

NNJR "Trackside Classroom"

Driving at the Limit

October 9-10, 2021

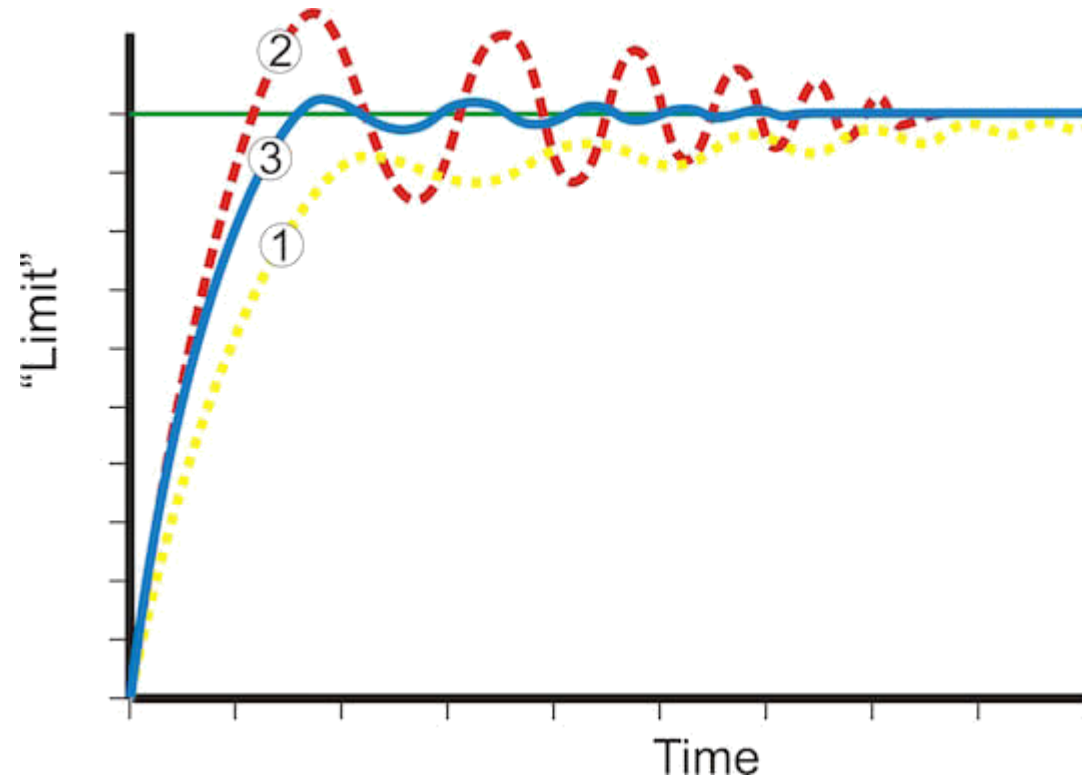


Disclaimer

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 Lightning, 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.

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



- 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>



NNJR 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





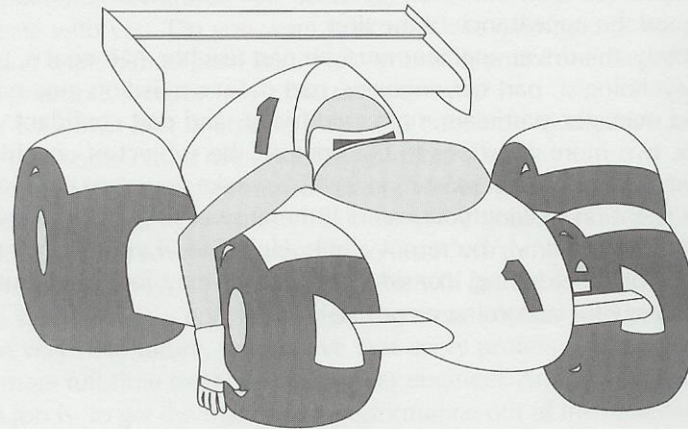
- Good physical condition
- Proper seating, control access
- Mental attitude
 - Learning mode (receptive)
- Prepare
 - One technique or corner for this session
 - Visualization



NJR Driver Prerequisites: In the Car



- Relaxed
- Focused on one thing
 - All other driving is a consistent baseline
 - Mental image of success
- **Full sensory input**



NNJR 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. 5 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

