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## **Module 10: Driver Testing and Examiner Training, part I**

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### ***Purpose:***

To present best practices in driver testing standards and examiner training

### ***Learning Outcomes:***

Upon completion of the modules the participant will be able to:

- Explain the importance of reliability and validity in driver tests
- Explain how reliability and validity can be achieved through:
  - test design and development
  - examiner training
- Explain the rationale for testing drivers' capabilities in real traffic situations

### **Content:**

- A. Purpose of driver testing
- B. Basic standards in driver testing: reliability and validity
- C. Design and field testing of reliable and valid driver tests
- D. Authentic assessment
- E. The importance of testing drivers' hazard perception
- F. Examiner training and quality of the driving test

### ***Format:***

#### **1. Overhead Presentation**

- General information on driver testing standards and examiner training

#### **2. Group Discussion**

1. How do road test standards in China differ from the “best practices” model presented in Module 10 regarding:
  - Test content?
  - Test design?
  - On-road testing?
  - Hazard perception?

2. What are the similarities and differences between the examiner training practices presented in this module and those in China?
3. Could adaptation of any of the practices presented contribute to improved traffic safety in China, and if so, which ones?

## **Purpose of driver testing**

A quote from the American Association of Motor Vehicle Administrators (AAMVA) summarizes the prime reason for testing new drivers:

“The purpose of a road test is to assure that the applicants have minimum skills needed to operate safely and within provincial traffic laws.”

As discussed in a summary document on driver testing systems (MacLean, 1998, p. 3), Tests of driving knowledge and skills are assumed to predict individual driving success. Implicit within this assumption is that the principles required for safe driving might be identified, and that the possession of such knowledge and skills is highly correlated with safe driving behaviour. While earlier research has shown this assumption to be tenuous, subsequent research on the principles of safe driving has provided justification for improving knowledge and road tests as a valid means for screening and educating licence applicants. Research has shown that systems directed at critical knowledge (and skill) requirements for safe vehicle operation are capable of reducing the risks that drivers face in being involved in traffic accidents for which they are responsible (McKnight, 1996).

The major objective of driver licence tests is to establish whether drivers have attained an adequate level of driving competence and to set an appropriate standard of good driving behaviour which is compatible with the safety of all road users.

Knowledge tests check on new driver knowledge of what information is in driving manuals. This should include topics such as safe driving practices and fitness to drive, as well as signs, signals and other basic information. On-road driver examinations measure what an examinee can do but they cannot indicate what they will do after qualification. Nonetheless, road testing helps examinees to become safe drivers by establishing skill and knowledge standards that they must meet at the time of the test. It also encourages them to obtain the knowledge and skills provided in educational materials.

Knowledge tests can be conducted in either paper and pencil formats or through automated testing systems. Computerized systems allow automatic, objective scoring plus tabulation, graphic representation and analysis of results across offices, regions, state/provinces and countries (if desired). Automated testing also allows use of pictures and photographs in color and touch-screen capability, and very “user-friendly.”

A comprehensive study in Australia suggested that variability in tests and testing practices may reduce the level of confidence one has in road test results. Ron Christie (2000, p. 32) states:

Regardless of crash-based or efficiency considerations, it may be prudent to consider the benefits of improving and standardising the validity and integrity of driver assessment and testing. This report suggests that, in the main, the validity, reliability and integrity of driver testing and assessment varies across Australian

jurisdictions, with most driver licensing authorities apparently unaware of the true validity and reliability of driver assessment measures that they use. With only a few exceptions, most Australian driver licensing authorities do not monitor applicant performance in terms of pass and fail rates, which provide vital clues to the validity/reliability of tests. This is of concern, as it suggests that driver licensing assessment may not be validly targeting the core skills related to the safe and competent operation of motor vehicles and may not be doing so reliably. The wide variation in theory and practical test pass rates noted ...tends to support this view.

### **Basic standards in driver testing: reliability and validity**

The basic testing standards of reliability and validity ensure that if applicants fail, it is for no other reason than being unable to meet an established standard. The standards are called “criteria.” Adherence to these testing standards help to avoid the situation reported in Australia by Ron Christie.

#### **Reliability**

In testing, reliability refers to consistency. New drivers who are tested by examiners should be tested in the same manner, regardless of which examiner conducts the test. This means that the examiners test driver competence against the same criteria, and driver pass or fail results depend only on whether or not the driver has met the standard.

