



Vision and Situational Awareness

NNJR Track Side Classroom Series



Porsche Club of America



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.

NNJR Agenda



Why is Vision Important?



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What Does it Mean to "Look"?



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Can Vision be Improved?



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How to Make Vision Worse!



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Summary + Q&A

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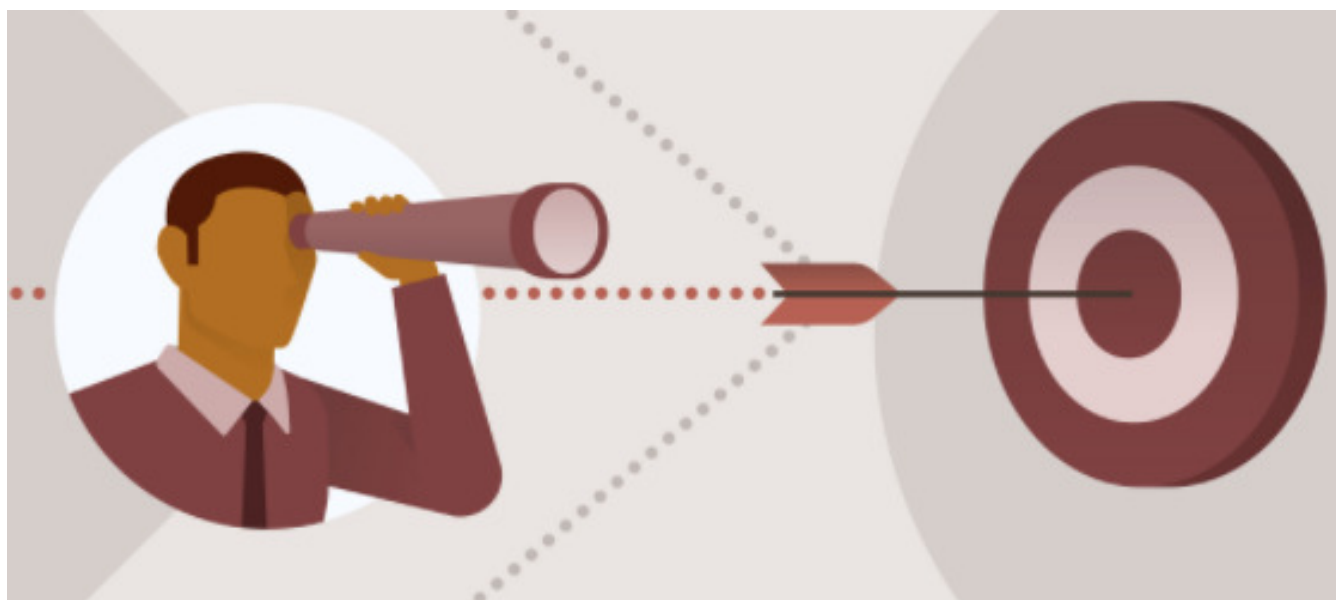
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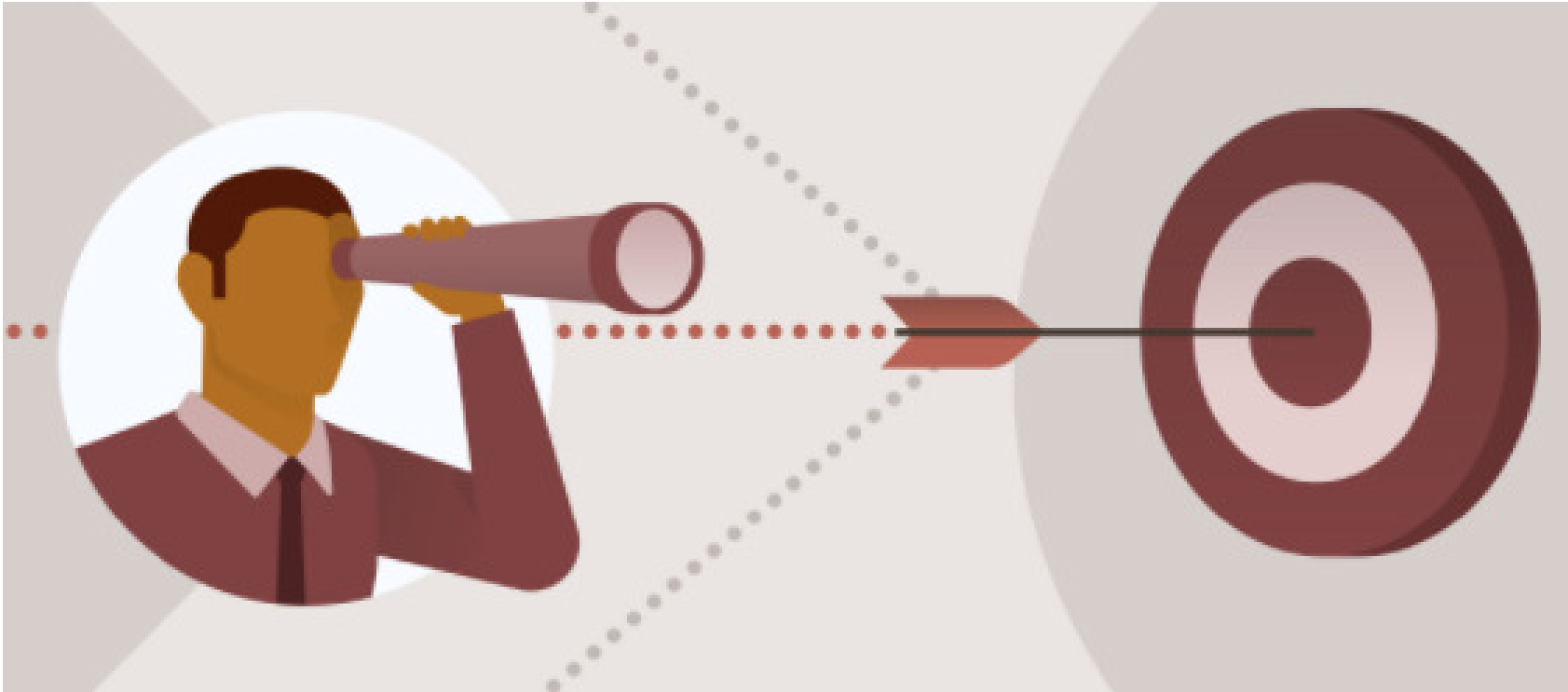
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Why is Vision Important?



- Look/focus where we are going





Why is Vision Important?



- Look/focus where we are going
- To “see” the line
 - Reference Points



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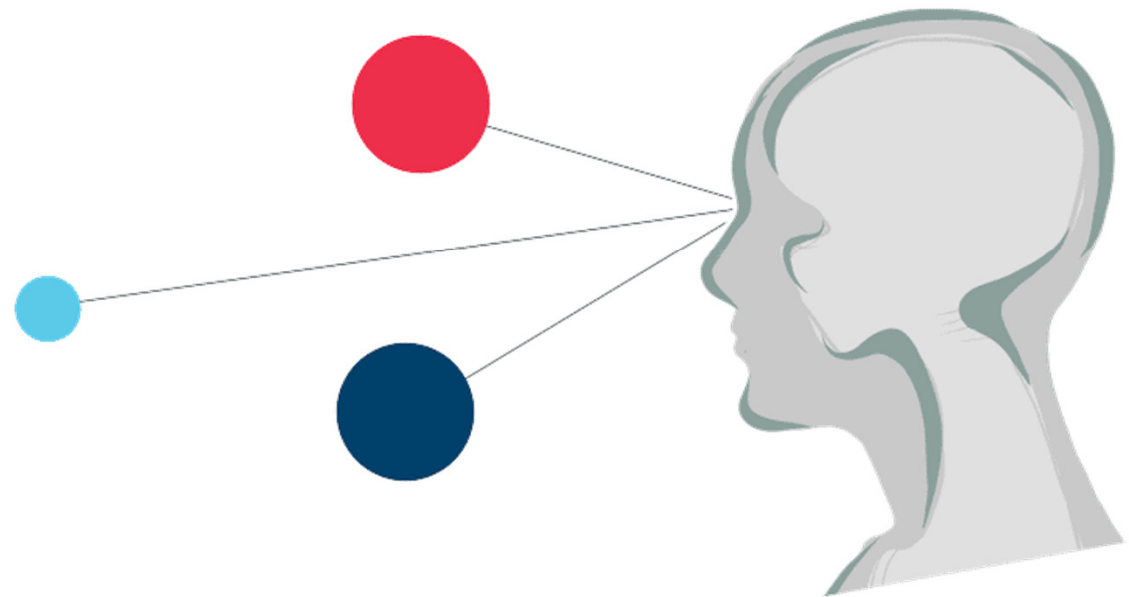
Why is Vision Important?



