Welcome


Flyin' Ryan

Bike Fitting

Your key to better power, less injury and more comfort

Our Objectives

- 1.To develop an awareness of how your bike fits.
- 2. To understand the principles of Bike Fitting.
- 3. Be able to work with a Bike Fitter of your choice to get the best bike fit of your life.

Fitting vs. Sizing

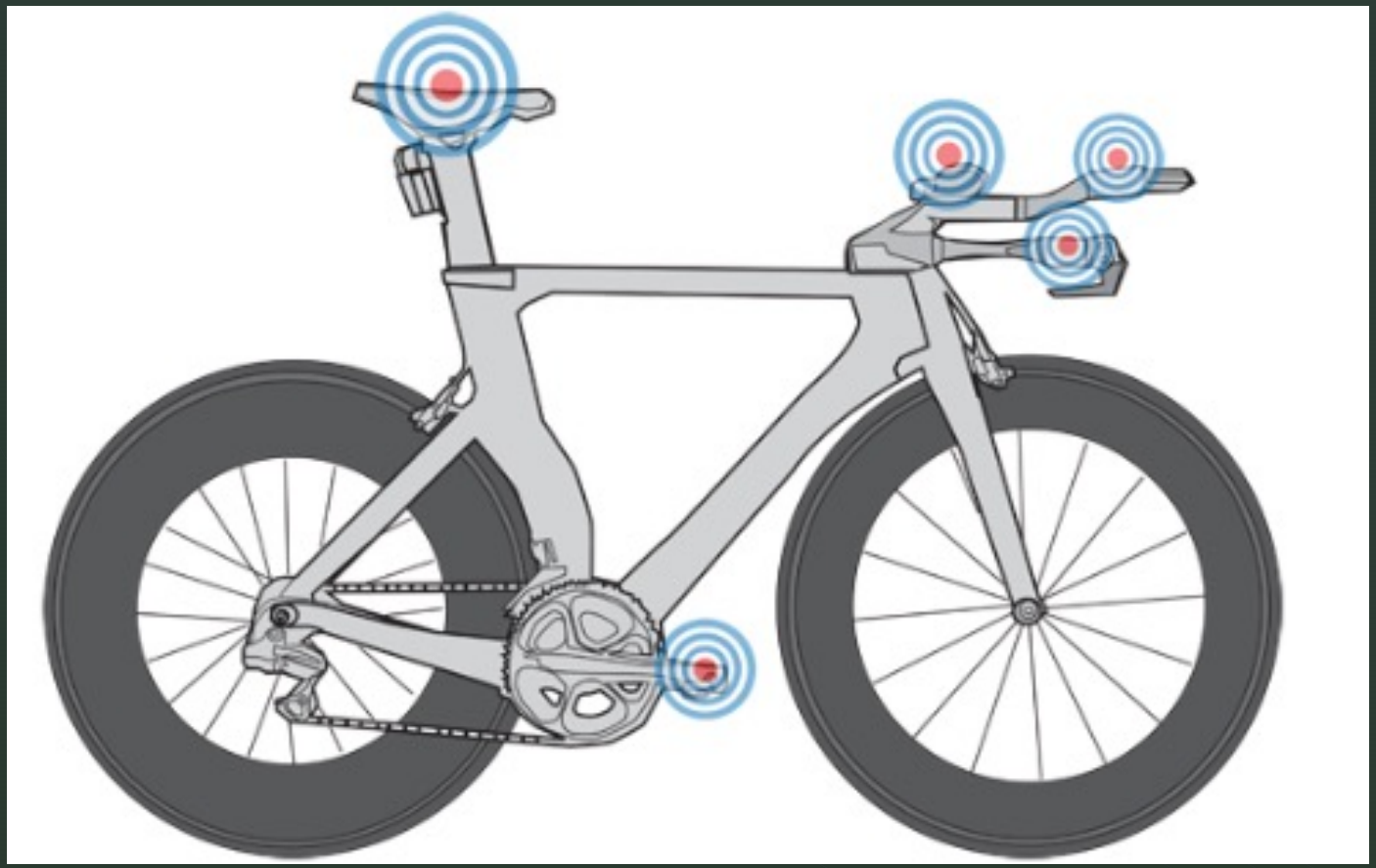
- **Sizing**
  - Getting an approximation of connection between the rider and the bike
  - Like a ready to wear jacket from the mall
- **Fitting**
  - Altering the cleat, pedal, saddle, handlebar, stem to a closer “bulls-eye”
  - Like going to a tailor to get a jacket altered to “fit” you better

Frame - too small

Frame – too big

Connection Points

Connection Points for Triathletes



Why Get a Bike Fit?

