

## **Conspicuity by Many Other Names: How Technology, Training, Judgment, and Strategies Can Supplement Neon Green**

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The paper defines the concept of conspicuity and summarizes previous research on conspicuity factors. Technological advances that may impact conspicuity are introduced. Limitations of each of these traditional views of conspicuity due to brain functions are explored and explained. MSF's approach to conspicuity, termed "strategic conspicuity" is discussed along with several training activities designed to stretch your hazard awareness abilities. Strategic conspicuity is a rider-based solution that challenges a rider to be aware, use judgment, have a strategy, and self-reflect on the many possible responses to hazards that are under the control of the motorcyclist.

# Conspicuity by Many Other Names: How Technology, Training, Judgment, and Strategies can Supplement Neon Green.

Dr. Sherry Williams  
Director, MSF Quality Assurance & Research

# Conspicuity (con-spik-CUE-i-tee):

*A term used to define the condition of being "visible", "easy to notice" or "obvious"; the ability of an object to draw attention to itself, even if no one's actively searching for it. Rider conspicuity, therefore, is the ability of a motorcyclist to draw attention to themselves, even though other drivers may not be actively looking for them.*

# “I didn’t see the motorcycle.”



2 vehicle, at fault:  
MC: 30-70%  
OVD: 30-70%

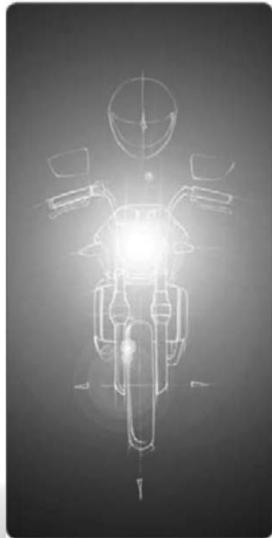
Man drives into a rockslide:

[http://www.youtube.com/watch?feature=player\\_embedded&v=qBmE92n5mEI](http://www.youtube.com/watch?feature=player_embedded&v=qBmE92n5mEI)

# *Conspicuity: Lights*



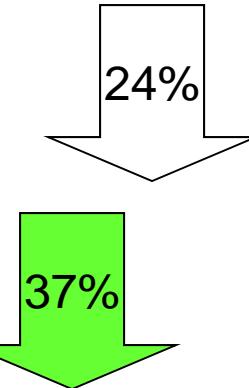
- Day time lights – small effect
- T-shape recognized faster



# Conspicuity: Gear



- White helmet lowers risk compared to black
- Reflective or fluorescent gear lowers risk
  - Hurt report
    - Consider the age of the report (1981)
    - Population proportion of neon – white gear compared to black



- Some inconsistencies



# *Conspicuity: Motorcycle*



- Motorcycle
  - Reflective material on frontal area studied



# *The Limits of Conspicuity: Cognitive Conspicuity*

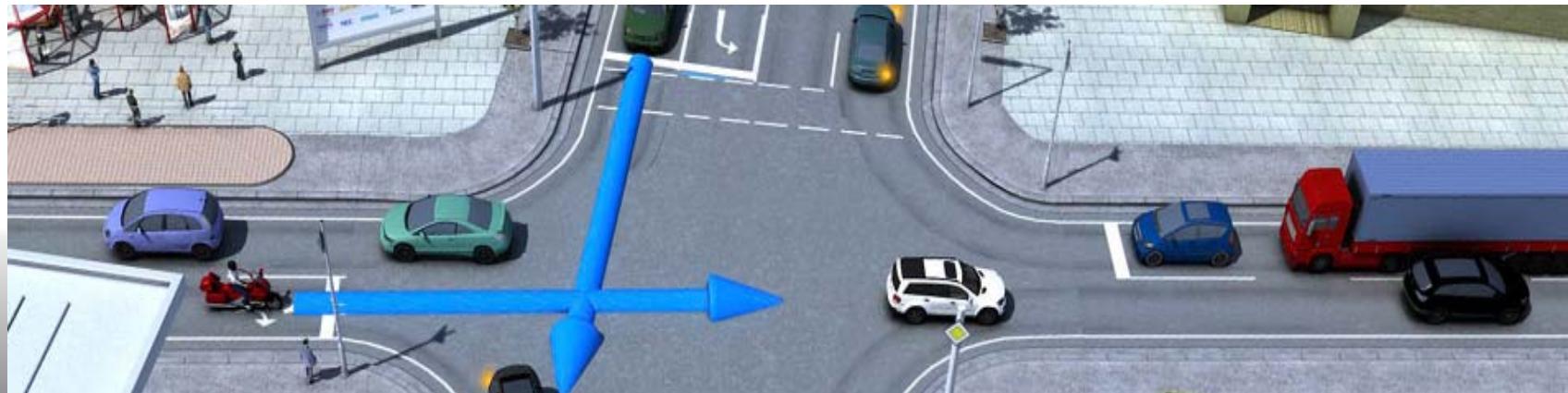


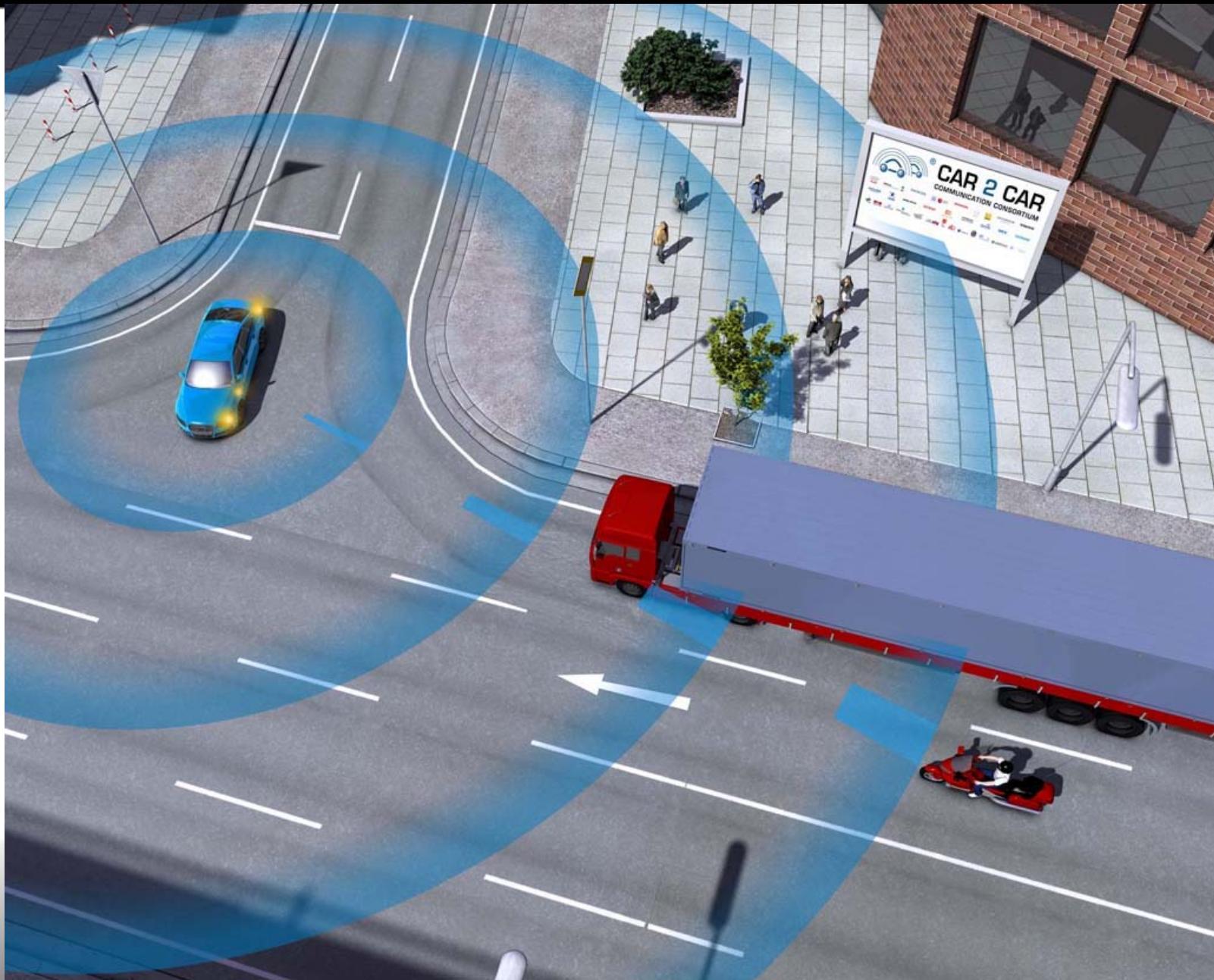
- Contrast & Context
  - High contrast needed in low salience condition
  - Object/Background dependent
    - Hole et al. (1996): the contrast between motorcyclists and background plays a considerable role in motorcyclists' conspicuity.
- Expectation-dependent
  - Langham et al. (2002) suggest that even highly conspicuous objects (like a police car with flashing lights) will not be identified quickly enough as a potential hazard if a driver's expectations are not equal to the actual traffic situation.
  - Common objects (89%) versus uncommon objects (48%)
  - Car drivers who are also licensed motorcycle riders are involved in fewer car-motorcycle collisions than car drivers who do not hold a motorcycle licence (Magazzù, Comelli and Marinoni, 2006).
- Little crash data is currently available on this issue.