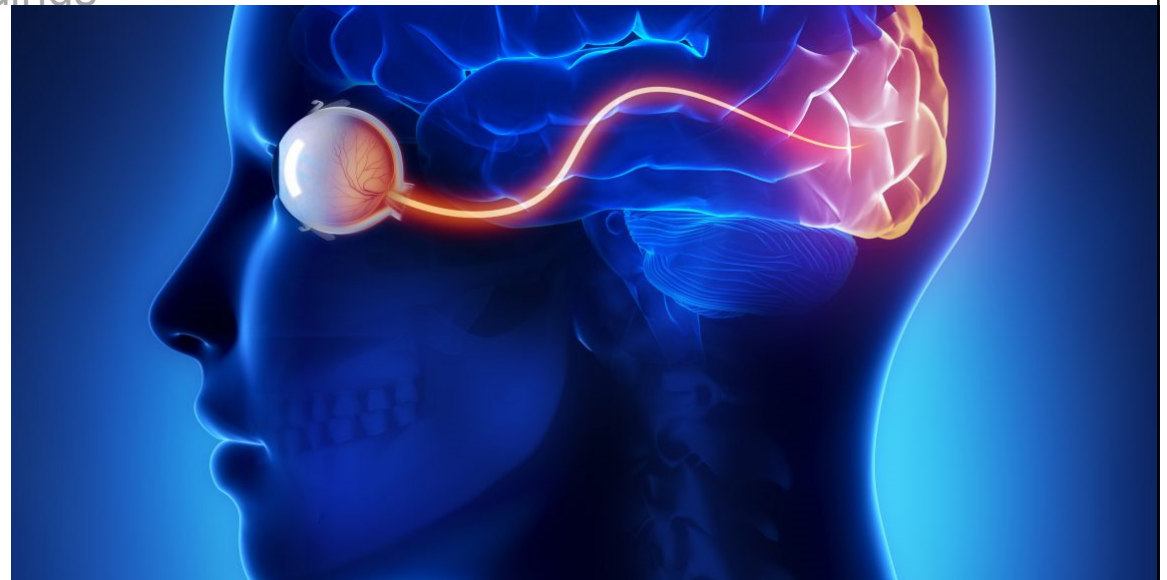
- Look/focus where we are going
- To “see” the line
 - Reference Points
- Safety
 - Situational Awareness
 - Flag stations
 - Traffic



- Look/focus where we are going
- To “see” the line
 - Reference Points
- Safety
 - Situational Awareness
 - Flag stations
 - Traffic
- Depth perception
 - Speed
 - Distance



- To see where we are going (duh)
- To see the line
 - Reference Points
- To be aware of our surroundings
 - Situational Awareness
 - Flag stations
 - Traffic
- Depth perception
 - Speed
 - Distance



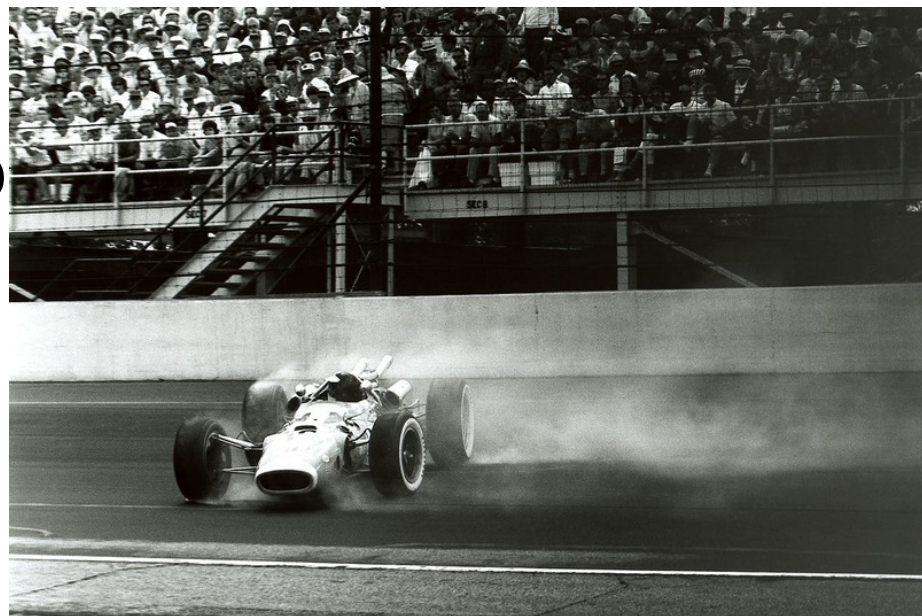
But

- Vision is worthless until
 - The brain processes what it sees and
 - Your hands and/or feet respond

NNJR Is “Classic” Advice Enough?



1. Look ahead
2. Look where we want to go
3. Lots of Reference Points
4. Use peripheral vision
5. Etc.



No: We can do better!



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What Does it Mean to “Look”?





What Does It Mean to “Look”?



- **Focus**
 - Central vision, 1 second or more, 3-5 degrees, 3% of what we “see”
- **Peripheral**
 - Side/surround vision
- **Glance**
 - Central vision, 1/2 second or less
- **Mental**
 - Your “mind’s eye”

Source: Central Indiana PCA



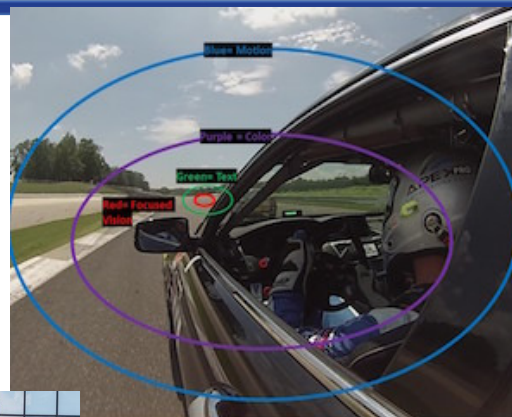
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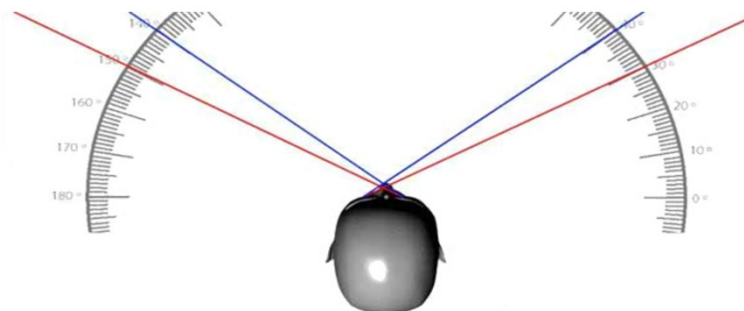
- How the Eyes Work