- Connection Points
  - Bike fitting is about all the connection points between the human and the bicycle.
  - A tailored fit that results in the bike becoming an extension of your body
  - We are fitting a very non-symmetrical being to a very symmetrical machine.
  - Adjust for anatomical changes as we age.
  - Adjust for unusual/special body types or asymmetrical body dimensions.

Tools of the Trade

Hex, Torx, Blade, Phillips srewdrivers,Torque wrench

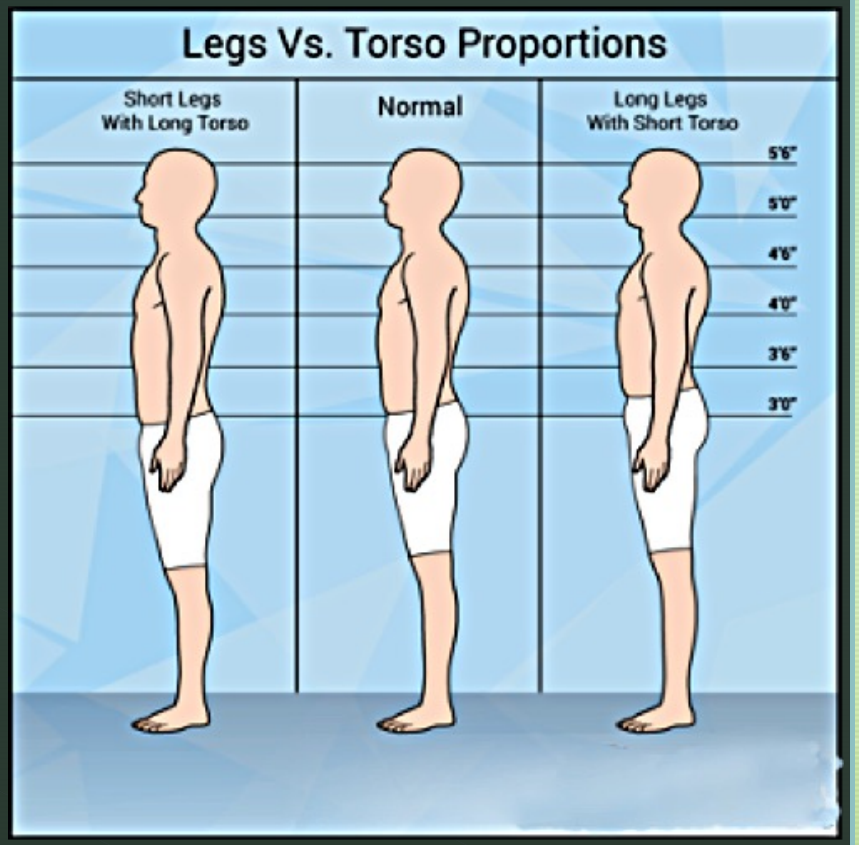
Full Set of Metric Wrenches and Sockets

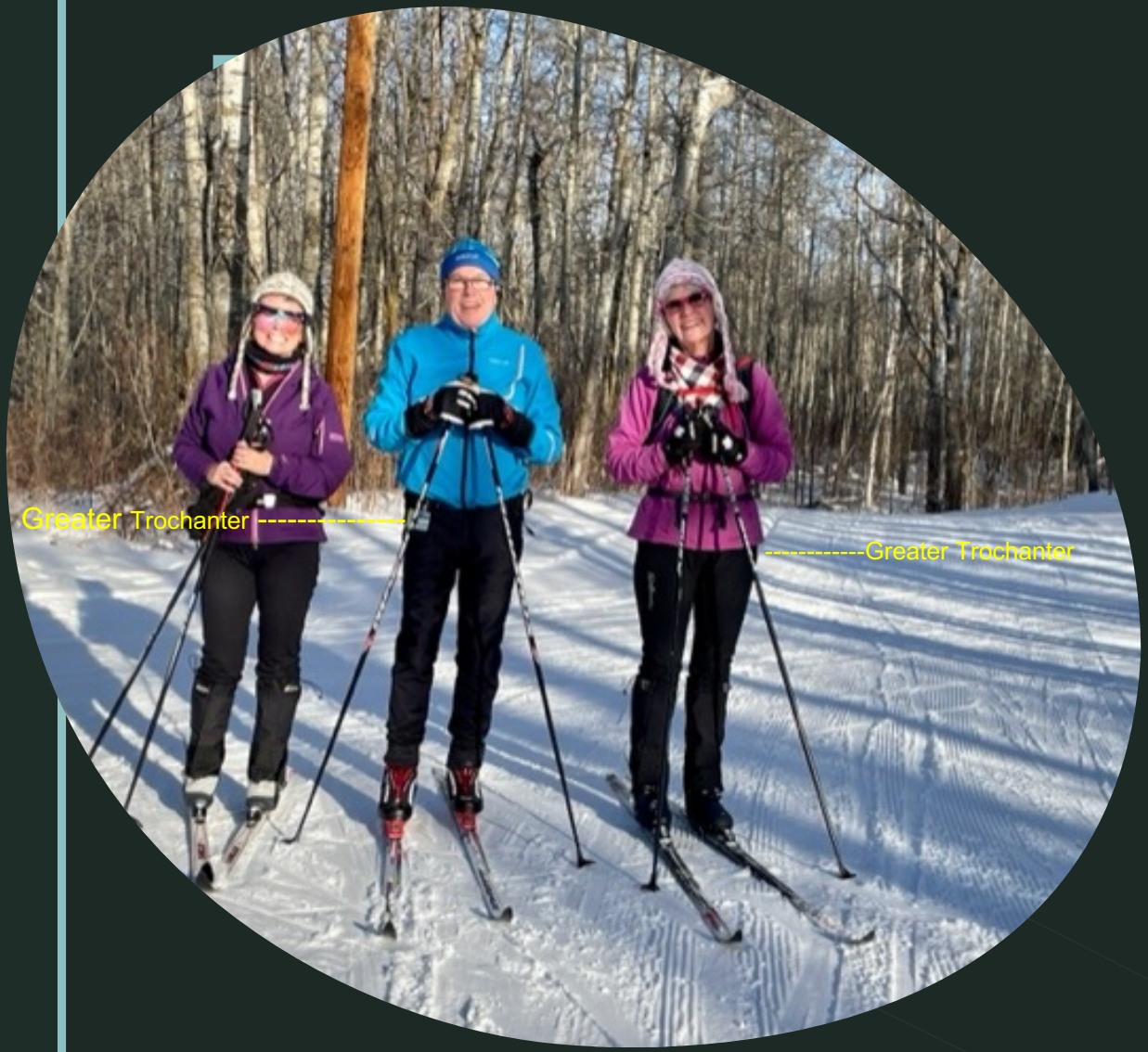
Goniometer, Laser Level, Level, and Angle Finder

Pipe cutter, in/out chamferer

3 Common Body Types

- Leg Length is most important when sizing a frame.
- Standing Height is almost useless for sizing a frame.
- Most mass-produced bikes are built for the normal body type.
- A custom crafted bike frame may be necessary.

