The 1989 Motorcycle Safety Foundation Experienced *RiderCourse* utilized SPA (Search, Predict, Act). The National Safety Council Defensive Driving Courses have been utilizing Recognize the hazard, Understand the defense, Act correctly in time. The American Driver and Traffic Safety Education Association (ADTSEA), in its teacher preparation and recognition program, promotes a 3-step approach including Mottola's ABCs of Zone Control of A: Alert switched on to check zones, B: Before acting check other zones, and C: Create time/space management.

From an education and training viewpoint, the exact terminology is not critical to the achievement of objectives. It becomes a matter of what best communicates to riders and what best transfers from the learning environment to the actual streets and highways. As stated in an Automotive Safety Foundation (1975):

> The precise division and labels are not important so long as they come from a systematic and logical analysis, and are meaningful to the teacher and his students. Some may prefer to use "perception" instead of identify"; and "judge" instead of evaluate, or "assess" instead of "predict." In any case the person senses and processes information, decides and acts. There functions tend to blend together and overlap in the rapidly changing traffic environment. None of them is independent; indeed, listing them is more a convenience than a reflection of reality.

In many ways, rider perception is a euphemism for situational awareness. In Banbury (2004), it is noted that in surveying definitions of situational awareness (SA) reveals the variety of conceptions currently conveyed in the literature. Breton and Rousseau (2001) performed a systematic classification of 26 SA definitions. These definitions turned out to be evenly divided in two classes corresponding to the now accepted duality of SA as a *State* or as a *Process*.

The Motorcycle Safety Foundation Basic *RiderCourse* utilizes the acronym SEE (Search-Evaluate-Execute) as a personal riding strategy (see Figure 1 below). Search, a visual function, means to actively scan and identify factors that could create increased risk; Evaluate, a cognitive function, means to consider potential problems from the interaction

of those factors; and Execute, a motor skills function, refers to physical, manipulative actions required for communication as well as time and space adjustments.

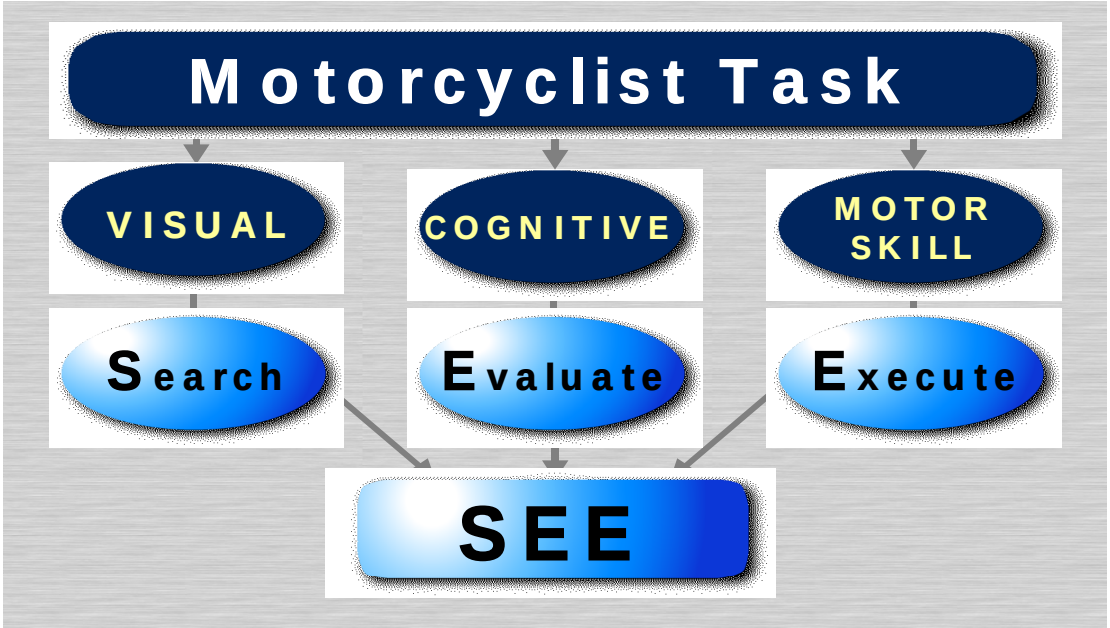


Figure 1. Motorcyclist Task

SEE is an active, thinking strategy that places responsibility on the motorcyclist to reduce risk by creating time and space in order to control a personal margin of safety. Besides being a simplified three-step process and easy to remember, SEE as a word acronym connects a thinking strategy with the importance of visual perception. This is supported by the Hurt Report (1981) that stated in one of its recommendations and proposed countermeasures: "…and this points out the need for the motorcycle rider to develop a traffic strategy so that he can see and be seen in traffic. This should be the most important component of any motorcycle rider training program."

