NNJR “Trackside Classroom”

Driving at the Limit

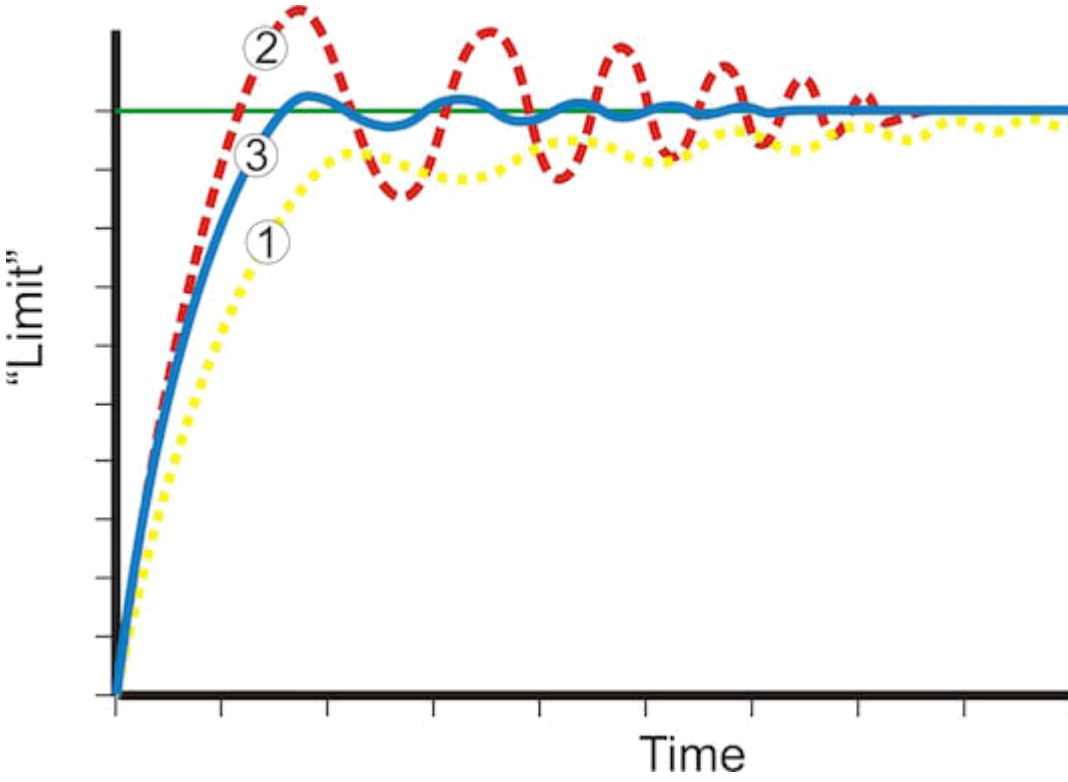
Disclaimer

The techniques shown here have been compiled from experienced sources believed to be reliable and to represent the best current opinions on driving on track. But they are advisory only. Driving at speed at VIR, or any other track, requires skill, judgment and experience. These techniques assume the reader has high performance driving knowledge and applies them as applicable to their level of driving experience.

High-performance driving can be very dangerous, carries inherent risks and may result in injury or death. NNJR and PCA make no warranty, guarantee or representations as to the absolute correctness or sufficiency of any representation contained herein. Nor can it be assumed that all acceptable safety measures are contained herein or that other or additional measures may not be required under particular or exceptional conditions or circumstances.

Agenda: Driving “At the Limit”

- What is the Limit?
  - Driver
  - Car
- How to (safely) approach the limit
  - Prerequisites
  - Techniques
  - Tips



Do You Know How Close you are to Your Limit?