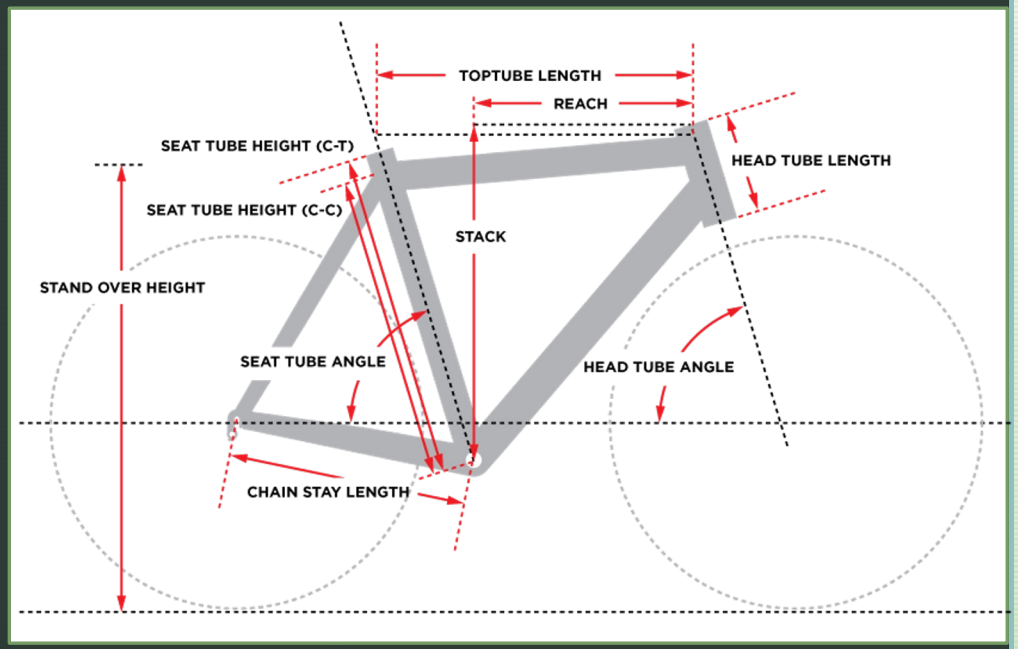




Leg length, not standing height is really, really important!

Frame Dimensions

- A real can of worms.
- Frame measurement points can be center to center, center to outside or center to inside.
- Measurement points change from manufacturer to manufacturer.
- Sometimes measurement points can even change within a single manufacturer.



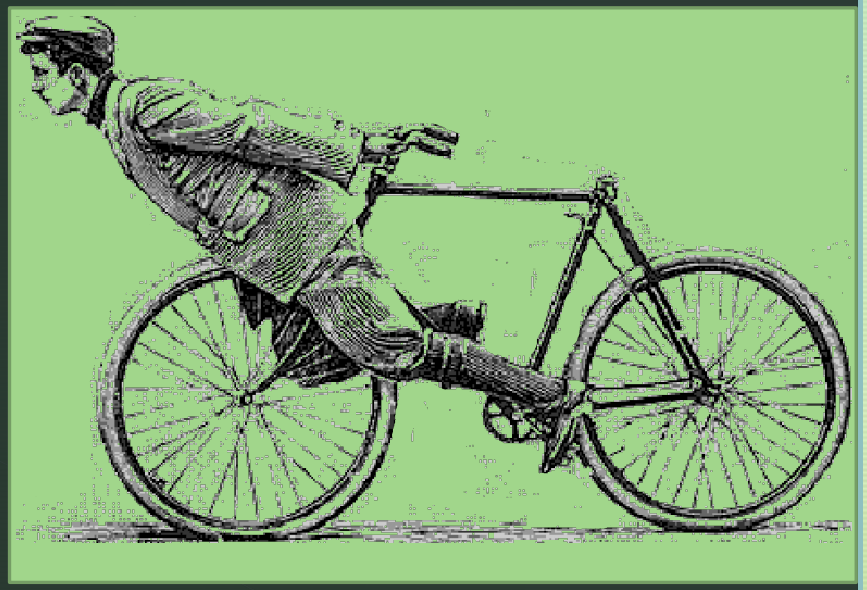
What happens if the frame is wrong?

- Generally frame sizes are designated by seat tube length.
- Sloping Top Tube designs may use virtual seat tube length or actual seat tube length.
- All frame dimensions change as the seat tube lengthens or shortens.
- The Top Tube length is very important.
- If the Top Tube is too short the proper Knee Over Pedal Spindle (KOPS) may not be possible.
- If the Top Tube is too long proper Arm to Torso angle may not be possible.

Why has Bike Fitting become so sophisticated?

- The Further you ride the more important that proper fitting be done. Cycling is a repetitive sport which can easily cause injury.
- Cyclists are riding further.
- Bike prices have skyrocketed, especially during the pandemic.
- Cyclists are buying higher quality bikes. The days of buying your bike from a “pimply faced youth” at a Big Box store are, happily, behind most of us.
- More and more riders are cycling into their 70’s 80’s and 90’s.

- Aerodynamic but . . .
  NOT Recommended!