#### **Validity**

In driver testing, validity refers to the relevance of the criteria for the purpose for which it was intended – that is, whether the right skills/outcomes are being measured and whether the testing process measures what it is intended to measure.

An example of the criteria used for lane position is given below from the ICBC Licensing Operations Manual (LOM, 2000, p. 20).

## **Design and field testing of reliable and valid driver tests**

The process of design and field testing of driver tests in British Columbia is an example of “best practices,” one that could be adapted successfully in other jurisdictions. The development of reliable and valid driver tests involves:

- Philosophies and principles of safe driving
- Identification of specific areas one needs to test
- Application of accepted principles of test development and design

The information in this section is based on a summary document prepared by the GLP Driver Testing and Training Team (2001, pp. 8, 42-49), and demonstrates a systems approach to achieving effectiveness and integrity in the driver testing system.

### **Philosophies and principles of safe driving**

BC driver tests incorporate the same philosophies and principles of safe driving that are contained in the driver education materials developed for GLP. For example, because unsafe speeds are related to the likelihood of being involved in a crash, new drivers’ knowledge of speed limits is checked in a written test and their ability to maintain safe speeds when driving is checked in the road tests.

## Test content

In BC, the content and design of new tests were based on a literature review in order to identify: The skills and aptitudes new drivers need to develop

- The types of driver error or skill deficits that are typical of new drivers
- The factors that are typically associated with novice driver crashes
- The major findings of studies on driver training related to effectiveness (e.g., crash reductions) along with possible explanations for these findings.

The causes of crashes in BC were obtained from crash statistics involving novice drivers to help identify what should be tested. An analysis showed that one of the reasons why inexperienced drivers were often involved in crashes at intersections was because they tend to ignore traffic controls and signals. They commonly failed to yield the right-of-way and drove at unsafe speeds. Typical factors related to driver crashes are shown in the table below.

Reasons for Collisions, 1997

<b>Passenger Vehicle</b>	<b>% of total crashes</b>		<b>Motorcycle</b>	<b>% of total crashes</b>
Unsafe speed	35.8		Unsafe speed	21.0
Driving without due care	31.1		Riding without due care	15.9
Alcohol involvement	30.2		Rider inexperience	11.1
Failing to yield right-of-way	11.2		Alcohol involvement	7.3
Driving on wrong side of the road	10.4		Following too closely	5.3

Source: ICBC GLP

## Test design and development principles

### Road Tests

Principles that guided the design and development of the road tests in BC included:

- Extensive research by a skilled team of psychologists and educators
- Early involvement of driver examiners to utilize their expertise and as a strategy for developing support for the new tests
- Design and development of a draft test model, based on content analysis, research and crash statistics
- Conduct of a pilot test to confirm that test procedures were workable, valid and reliable

- Revisions to route design criteria, marking criteria and score sheet in view of what was learned in pilot test
- Conduct of field trial and complete statistical and qualitative analyses of results
- Revision and refinement of testing and scoring procedures, marking criteria, score sheet and pass/fail thresholds
- Conduct of examiner training and personnel at point-of-service locations
- Conduct of industry information sessions to confirm test content and design

### Knowledge Tests

The knowledge tests in BC are generated from a computerized testing system, so questions within the test item bank are randomly generated (based on driving guides content), and test results are compiled automatically.

- An analogous set of principles guided the design and development of knowledge tests in BC:
- Draft test items for the knowledge tests were generated following extensive research and in collaboration with driver examiners
- Field trials were conducted to assess the reliability of each test question, and to obtain feedback from prospective test applicants
- Field test results were analyzed from the perspective of the group's test performance, applicant performance on each test question, measures of internal consistency, and the pass/fail rate threshold.
- Content validity was achieved through extensive consultation with an advisory group of experts.

### Authentic assessment

As reported by Dan Mayhew in an international conference session (1999, pp. 29, 31-33), the skills and capabilities that novice drivers need are those that reduce crash risk. These are usually considered to be the higher order skills acquired through behind-the-wheel practice and experience...It is these higher order skills that need to be assessed in exit [driving] tests. Such testing is "authentic" because the testing conditions replicate those the new driver will face once he or she has been granted drivers' licence.

In the following passage, Mr. Mayhew provides examples of the driving skills tested and suggests various methods and procedures for testing them. Key skills to be tested in driving are psychomotor, perceptual and cognitive skills as well as attitudes and motives in new drivers.