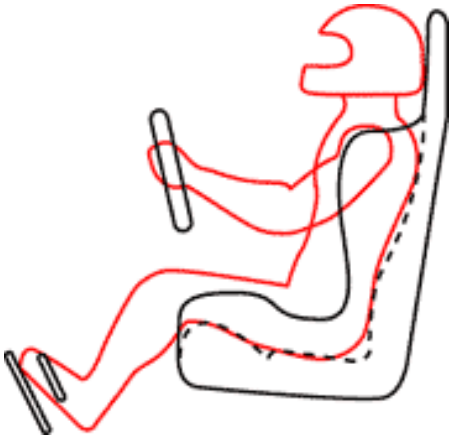
- Know Yourself
- Never “push”
- Dennis Macchio
  - “Fear is real: acknowledge it”
  - “Don't ignore fear even if others can drive faster”
  - “Driving is an intellectual sport; as we get better, fear goes down”
  - “Have to sneak up to the threshold”
    - “Stop at each level until it is rote”
    - “Consistency reduces fear”
- https://www.youtube.com/watch?v=Jc5PaiGRbQw&t=645s

Driver: Limits vs. the Limit

- Physical Condition
  - Uncomfortable in the car
  - Tired
  - Dehydrated
- Mental Condition
  - Distracted
  - Tired
  - Hurried
  - Focused on the wrong thing, or too many things e.g.
    - Go fast
    - Poor technique
  - Not prepared

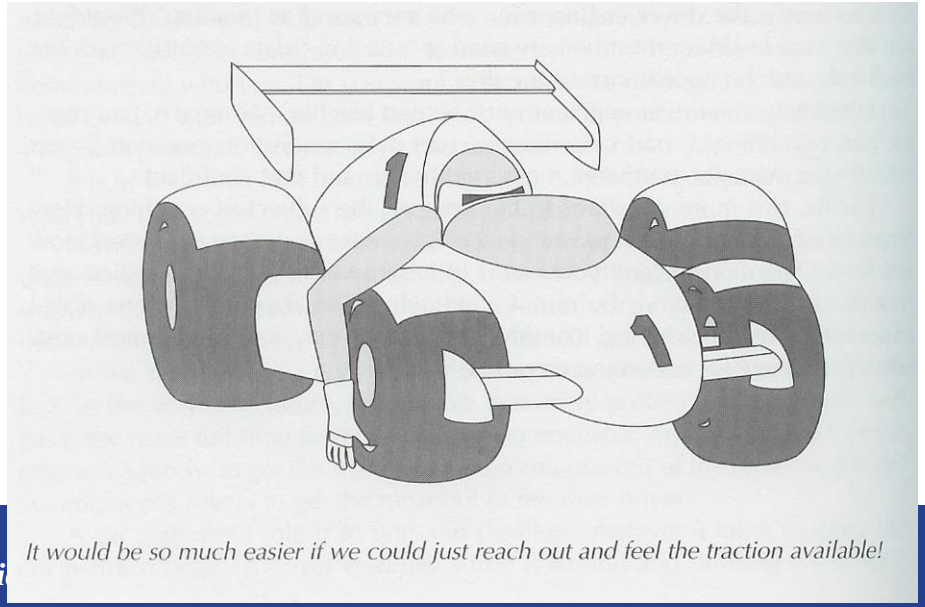
Driver Prerequisites: Before Driving

- Good physical condition
- Proper seating, control access
- Mental attitude
  - Learning mode (receptive)
- Prepare
  - Priority for this session
  - Visualization



Driver Prerequisites: In the Car

- Relaxed
- Focused on one thing
  - All other driving is a consistent baseline
  - Mental image of success
  - A vs B: try both, compare
- **Full sensory input**



Getting Closer to the Limit

- Example: Braking at Turn 1
  1. Can you Heel and Toe (consistently)?
  2. What is current braking point? Speed?
     - Is it consistent? Really consistent? Indexed?
  3. Set target: e.g. 10 feet later or softer (8 vs. 9)
  4. In the paddock, measure half a car length/softer brake
  5. Merge 3 and 4, visualize
  6. On track: out lap at reduced speed, brake at new point
  7. Increase pace slightly for several laps
  8. Success: back to original pace or it's too late / light