- Implications



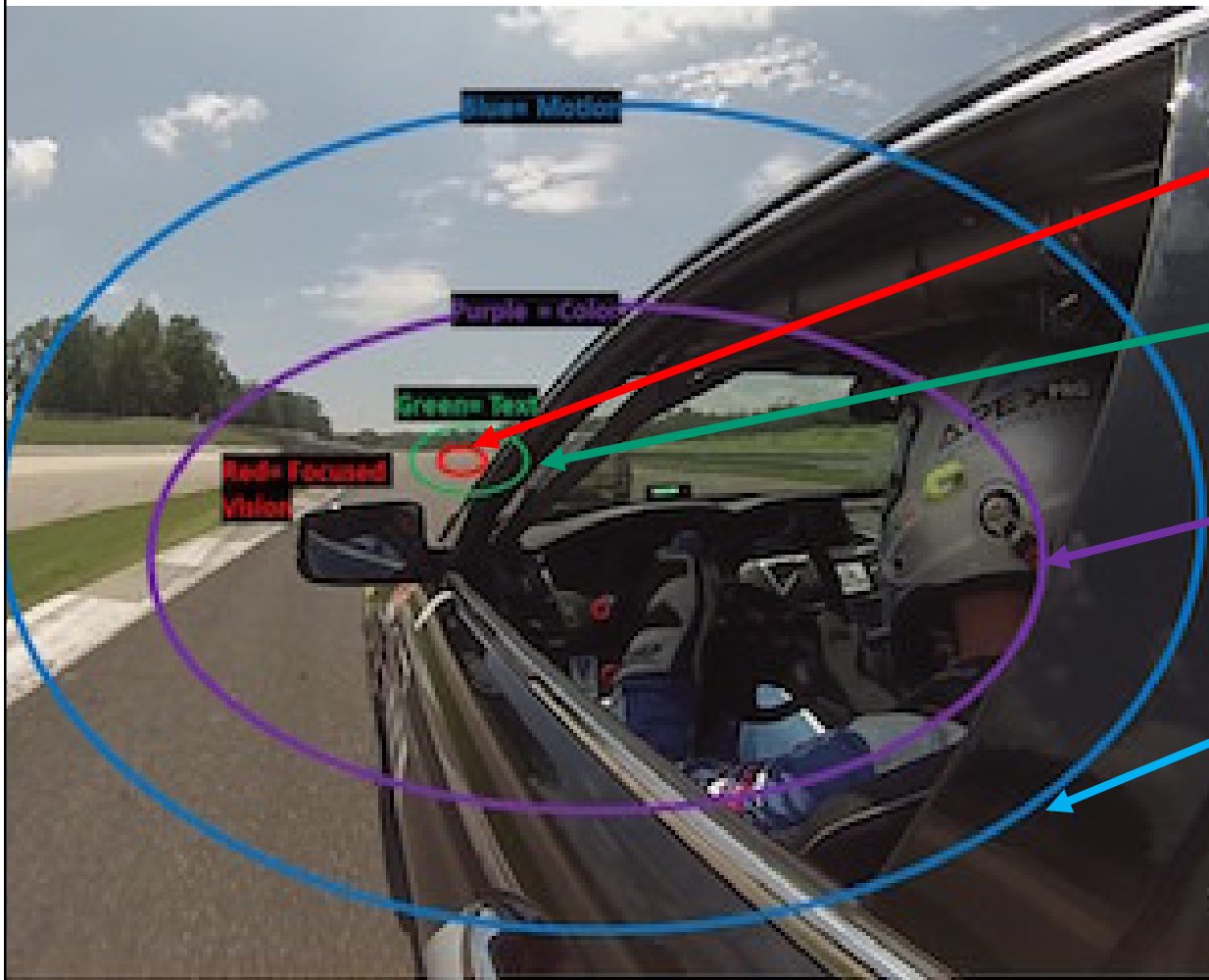
- Peripheral Vision



NNJR How the Eyes Work



- Vision focus and “zones”*



Focus (3-5 degrees)

Text

Color

Motion

** Speed Secrets 231, Power of the Periphery, by Andrew Rains*



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- Focus is small: 3% of our vision
 - Eyes move quickly (3+ times/sec)
 - Brain is slower (0.5 to 1.5+ sec)
 - Shorter: normal, expected
 - Longer: unexpected, surprise
 - We drive to focus (target)
- Text area only slightly bigger
 - Lap timers, etc. can easily disrupt
- Color is seen in much larger area
 - Warning lights, shift lights, etc.

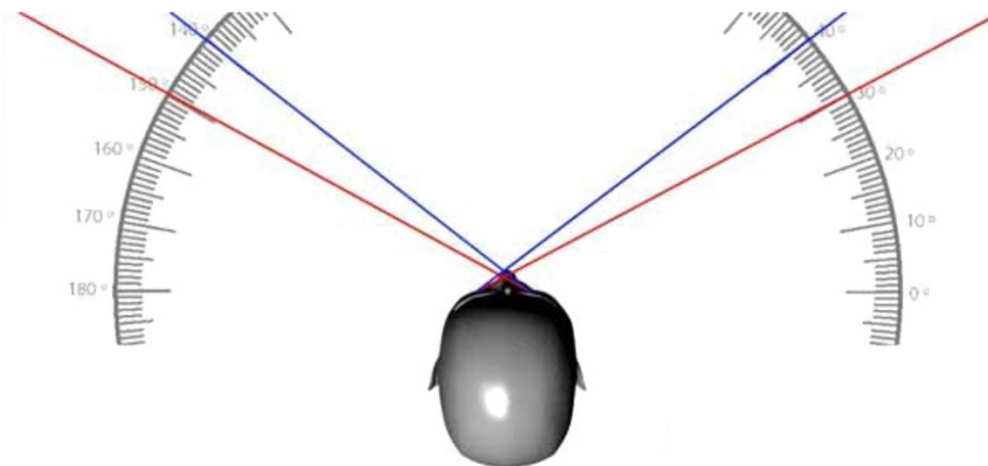


Carol M. Highsmith

NNJR “Peripheral Vision”



- Over 90% of our field of vision!
 - Less detail but sensitive to movement and contrast
- Critical on track
 - Focus ahead and use peripheral vision when close to Reference Points
 - Essential for “track awareness”
 - Mirrors
 - Cars, objects in motion
 - Part of depth perception



- A curve requires 3 points (basic geometry)
 - Our eyes have to "see" the whole corner
 - When we see the whole corner, we have (more) confidence
- Ocular driving: primary + peripheral + memory vision
 - Can you drive blindfolded ?!?



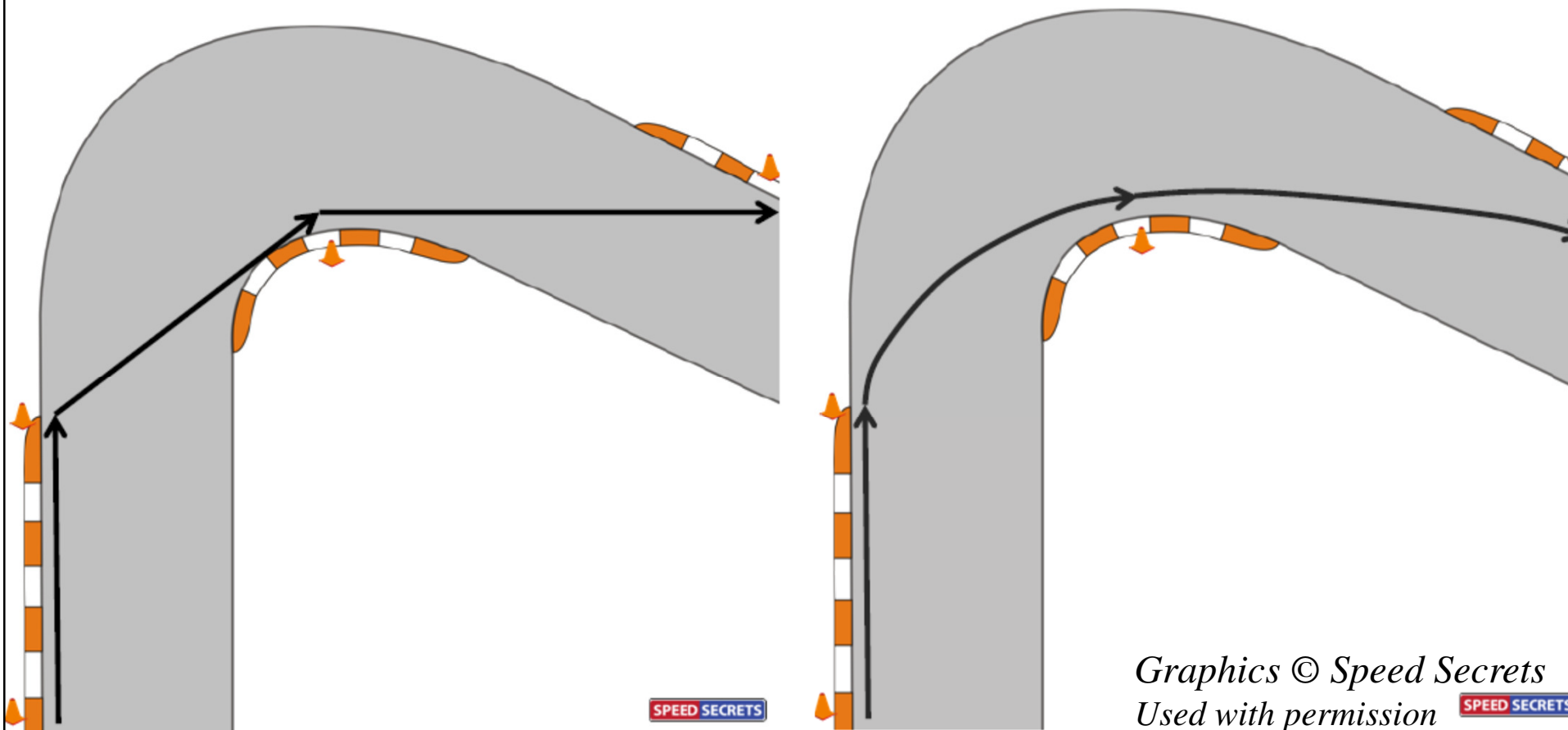
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* *Dennis Macchio*

