DSOC
Defense Safety Oversight Council

Motorcycle Mentorship Module 24

Cornering: Proper Speed and Lane Position

Warning: Incorrect or inaccurate information could lead to tragic results on the road. If a question arises that is not covered in the guide and you don't know the answer from your own experience and training, simply state, "That is a great question, I'll get back to you with the answer."

Your Service Safety Center will help with these types of questions should they arise. Their numbers are as follows:

US Army Driving Directorate: **334.255.3039**

USMC Safety Division: **703.604.4459**

US Navy Shore Safety: **757.444.3520 x7165**

US Air Force Safety Center: **505.846.0728**

USCG Safety Division: **202.475.5206**

Preface

About: The Defense Safety Oversight Council (DSOC) Motorcycle Mentorship Modules are a set of thirty six (36) facilitation modules designed for the purpose of increasing rider knowledge on various aspects of riding and providing additional capability for self-policing within peer groups. The modules are intended as a mechanism to further decrease motorcycle related mishaps and fatalities within Department of Defense (DoD) by encouraging riders to talk, live, and think about the topic.

Using the Module: The module content enclosed is intended as a facilitation guide to assist you with discussing the topic. However, it is still critical to use your skills and talent to engage participants and develop "buy-in" on this subject from your group. To maximize this, motivate and moderate your participants, control the accuracy of participant feedback, and be mindful of their time.

Facilitation Guide for DSOC Mentorship Modules

It is recommended that this Mentorship Module be conducted in a facilitation style. Using the information provided in this Mentorship Module, you, as the facilitator, will lead a discussion on the subject. *You should not be conducting a lecture!* The facilitator's role is to help with how the discussion is proceeding. Participants will have much more "buy in" and connectivity with the information if they have input. One of your roles as the facilitator is to control the accuracy of the input and control the time. From the Mentorship Module, generate questions which will lead to group discussion. The more you let the group participate, the more success you will have.

Competencies of a Facilitator:

- Prepare prior to the event
- Make sure everyone gets a chance to participate and help members to express themselves
- Ask rather than tell
- Honor the group, display respect for the members, and acknowledge participant contributions
- Ask for others' opinions
- Listen without interrupting
- Demonstrate professionalism and integrity

The key characteristic distinguishing facilitation from other types of leadership, like scripted training, is that the outcomes are never predetermined in a facilitative setting. Although the background information provided with this Module remains the same, the result will depend on the participants, the knowledge and experience they bring, and the information that they feel they need to take away. The group uses the activities provided by the facilitator to unlock expertise, ensure thorough discussion, stay focused and reach decisions that are better than those any individual could come up with alone.

At the beginning of each Mentorship Event, discuss why the participants are there and what they will receive as a result of participating. Adults have limited time and they want to know "What's in it for me?" A facilitator should make training fun. Encourage humor and laughter in your Mentorship Event.

Principles of Adult Learning:

- ➞ Adult Learners want material that is relevant to them. "What's in it for me?" "What will I get out of this that will make a difference to me?"
- ➞ Adult Learners come to training events with varying amounts of experience. They like to share their experiences. If you have minimal or no motorcycle experience, you can still draw from your group.
- ➞ Even if you have motorcycle experience, you should draw from your group because people tend to remember what "they" said longer than what you said. Information that they "own" is more valuable to them.
- ➞ Facilitators are not always subject matter experts; nor do they need to be. Facilitators may draw on the existing knowledge of the participants and the information provided in these Modules.

Section I: Module Overview

Time Frame: One 30-60 minute facilitator-led discussion

Level of Prior Knowledge: Participants should be able to operate a motorcycle at a novice level and be familiar with basic motorcycle operations.

Synopsis: Effective cornering using proper speed and lane position are some of the most critical skills a motorcyclist can develop. The number one cause for single vehicle motorcycle mishaps in the United States is "failure to negotiate the curve" or improper cornering technique. The crash is usually attributable to excessive speed; going into the corner too fast and either attempting to slow abruptly mid-turn, "target fixating" or some combination.

