

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 Lime Rock, 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.

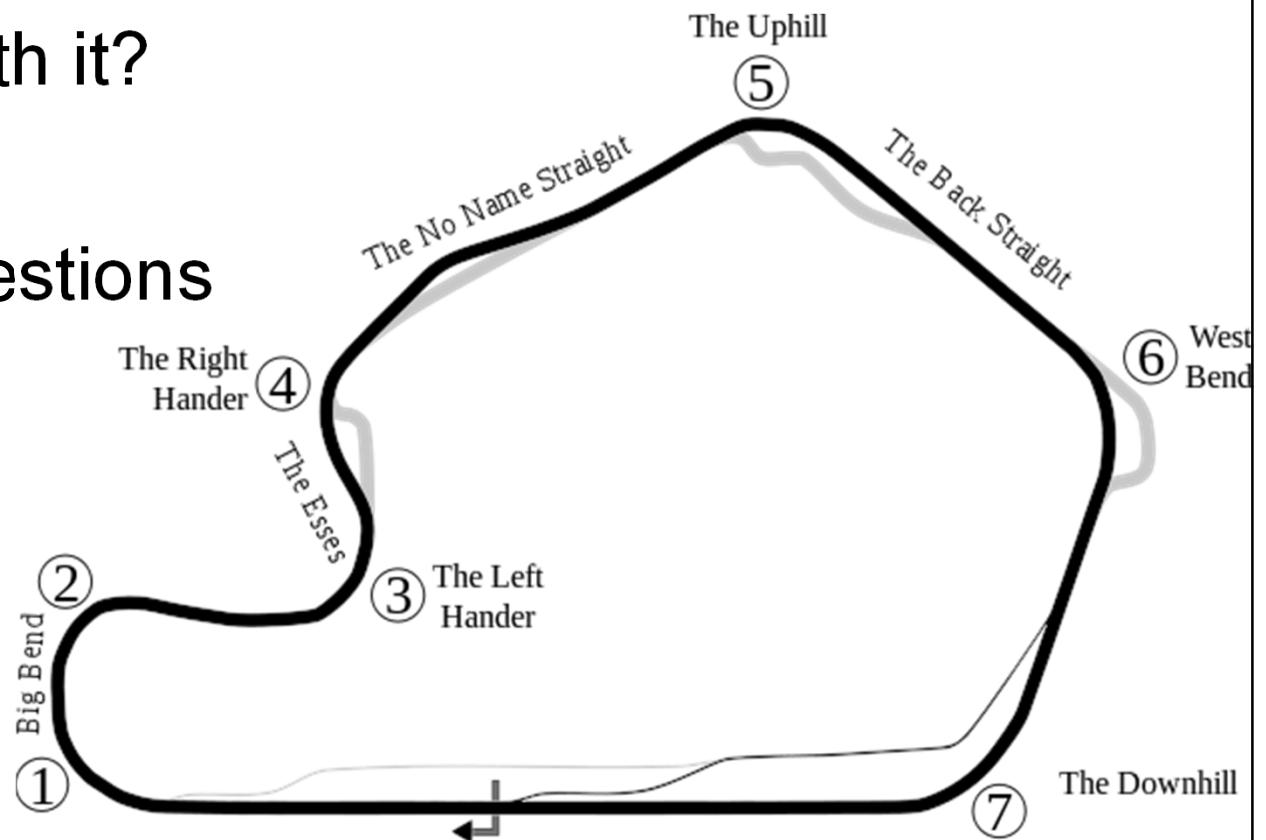
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Trackside Classroom

Weight Transfer



- Weight transfer
 - Why do we care?
- How to deal with it?
- Lime Rock Questions





Weight Transfer



$$A = W \times \mu$$

A = Adhesion

W = Weight

μ = Coefficient of adhesion (surface)

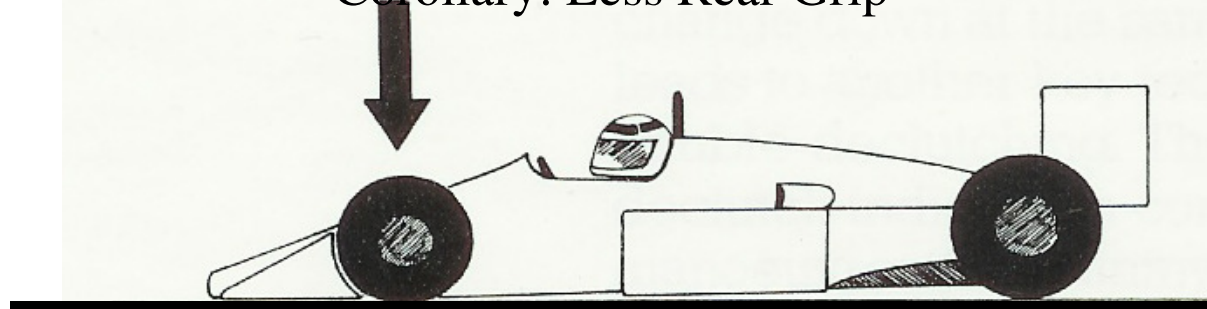
Why do you care?