Adapted from Ross Bentley: *Speed Secrets weekly 165*

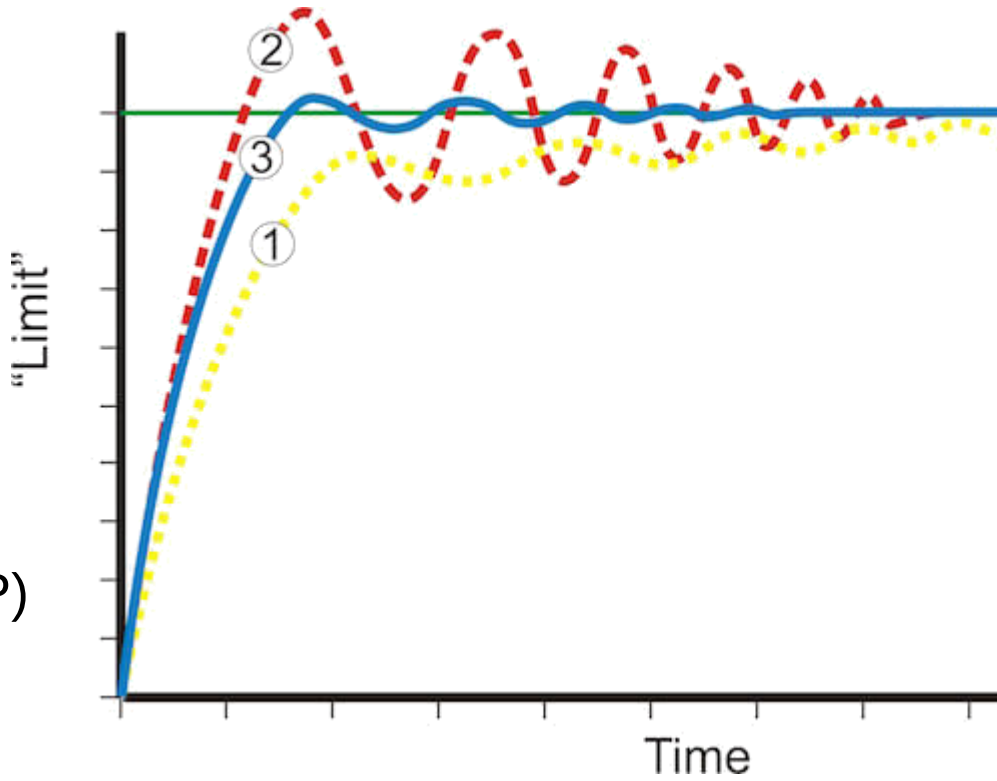
Drivers with Limited Experience

- Focus on Consistency
  - 20 laps within +/- .2 tenths
- Assuming the line is consistent:
  - Approach speed: same every lap?
  - Braking Point: same every lap?
  - Braking Force: same every lap?
  - End of braking: same every lap?
  - Transition off the brakes: smooth?
  - Throttle application: smooth? Same every lap?
  - Consistent Heel and Toe?

Car (and Driver): Which Limit?