- Automobile-based
- Motorcycle-based
  - Collision Warning System
  - ABS brakes

## Vehicle to vehicle collision warning systems

- V2V, V2I
- 10-20 years?
- Welcome in the modern automobile?
- Useless nannies designed to coddle inattentive drivers?
- One motor carrier has reported that its front-end crash incidents have decreased 75 percent since it installed the devices in half of its trucks.





# **BMW Motorrad ConnectedRide**

## **- Collision Warning**

[http://www.youtube.com/watch?feature=player\\_detailpage&v=o7JHQs9XWwQ](http://www.youtube.com/watch?feature=player_detailpage&v=o7JHQs9XWwQ)

- Cell phone-based applications
  - Cyclists warning display system (ISS Ltd.)
  - Warning cyclists that a potentially dangerous maneuver is about to occur and placing the onus on them to act accordingly.
- iOnRoad app

# CWS: Cell-phone based





Distance Warning Alert Sound

Replay

Next

# Technology: ABS brakes



- Prevent wheel lock up under extreme braking
- Proven equalizer
- Add \$1000 to cost, 20 # to weight
- Studies
  - Experienced riders
  - Novice riders
- Braking in a curve?
- Mandatory?
- Used market?

## A Rider-Based Solution, Strategic Conspicuity

- Awareness
- Judgment
- Strategy
  - Adaptable to situation
- Self Reflection leading to Rider Improvement
- Many possible responses under a motorcyclists control

## **A Level 4 Rider**



# Improving Awareness / Perception

[http://www.myvidster.com/video/249582/The\\_monkey\\_business\\_illusion](http://www.myvidster.com/video/249582/The_monkey_business_illusion)



# the invisible gorilla

We truly are arguing that directing our eyes at something does not guarantee that we will consciously see it.

the invisible gorilla



And Other Ways Our Intuitions Deceive Us

Christopher Chabris and Daniel Simons

# the invisible gorilla

The problem is not with the limitations on motor control, but with limitations on attention resources and awareness.

the invisible gorilla



And Other Ways Our Intuitions Deceive Us

Christopher Chabris and Daniel Simons

You're riding down the road.

What do you see in this scene?





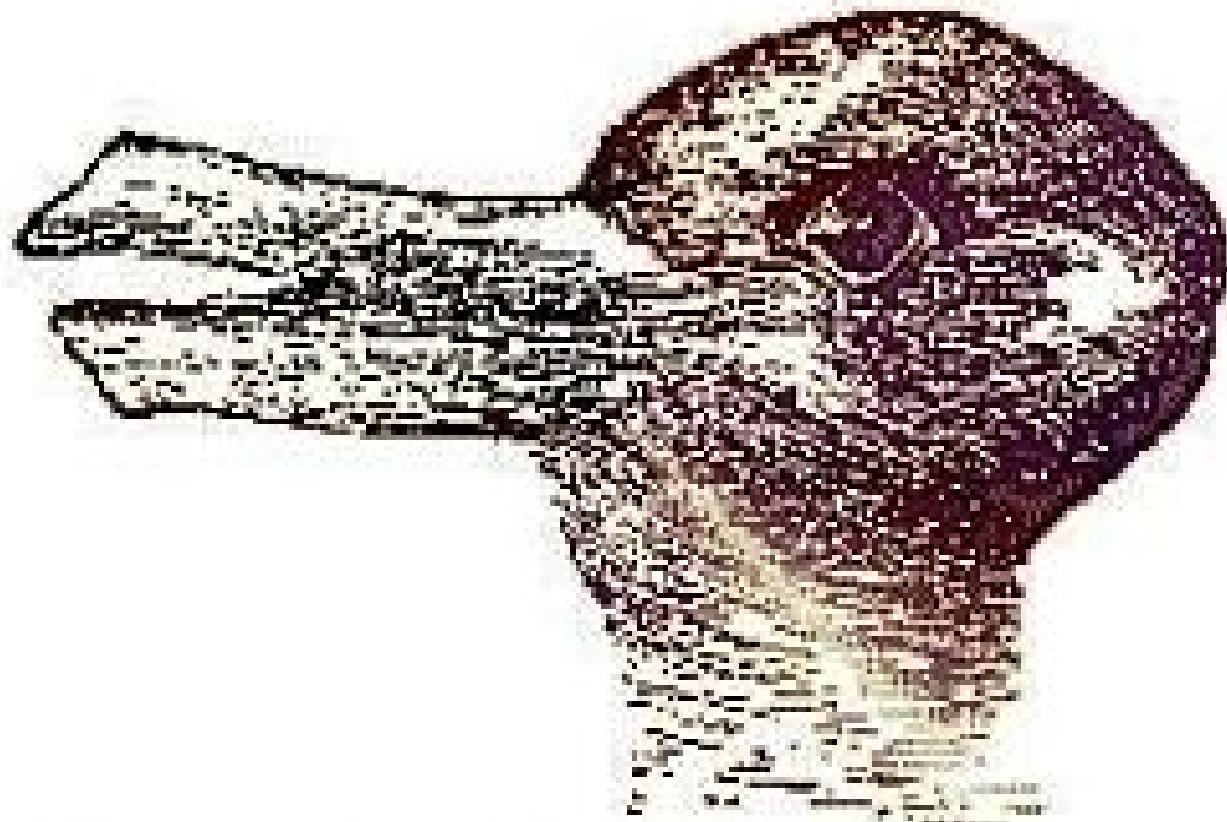




"I have the right-of-way."

# Agree or Disagree?

Our eyes don't necessarily tell our brain what we see; rather our brain tells our eyes what to look for.



What do you see here?