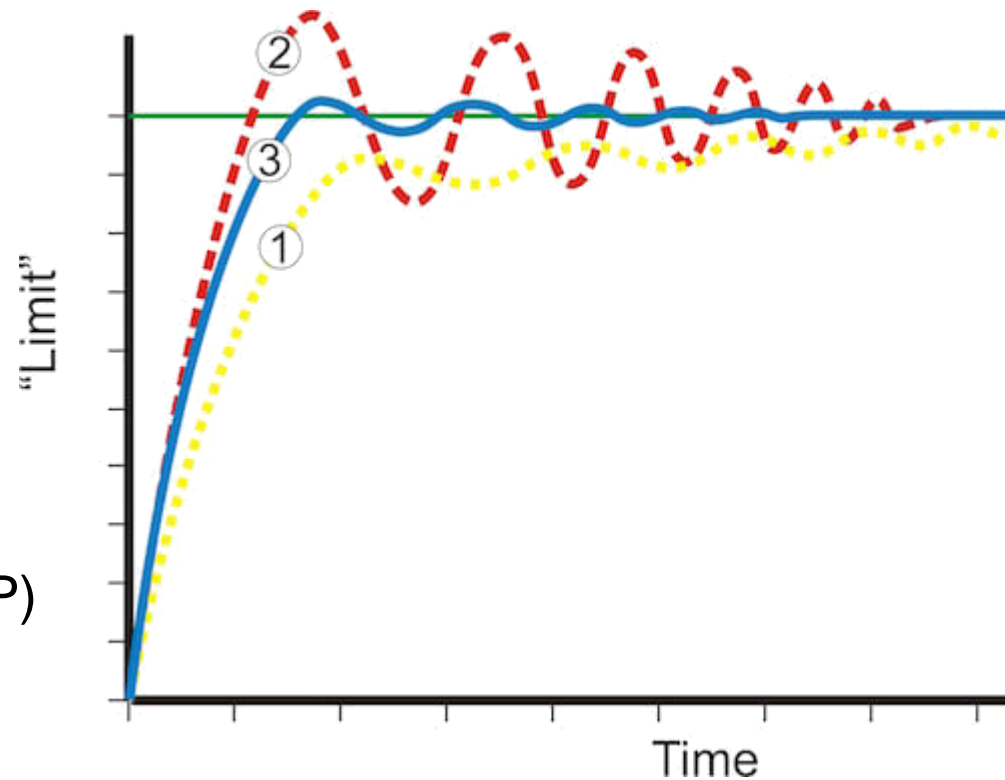
Adapted from Ross Bentley: *Speed Secrets weekly 165*



- Focus on Consistency
 - 20 laps within +/- .2 tenths
- Assuming the line is consistent: Braking
 - 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?

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

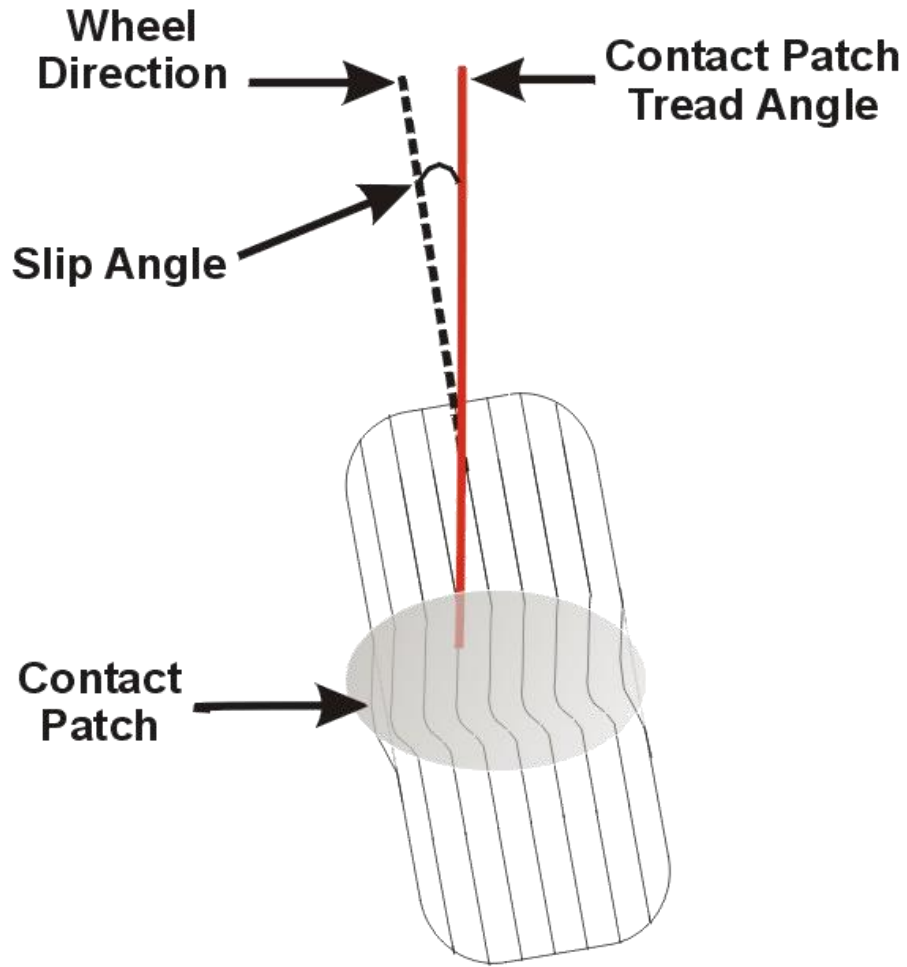
- Work on one at a time
 - Focus!