INTEGRATION OF S.E.E. INTO THE MSF RIDER EDUCATION AND TRAINING SYSTEM

With the introduction of the MSF's latest learn-to-ride curriculum, the Basic *RiderCourse* in 2001, S.E.E. became the primary method used to convey the notion of the human functions of the riding task. But using S.E.E. is the tip of the iceberg in terms of improving rider safety through the development of hazard perception ability. Consider the MSF Pyramid of Safety (see Figure 2 below). It demonstrates the components of a safe rider, which certainly transcends the notion that rider safety is a function of primarily physical skills. And the development of physical riding skills too often becomes the central feature of rider education and training safety programs.

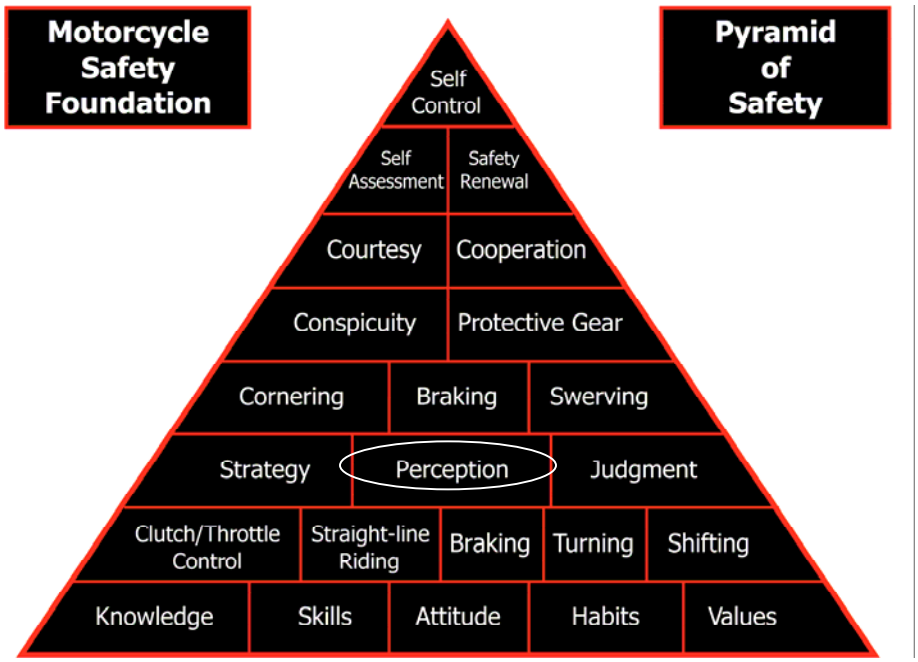


Figure 2. MSF RETS Pyramid of Safety

All MSF programs incorporate the topical areas of the pyramid. The more basic programs emphasize the baseline topics while acknowledging the higher-order functions; the more advanced programs renew the fundamentals while delving deeper into the

functions of rider decisions and choices. Notice that Perception is essentially in the middle.

It is important to situate *perception* in the context of a larger of general human error, which transcends the notion of basic hazard perception. As noted in Breakwell (2007), some hazards are the product of human error. Several types of error create hazards:

- Failures in problem analysis – e.g. missing the way peripheral elements in the problem can interact with each other to become major obstacles to it;
- Solution failures in problem solving – e.g. believing that the solution is identified without adequately testing it;
- Failure in attention to information – e.g. ignoring information that is available (or sometimes, not recognizing what information is not available);
- Failure in interpretation of information – e.g. misunderstanding the implications of the data that you have noted;
- Failure in the choice of action that a situation requires – e.g. deciding that it is necessary to intervene when it is not;
- Failure in the appropriate execution of the chosen action – e.g. either in when it is done or how it is done.

Note all but the final point address the brain/mind connection associated with perception. Dominguez (1994) suggests a set of processes "on which situation awareness depends: *information extraction, information integration, mental picture formation,* and *projection*

and anticipation." Training in hazard perception not only connects with the executive functions of the human brain, but also creates the opportunity to delve deeper into a rider's risk reduction management strategies. Endsley (1998) also describes three cognitive processes or functions: *perception*, *comprehension* and *projection*.