# *An organizing schema*



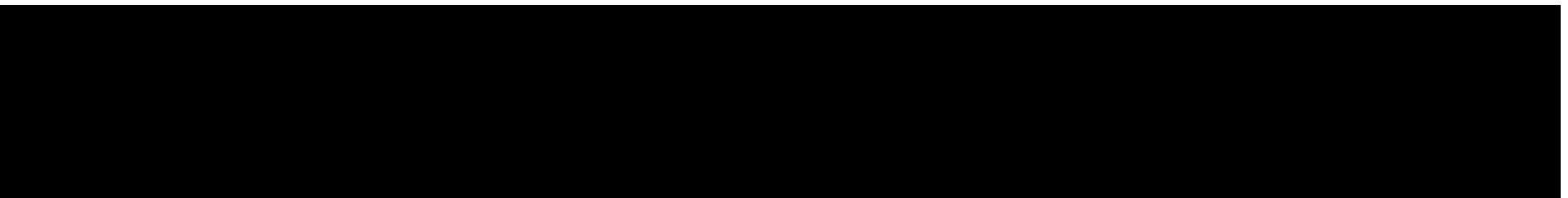
# Possible Escape Paths

2-lane, 2-way traffic



# Possible Escape Paths

3 lanes going one way





The screenshot shows the homepage of the MSF website. At the top left is the MSF logo. To the right are links for "Naturalistic Study of Motorcyclists", "The New MSF CORE Curriculum", and a "MSF Update" section for Washington DC on 3-31-10. Below the logo is a navigation bar with links for RiderCourse Info, Library / Safety Tips, Host An Event, MSF News, MSF Products, RiderCoach Info, Training Site Support, State Laws and Reports, Donate to NMSF, and Contact/FAQ. A search bar is also present. A message "Version Espanola Aquí!" is displayed above a map of the United States with state outlines. A callout box highlights "Armed Forces Locations". Below the map are instructions for finding a RiderCourse: "Click on your state above", "Call (800) 446-9227", and "Select from the list below". A dropdown menu shows "Find a RiderCourse". A large graphic displays the number "5,571,445" in a grid pattern. Text below it states: "Students have graduated from MSF RiderCourses since 1974. 400,000 motorcyclists enroll in our courses each year." A section titled "Key Messages" lists five points: 1. Get trained and licensed, 2. Wear protective gear -- all the gear, all the time -- including a helmet manufactured to the standards set by the DOT, 3. Ride unimpaired by alcohol or other drugs, 4. Ride within your own skill limits, and 5. Be a lifelong learner by taking refresher rider courses. Below this are icons for a car and motorcycle, and text for "Free Safety Tips for Car Drivers & Motorcyclists". A link to "Ian Ziering Talks About Motorcycle Safety" is shown. On the right side, there are video clips with descriptions: "Welcome to the Ride" (5 min), "Basic RiderCourse Highlights" (5 min), "Group Riding" (10 min), and "Common Road" (3 min). A red circle highlights a "RIDER PERCEPTION CHALLENGE!" section with a "Click Here" button. At the bottom, there's information about the "COURAGE COURSE" and a "Visit Website >>" link.

Version Espanola Aquí!

Armed Forces Locations

3 Ways to Find the RiderCourse<sup>SM</sup> Nearest You:

- Click on your state above
- Call (800) 446-9227
- Select from the list below

Find a RiderCourse

5,571,445

Students have graduated from MSF RiderCourses since 1974. 400,000 motorcyclists enroll in our courses each year.

**Key Messages:**

1. Get trained and licensed
2. Wear protective gear -- all the gear, all the time -- including a helmet manufactured to the standards set by the DOT
3. Ride unimpaired by alcohol or other drugs
4. Ride within your own skill limits
5. Be a lifelong learner by taking refresher rider courses

Free Safety Tips for Car Drivers & Motorcyclists

Ian Ziering Talks About Motorcycle Safety:

**Welcome to the Ride**  
5 min - Discover the diverse aspects of street motorcycling. Welcome to the club!

**Basic RiderCourse Highlights**  
5 min - Explore our hands-on, 15 hour, Basic RiderCourse training program.

**Group Riding**  
10 min - Learn about riding formations, pre-ride meetings, hand signals, and more. [Host an Event](#)

**Common Road**  
3 min - Learn how car drivers can share the road safely with motorcyclists.

Left-click image to play; right-click to download.  
You may use the above video clips for your own projects.