#### *Psychomotor Skills*

- Testing psychomotor skills involves assessing the following: steering and speed control, the ability to integrate skills and the ability to cope with higher demands.

There are several testing procedures that could be used to assess novice drivers exiting into full privilege licenses. These include:

- Test under more difficult and demanding situations, such as night or heavy traffic.
- Make tests longer to create more test validity.
- Use only test items that relate to risk for crashes and eliminate any maneuvers or items that don't relate to the potential for crashes.
- Have examiners take more active roles during the test. For example, examiners could ask questions about rules of the road while the applicant is driving. This places more demands on applicants.
- Use simulation techniques to capture more driving situations and environments not always possible during an on-road test.
- Change the test so that it is both a diagnostic and educational tool. Tests could be used to identify problem areas and, then, to provide feedback on corrective measures.

### *Perceptual Skills*

Testing perceptual skills involves assessing searching/scanning skills, hazard recognition and responses to hazards. Perceptual skills are more difficult to test than psychomotor skills and involve newer techniques.

- Examiners can pay close attention to searching/scanning techniques by watching for mirror and shoulder checks.
- Special mirrors can be mounted so that examiners can track driver eye movements.
- Examiners can rate how drivers search/scan during each maneuver and look for the systematic patterns of drivers and score accordingly.
- Examiners can ask applicants to identify major driving hazards while on road tests.
- Simulated or automated testing can be used to test hazard perception.

## *Cognitive Skills*

Key cognitive skills that new drivers need to demonstrate include appropriate decision-making, accurate estimates of their driving abilities and the ability to accurately judge risk. Again, testing for these skills involves newer testing techniques.

- Use commentary-driving techniques, in real time, while on a road test, help to identify what drivers are thinking.
- Use automated testing to determine if applicants can recognize risk accurately.

## *Attitude*

The testing of attitudes has provoked wide-ranging discussions. Research shows that most young people will grow out of unsafe attitudes and risky lifestyle choices. However, the question is how to keep these young drivers safe in the interim. This suggests that intervention or remediation programs may be useful to help interrupt or correct the development of risky driving behaviors. One potentially effective way is to promote peer group discussion related to driving safety and personal choices. Testing tools could also be developed and used to identify applicants who may have tendencies toward engaging in risky lifestyle. These people can be routed into intervention programs.

## **The importance of testing drivers' hazard perception**

Research and experience across jurisdictions indicate that new drivers possess underdeveloped hazard perception skills. For the purpose of training and testing new driver in BC, hazards are defined as follows (ICBC, 2000):

<b>Space Grabbers</b>	Anything that could move into your space is a hazard. An example is another driver quickly moving into a merge lane just in front of you. That driver wants to move into the space you expect to use.
<b>Surprises</b>	Anything that could dart into the roadway unexpectedly. Children playing at the side of the street could unexpectedly dash out in front. Weather condition such as wind or turbulence, as unpredictable because you don't know exactly how the vehicle will respond.
<b>Vision Blockers</b>	Anything that obstructs your vision of other road users is a hazard. A large truck can hide animals or children who might enter your path.
<b>Poor Road Conditions</b>	Poor road surfaces can affect your traction and steering. For example loose gravel or ice could cause you to lose control.

Summarizing research, Kimberly MacLean (n.d., pp. 29-30) writes that decision making and risk assessment, especially perceptions of personal risk, are the key cognitive processes that distinguish novice from experienced drivers....

Research indicates that decision making and risk assessment, especially perceptions of personal risk, are the key cognitive processes that distinguish novice from experienced drivers (Mayhew & Simpson, 1995). Estimating the severity of risk is affected by how easily and quickly information and experience considered relevant can be retrieved from memory (Heimer, 1988). Therefore, inexperienced drivers are likely to have little information or experience to draw from in making decisions in complex driving situations, which places them at high risk for involvement in accidents.

Hazard perception and risk assessment are critical skills that are not currently evaluated through Road Tests. Implementing elements such as skid recovery, evasive steering and maximum braking ability may place test applicants, examiners and other road users in potentially dangerous situations. Furthermore, there is an absence of research establishing the relationship between such testing and safe vehicle operation. Hazard perception and risk assessment may be more appropriately tested through other means, such as automated testing systems. MacDonald (1987) states that perceptual skills such as hazard perception have been tested through utilization of a series of slides or film in which responses to questions assessing hazards allow for discriminating between good and bad drivers.