NNJR How We "See" a Corner



- A curve requires 3 points (basic geometry)
 - Our eyes have to "see" the whole corner
 - When we see the whole corner, we have (more) confidence



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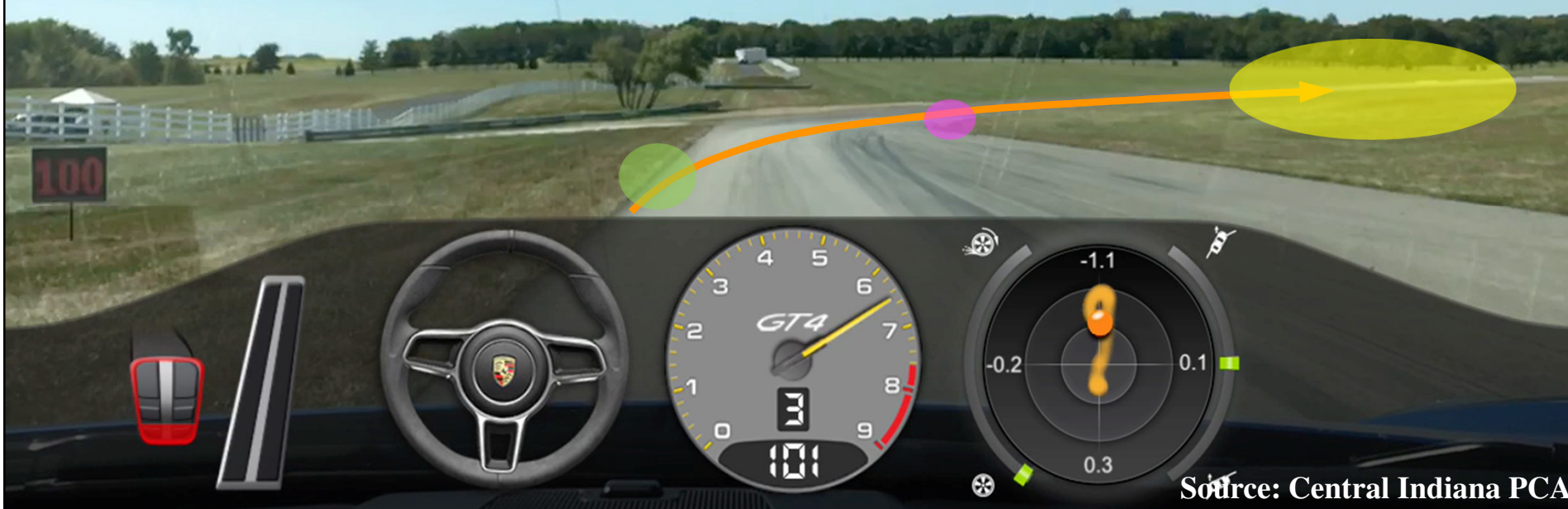
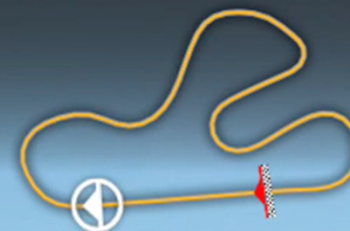
NNJR Example



Chuck Tucker, Cayman GT4, 09/10/2017
Putnam Park, Lap 7/15
Sector – Sector 1

Total Time: 0:08:19.8
Lap Time: 00:08.3

Glance
Mental
Focus
Peripheral



Source: Central Indiana PCA



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The Vision Process

1. **Mental Vision:** See the unseen in your “mind’s eye”
2. **Glance:** Ahead, sides, mirrors, checks
3. **Focus:** Primary “target”
4. **Peripheral:** Awareness, checks

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- Critical part of Situational Awareness
 - MUST be aware of cars behind
- Should never be surprised by a car in mirror
- Scan mirrors (esp. rear view)
 - On and end of straightaway
 - Are cars closer or further away?
 - Exiting a corner
 - Confirms how close the next car is

NNJR Mirrors?



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Can Vision be Improved?







How to Improve on-track Vision?



1. On the street
 - 5 seconds, 20 seconds
 - Focus vs. glance vs. peripheral
 - Adjust mirrors!
2. Visualization / Mental Imagery
 - Develop the mental picture!
3. Deliberate Practice
 - Sensory Input Sessions
4. Exercises





1. How Far Ahead Do You Look?



CONDENSED
PACKAGE

Vision in Driving - Part 1 - Visual Field / Focus



Watch later



Share

MORE VIDEOS



0:25 / 7:08



YouTube



Yes 89635.png



Show all



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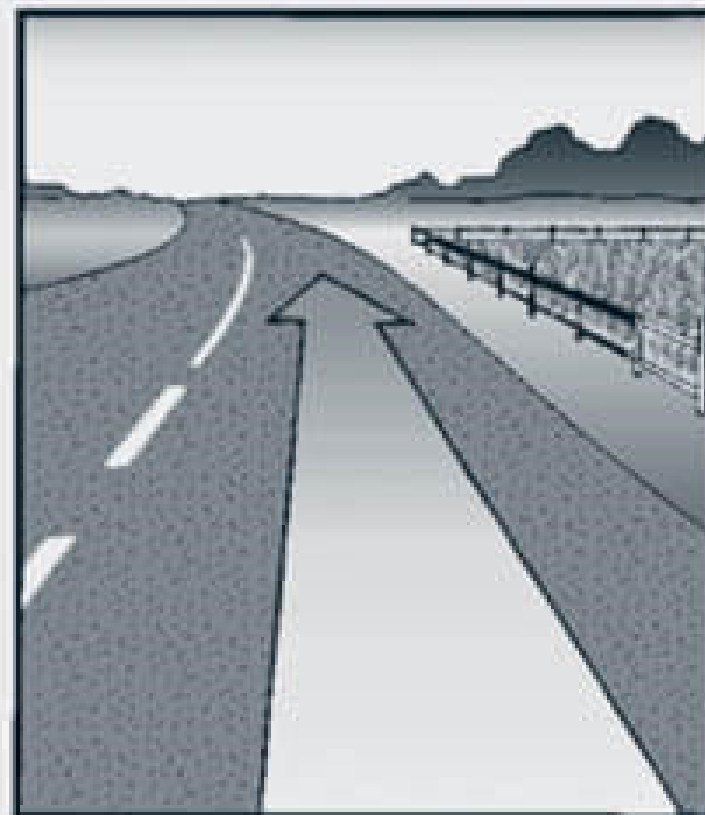
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CITY DRIVING