**RIDER PERCEPTION CHALLENGE!**  
Test the limits of your perceptual abilities.

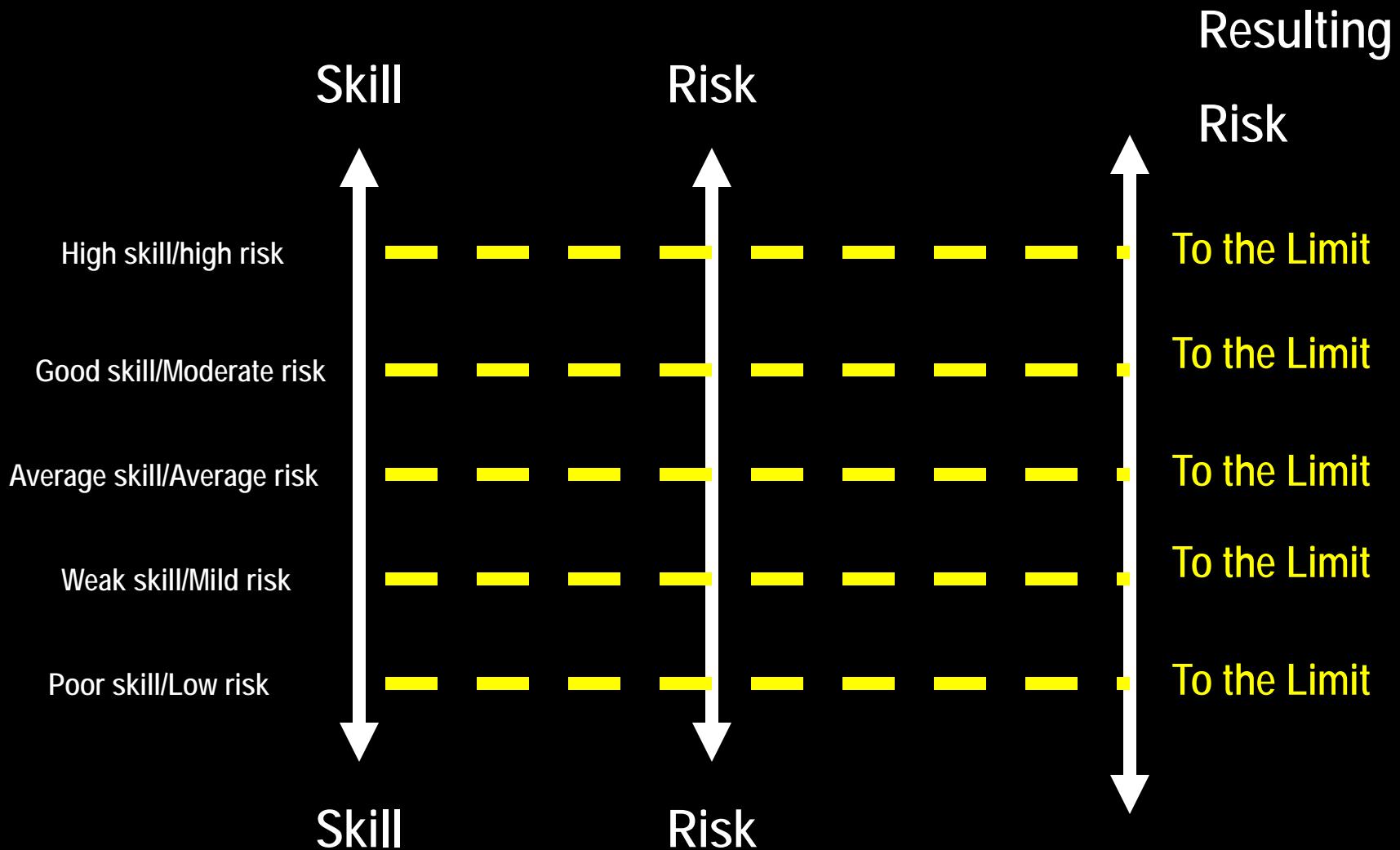
Click Here ➔

COURAGE COURSE

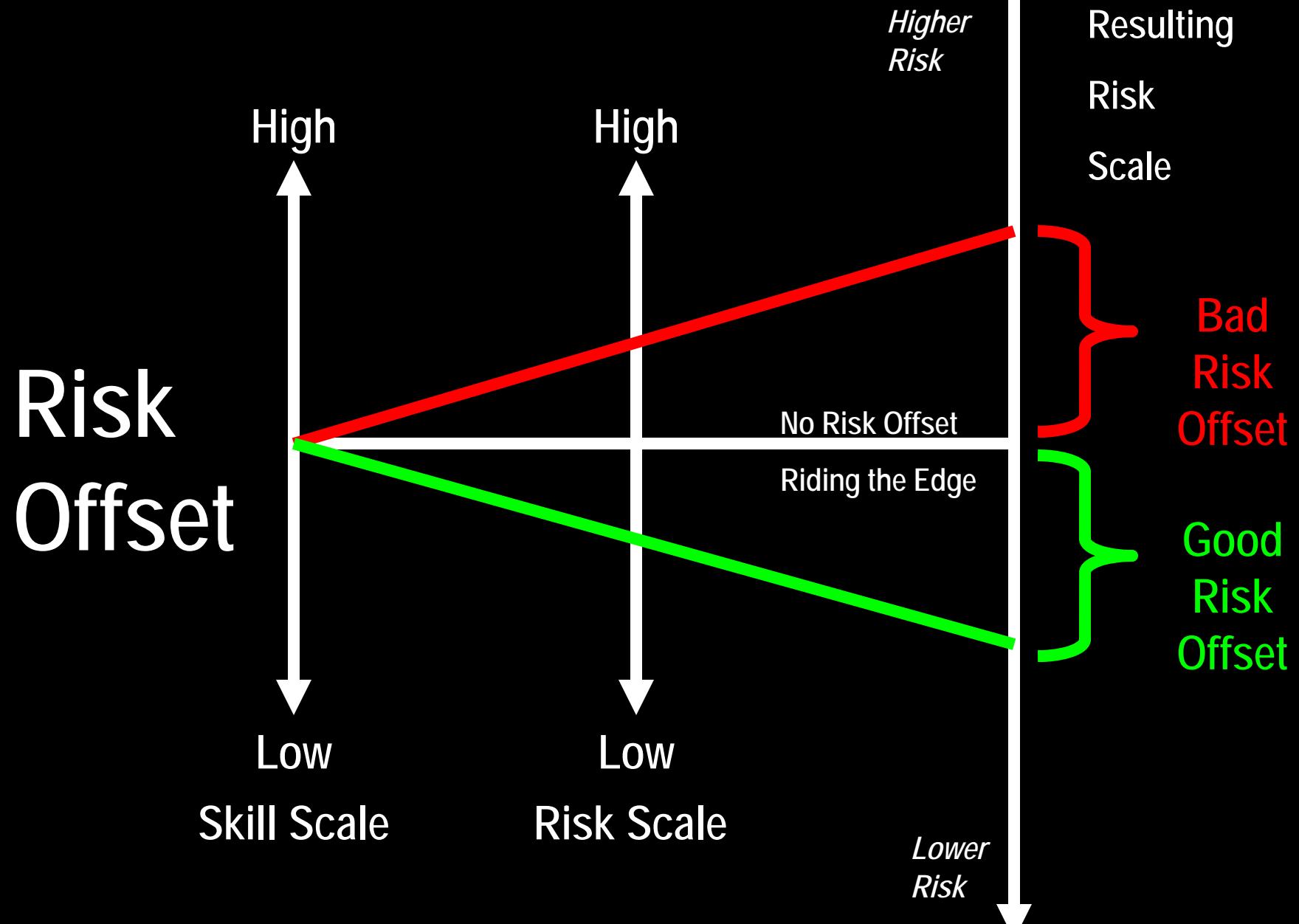
Take a hands on, half-day training class for entry-level scooter riders offered by the Motorcycle Safety Foundation®