'Curve', 'corner' and 'turn' are used interchangeably throughout this discussion to mean changing direction of the motorcycle in order to conform to arcs or changes of direction of the roadway.

Learning Objectives

- Have participants recognize that proper cornering technique greatly reduces potential for mishaps.
- Participants will understand the importance of selecting a suitable entry speed for any turn.
- Attendees should be able to use simple rules to allow safe cornering techniques on even unfamiliar roads with blind turns.
- Attendees will be aware that applying the brakes too forcefully while turning can be the cause of a crash rather than helping avoid one.
- Participants will understand how proper lane positioning can help reduce the likelihood of a crash.
- Participants comprehend facts and knowledge. Participants may offer alternative perspectives, contribute or supplement accurate statements regarding terms, facts, sequential events, and are encouraged to share experiential knowledge.

Suggested Environment/Props/Handouts:

Any comfortable environment, such as classroom, conference room, auditorium, or stadium seating, is appropriate.

- **Handout: Lane Positioning, Apexing Turns**

Section II: Module Discussion

Introduction: Facilitate discussion: How important is proper cornering on a motorcycle? What are the most important factors in cornering?

The topic of this module: proper cornering technique, speed selection and lane positioning are the most important factors in riding well through turns and the majority of riders will agree that the most fun part of motorcycle riding is taking turns well.

Open discussions with participant-centered activities. Have attendees introduce themselves (or each other) and share their current motorcycle make and model. All activities should encourage participant interaction and develop camaraderie and a willingness to participate in discussions. Ask for and encourage participant sharing of experiences related to the module topic.

Sample questions may include:

- ➤ What is the most common cause of single vehicle motorcycle crashes?
- ➤ Have you ever seen a motorcycle crash in a turn?
- ➤ What rider errors accumulated for this crash to happen?
- ➤ Can we define: 'suitable entry speed' as it relates to cornering on a motorcycle?
- ➤ Where is braking accomplished for most turns?
- ➤ How important is lane position for turning?

Two of the more common causes of single vehicle motorcycle crashes are entering turns too fast causing a loss of traction or target fixation, which is looking toward an inappropriate area or object. A motorcycle tends to follow 'visual directional control' (i.e. it goes where you look). Novice to intermediate level riders will often combine these two errors compounding the possibility of a crash.

A suitable entry speed for any curve is a speed that allows the rider to maintain or increase speed throughout the turn. Braking to establish entry speed should be accomplished prior to initiating lean. Therefore, braking for a turn should ideally be done while still traveling in a straight line before the turn, then steady throttle applied for the entirety of the turn.

Choice of position within a lane affects the *path of travel.* The path of travel through any turn will affect the lean angle, the speed, the overall motorcycle control and the *traction reserve*, which is the amount of traction available in case of emergency. Proper path of travel selection can be the difference between a good ride and a bad one.

Suggested Discussion Areas:

Discussion Area 1: Cornering Overview

Facilitation Questions:

- What four actions are involved in cornering?
- How important is where you look in controlling the motorcycles direction?
- What is the term for how a motorcycle changes direction at speed?
- What should a rider do with the throttle in a turn? Why?
- Are there techniques that can help when making turns

Facilitator Information:

- The principle actions in corning are: **Slow**, to a suitable entry speed. **Look** through the turn. **Press** the handgrip to initiate lean of the motorcycle. **Roll** on some throttle to stabilize the suspension and allow for the best possible traction.
- While it is always important to keep one's eyes moving in order to sweep or scan the surroundings, a rider's primary focus must be the direction he wants to go.
- Single track vehicles such as motorcycles and bicycles change direction by '*counter-steering'*, the right handgrip is pressed slightly (to initiate motorcycle lean) to go right and the left handgrip is pressed to go left. Steering this way is counter-intuitive, hence the name, but it is the only way to make significant changes in the direction of a motorcycle when traveling above approximately 10 to 12 miles-per-hour.
- Speed should ideally be steady or increasing through a turn.
- When speed is steady or increasing, the suspension is stabilized at a midpoint in its travel, which in turn maximizes ground clearance and the ability of the suspension to deal with uneven surfaces such as bumps and potholes without losing traction.
- A good truism is: 'Slow more than you think you need to as you enter a turn. You can always add speed in a turn. Attempting to subtract speed in a turn is difficult and dangerous.