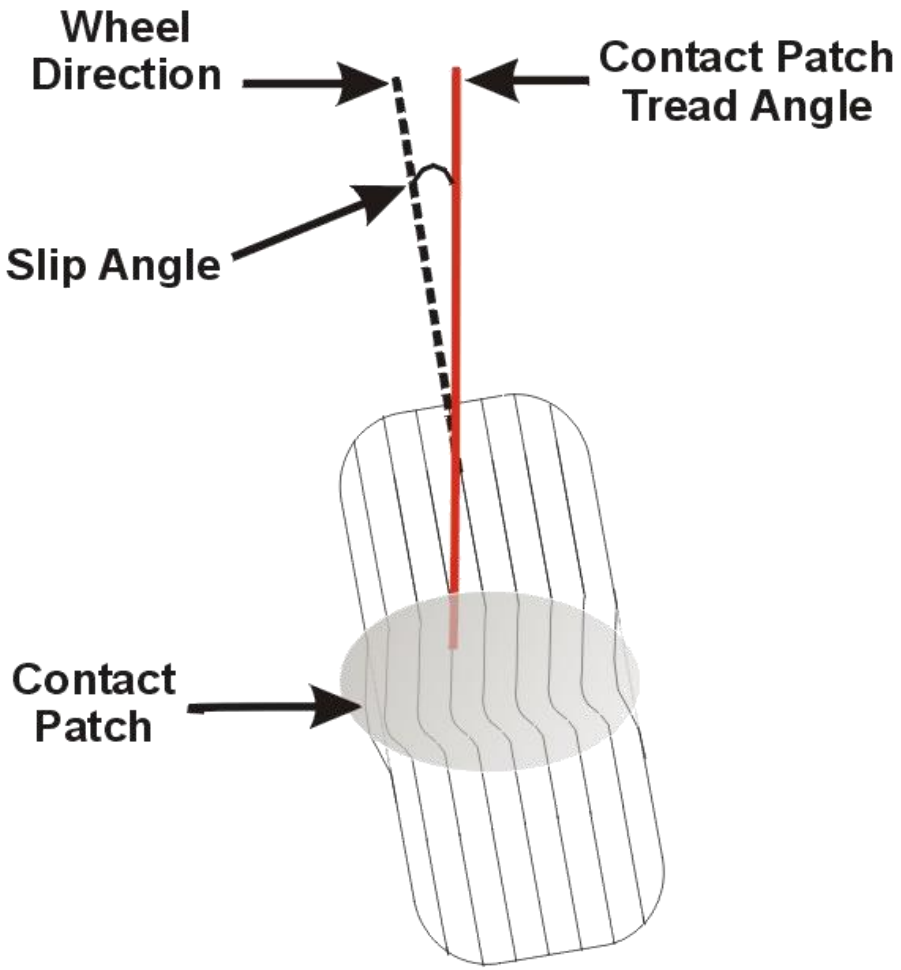
- Which corner/section?
- Braking?
- Cornering?
- Accelerating?
- Transitions
  - Steering Input
  - Brake Application
  - Heel and Toe
  - Off the Brake (EOB)
  - Throttle Application Point (TAP)
  - Wide Open Throttle (WOT)

- Work on one at a time
  - Focus!