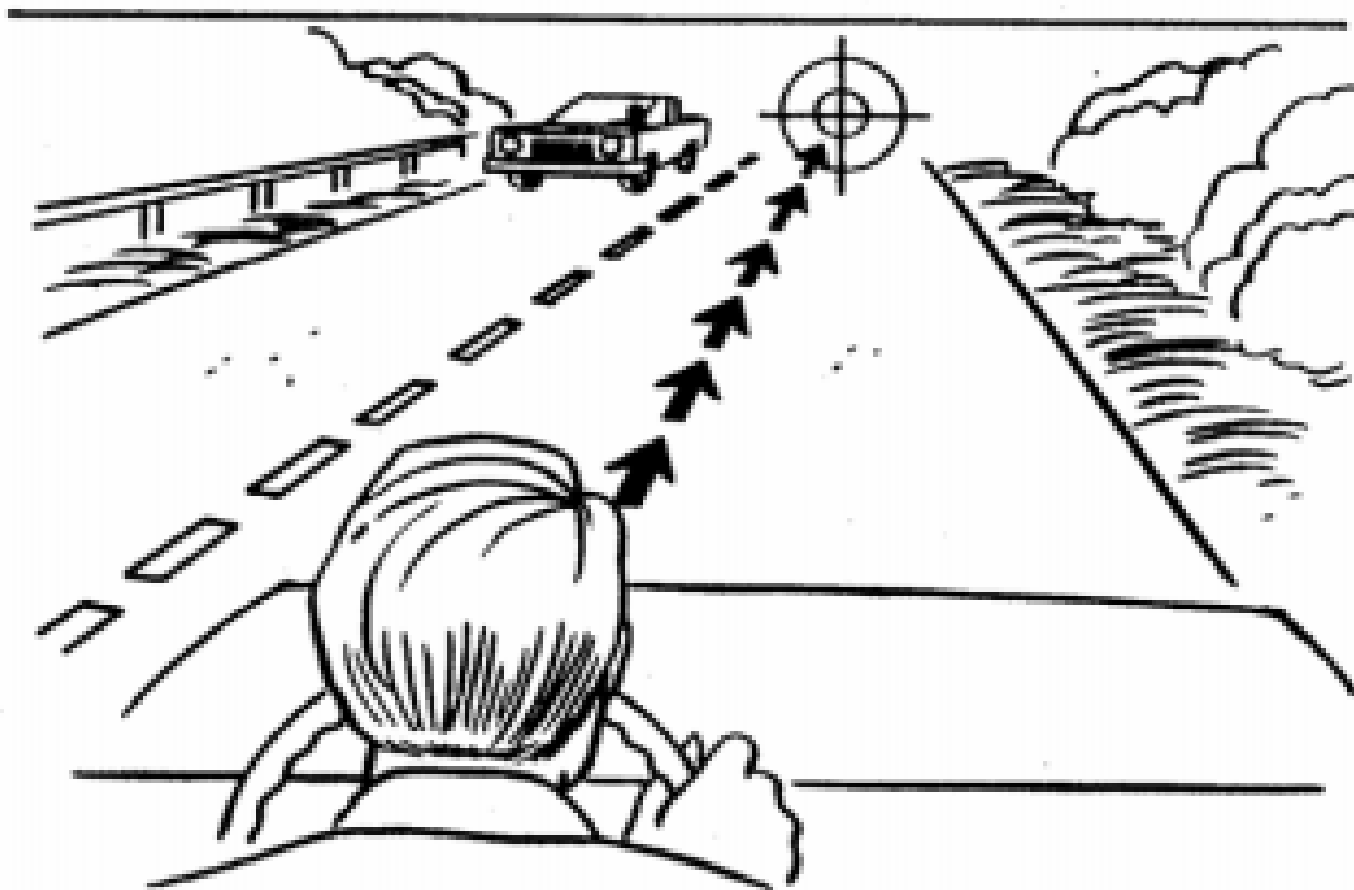


OPEN HIGHWAY

12-15 Seconds is About One Block 12-15 Seconds is About A Quarter-Mile



Look Where We Want to Go



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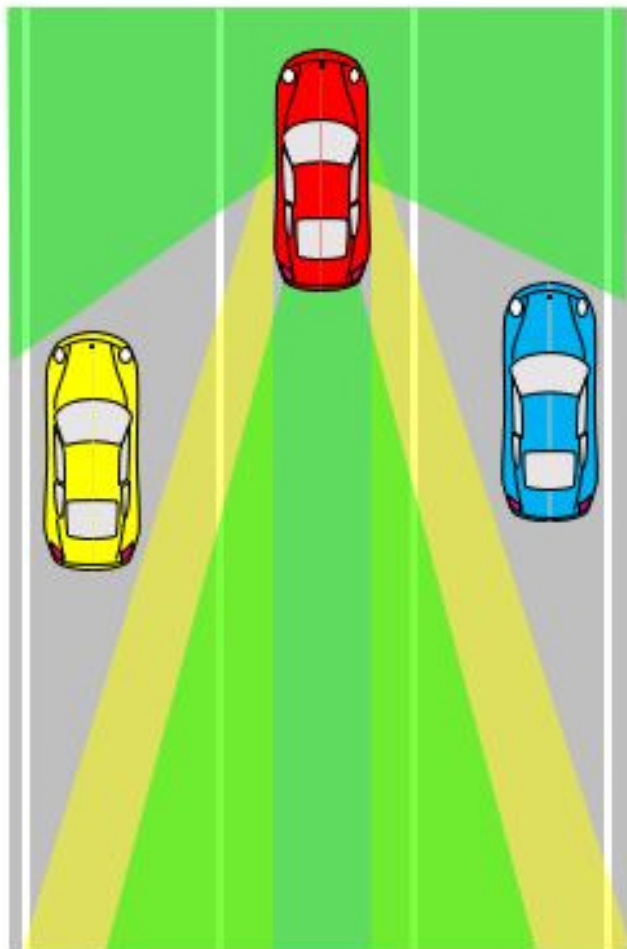
NNJR Adjust Mirrors!



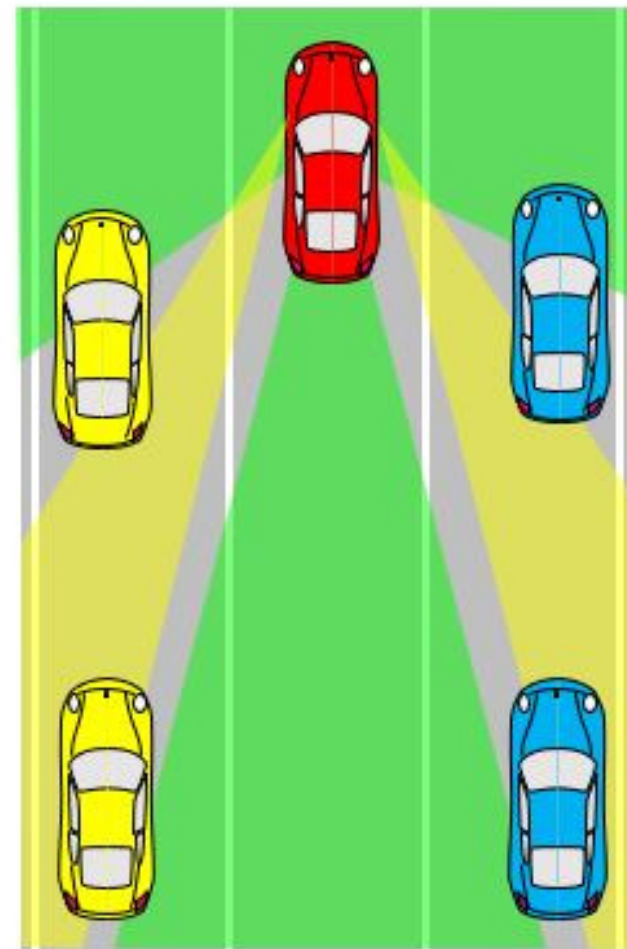
- **Start in correct seating position!**
 - Height tradeoff: up helps vision, down helps kinesthetics
- **MIRRORS**
- **Rearview Mirror**
 - Adjust to see entire rear window
- **Left Mirror**
 - Rest head against driver's window
 - Adjust to barely see left rear fender
- **Right Mirror**
 - Lean right so head is under rearview mirror
 - Adjust to barely see right rear fender



Common



Better



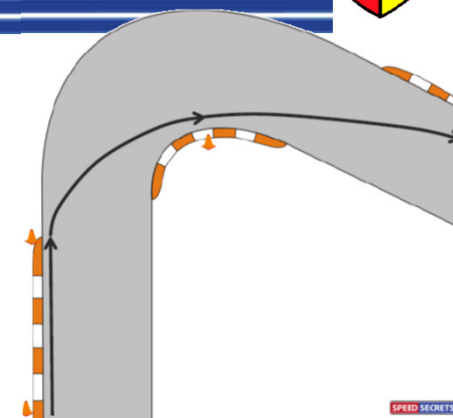
G. Plazer, "The Geometry of Automotive Rearview Mirrors—Why Blind Zones Exist and Strategies to Overcome Them," SAE Tech. Paper 950601 (1995).