Muscle Groups

Leg Musculature - Anterior

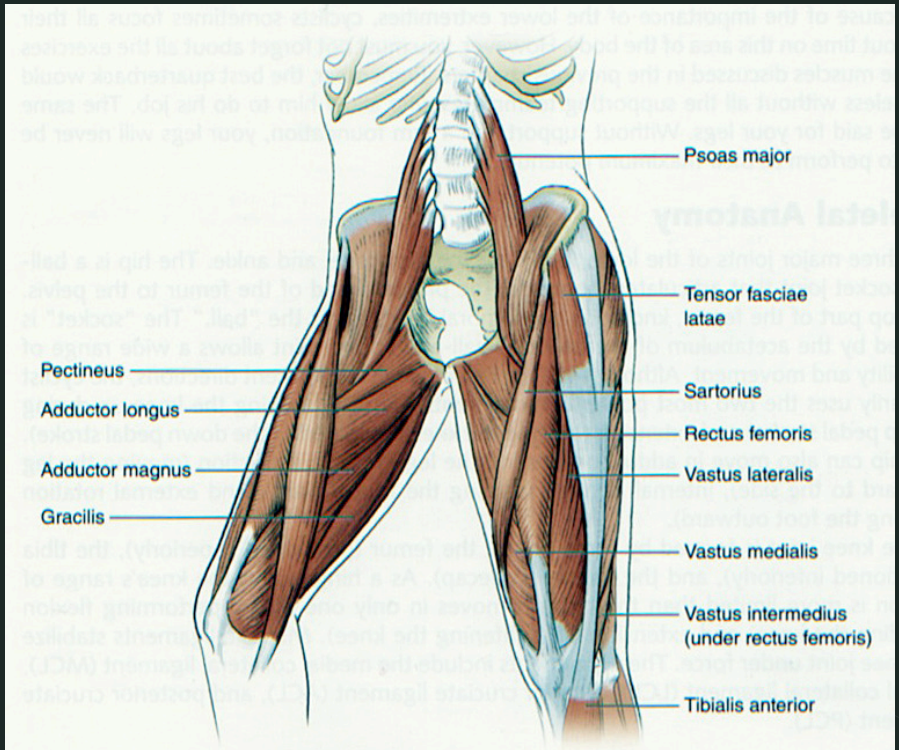
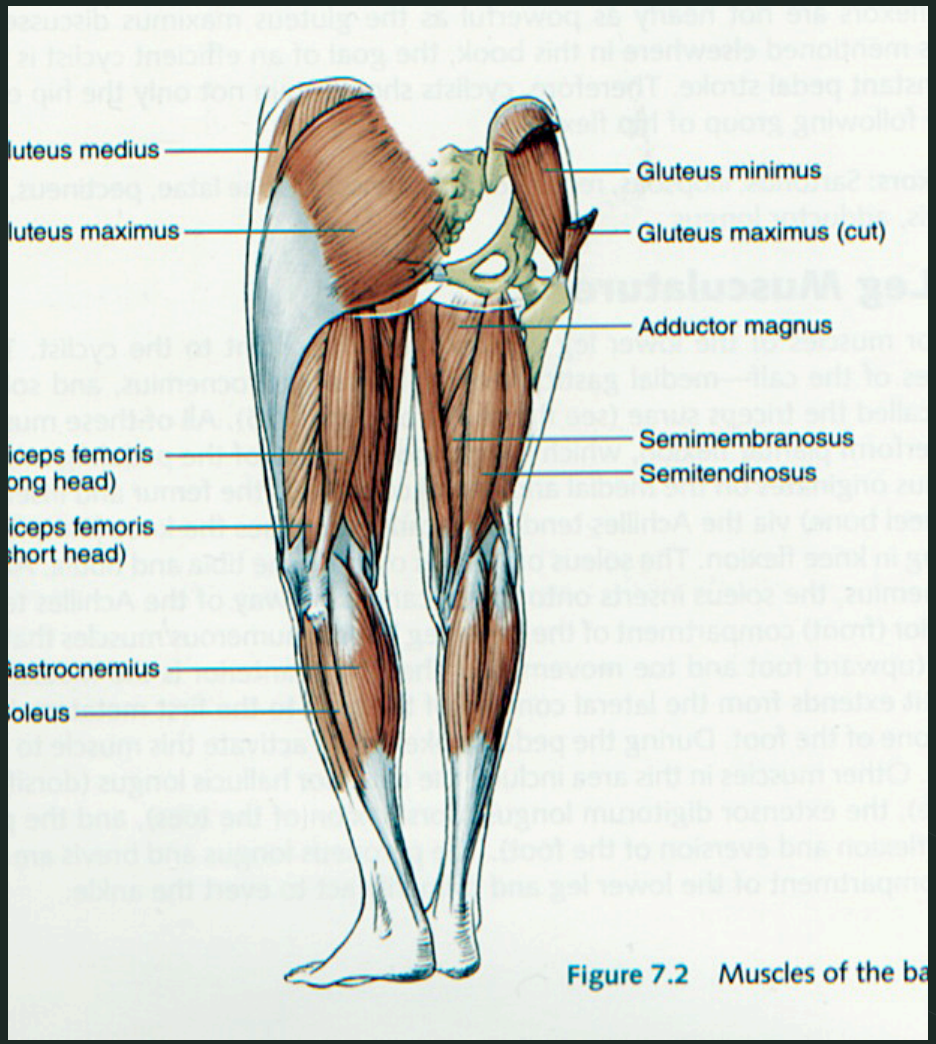