Traction is based on weight!

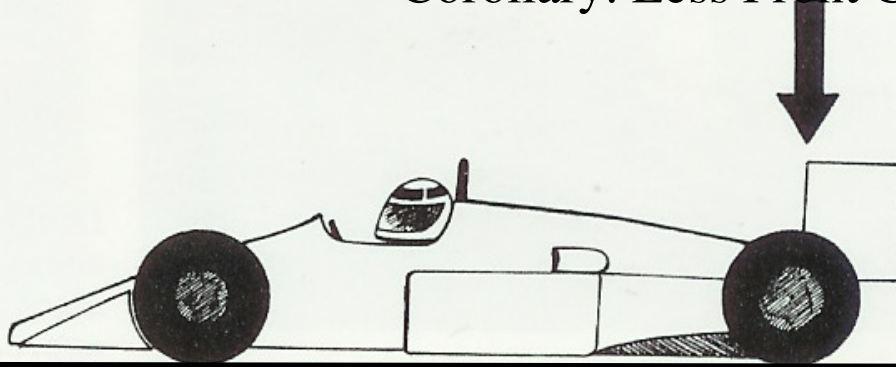


Weight Transfer: Acceleration and Braking

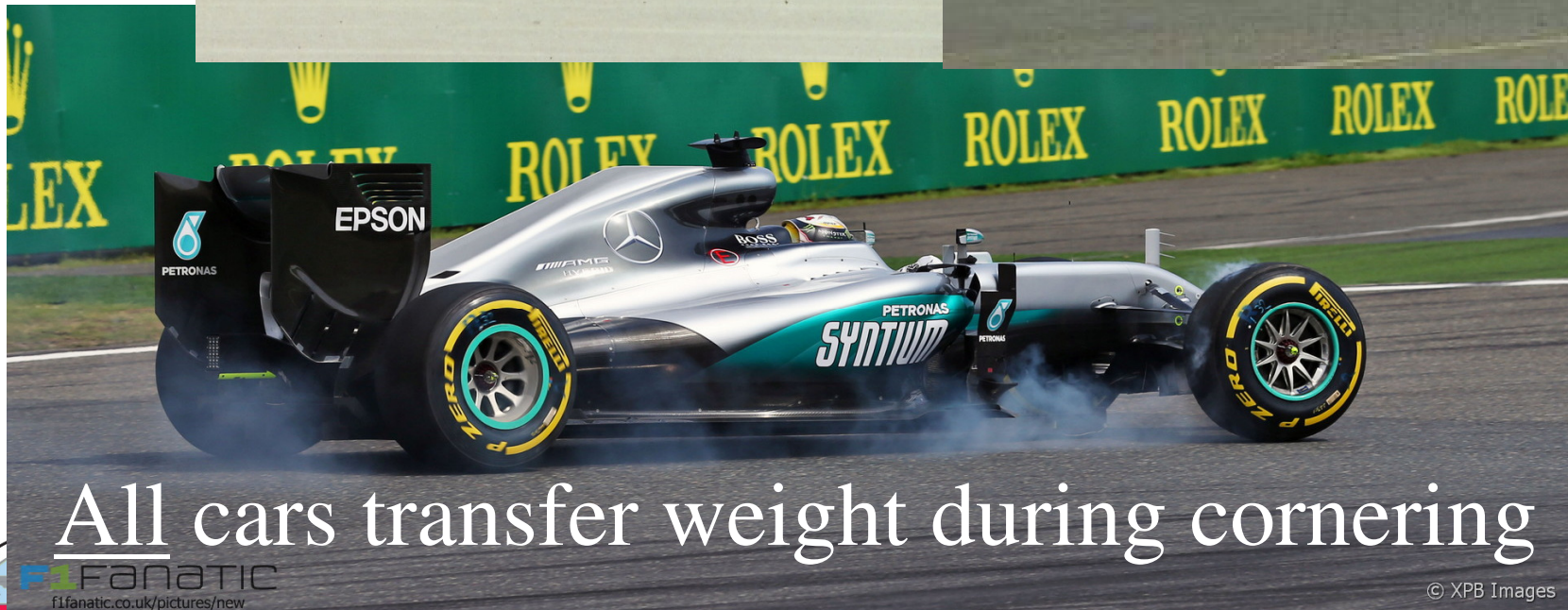
Braking: Weight Forward
Corollary: Less Rear Grip