Discussion Area 2: Proper Speed

Facilitation Questions:

- How do you determine a suitable speed for any given turn?
- Where is this speed established?
- What happens when you apply brakes while leaned into a turn?
- Is the effect on weight transfer essentially the same with a sudden roll off of the throttle?
- What two basic human instincts can CAUSE problems when going too fast in a turn?
- What is the suggested procedure for completing a turn where entry speed was too fast?
- What is 'Trail Braking'?

Facilitator Information:

- A *suitable entry speed* for any turn on a motorcycle can be defined as a speed that allows the rider to maintain or increase speed throughout the turn OR stop in the distance that she can see.
- Entry speed is always determined prior to the curve. The majority of slowing must occur while traveling in a straight line before leaning into the curve.
- Anytime the brakes are applied the weight of the motorcycle is transferred forward to the front wheel, greatly increasing traction requirements. If the front tire is leaned over at an angle in order to make a turn, most of the available traction is already being consumed by the lateral forces involved (keeping the tire from slipping out). This mean traction available for braking is very limited.
- Sudden roll-off of the throttle or rapid deceleration has the same potential for problems as braking in a turn. Smooth, steady roll-on is desired.
- Human instinct or 'reflexive responses' can be troublesome for riders when going too fast in a turn.
  - The first problem is that if a rider feels they are going too fast, the reflexive response is to slow down now! The problem created by this reflex is if you apply brakes on a motorcycle that is already leaned over at a sharp angle to make a fast turn, the tires (especially the front) do not have enough traction available for significant slowing. Insufficient traction results in a tire skid causing loss of control and substantial increase in the likelihood of a serious crash.
  - The second of the dangerous reflexive responses is target fixation. This is where survival instincts take over and the rider reflexively focuses on a hazard such as a guard rail, other vehicle or road hazard, etc. The problem here is that a motorcycle operates via 'visual directional control' i.e. it goes where the rider looks! Continuing to look at the hazard virtually guarantees that the rider will hit the hazard. Riders must train themselves to look AWAY from the hazard and instead focus on where they want to go.
  - Suggested procedure for when a rider is in a turn and going too fast: LOOK where you want to go, lean slightly forward and inward on the bike (Chin toward the inside wrist), lean the bike more if needed and hold a steady throttle to allow the suspension to do its job until you are clear of the turn.

- "Trail braking" refers to any braking done while the motorcycle is leaning in a turn. The term originates from the technique of "trailing off the brakes" as you approach the apex. It is generally considered to be an advanced riding tactic used by expert riders, particularly in on-track riding situations. Novices attempting this technique may find it difficult to develop the subtle 'feel' for the extremely fine motor skills necessary to successfully exploit the advantages of trail braking. Those to whom trail braking is a new technique should get track or closed course experience in order to develop advanced techniques in a safe, controlled environment with proper instruction.

Discussion Area 3: Choosing a Line (Path of Travel)

Facilitation Questions:

- What is meant by a choosing a good 'line' through a turn?
- What is meant by "Outer-Inner-Outer" (or "Outside-Inside-Outside") path of travel through a curve?
- Are there other preferred options for path of travel?
- What is the "Apex' of a turn?
- Why would the location we choose to apex a turn be important?
- What are the advantages of choosing a 'late apex'?
- If your vehicle turns by leaning and the tires are very close to the centerline, where is the riders' upper body?