Figure 7.1 Muscles of the front of the leg.



Leg Musculature - Posterior

Other Considerations for Fit

Gender

- Unisex frame may not fit a woman
  - Swap parts to accommodate
    - Know when to stop if it does not work

Accessories

- Swapping parts is common - especially the stem.

Communicate

- LISTEN to your body. It may be telling you what works and what doesn't.
- Be aware of body English (e.g. Pulling back from the brake hoods, bowing of shoulders, sitting up)

Bike Fitting Process

- Assess
  - Balance comfort with efficiency.
  - We start with the feet and move up through the body and end with the hands.
  - Fit the bike to the rider NOT the rider to the bike.
  - Fitting and refitting is an ongoing process.
  - Physical changes in the body mean that a bike fitted when the rider was 25 likely won't fit properly when they're 50.

Identifying the key body parts

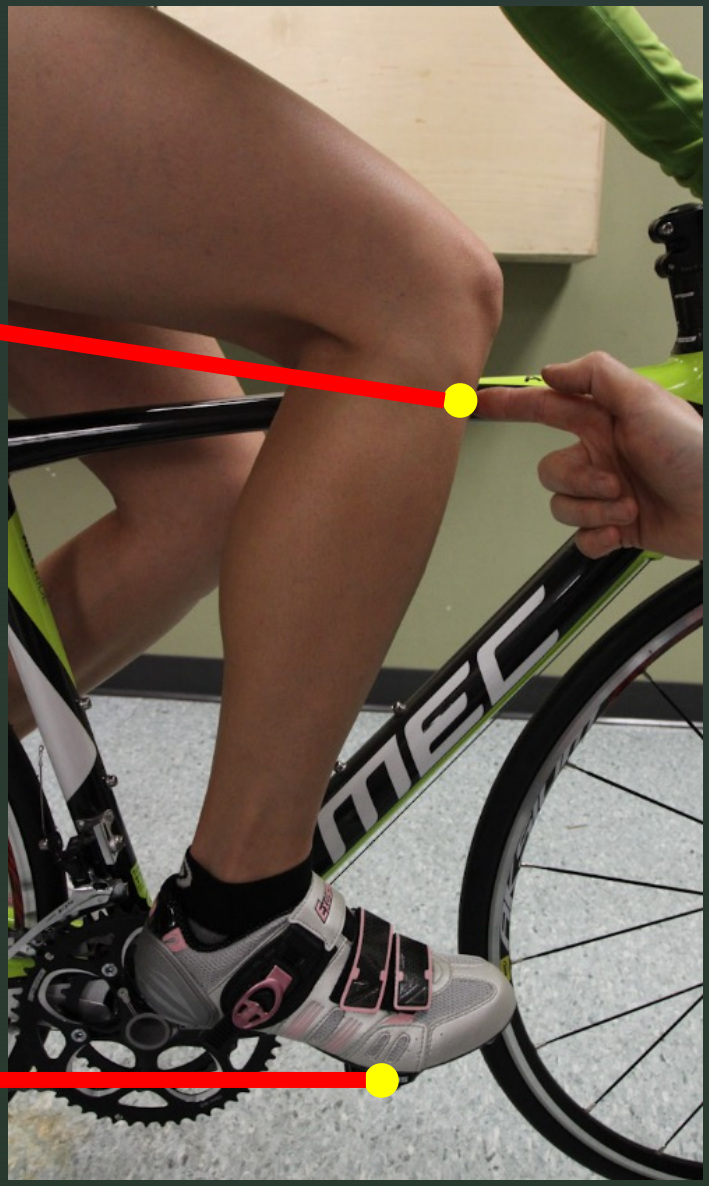
- Greater trochanter
- Tibial tuberosity
- Lateral Femoral Epicondyle
- Patella
- Lateral Malleolus
- Medial Malleolus
- Metatarsal Heads
- Ischial Tuberosity