Visit Website >>

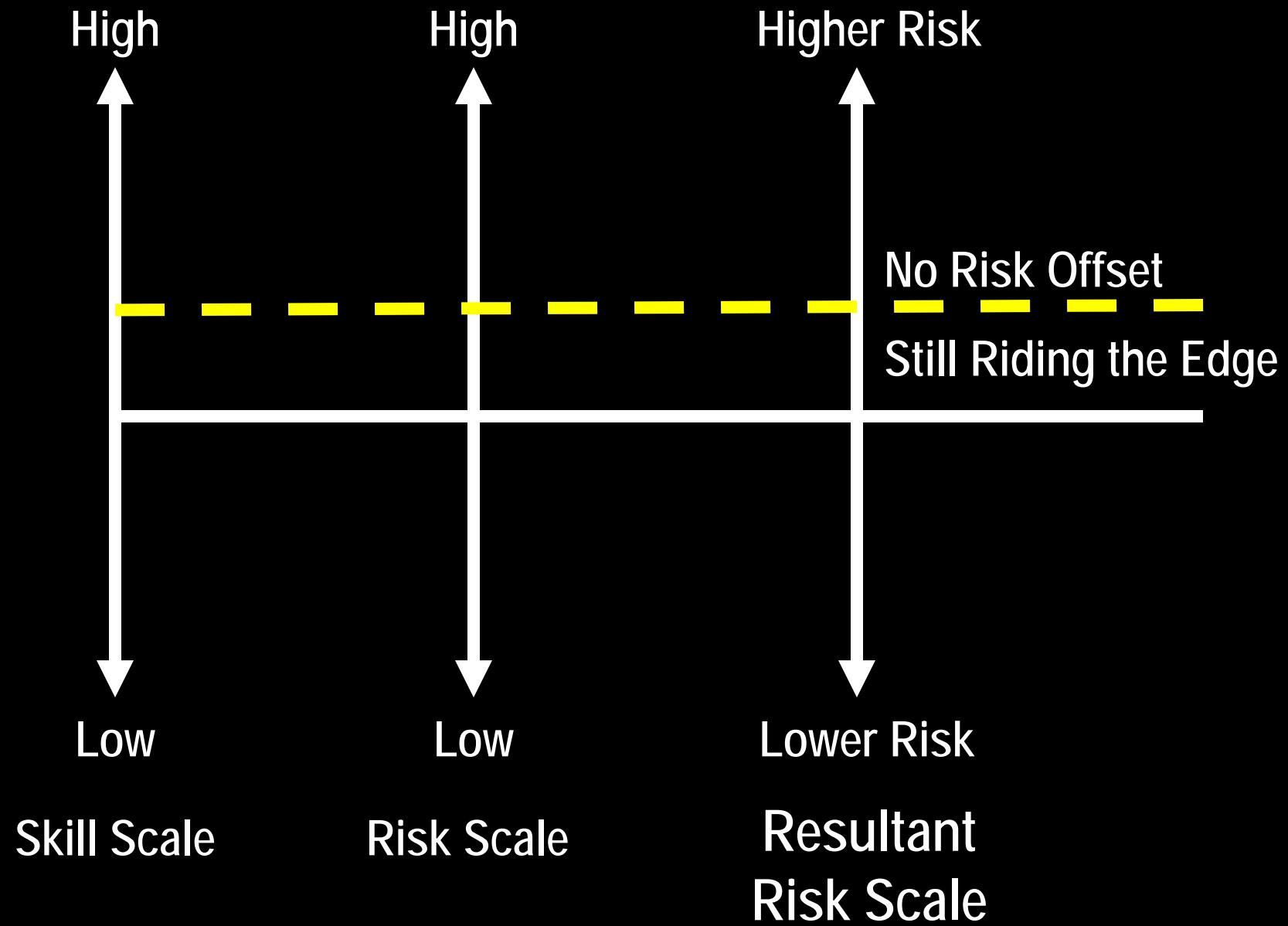
# *Self Assessment: Skill and Risk*



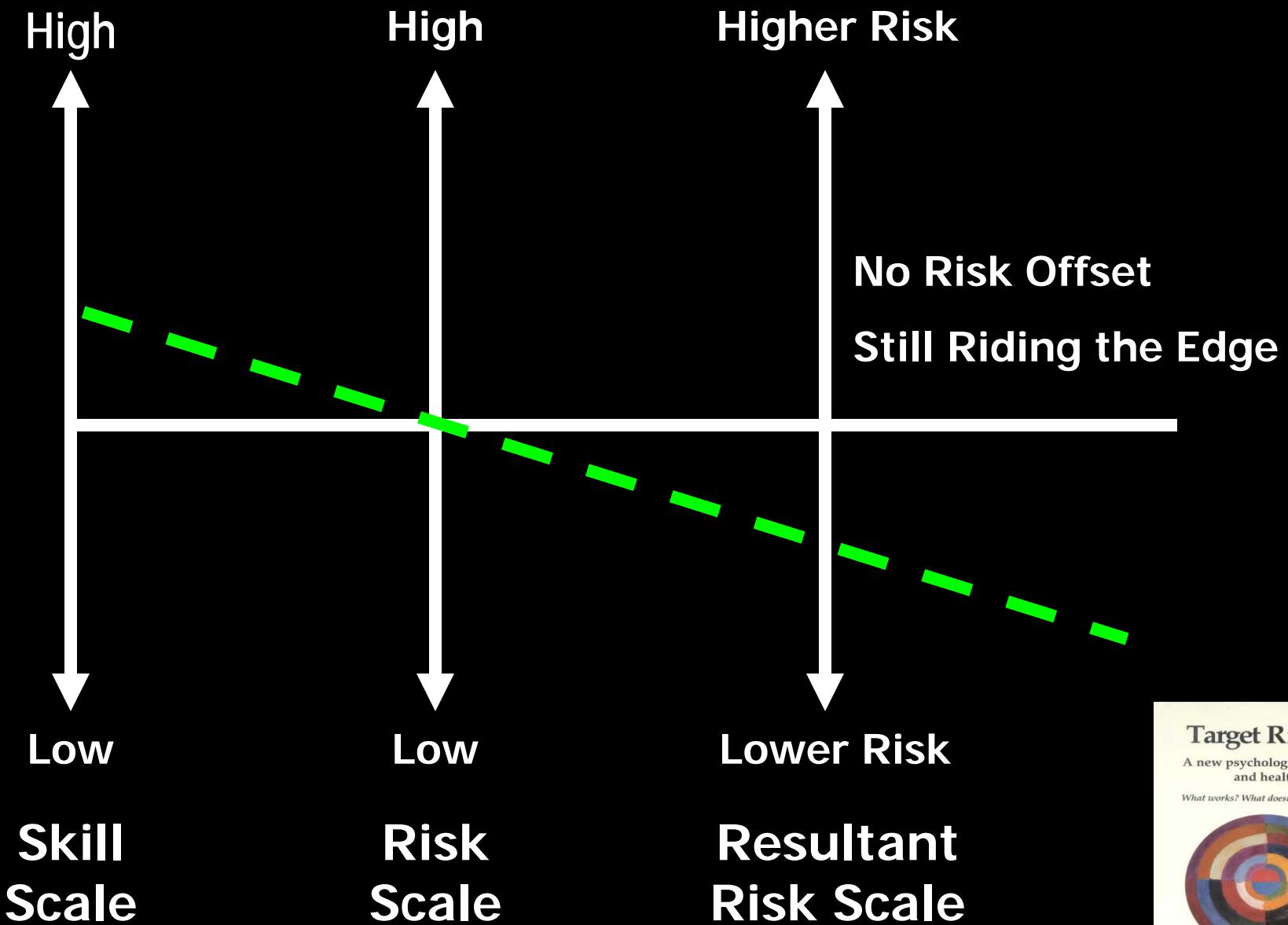
**Overall & Moment-to-Moment**



## *Value of safety training if higher risks are taken?*



# *Value of safety training!*



## Are you a Level IV Rider?

**Level 0 = Self taught and/or rides without a license**

**Level I = Completes a learn-to-ride course & licensed**

**Level II = I + Completes additional courses**

**Level III = II + Reflects on experiences**

**Level IV = III + Lifelong learner & subconsciously safe**

## The Upper Half of the Motorcycle

Improvement requires a constant intent to improve.

The implementation and maintenance of this intent is a task that requires the utmost in rational control, which is a *duty—a “leadership duty”—of the conscious self.*

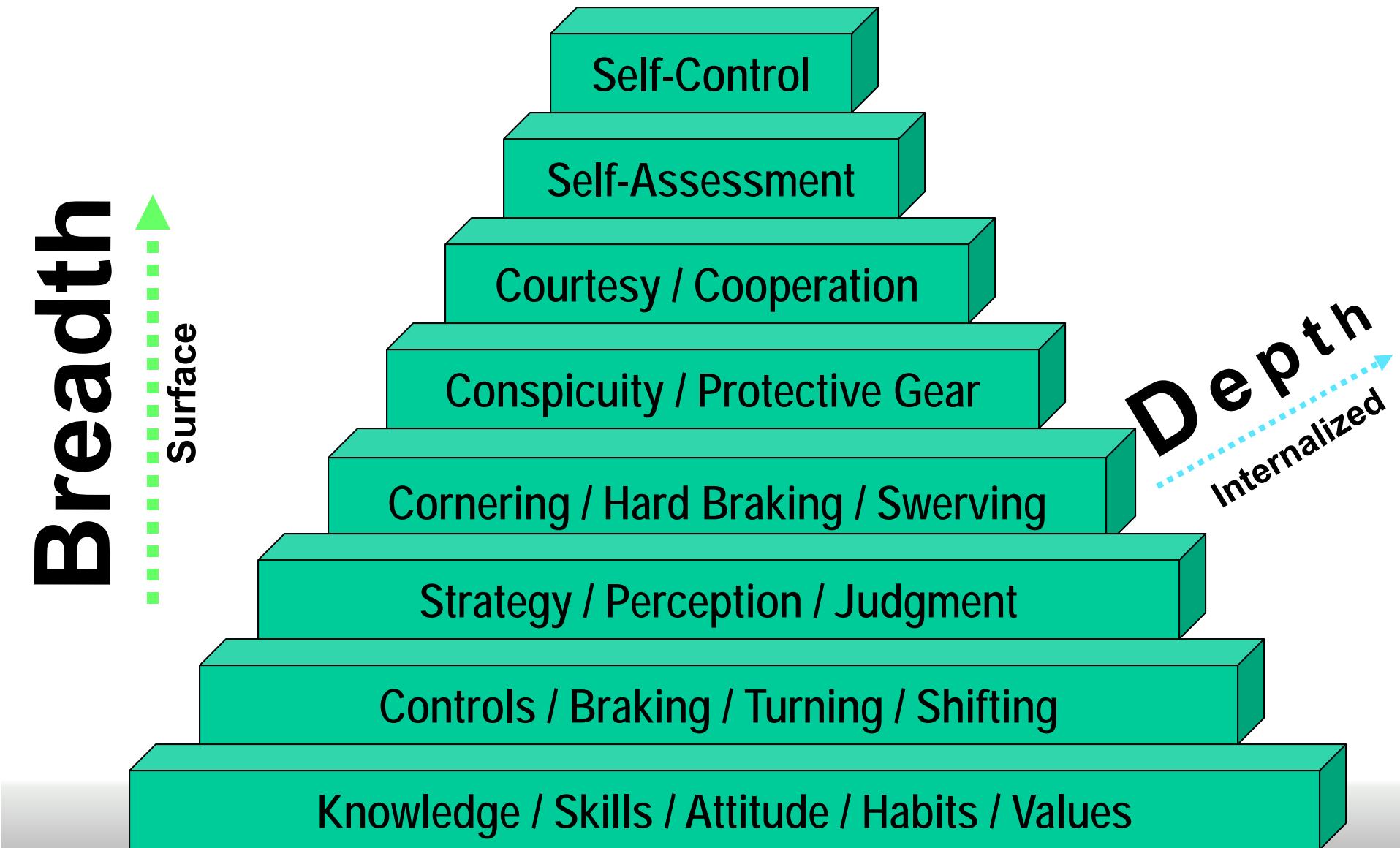
**The Upper Half  
of the Motorcycle**

on the unity of rider and machine



Bernt Spiegel

# *Self Assessment: Competencies & Abilities*



■ ■ ■ **Last year MSF curricula were used to train over 500,000 riders (6 million riders to date)**

Thanks to...