Acceleration: Weight Back
Corollary: Less Front Grip



NNJR Weight Transfer: Cornering

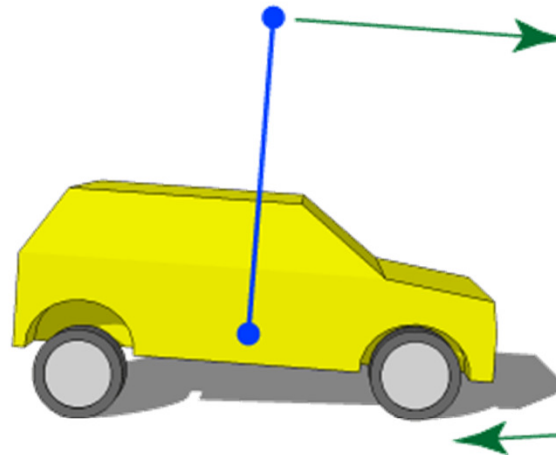


All cars transfer weight during cornering

© XPB Images



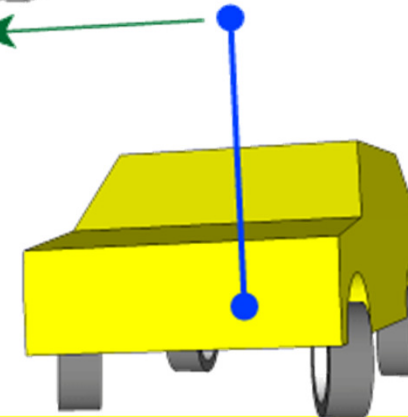
Braking: 300+ pounds
per front tire !



Braking

Cornering: 500 pounds
per outside tire !

Cornering



Rules of Thumb

Lateral Weight Transfer $\geq 30\%$ of car weight
Braking Weight Transfer $\approx 20\%$ of car weight
1000 lbs for a stock Porsche !!

Both are proportional to Weight, CG, and wheelbase/track inverse

- Lateral load transfer (lb) =
Lateral Acceleration (g) x center of gravity
height (in.) x Weight(lb) ÷ Track Width (in)
- Longitudinal load transfer (lb) =
Acceleration (g) x center of gravity height (in)
x Weight (lb) ÷ Wheelbase (in)



Dealing with Weight Transfer



- Weight transfer is inevitable
- But...sudden is bad
 - Weight should move smoothly, and only once
- And...less is better
 - Cornering: Outside tire gain < Inside tire loss
 - Braking: Front tire gain < Rear tire loss





Controls: Steering and Shifting



- Steering
 - Turn progressively and once: take a “set”
 - Always know where center is
 - Smooth: wind and unwind
 - Practice every day
- Shifting
 - Each shift upsets the car, takes time
 - Learn it the right way (3 steps)
 - Practice every day