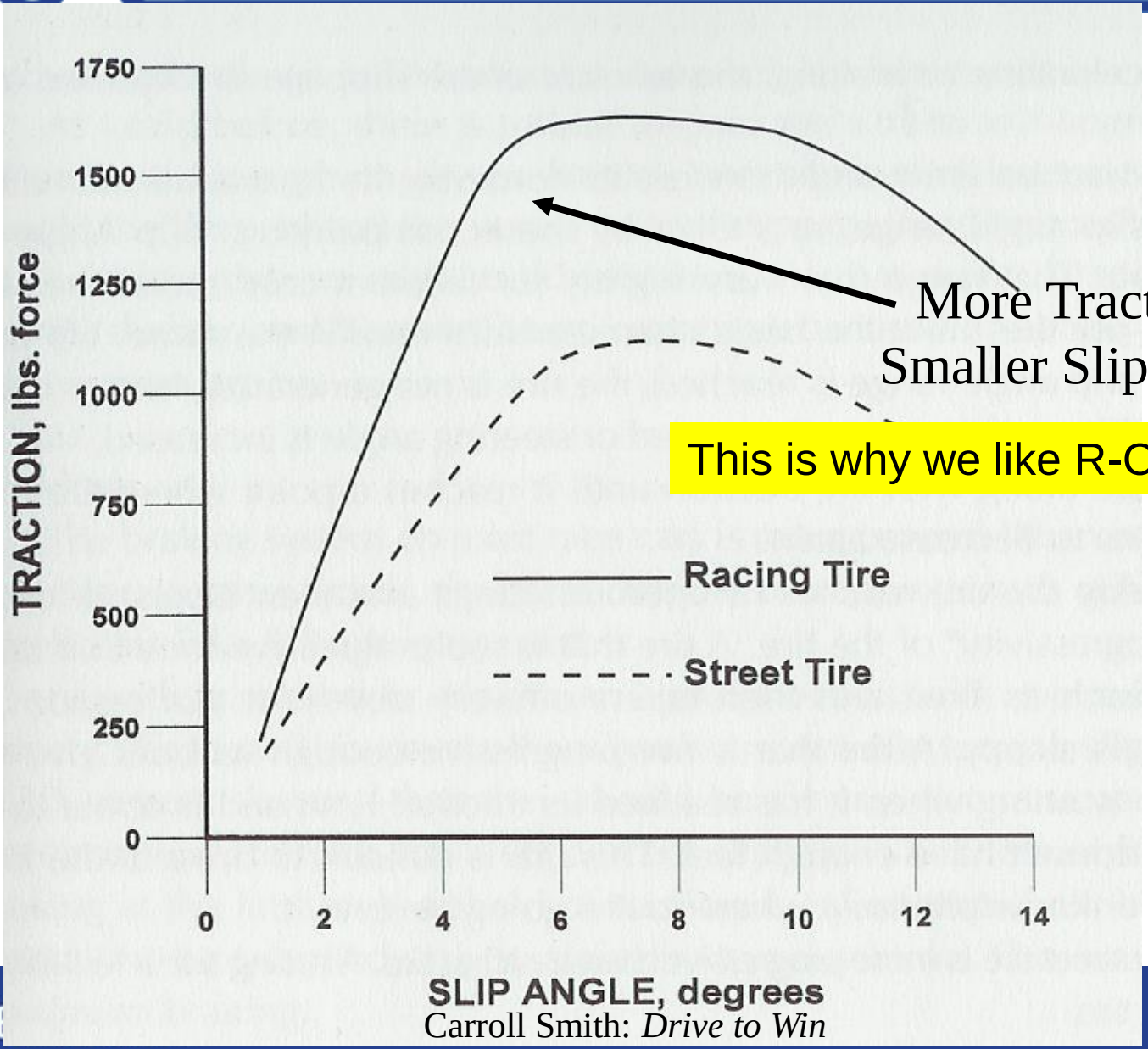
Tire Limits: Slip Angles

- Definition



Wheel Turning Left

Tire Variations