The driving situation is safe to make a response. The applicant is scored as to whether he or she touched the screen at the right time. The initial version of the test had 33 items and has been administered immediately after a 15 item knowledge test. The reliability and validity of the test is under review.

In Austria and Germany, a diagnostic test called the ART90 Test, is used for assessing a range of attributes of problem drivers and commercial vehicle drivers. This test includes an evaluation of perceptual motor skills, tachistoscopic recognition, peripheral vision, reaction time, vigilance, IQ, visual memory, and personality characteristics.

In the United Kingdom, a strategy for improving road safety that introduces hazard perception as part of all types of driving theory tests was introduced in 2000 (*Tomorrow's Roads – Safer for Everyone in ICBC Road and Vehicle Safety News for Monday March 6, 2000*). The initiative is intended to contribute to a reduction in the disproportionate number of accidents that new drivers are involved in during the early months after passing the practical test.

In this news release, the Chief Driving Examiner was quoted as stating that hazard perception has been the subject of a three-year study by the Transport Research Laboratory (TRL) in the UK. Research has shown that experienced drivers, and those with good accident records, score well on hazard perception tests. Learner drivers and those with poor accident records get much lower scores. The TRL have developed

prototype tests which distinguish between experienced and novice drivers. It is intended that new drivers will take the hazard perception test at the same time as the theory test and it will be introduced by the Year 2002. It will consist of a series of digitized video clips, to which the candidate must respond.

### **Examiner training and quality of the driving test**

A driver examiner conducts road tests for all classes of driver's licences in order to assess the knowledge and ability of drivers to safely operate motor vehicles. An applicant's respect for the license he/she will receive, and for the entire licensing program, may depend upon their respect for the individual Driver Examiner.

A typical example of a Driver Examiner Job Profile is provided at the end of this module.

Examiner training can include many topics, including:

1. Key skills and attributes, e.g., communication skills, dealing with difficult people
2. Core knowledge, e.g., driving/riding skills
3. Test procedures, e.g., conducting Road Tests, evaluating performance
4. Documentation procedures and business functions, administration of Knowledge tests
5. Organizational expectations, e.g., teamwork, role of examiner as traffic safety expert and educator, conducting the test in a professional manner

A driver examiner conducts driver examinations (knowledge, road tests, screening tests, etc.) in accordance with established procedures, assessing the knowledge and ability of drivers to safely operate motor vehicles. When a new driver passes a test, the examiner is certifying that the individual has the minimum knowledge and skills needed to drive safely. This is a serious responsibility, and a critical link in achieving safe driving practices in the general public.

Key to the success of road testing in supporting the goal of reducing crash rates is that examiners apply criteria in the same way. As stated previously, new drivers should be assessed in an identical manner, no matter who conducts the test. Examiners must be helped to acquire the knowledge and skill to conduct a road test properly. In summary, three considerations for examiners are:

Objectivity:

- Scoring only those actions that are observed.
- Applying the defined criteria.
- If possible to assess where it was observed.

Realism:

- Does the performance of the applicant match the criteria as closely as possible?
- Is the performance as realistic as possible?
- Were the conditions at the time as realistic as possible?

## Consistency

- Achieved by always applying the criteria the same way.

## **Example of Driver Examiner Job Profile (ICBC)**

### **Purpose**

To conduct road tests for all classes of driver's licenses in order to assess the knowledge and ability of drivers to safely operate motor vehicles.

### **Job Requirements**

#### **Knowledge/Technical Skills**

- of the relevant acts, regulations, policies, procedures and guidelines as they relate to driver examinations and licensing of all classes of vehicles
- of the operation of various classes of motor vehicles
- of safe driving practices and defensive driving techniques
- of the relevant computer applications to enter and retrieve data and perform basic functions
- of the relevant department procedures as they pertain to the collection and processing of fees
- to operate digital photo equipment

#### **Analytical/Problem-Solving Skills**

- to determine whether applicants possess the necessary knowledge, driving and observation skills to safely operate a motor vehicle in traffic
- to determine whether applicants have the physical ability and emotional attitude to drive safely
- to determine when to take verbal or physical control of a motor vehicle to prevent an accident during road tests
- to recommend vehicle modifications and driver license restrictions in unusual cases