The MSF recommends a core set of courses for complete preparation in developing and maintaining safe and responsible performance and behavior. S.E.E. is the fundamental strategy the forms the central thread that ties together the mental aspects of riding. Here are the primary programs of the MSF's recommended core of courses, and how S.E.E. is addressed in each:

- Basic *RiderCourse* (BRC): S.E.E. is introduced as the strategy for minimizing risk. It is to be applied when learning basic operation on the closed-course practice area, and is reinforced in audio-visual training aids.
- Street *RiderCourse* 1: Basic: Part IV of the Street Smart – *Rider Perception* program is used prior to the on-street instructional activities. During the route, riding experiences under the supervision of a RiderCoach with radio communication and during the mid-route debriefs, S.E.E. is used as the focal point the identification of potential hazards.
- Street Smart – *Rider Perception*: this classroom only program solely focuses on developing good perception, and details are provided later in this paper.
- *Rider Perception Challenge!* that is an online program related to Street Smart – *Rider Perception*.

- Advanced *RiderCourse – SportBike* Techniques: a segment of the classroom learning activities uses parts of the SSRP.
- The Safe Motorcyclist Awareness and Recognition Trainer (SMART) – *Traffic Awareness*: this learning tool provides simulated traffic scenarios and uses S.E.E. in the learning environment.

Just as motor skills are developed from gross to fine skills, so too is rider perception developed over time with deeper levels of understanding. It would be preferred to have perfect riders before ever letting them on the street, but this is not practical. So it becomes important throughout training, particularly in the beginning when only basic skills have been acquired, that every rider knows how to keep their skills ahead of their risks. Riders must keep a margin of safety as they consider their capabilities and limitations. Awareness and training in rider perception not only enhance hazard identification capabilities, but also provide experiences in the vulnerabilities when riding in traffic.

In summary, it is important for riders to have the mental, physical and social skills necessary for safe motorcycle operation. The mental aspect can be developed and used in a course, but more importantly, riders need the appreciation of and value for making safety a priority. One way to accomplish this is to provide learning activities that not only built hazard perception skills, but show how quickly the eyes and mind can work if attention is devoted to the riding task. If a rider makes safety a priority, has good hazard perception skills, and chooses to keep the mind in a state of readiness, then hazard

perception training has accomplished more than merely the surface learning of identifying potential collision traps while riding.

STREET SMART – *RIDER PERCEPTION* PROGRAM

Street Smart – *Rider Perception* (SSRP) is an MSF Host-an-Event program that is totally devoted to rider perception. (Host-an-Event programs are available to the public and do not require specialized training or certification.) The SSRP has been implemented in two formats: one is a kit that contains a Leader's Guide with a core lesson plan, student workbooks, oversized playing cards and floor mats for highlighting central vision and peripheral vision, and a training aid with PowerPoint program and interactive scenarios that consist of traffic signs and traffic situations; the other is an online web-based version that may be used as a perceptual awareness activity that includes self-assessment with personal perceptive abilities specific to motorcyclist operation.

The SSRP kit consists of learning activities divided into four separate parts: (1) Introduction to Rider Perception; (2) Improving Perception; (3) Analysis of Collision Traps; and (4) Road Sign and Collision-Trap Practice. The PowerPoint program is designed with highly interactive learning activities and Part IV, Road Sign and Collision-Trap Practice tests participants as a capstone activity.

As stated in the SSRP Leader's Guide, the overall aim of the SSRP is to improve a rider's perceptive abilities when riding in traffic. Having good perception skills means to see and understand accurately.

The stated objectives of the SSRP are:

1. Name several factors that affect perception.
2. Explain how quickly the eyes and mind can effectively work to accurately perceive a situation (in the case of this module, that would be quick identification of road signs and traffic situations).
3. Identify traffic signs and state their meaning.
4. Identify factors in traffic situations that could affect rider speed, lane position or path of travel.
5. Increase the speed of identification of key factors in traffic.
6. State the value of attention in identifying factors and managing risks.
7. Name several collision traps that could affect rider safety.

Objectives 2 and 6 above allude to the executive functions as they relate to hazard perception. As stated in the Leader's Guide when referencing the collision traps practice test items: "A point to keep in mind is that the purpose is not to solve specific situations with an absolute, only-one-answer response, but to gain an appreciation of how quickly the eyes and mind can work…." For the online *Rider Perception Challenge!* it is explained about the signs and situation tests that: "Both types of tests demonstrate how quickly your eyes and mind work together if you are attentive."