*Facilitator Information: (*Handout – Lane Positioning: Apexing Turns)

- The 'line' one chooses to take through a turn is the exact path of travel the motorcycle will follow. Different lines are chosen for differing reasons: available line of sight, debris, road condition, traffic, relative speed, bike design limitations and other variables. These all affect the appropriate path of travel through a given turn. In any case the rider should allow for traction reserve. In other words, the rider should keep some extra traction available in the case of an emergency mid-turn.
- Outer-Inner-Outer refers to a path of travel that begins at the outermost lane position (right side portion of the lane for a left curve) then moves to the innermost portion of the lane in the middle of the curve and gradually returns to the outer-most part of the lane at the exit of the turn. This is the most common and affords the best line of sight as you enter the turn.
- There are a number of different path of travel (POT) options: O = Outer, I = Inner, and M = Middle: O-O-O. M-M-M, M-I-M, etc. Different situations may require any of these.
- The apex is the point of closest approach to the inside of the turn. It can occur at any time or point during the turn. Where the rider "hits the apex" can have a strong influence on safety, traction and exit position for the rider and bike.

- An early apex in a turn can cause the motorcycle to run wide at the exit of the turn. Early apexing is also very often a habit of people who ride too fast. The combination of riding too fast and an early apex with its resulting tendency to run wide at the exit of the turn and makes for a dangerous scenario.
- Choosing a late apex gives more control over the bike's traction and how the bike exits the curve. Traction management is also improved as well as continuing to improve the sightline in order to see further down the road.
- In general, a smoother, straighter path of travel requires less lean angle which allows for more ground clearance and more traction. Definitely preferred in situations such as imperfect road surface or a rainy day.
- Be careful of being near or touching the centerline in left turns. When the bike is leaned over the rider's head or upper body can protrude into the on-coming lane creating an extremely dangerous situation. And, that centerline can be slippery!

Wrap-Up:

Close out discussion with the following questions:

- ➤ How can proper cornering technique reduce potential for motorcycle crashes?
- ➤ How important is a suitable entry speed when making a turn?
- ➤ What is a simple rule that will allow safe cornering around any turn? (There are several)
- ➤ Is it ever a good idea to brake suddenly when turning?
- ➤ Can proper lane positioning help reduce the likelihood of a crash?

Ask participants how they would apply the knowledge they gained from this discussion to their ride home or their next ride. What opinions or preconceptions about cornering, proper speed or lane positioning may have changed?

Distribute copies of the DSOC Motorcycle Mentorship Module Evaluation form to all participants and request that they deliver or mail the completed form to the Command or Command Safety Office for processing.

Remind everyone to ride safe, and see you at the next Mentorship Meeting.

DSOC Motorcycle Mentorship Feedback Form

Presenter Name:	Date:
Topic/Title:	Unit Number:

Please review each statement below and check the response that closely matches your experience in the Mentorship Module today:

1. Please rate the presenter's performance:

☐ Prepared ☐ Not Prepared | ☐ Engaging ☐ Not Engaging | ☐ Led Discussion ☐ Lectured

Comments:

2. I was given opportunities to participate in the module's discussion

☐ Never ☐ Only Once ☐ 2-4 Times ☐ Many Times Throughout Discussion

Comments:

3. With regard to my personal riding experiences, this discussion was:

☐ Relevant ☐ Not Relevant | ☐ Interesting ☐ Not Interesting

Comments:

4. This discussion topic has provided me with specific learning points that I can use to be a safer, better informed rider

☐ None ☐ One Idea or Fact ☐ 2-4 Learning Points ☐ 5 or More

Comments:

5. I would be interested in participating in other Motorcycle Mentorship Module discussion topics

☐ Never Again ☐ Willing to Try Another Module ☐ Would Like to Do Modules Regularly

Comments:

Thank you for your participation. Please make note of any other suggestions or comments below (continue on the back if needed):

Deliver or mail this completed form to the Command or Command Safety Office for processing. Please do not return this form directly to the Module Presenter.