NNJR Tire Limits: Slip Angles



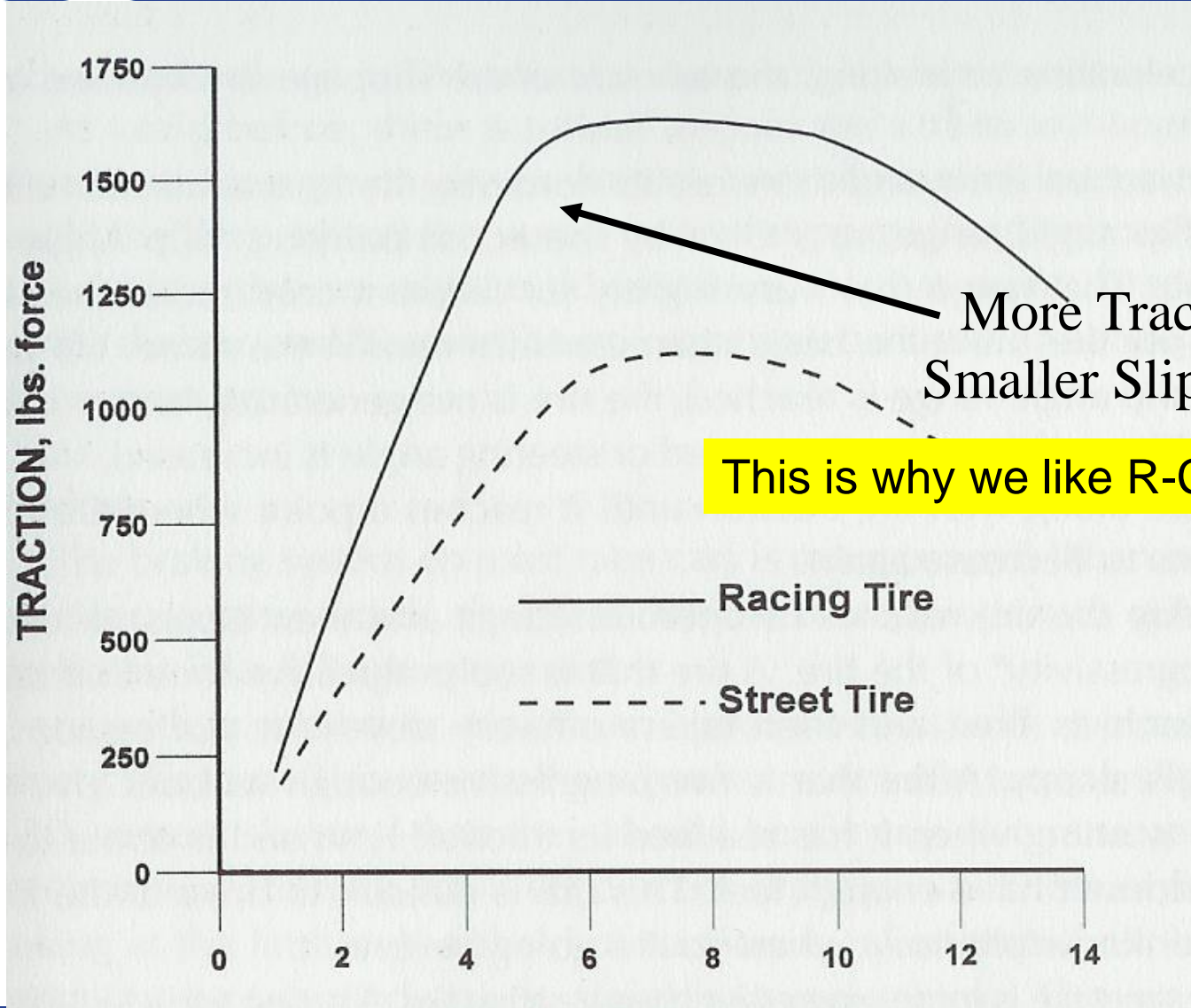
- Definition



Wheel Turning Left



NJR Tire Variations



This is why we like R-Comp Tires!