The Leader's Guide also provides an overview of the program as well as the administrative requirements. The guide lists the facility requirements and materials, provides facilitation tips and contains appendices that include Rider Perception Facts, an

explanation about select slides used in the program, a Feedback Form and Sample News Release.

A typical classroom facility is needed to conduct the SSRP. A classroom should have tables with comfortable chairs where small groups of three to five participants may sit together (as opposed to desks in rows or theater-style seating). All participants must be able to clearly see the visual display and should not have their backs to the screen. Room lighting should be adjustable for the presentation of the visuals.

The core lesson plan materials consist of a compact disk (CD) that contains the four parts of the program. A computer is necessary to play the CD, which contains PowerPoint slides and the 10 tests. Specialized floor mats are used, and together with oversize playing cards make up a vision challenge related to peripheral vision and central vision. A Participant Workbook is used and it contains several learner-centered activities to ensure participant interaction.

For a hazard perception experience, visit the MSF website (msf-usa.org) and click on *Hazard Perception Challenge!* It will give you a first-hand example of a type of hazard perception training and the connection to the executive functions of the brain.

SAFE MOTORCYCLIST AWARENESS AND RECOGNITION TRAINER

The Safe Motorcyclist Awareness and Recognition Trainer (SMART) is a training tool that provides simulated traffic experiences for a virtual riding environment. It combines

a personal computer, computer generated traffic images and video monitor, plus a handlebar, seat, footrests and all the standard controls found on a real motorcycle. The combination of this specialized software with actual motorcycle controls makes it possible to navigate an on-screen motorcycle (or scooter) through various scenarios presenting the rider with real-world situations and hazards. The program will record the ride and provide feedback to the rider. The SMART is not a passive teaching device. It has a powerful playback feature that provides feedback regarding crashes or near crashes.

The purpose of the SMART is not to teach riders how to operate a motorcycle or acquire the feel of an actual motorcycle; rather the goal is to enhance a rider's hazard perception capabilities. It works for all experience levels by providing opportunities to experience typical hazards that riders face in city streets, suburbs and open highways. The way a rider perceives and responds to situations is measured and evaluated electronically. The SMART software gives feedback on the results and allows self-assessment of decisions regarding perception to various situations, provides an evaluative rating for each, summarize the results and offers advice for safety improvement.

SMART provides a rich learning environment to help a rider develop hazard awareness and traffic-related perceptual skills. S.E.E. is developed two primary ways. One is with immediate feedback as a first-person crash is experienced on the screen; the other is with safety related dialogue between the rider and a qualified coach.

Each riding scenario lasts from five to ten minutes. At the conclusion of each scenario, a color print out provides information about specific situations and shows the results of rider actions. The rider's results appear as a map, showing the route with indications of speed, turn signal use, lane position, braking and other data that may be used during the interactive debrief and coaching segment. Another important feature of each scenario is the replay function. A replay allows the rider's performance to be reviewed either forward or backward, and from various points of view: hovering mode, bird mode, other-vehicle mode, sky mode, and rider viewpoint mode. The SMART can pause the replay at any point for further individualized feedback.

Besides learning specific hazard perception techniques, the SMART raises a rider's awareness of the need for heightened attention and the importance of early identification of roadway and traffic factors that contribute to risk. A rider who experiences SMART learns the value of constant vigilance and how the mind must be constantly alert for possible risky situations.

SUMMARY

Preparing Riders to S.E.E. Better: MSF Tools for Improving Hazard Perception is about how the Motorcycle Safety Foundation (MSF) deals with hazard perception in its Rider Education and Training System programs. The purpose of this paper is to show how MSF has incorporated hazard perception training into its Rider Education and Training System, and to show details of the Street Smart – *Rider Perception* program.

The MSF develops and maintains high quality, research-based rider education and training curricula. Its mission focuses on quality rider education and training as well as maintaining a safe riding environment.

With the development of a comprehensive rider education and training system, the MSF has transcended simple skill-based training programs and has expanded into behavioral programs the target rider perception as a primary executive function that can lead to safe and enjoyable riding.

Because MSF characterizes the riding task as more a skill of the eyes and mind than of the hands and feet, using the eyes well and using the brain to sort, organize and prioritize factors in the traffic environment is of integral importance for training programs.

The MSF will continue to develop programs to enhance rider safety. As new and more effective programs become available and as research demonstrates viable and effective programs, the MSF will embrace its programs and methods to improve and enhance its existing programs.

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