- 9,499 certified *RiderCoaches*
- 275 certified *RiderCoach Trainers*
- Over 10,000 certifications
- 1,102 RERP Sponsors managing 2,691 sites
- State, Military, Other Administrators



# MSF RETS



## Learning-to-Ride

Basic RiderCourse (BRC)  
Standard  
Expanded  
Small Group  
Tutoring  
Skills Practice  
Formal Remedial Training

Basic RiderCourse 2  
License Waiver  
Skills Practice

Street RiderCourse 1

Basic Bike Bonding RiderCourse

Returning Rider BRC

3-Wheel BRC

Scooter BRC

## Improving-the-Ride

Street RiderCourse 2

Advanced RiderCourse

Safe Motorcyclist Awareness and Recognition Trainer (SMART)

Ultimate Bike Bonding RiderCourse

MSF Kevin Schwantz RiderCourse

Street RiderCourse 3

## Specialized Programs

Introductory Motorcycle Experience

ScooterSchool: Introduction to Scooters RiderCourse

Military Motorcycle RiderCourse

Military SportBike RiderCourse

DirtBike School: DirtBike BRC

Trail Riding RiderCourse

State Education Programs

Online Programs

## Host-An-Event

Intersection – Motorist Awareness

Share the Adventure – Group Riding

Street Smart – Rider Perception

Riding Straight – Alcohol Awareness

SeasonedRider – Aging Awareness

Introduction to Motorcycling – Non-Rider Awareness

### Essential Core

**Basic RiderCourse**  
**Street RiderCourse 1**  
**Basic Bike Bonding RiderCourse**

### Expanded Core

Essential Core plus

**Street Smart – Rider Perception**

**Advanced RiderCourse**

**Street RiderCourse 2**

### Recommended Core

Expanded Core plus

**Ultimate Bike Bonding RiderCourse**

**MSF Kevin Schwantz RiderCourse**



***Rider Perception***

***SMARTrainer***

***Basic Bike-Bonding RiderCourse***

***Ultimate Bike-Bonding RiderCourse***

***Street RiderCourse***

***3-Wheel Basic RiderCourse***

***Scooter Basic RiderCourse***

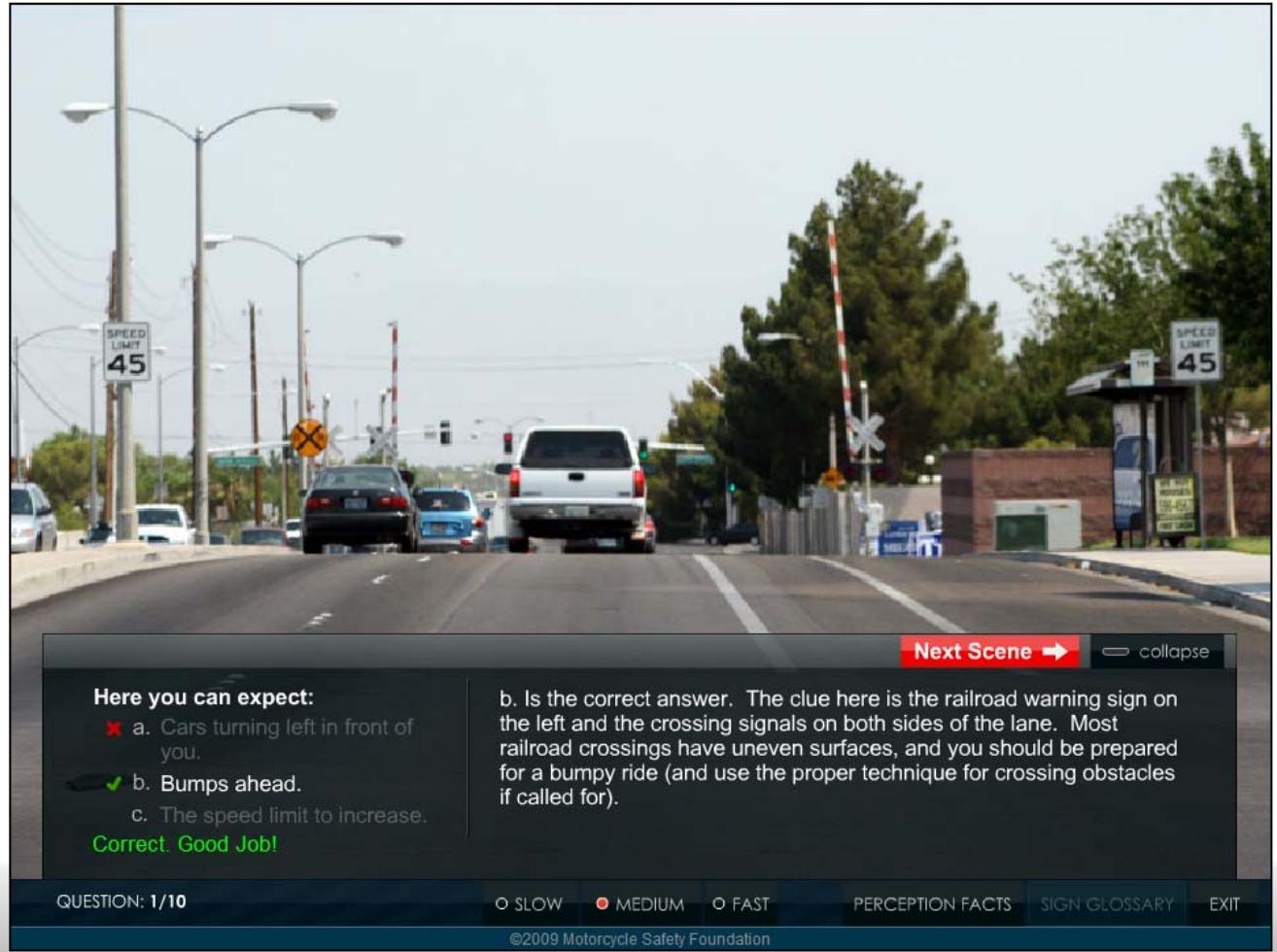
***Military Sportbike RiderCourse***

***Advanced RiderCourse***

## ||||| Rider Perception

Modern visual technology

Improves rider's perceptual skills



Here you can expect:

- a. Cars turning left in front of you.
- b. Bumps ahead.
- c. The speed limit to increase.

Correct. Good Job!

QUESTION: 1/10       SLOW     MEDIUM     FAST      PERCEPTION FACTS    SIGN GLOSSARY    EXIT

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## SMARTainer



Hazard perception

Risk management

Play back and coaching

## ■■■■■ ***Basic Bike-Bonding RiderCourse***

## ■■■■■ ***Ultimate Bike-Bonding RiderCourse***

Drills on skills

Slow speed  
focus

Fine motor  
skills





## *Street RiderCourse (SRC 1, SRC2)*



Light residential riding

Light suburban traffic

Complex traffic situations

## ||||| **3-Wheel Basic RiderCourse**

Same concepts as Basic *RiderCourse*, now applied to 3-wheel motorcycles



## ////// *Scooter Basic RiderCourse*



Same  
concepts as  
Basic  
*RiderCourse*,  
now applied  
to scooters

## ||||| *Military Sportbike RiderCourse*

## *Advanced RiderCourse*

U.S. Navy helped pilot  
MSRC

60% enrolled

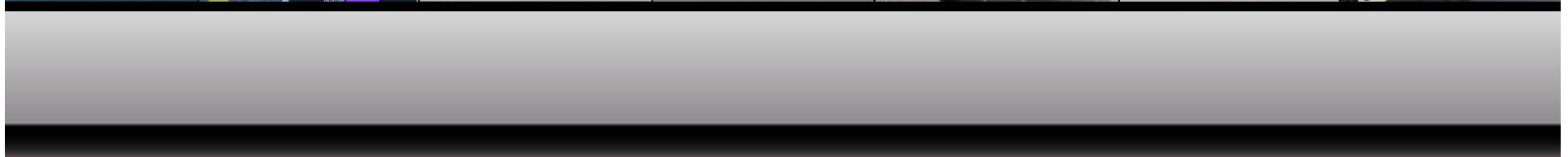
61% reduction in Navy  
motorcycle-related  
fatalities

MSF releases ARC  
Public, private



## ■ ■ ■ **Modular-type courses provide:**

- More breadth and depth
- Multiple points of entry and renewal
- Individualized coaching
- Segmented learning opportunities
- Distributed practice