SLIP ANGLE, degrees
Carroll Smith: *Drive to Win*



THE SLIP ANGLE vs LATERAL FORCE CURVE
DIVIDED INTO ENVELOPES OF DRIVER EXPERTISE

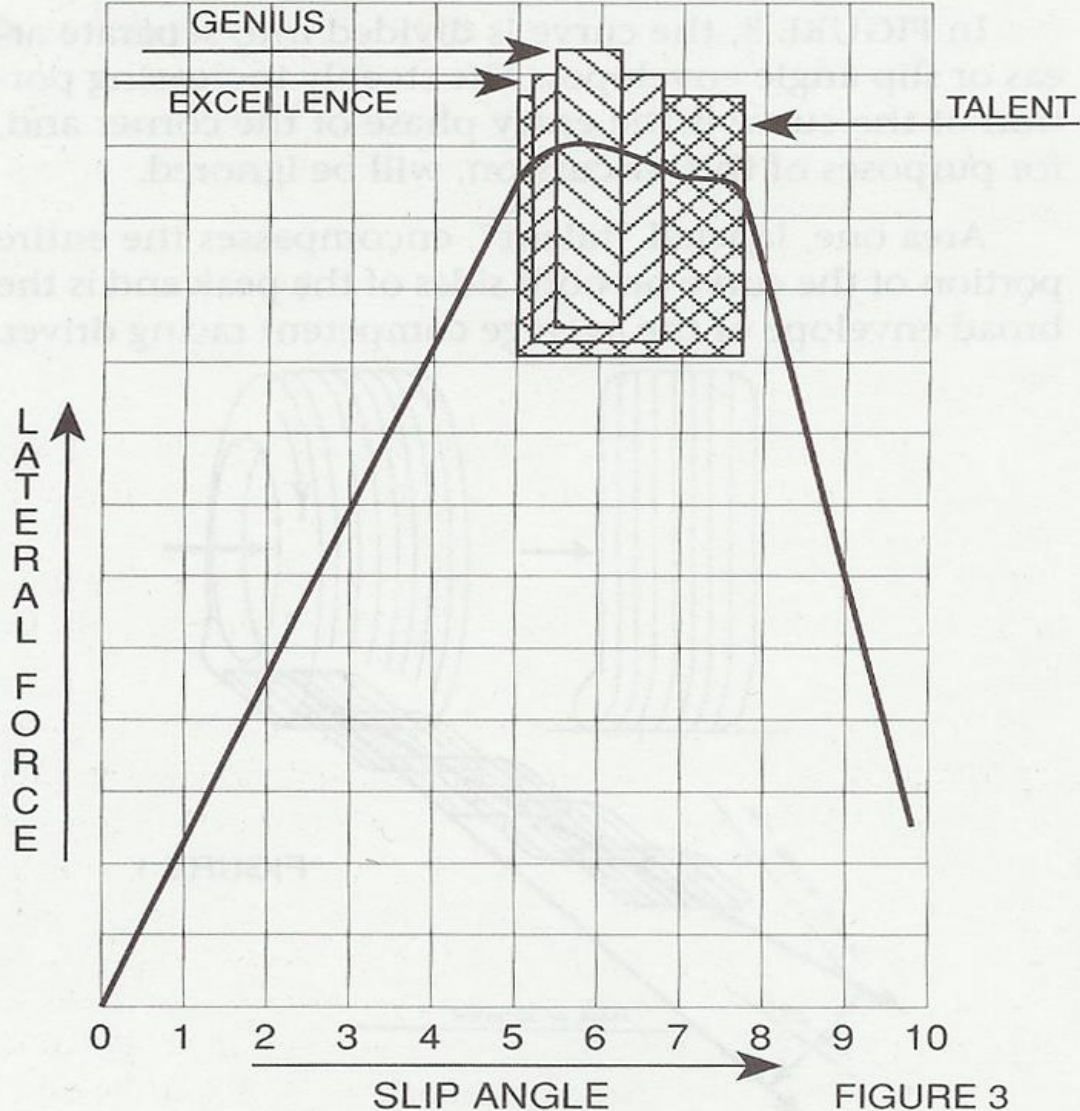
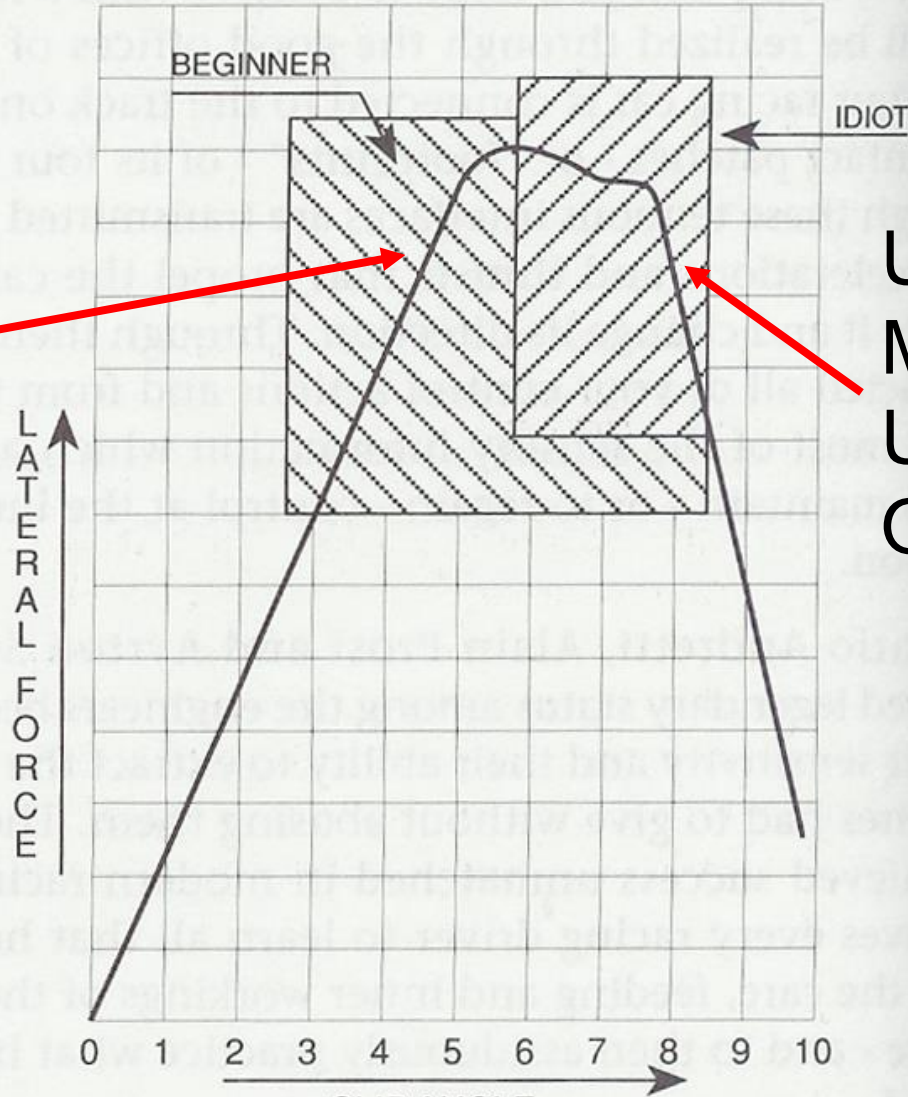


FIGURE 3

Carroll Smith: *Drive to Win*

BEGINNERS AND IDIOTS SLIP ANGLE ENVELOPES



Even,
controllable,
predictable

Unpredictable,
Massive
Understeer &/or
Oversteer

NNJR 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?

- Is it scary?



1. Pick a “safe” corner (!?!)
 - e.g. Turn 4; not Turn 1
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? Full throttle point?
5. Mid-corner: what do tires sound like? Feel like?
 - Are all of these consistent?
6. Visualize: 5’ earlier TAP or +3% cornering force
7. On track: reduced pace, try earlier TAP, FTP
8. Cornering force: remember slip angle graph!
 - Cornering best learned at AX, skid pad
9. Biggest improvement from earlier TAP and/or FTP
 - May require slightly slower early corner pace

NNJR 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
- Understand the physics
 - They set the car/tire limits





LIGHTNING TURN BY TURN