2. Visualization / “Mental Vision”



- Develop “mental vision”*
 - A picture in your mind of entire corner
 - Start with in-car video of corner (over & over)
 - Key: Turn video off and visualize full corner including exactly how you want to drive it. Repeat.
 - Turn your head!
 - Move your hands and feet!
 - Imagine the sound the car will be making, how it will feel, physical movements you'll be making and how you will feel



SPEED SECRET

Using all your senses while doing mental imagery is powerful - and will make you a better driver.

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*Ross Bentley Speed Secrets 212

[See Mental Imagery Guide for Drivers](#)



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Safety

- How soon/far ahead can I see flag stations?
- Bail out area(s) for each corner

NJMP - LIGHTNING Deliberate Practice Worksheet: Vision 2

- Mirrors**
- Adjusted properly? (no blind spots)
 - How many cars behind?
 - End of front straight? Entering Turn 7?
 - Closing speed: Is car in mirror closer or further away?
 - What color(s) is/are cars behind?
 - Etc.
- Safety**
- How soon/far ahead can I see flag stations?
 - Bail out area(s) for each corner



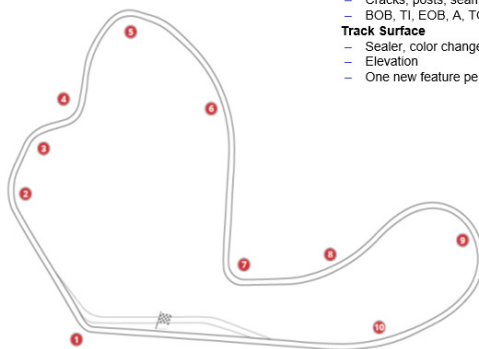
Remember: Capture learning immediately: in the first 10 minutes

- Write down what you saw, heard, felt
- Before lap times, data, video, socializing

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SpeedSecrets.com

NJMP - LIGHTNING Deliberate Practice Worksheet: Vision 3

- Reference Points**
- Not contest
 - Cracks, posts, seams, curbs, etc.
 - BOB, TI, EOB, A, TO, in between
- Track Surface**
- Sealer, color change, etc.
 - Elevation
 - One new feature per lap



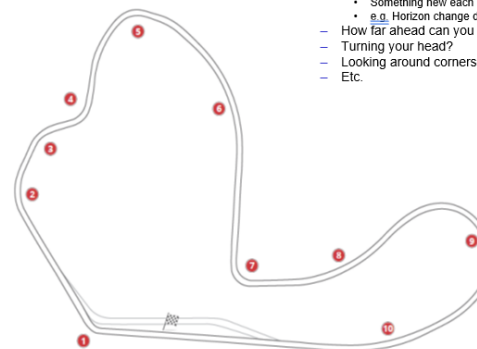
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NJMP - LIGHTNING Deliberate Practice Worksheet: Vision 1

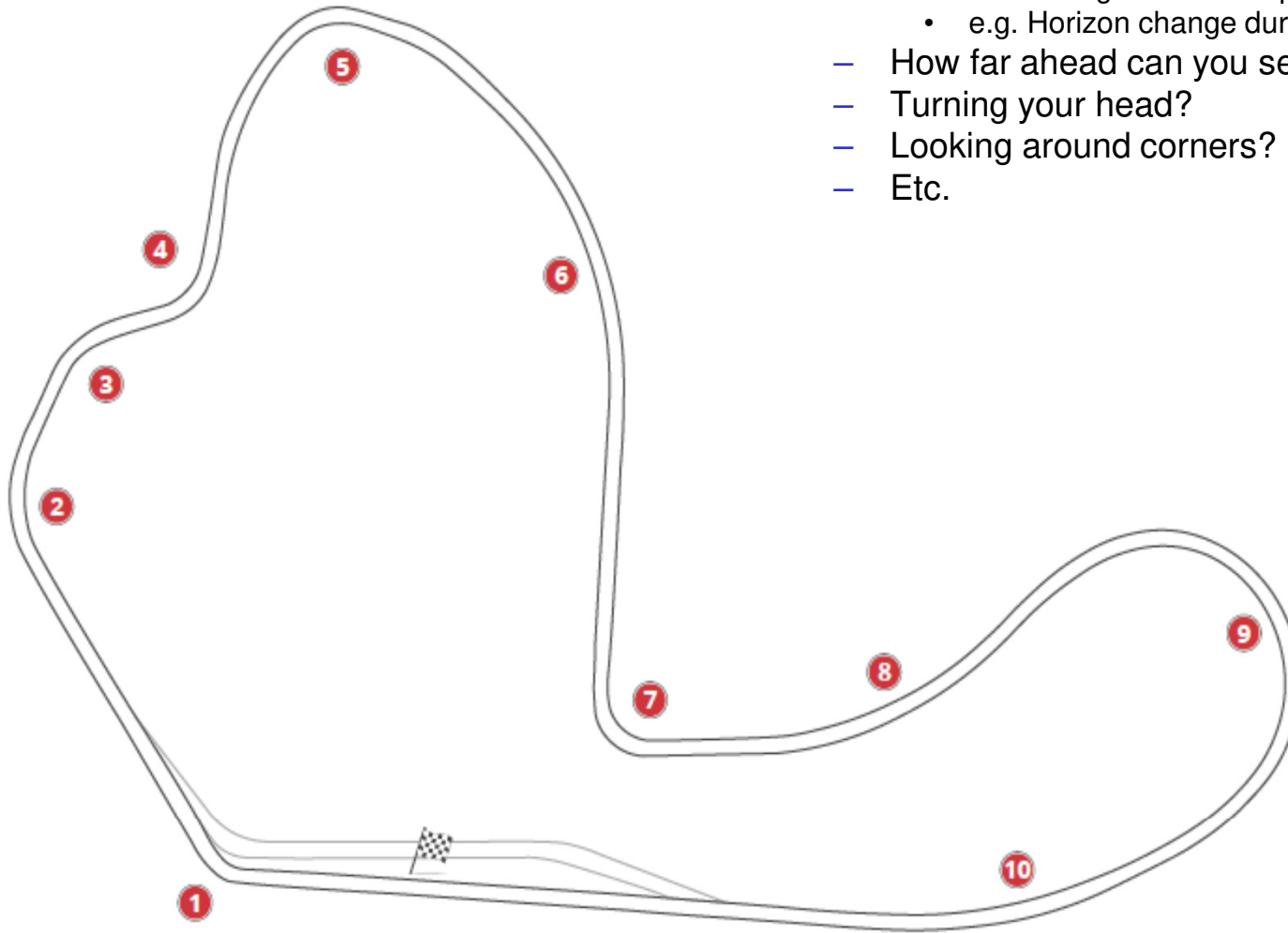
- General**
- Everything you see on and off track surface
 - Something new each lap
 - e.g. Horizon change during cornering
 - How far ahead can you see?
 - Turning your head?
 - Looking around corners?
 - Etc.