**Intersections** – All Roadway Users

**Share the Adventure** – Group Riding

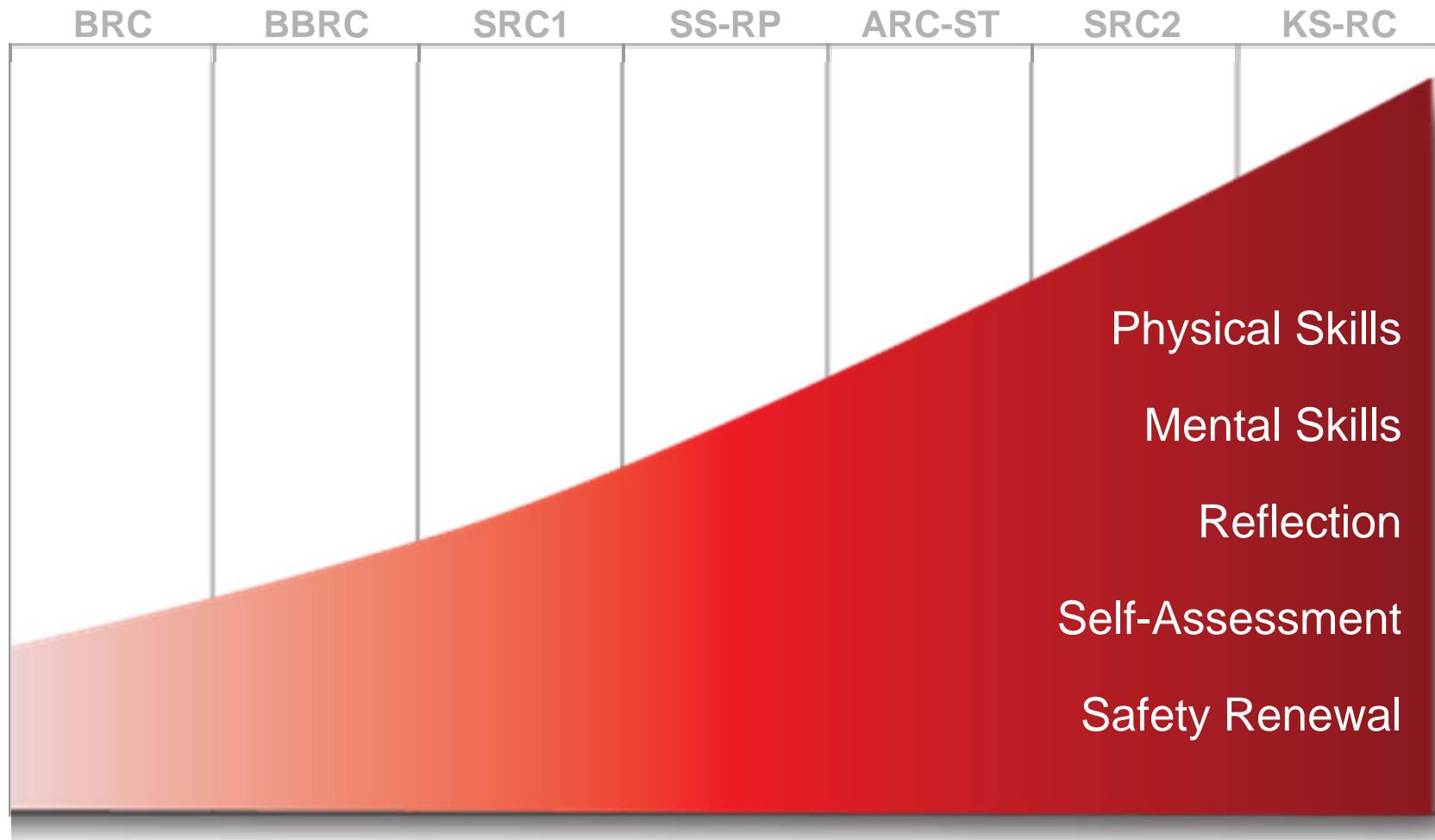
**StreetSmart** – Rider Perception

**Riding Straight** – Alcohol Awareness

**Seasoned Rider** – Aging Awareness



# *Developing the Whole Rider*



 ***Continuum of Learning***

## A Rider-Based Solution, Strategic Conspicuity

- Awareness
- Judgment
- Strategy
  - Adaptable to situation
- Self Reflection leading to Rider Improvement
- Many possible responses under a motorcyclists control



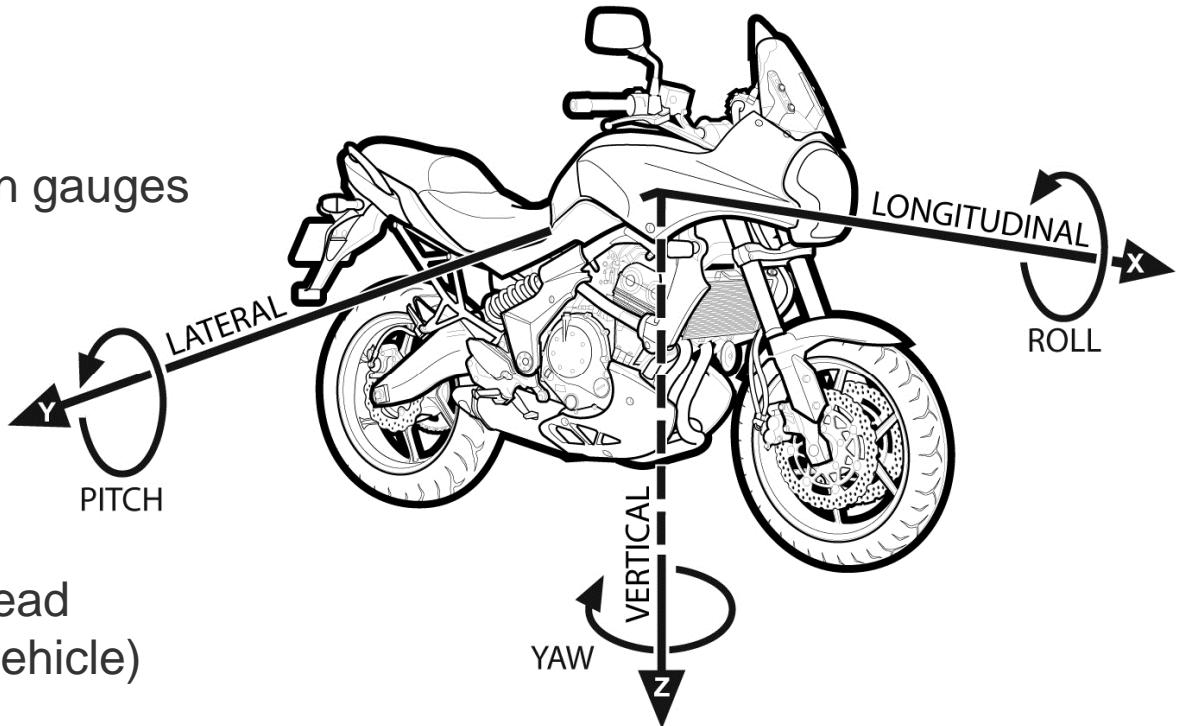
# *The MSF 100* **Naturalistic Study of Motorcyclists**

■■■■■ **MSF, its members, and VTTI are conducting the first ever, Naturalistic Motorcyclist Study.**

- 100+ participant-owned motorcycles
- One year per bike, ext. 400-500K miles
- Data collection 2012 and 2013
- Recruiting primarily on Age and Bike
- We will track other factors (e.g., training, experience)
- MSF will collaborate worldwide to allow use

## ■■■ Instrumentation Installed

- Color Video cameras (5)
- Lane tracking
- Helmet / Gaze tracking
- Front and rear brake strain gauges
- Accelerometers (3 axes)
- Gyro (3 axes)
- Speed
- Turn signals
- GPS
- Forward radar (speed to lead vehicle; distance to lead vehicle)
- Continuous collection
- 8-12 month capacity
- Expandable measures