Resources

Continued Reading:

Ienatsch, Nick (2003). *Sport Riding Techiques: How To Develop Real World Skills for Speed, Safety, and Confidence on the Street and Track.* Phoenix, AZ: David Bull Publishing

Kunreuther, Howard and **Useem, Michael** (2010). *Learning from Catastrophes: Strategies for Reaction and Response*. Upper Saddle River, NJ: Wharton School Publishing

Motorcycle Safety Foundation, (2005). *The Motorcycle Safety Foundation's Guide to Motorcycling Excellence,* 2nd Edition. Irvine, CA: Whitehorse Press

Parks, Lee (2003). *Total Control – High Performance Street Riding Techniques*. St. Paul, MN: Motorbooks International

Pridmore, Reg (2004). *Smooth riding, the Pridmore way.* Center Conway, New Hampshire: Whitehorse Press

Ropiek, David (2010). *How Risky Is It, Really?: Why Our Fears Don't Always Match the Facts*. New York: The McGraw-Hill companies, Inc

Definitions: *(As defined for purposes of this module.)*

Suitable Entry Speed: A speed that, upon entering a curve, will allow the rider to maintain or increase speed slightly throughout the turn while still leaving the option of stopping in the distance the rider can see ahead.

Path of Travel (POT) or 'Line': The exact path of the tires on the motorcycle as it progresses through a turn.

Trail Braking: Refers to any braking done while the motorcycle is leaning in a turn.

Apex: The point of innermost approach in a turn.

'Curve', 'corner' and 'turn': Are used interchangeably throughout this discussion to mean changing direction of the motorcycle in order to conform to arcs or changes of direction of the roadway