Key Areas of the Feet

- Critical in Cleat setup
  - Fore/Aft Adjustment
    - 1st and 5th metatarsal
  - Lateral (side to side) adjustment
    - Center of cleat over second toe

Reference points

Tibial Tuberosity
– bump below patella



Pedal Spindle

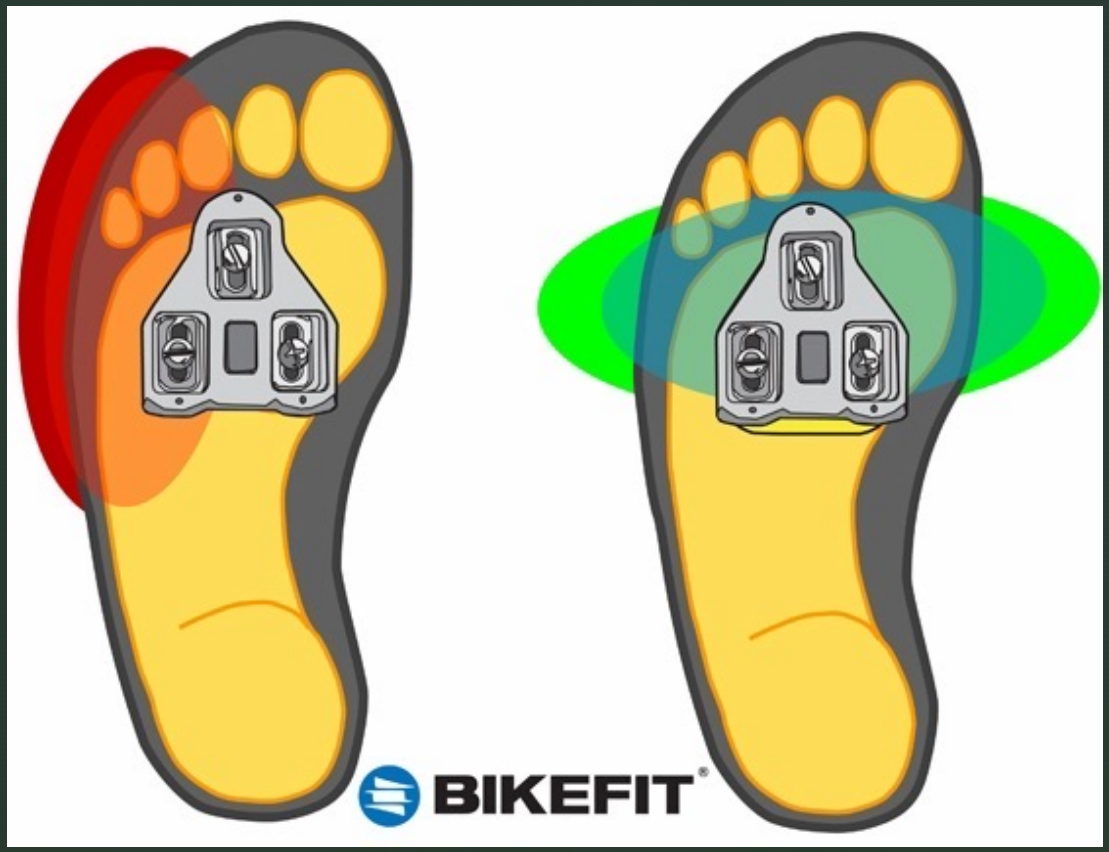
Let the Fitting Begin

- Remember – We're fitting the bike to the rider NOT the rider to the bike
- Observe the body English – in what ways does the bike not fit you now?
- Listen to your body what is it telling you?
- Keep in mind that other than trimming handlebars all the adjustments can be backed out of.
- If the bike's frame is just not right for you, the bike will never fit.

The Feet

- A most crucial part of a fit – the foundation.
- Fixed position is the only way to achieve proper fit.
- Achieved with a step-in system.
- Can be approximated without a step-in system.
- Adjustments
  - Fore/Aft.
  - Laterally position to centre foot over pedal.
  - Toe-in/neutral/or toe-out
  - Must be correct to achieve Knee Over Spindle or KOPS later on.