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SpeedSecrets.com

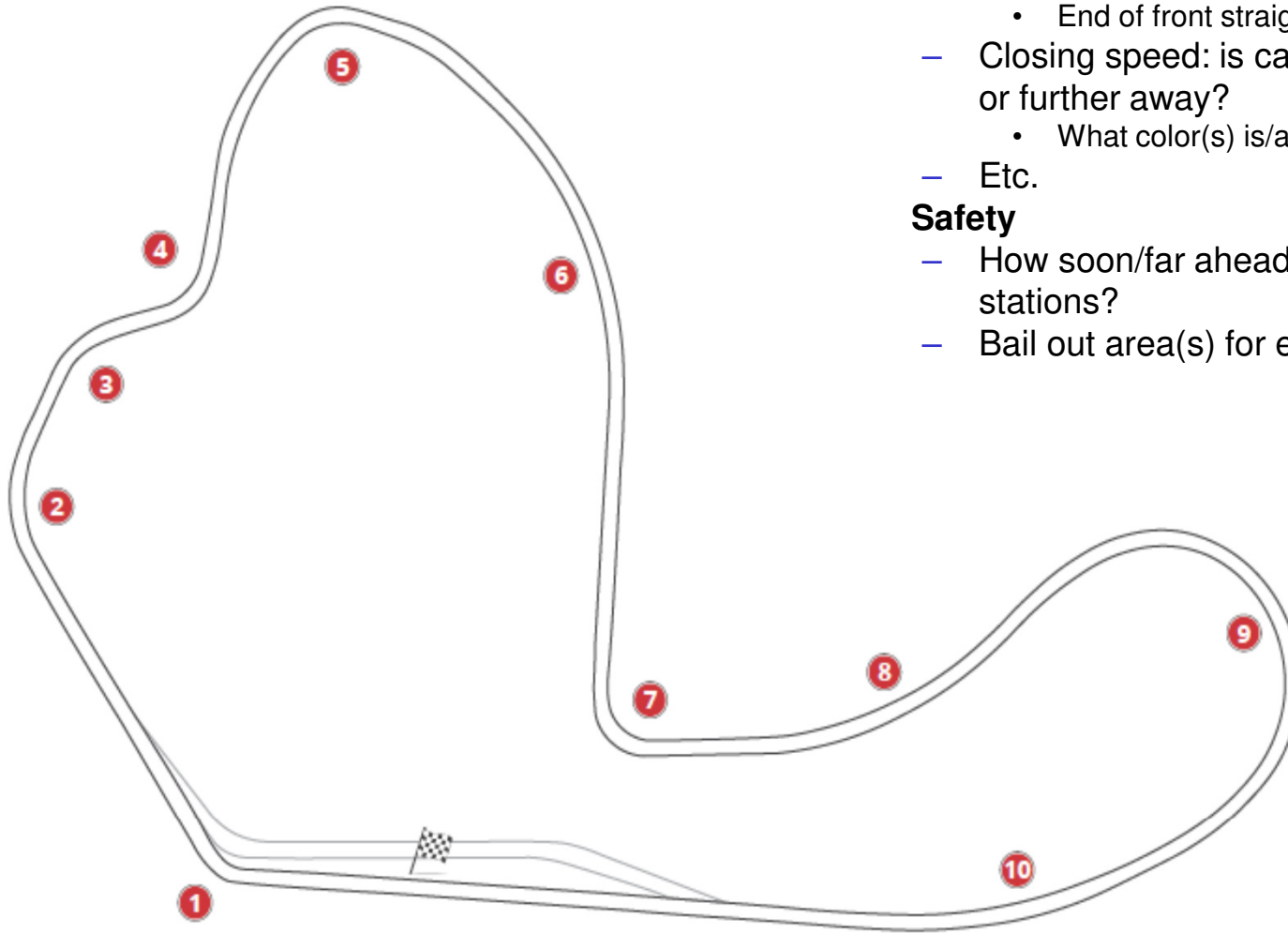
General

- Everything you see on and off track surface
 - Something new each lap
 - e.g. Horizon change during cornering
- How far ahead can you see?
- Turning your head?
- Looking around corners?
- Etc.



Remember: Capture learning immediately: in the first 10 minutes

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Mirrors

- Adjusted properly? (no blind spots)
- How many cars behind?
 - End of front straight? Entering Turn 7?
- Closing speed: is car in mirror closer or further away?
 - What color(s) is/are cars behind?
- Etc.

Safety

- How soon/far ahead can I see flag stations?
- Bail out area(s) for each corner

Remember: Capture learning immediately: in the first 10 minutes

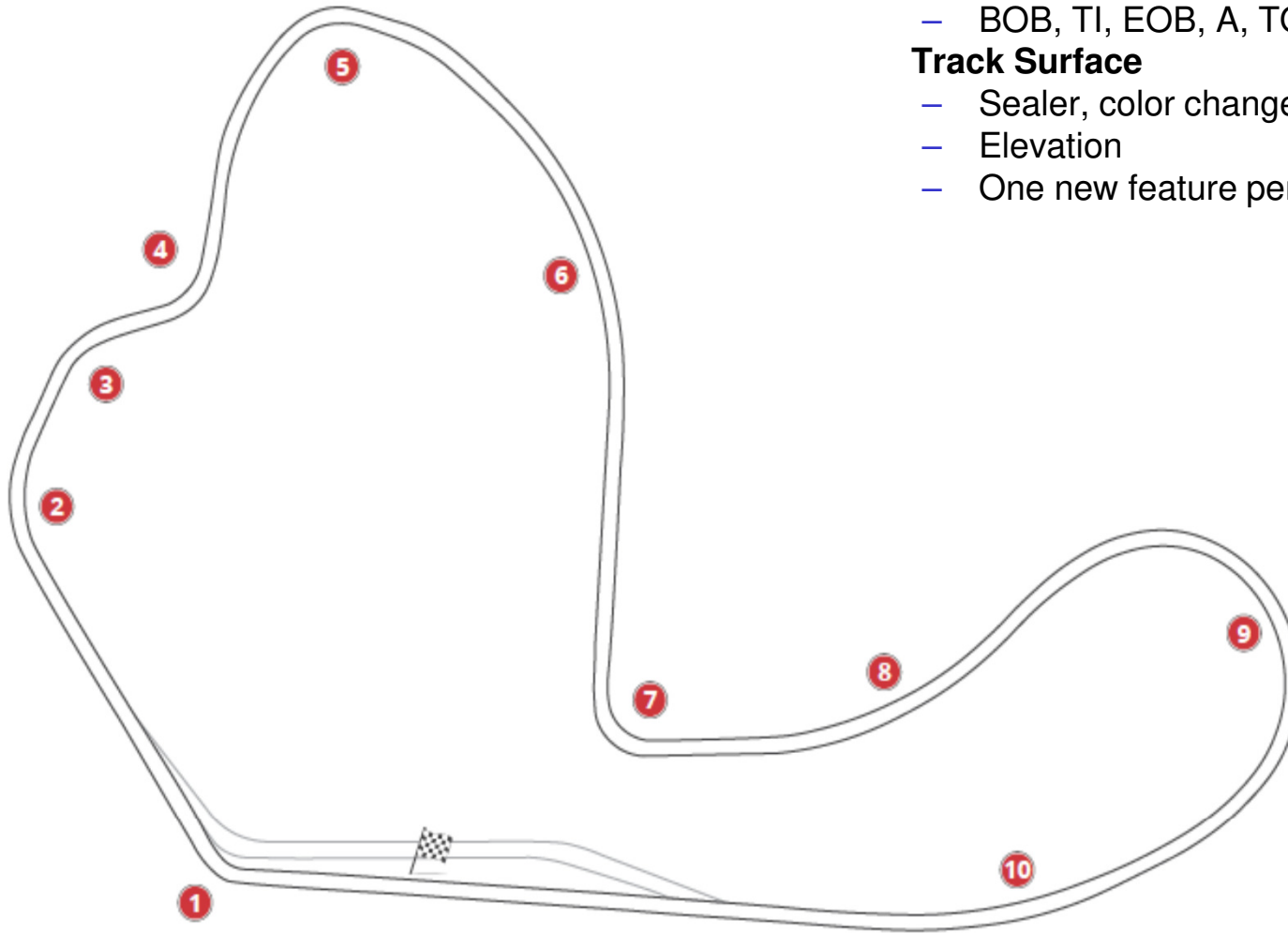
- Write down what you saw, heard, felt
- Before lap times, data, video, socializing

Reference Points

- Not cones!
- Cracks, posts, seams, curbs, etc.
- BOB, TI, EOB, A, TO, in between

Track Surface

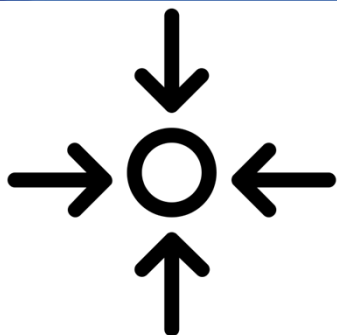
- Sealer, color change, etc.
- Elevation
- One new feature per lap



Remember: Capture learning immediately: in the first 10 minutes

- Write down what you saw, heard, felt
- Before lap times, data, video, socializing