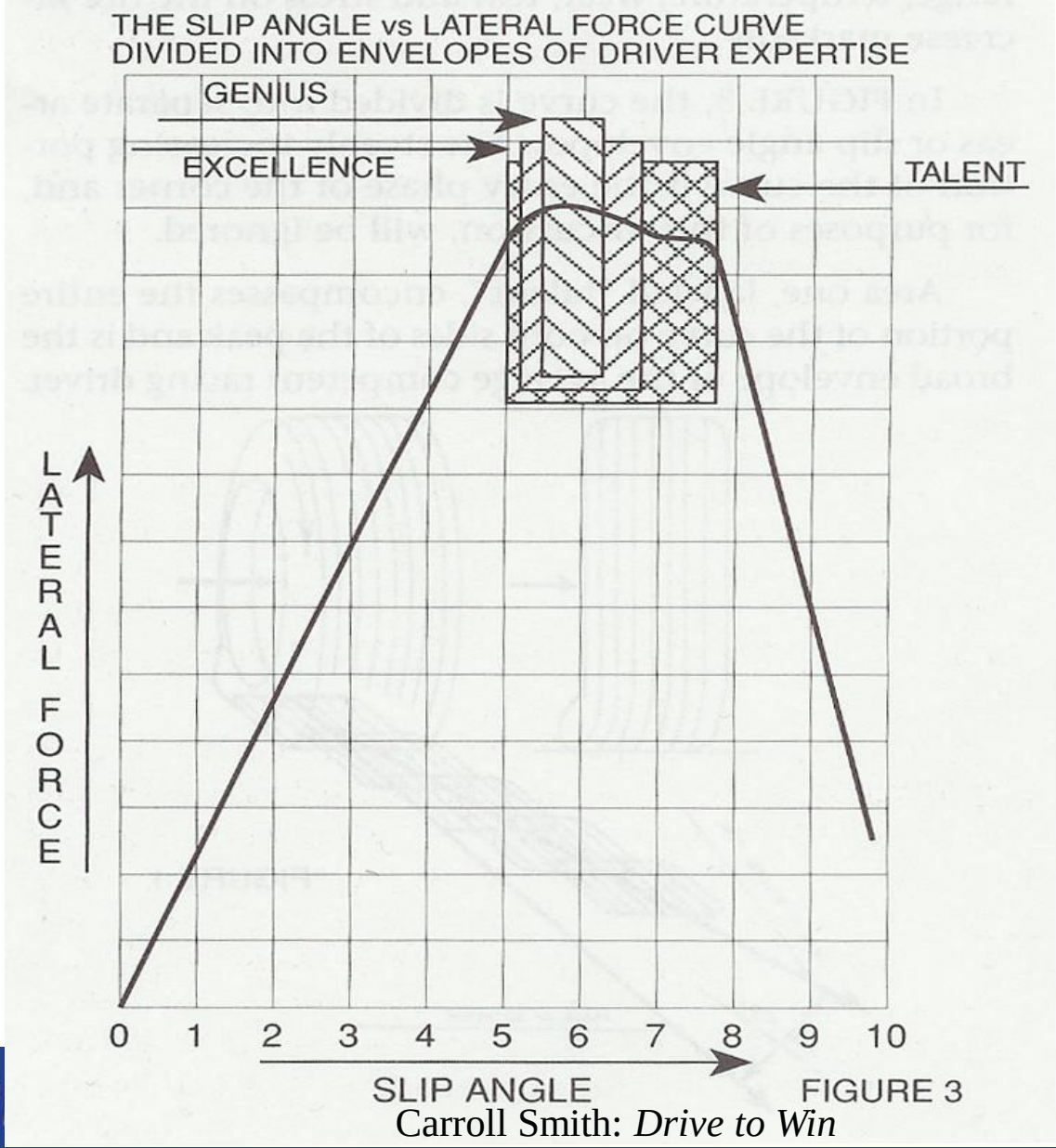


More Traction;
Smaller Slip Angle

This is why we like R-Comp Tires!