Handout: Lane Positioning, Apexing Turns

Figure 1. Early Apex Vs. Late Apex Path of Travel

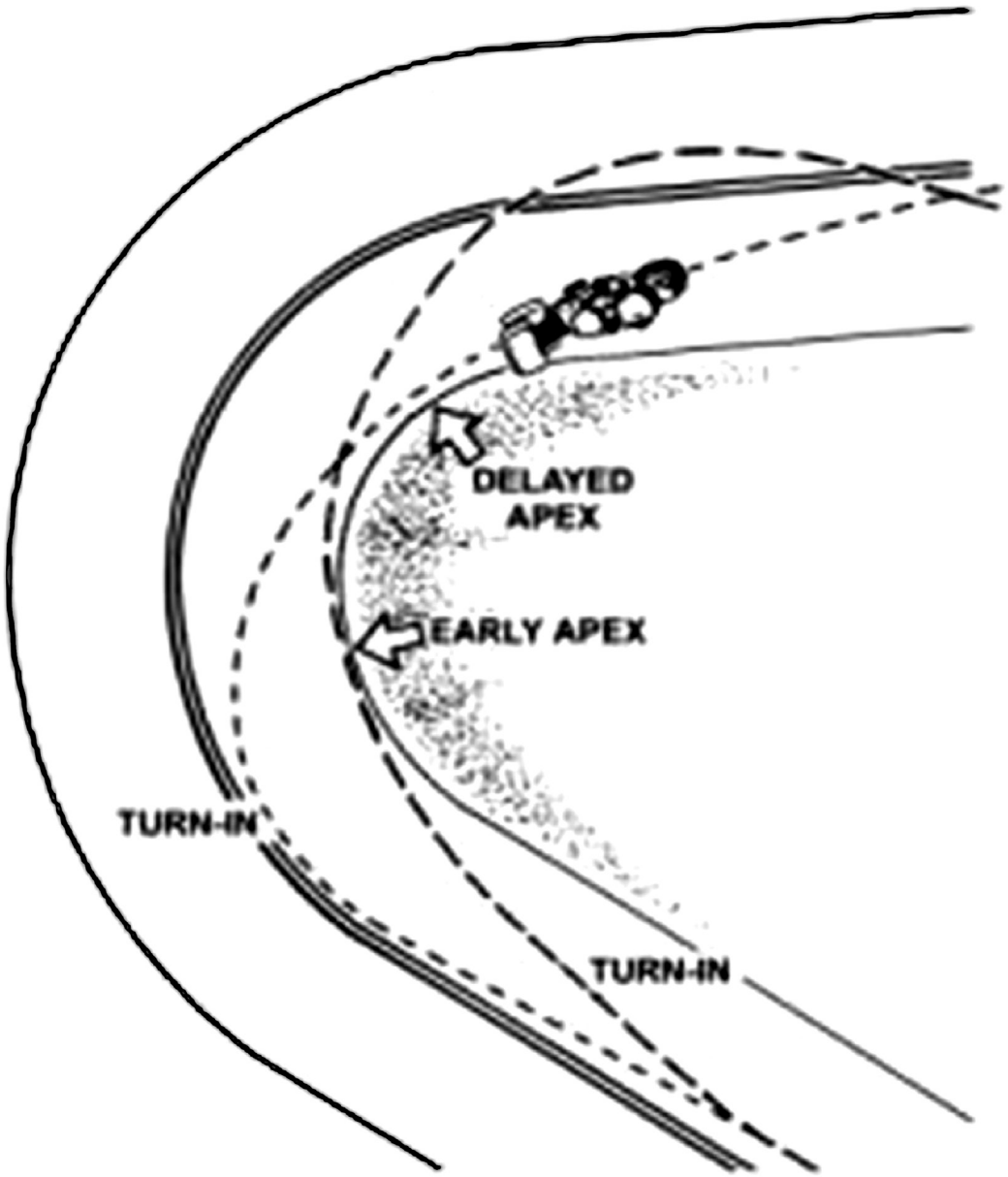
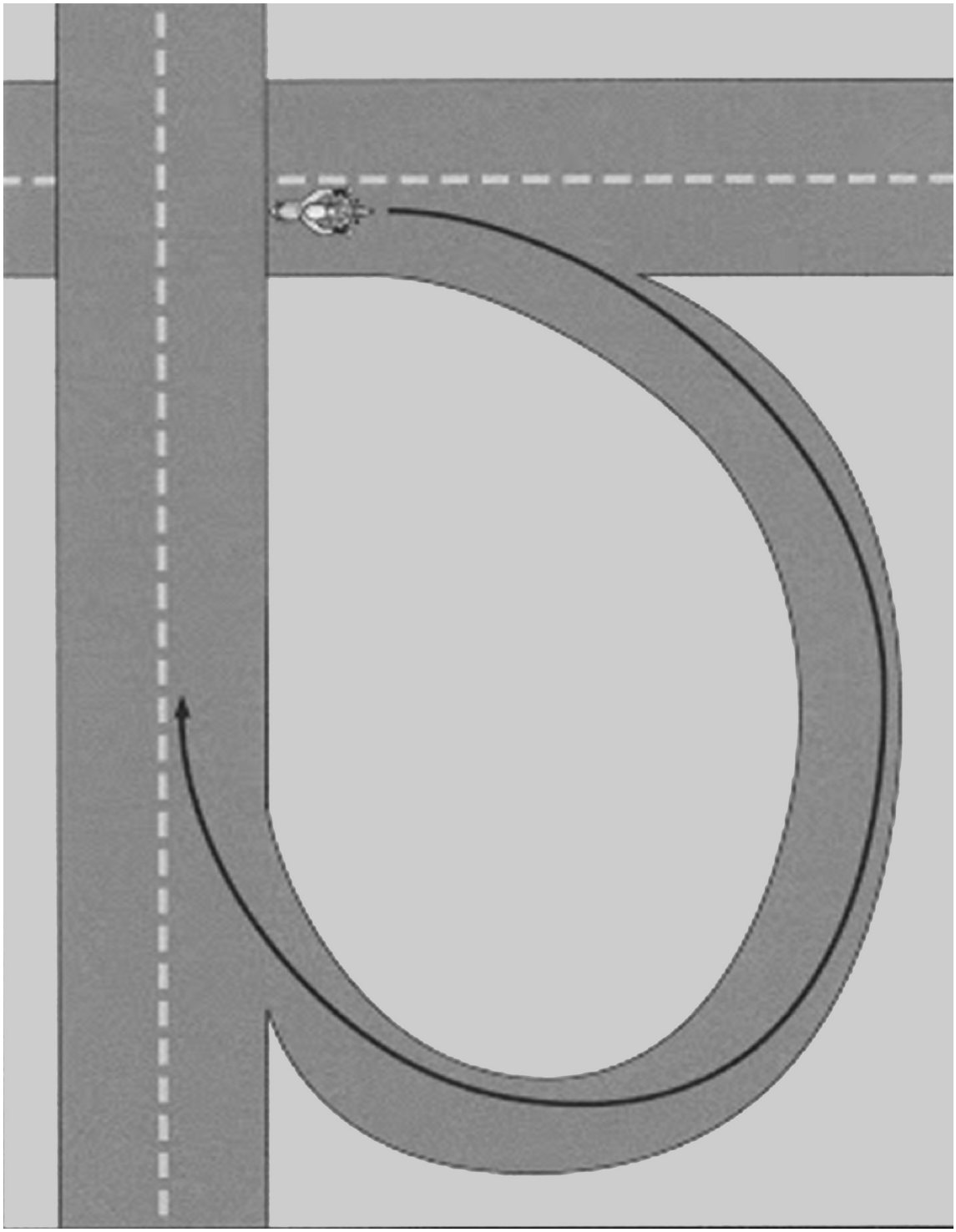