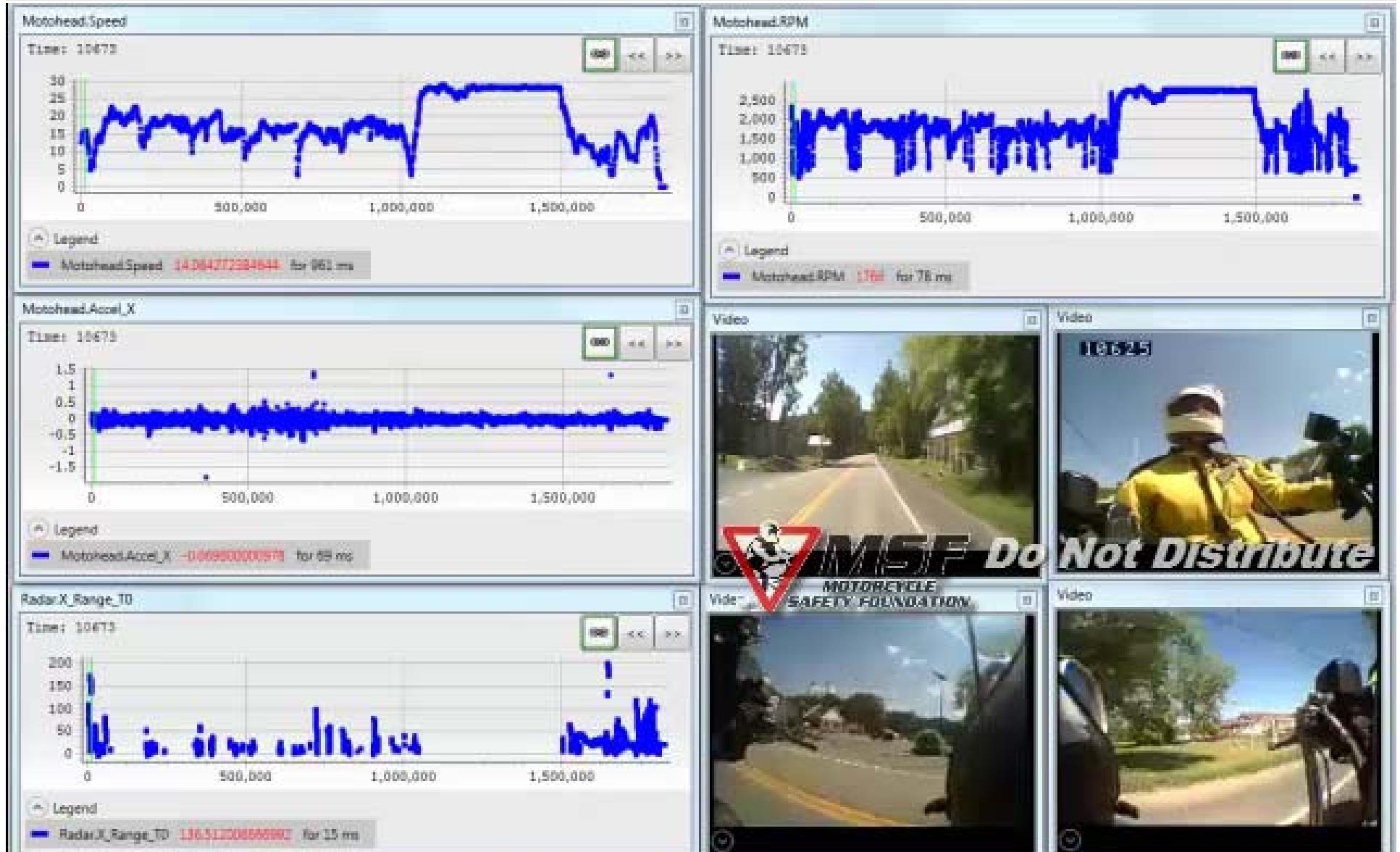
# *Instrumented Motorcycles - Unobtrusive*



## Sample Data



# The MSF 100 Naturalistic Study of Motorcyclists



# Bike Model Listing

- Kawasaki Ninja ZX600, ZX-6R (2009 – 2012)
- Suzuki GSX-R1000 (2009, 2011 – 2012)
- Harley-Davidson Sportster 883 (2004 – 2012)
- Harley-Davidson Sportster 1200 (2004 – 2012)
- Harley-Davidson Iron 883 (2009 – 2012)
- Harley-Davidson Forty-Eight (2010 – 2012)
- Harley-Davidson Seventy-Two (2012)
- Honda Rebel CMX 250 (2001 – 2011)
- Yamaha V-Star 650 (2002 – 2011)
- Honda Goldwing 1800 (2006-2011)
- Harley-Davidson Ultra Classic Electraglide (2008-2011)

# Sport Bikes



**Suzuki GSX-R1000**  
2009, 2011 – 2012

**Kawasaki Ninja**  
**ZX600/ZX-6R**  
2009 – 2012



# Cruisers



Honda Rebel 250  
2001 – 2011

Yamaha Vstar  
650  
2002 – 2011



# Cruisers (continued)



Harley-Davidson  
Sportster 883/1200  
2004 – 2012

Iron 883  
2009 – 2012

Forty-Eight  
2010 – 2012

Seventy-Two  
2012

# Touring

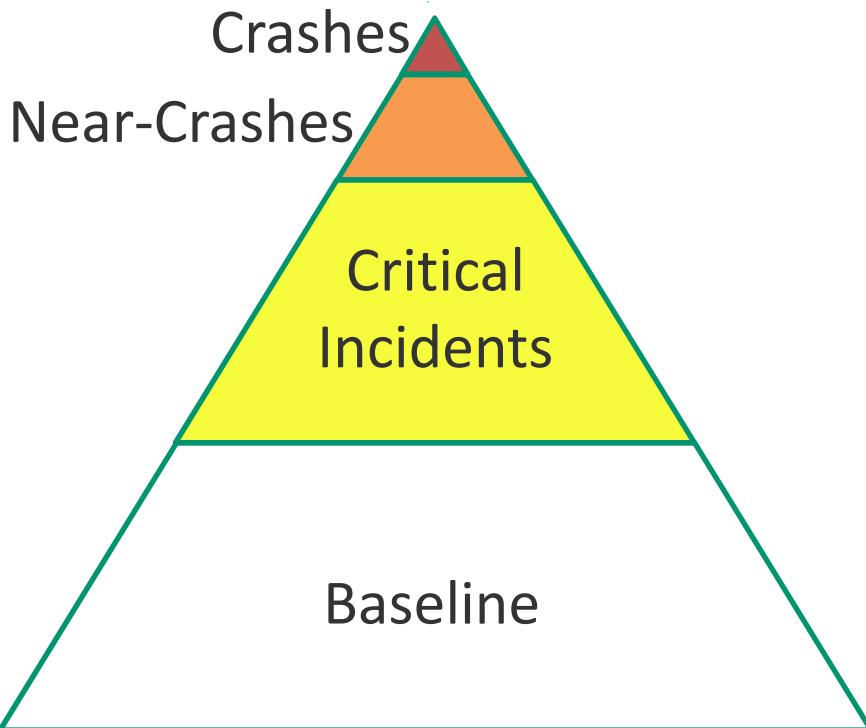


Honda Goldwing  
2006-2011

Harley-Davidson  
Ultra Classic  
Electraglide  
2006-2011



## ■■■ Naturalistic Method



### Able to identify:

- Interaction of rider attributes, behaviors, roadway, adjacent vehicles, and environment.
- Factors in crashes using time-series video and numeric data.
- Factors not detectable through crash investigation.
- Compares crash-involved rider to himself / herself at all other times.
- Pre-event data, seconds, minutes, days, weeks, months prior to.
- Differences between successful and unsuccessful evasive maneuvers.
- Rider performance and behavior in non-critical and critical riding.
- Attributes and habits of safe riders
- Detailed exposure data across numerous factors
- Research questions that arise in the future.

## ***The Value of Video***

- Provides “perfect witness.”
- Documents rider, vehicle, roadway, and environmental variables sufficiently to support a wide range of investigations.
- Numerous variables can be identified post-collection based on new research questions or observation.
- Accurately records the sequence of many rapidly occurring actions.
- Captures factors that do not leave a physical record or may not be accessible in witness recall.

## **■■■ Current status: The Largest EVER!**

- 50 fully instrumented motorcycles on the road
- All 3 markets up and running (VA, CA, FL)
- ~ 9000 trips recorded
- 2700 hours – 67,000 miles of data
- Preliminary observations in one year



# Our Member Companies

We stand behind our work.



Motorcycles



 HONDA

 KTM



 YAMAHA



 Kawasaki



 SUZUKI

 TRIUMPH

Who's in your corner?