- Focus



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from Noun Project

- Scanning



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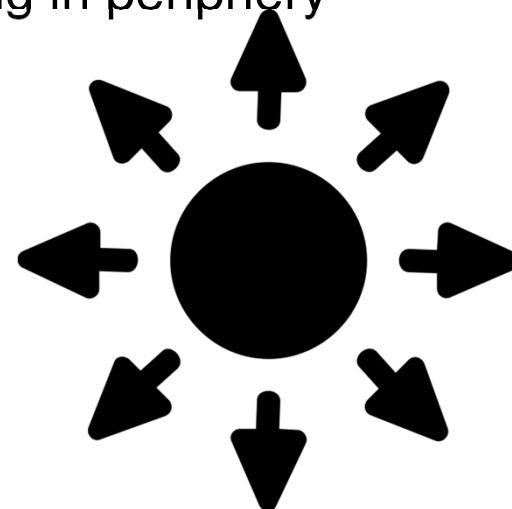
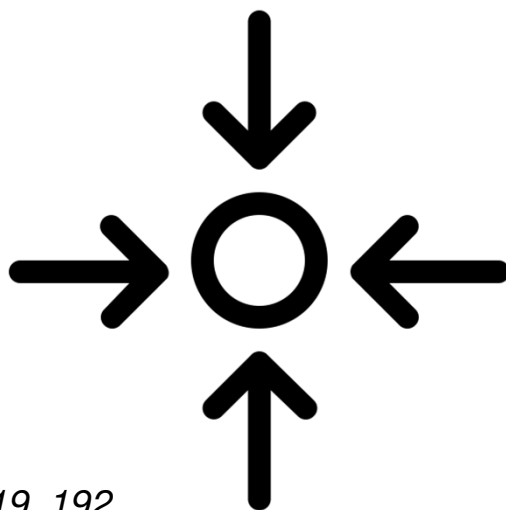
- Peripheral Vision



NNJR Vision Focus Exercise



- Focus on object across room or out window
 1. Without moving eyes, consciously note shapes and colors of objects in your periphery
 - As far as possible
 - Include up and down
 2. Laser focus* on that object for 20 seconds (zoom in)
 - After 20 secs, zoom out, pick up everything in periphery
 - Repeat



**Ross Bentley Speed Secrets 231, 219, 192*

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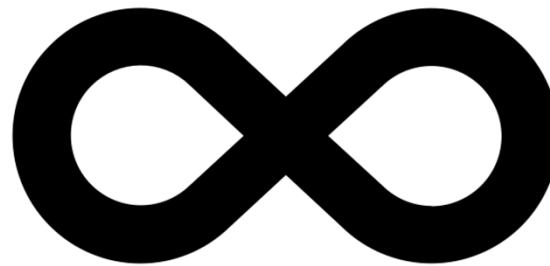
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NNJR Vision Scanning Exercise



- Stand with arm in front, make figure 8 on its side with hand. Follow with eyes, no movement of head
 - Eye movement should be fluid, not jerky



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- “Old” Peripheral Vision test. While looking forward
 - Extend arms horizontally to both sides, slowly bring forward
 - Repeat while wiggling thumb or fingers



**Ross Bentley Speed Secrets 231, 219, 192*



How to Improve on-track Vision?



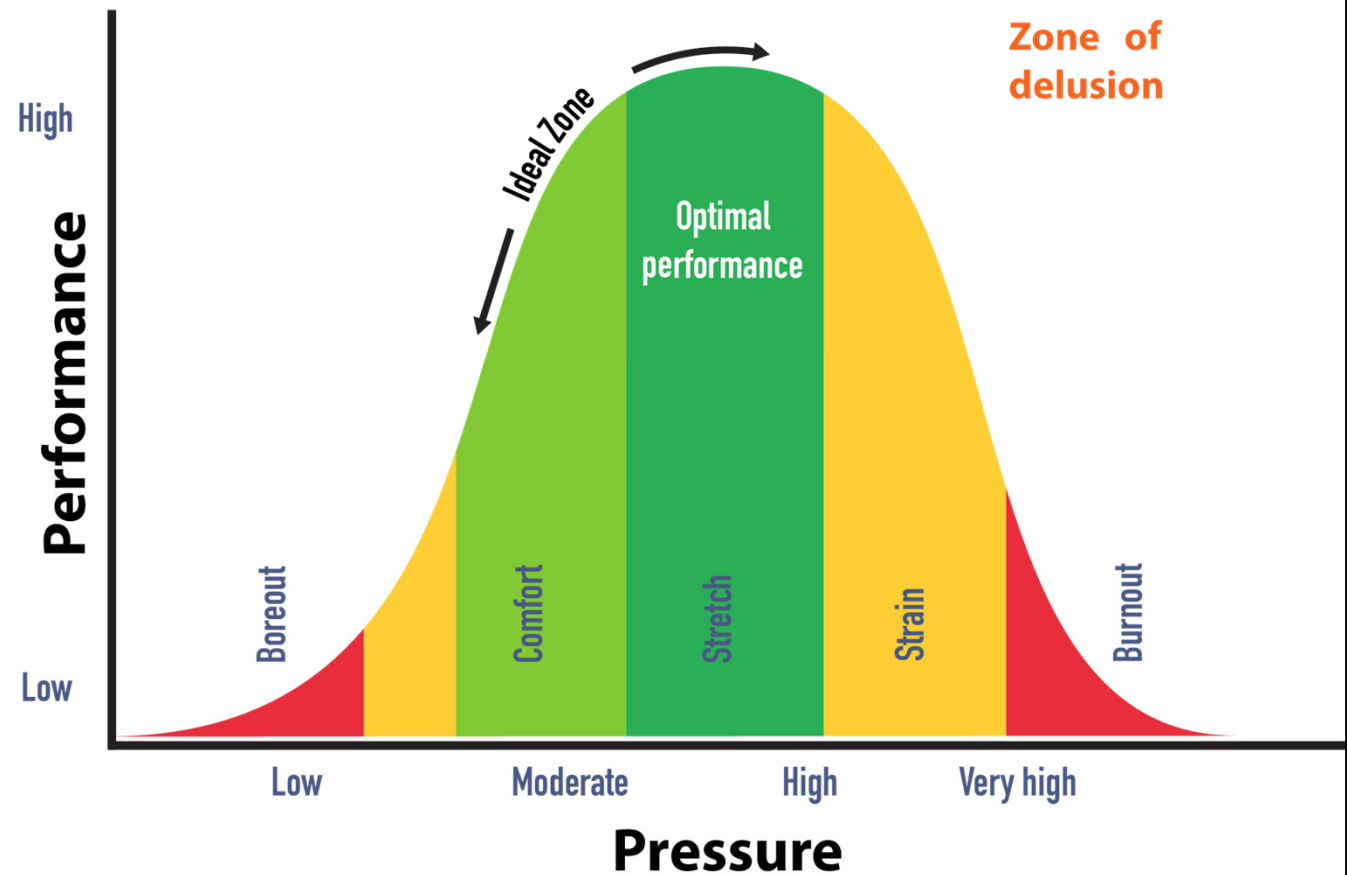
1. On the street
 - 5 seconds, 20 seconds
 - Focus vs. glance vs. peripheral
 - Adjust mirrors!
2. Visualization
 - Develop the mental picture!
3. Deliberate Practice
 - Sensory Input Sessions
4. Exercises



How to Make Vision Worse!



- In a rut / lose focus
- Pressure





Pressure and Stress



- Cause
 - Tunnel Vision!
 - Lose peripheral vision => Lose Awareness
 - Reaction time slows
- Don't go on track when stressed or tense
 - In staging or before, relax the body, from toes to head
 - Release tension, especially on the neck

*Speed Secrets 231, Power of the
Periphery, by Andrew Rains*



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Ways to Make Vision Worse



- In a rut / lose focus
 - Pressure
 - Tired
- “Lack of sleep can make you less alert and affect your coordination, judgement and reaction time while driving.”*
-- CDC



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Ways to Make Vision Worse



- In a rut / lose focus
- Pressure
- Tired
- Distracted



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- In a rut / lose focus
- Pressure
- Tired
- Distracted



Summary + Q&A

- Vision is Important
 - Classic Advice applies, but...
- Do You Know How to Look?
 - Mental, focus, glance, peripheral
 - Practice mental image of all corners
 - Emphasize Situational Awareness
 - Flags, Traffic, “bail out” space, etc.
- Many ways to improve “vision”
- Many ways to compromise “vision”



If You are Really Good...



- <https://www.facebook.com/wtf1official/videos/171929437071624/>
- <https://www.skysports.com/watch/video/sports/f1/10318759/eye-tracking-with-nico-hulkenberg>