- to determine whether applicants should be referred to a medical authority as a result of visual or medical impairment
- to determine whether requirements for driver's license renewals, duplicates and BCID cards have been met

### **Communication/Interpersonal Skills**

- to deal with anxious, nervous, confused and apprehensive applicants under examination conditions
- to advise applicants if they have failed any of the mandatory tests
- to explain to angry and emotional clients what is necessary to meet driver licensing requirements
- to speak to groups regarding driving and safety issues

### **Organizational Skills**

- to plan own workload to meet strict deadlines

### **Physical/Concentration Ability**

- to maintain a high level of mental and visual concentration when observing and assessing a driver's mental and physical ability
- to spend considerable time standing and walking
- to climb into and out of all types of vehicles
- to crouch, bend and maneuver under vehicles when doing pre-trip inspections
- to bend and lift when moving traffic cones during motorcycle tests

### **Work Environment**

- some safety precautions are required when dealing with hostile clients
- exposure to the possibility of injuries in traffic accidents
- exposure to all weather conditions when conducting road tests
- exposure to dirty vehicles and unpleasant odors when conducting road tests

- may involve frequent travel to locations within a regional area

Must meet the provincially legislated requirements of the Criminal Records Review Act.

The above requirements would typically be acquired through completion of high school and a few years related experience in the transportation or safety field with additional relevant courses.

## Slides

### Slide 1

The purpose of a road test is to assure that the applicants have minimum skills needed to operate safely and within provincial traffic laws – AAMVA

### Slide 2-3-4

#### Standards

- If applicants fail, it is for no other reason than being unable to meet an established standard

#### Reliability = Consistency

- Anyone, anywhere, any time, in any passenger vehicle, on any day will get the same result on his or her road test

#### Validity

- Measures the right thing
- Measures what is intended to be measured

### Slide 5

#### Lane Position criteria

Source: ICBC LOM

### Slide 6

#### Test design and field testing

- Philosophies and principles of safe driving
- Test content
- Test design and development principles

Source: ICBC GLP

Slide 7

Reasons for Collisions, 1997

<b>Passenger Vehicle</b>	<b>% of total crashes</b>		<b>Motorcycle</b>	<b>% of total crashes</b>
Unsafe speed	35.8		Unsafe speed	21.0
Driving without due care	31.1		Riding without due care	15.9
Alcohol involvement	30.2		Rider inexperience	11.1
Failing to yield right-of-way	11.2		Alcohol involvement	7.3
Driving on wrong side of the road	10.4		Following too closely	5.3

Source: ICBC GLP

Slide 8

Test Design & Development Principles

- Research
- Involving people affected
- Testing prototypes
  - Draft test model
  - Pilot test
- Revisions
- Field trials and analyses of results
- Revision and refinement

Source: ICBC BLP

Slide 9

Authentic Assessment

Authentic = Testing conditions replicate those encountered after receiving a licence  
Assessment = Gathering information in a systematic manner

Slide 10

Psychomotor skills

Assess:

- Steering and speed control
- Ability to integrate skills

- Ability to cope with higher demands

Methods:

- Difficult situations, e.g., heavy traffic
- Longer tests increase validity
- Use simulations

Source: Mayhew

Slide 11

Perceptual Skills

Assess:

- Searching/scanning skills
- Hazard recognition
- Responses to hazards

Methods:

- Watch mirror and shoulder checks
- Track eye movements in special mirrors
- Ask for hazard identification on road test

Source: Mayhew

Slide 12

Cognitive Skills

Assess:

- Appropriate decision-making
- Accurate estimates of driving abilities
- Ability to accurately judge risk

Methods:

- “Running commentary” driving techniques
- Automated testing

Source: Mayhew

Slide 13

Attitudes

Assess:

- Unsafe attitudes

- Risky lifestyle choices

Methods:

- Intervention or remediation programs
- Peer group discussions
- Tests for tendencies toward risk

Source: Mayhew

Slide 14

Hazard Perception

- Space grabbers
- Surprises
- Vision Blockers
- Poor Road conditions

Source: ICBC GLP

Slide 15

Targetted Examiner Training

- Procedures – how to conduct the test
- Criteria – what the standards are

Examiners should develop:

- Objectivity
- Realism
- Consistency

Source: ICBC GLP

Slide 16

Examiner Training:

Practice, Practice, Practice!