Carroll Smith: *Drive to Win*

Tire / Slip Angle Limit



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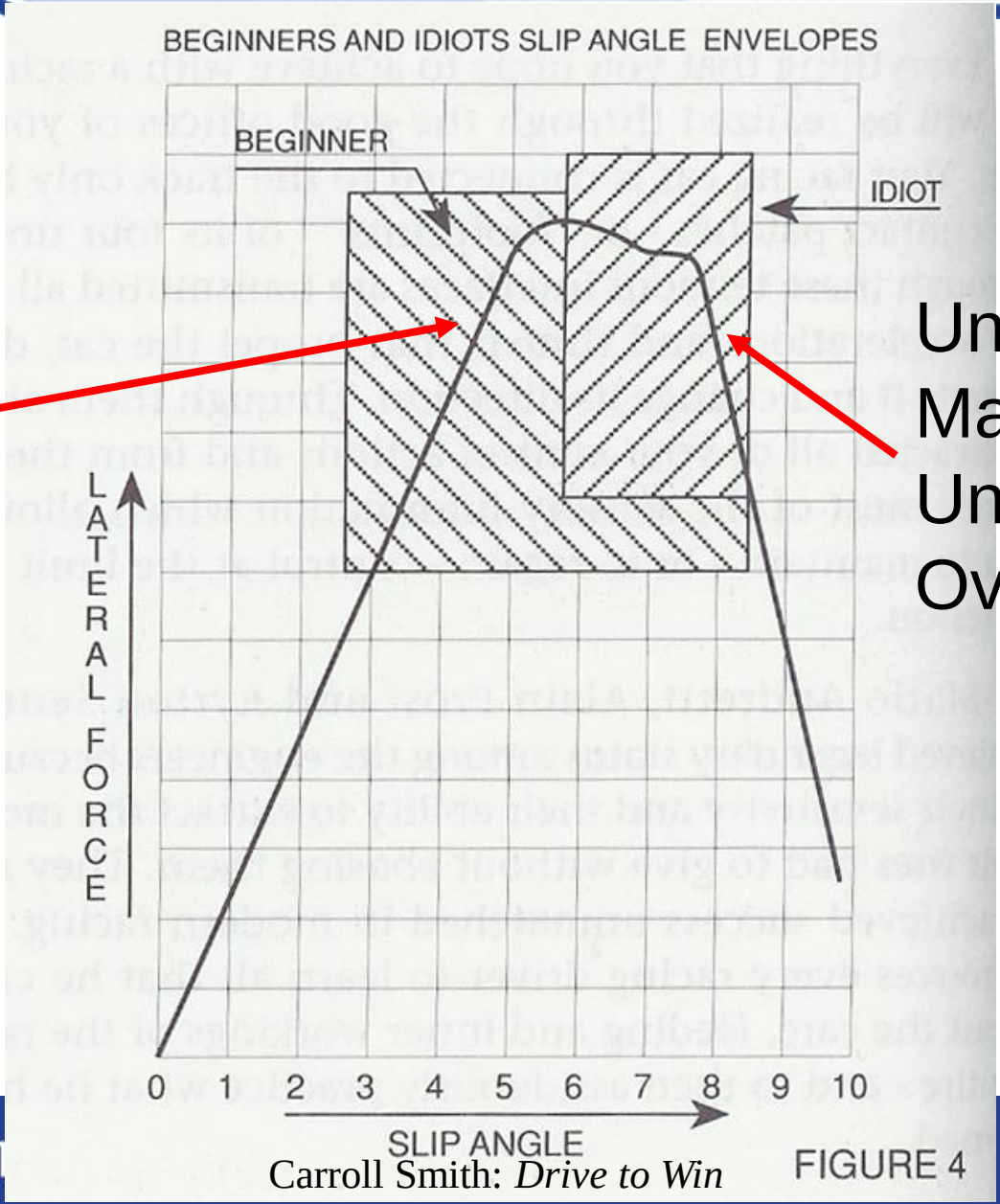
Where do you drive?

Even, controllable, predictable



Carroll Smith: *Drive to Win*

FIGURE 4

Unpredictable, Massive Understeer &/or Oversteer

How Close to the Limit Am I?

- Are you using the entire width of the track?
- Does the car feel like it is sliding?
- Can you steer the car with your feet?
- Does it understeer at corner entry?

- Is it scary?

Getting Closer to the Limit: Cornering

1. Pick a “safe” corner (!?!)
   - e.g. Turn 1? Turn 4?
2. Is current driving very consistent? Indexed: +/- 100 rpm
3. What is current entry speed/rpm? Exit speed/rpm?
4. What are the current Reference Points?
   - End of braking? Throttle application point? WOT?
5. Is the car understeering at corner entry?
6. Mid-corner: what do tires sound like? Feel like?
   - Are all of these consistent?
7. Visualize: 2 mph faster entry or +3% cornering force
8. On track: try later or lighter brake, same EOB
9. Cornering force: remember slip angle graph!
   - Cornering best learned at AX, skid pad
10. Biggest improvement from earlier WOT

Summary: Driving at the Limit

- Starts with the driver
  - Solid, very consistent, baseline
  - Focus on one item
  - Well-developed “seat of the pants”
- Getting closer to the limit
  - Small steps
  - Start with visualization (e.g. brake half car length later)
  - Practice at lower speed
  - Gradually increase speed (indexing)
  - Solidify a new baseline (use A vs. B)
- Understand the physics
  - They set the car/tire limits

NNJR Q&A

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