Controls: Braking

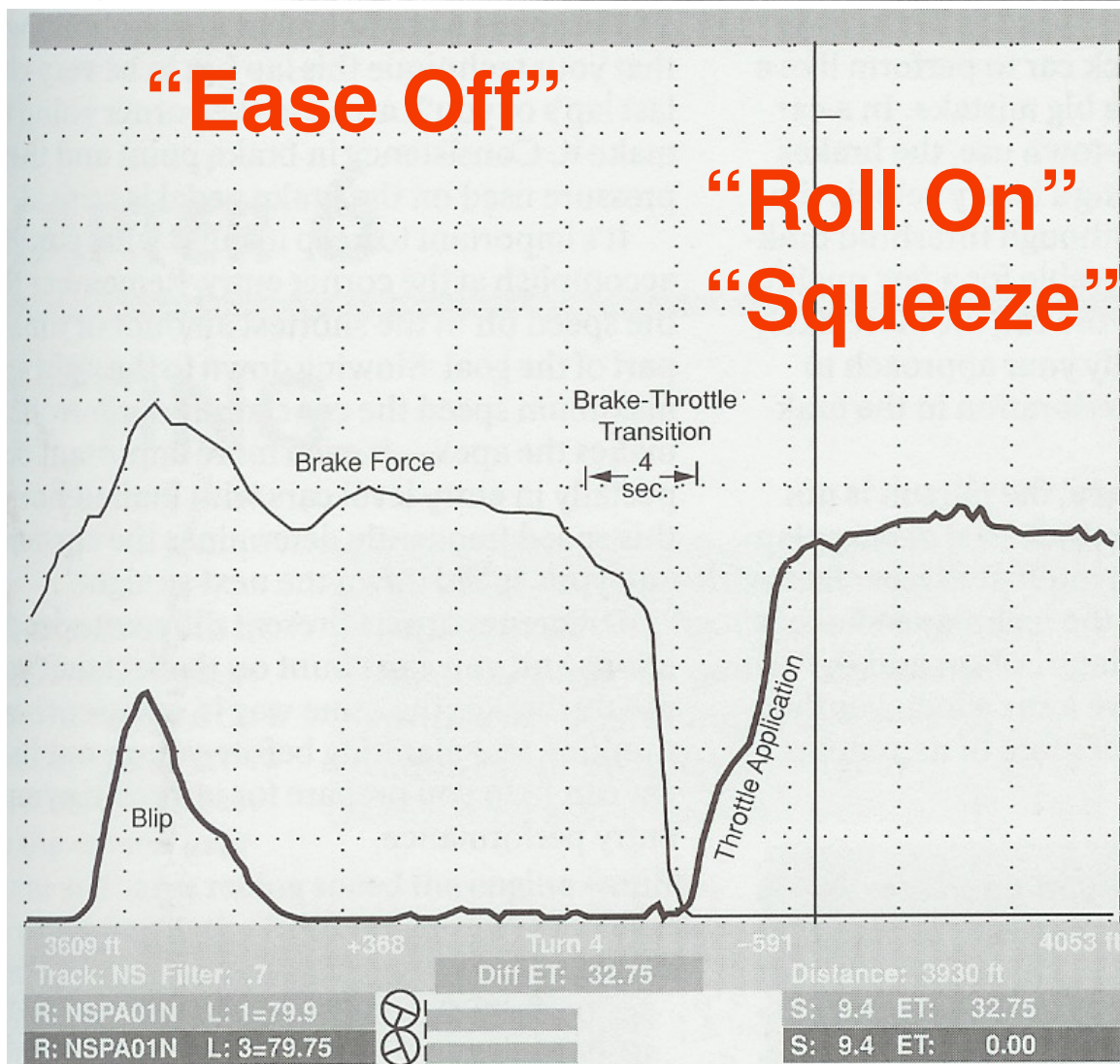


- Critical part of balance, hardest to learn
 - Move foot smoothly (heel on floor)
 - Smooth but hard initial pressure
 - Push against pressure
 - Gentle Brake Release
- On track, brakes are not for stopping! They
 - Set entry speed for a turn
 - Determine car attitude
- Focus on the End of Braking

Mario Andretti: *“Its amazing how many drivers, even at the F1 level, think the brakes are for slowing the car down.”*



NNJR Pace of Transition is Critical



Carl Lopez: *Going Faster!*





Its All about Balance !



- **Balance** = moving weight when, and where you choose to do so
- **Vic Elford**: “You will notice that professional drivers often act extremely quickly, but they are rarely in a hurry. Turning from a straight must be a smooth flowing transition into and then out of the corner.”
- **Jackie Stewart** (1985): “Senna is mellow on and off the throttle, calmly, smoothly, almost slowly.”





Objective = Improve



- Decide to get better on each run!
 - Admit you don't know it all
 - Warm up slowly—and smoothly
- Focus on:
 - One corner
 - One technique
 - One session at a time
- Avoid going out with your friend on every run
- Leave the car alone





Seat Time, Seat Time, ...



“There’s a huge difference between knowing what you need to do and being able to execute it.”

-- David Murry

“For every complex problem, there is a solution that is simple, neat, and . . .

wrong”

--H. L. Mencken

“In theory, theory and practice are the same. . .

In practice, they are not.”

-- Yogi Berra





Weight Transfer Summary



- Large amounts of weight move on track
 - Inevitable
- Improving weight transfer improves traction
 - Requires smoothness with controls
 - Objective = balance
- Steering, Shifting and Braking cause weight transfer
 - Learning to master braking is a lifelong challenge!