Figure 2. Delayed apex on a decreasing radius turn



ACKNOWLEDGMENTS

This module was developed collaboratively through the Defense Safety Oversight Council's (DSOC) Private Motor Vehicle Accident Reduction Task Force (PMV TF), Service Safety Centers, Line Leaders, Military Riders, National Safety Council, and the Motorcycle Safety Foundation. The DSOC wishes to recognize the organizations and the Service Men and Women who made this Motorcycle Mentoring Module possible.

Some of the principal contributors to this effort include the following:

Mr. Joseph J. Angello, Jr., DSOC Executive Secretary
Major General Margaret Woodward, USAF, PMV TF Chair
Colonel John "Odie" Slocum, USAF, PMV TF Vice-Chair
Major Alejandro Ramos, USAF, PMV TF Executive Secretary
Mr. Jerry Aslinger, DSOC Program Manager

Captain Richard D. Jones, US Naval Safety Center
Mr. Walter Beckman, US Army Ground Driving Task Force
Mr. Peter Hill, HQMC SD, PMV-2 Working Group Chair
Mr. John Waltman, HQMC SD
Mr. Dave Kerrick, US Naval Safety Center
Mr. Don Borkowski, US Naval Safety Center
Mr. Bill Parsons, USAF Safety Center
Mr. Mark Erpelding, USAF Safety Center
Mr. William Walkowiak, USAF Safety Center
Mr. Arthur Albert, USAF Safety Center
Mr. Dale Wisnieski, USCG Traffic and Recreational Safety
Ms. Wendy Medley, US Joint Bases Subject Matter Expert
Ms. Debra Ann Ferris, National Safety Council
Dr. Ray Ochs, Motorcycle Safety Foundation
Ms. Karen F. Nelson, Concurrent Technologies Corp.
Mr. Robert A. Gardiner, Concurrent Technologies Corp.
Mr. Steve Kurtiak, Global Support Services
Mr. Zack Sionakides, Cape Fox Professional Services

MILITARYRIDER
THE RIGHT SKILLS>THE RIGHT TRAINING>THE RIGHT ATTITUDE

DSOC
Defense Safety Oversight Council