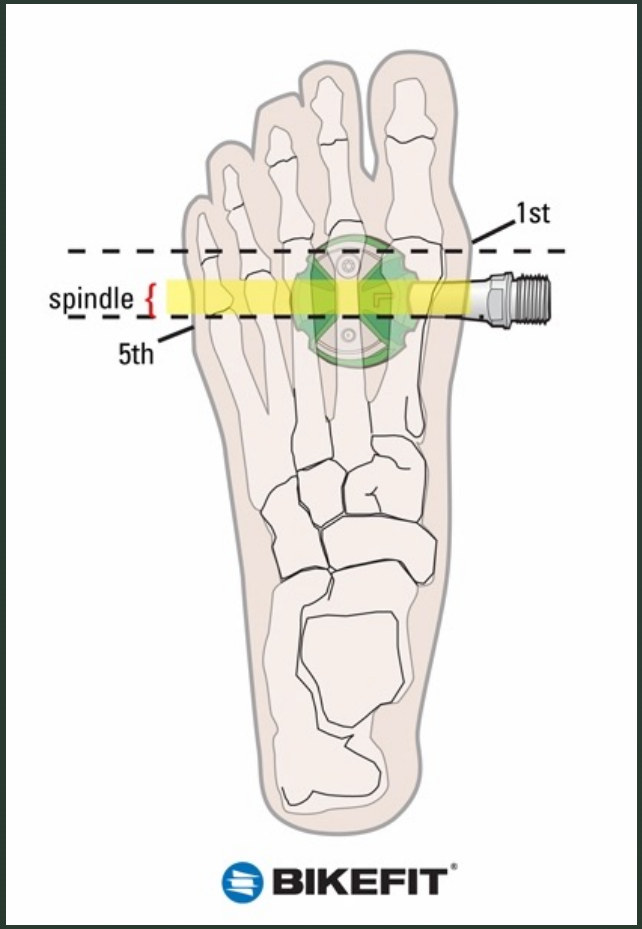
Pressure should be equal and centred over forefoot



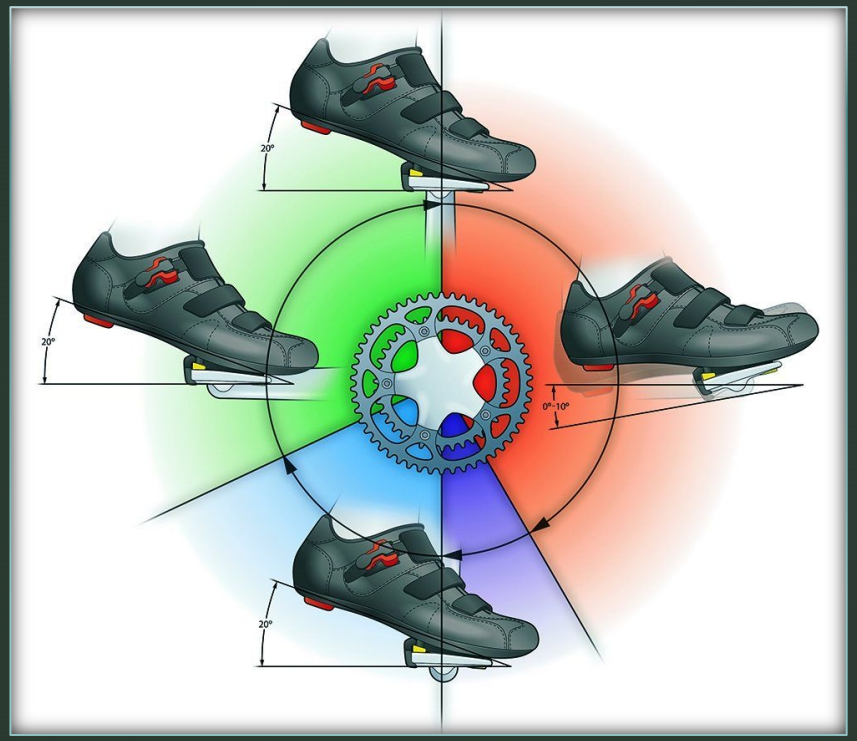
Cleat Setup

- **What are we trying to accomplish?**
  - Getting even pedal/foot contact.
  - Optimizing power and comfort.
  - A second check at the end of the fit to ensure that the foot is is as closely centred relative to the tibial tuberosity as possible.

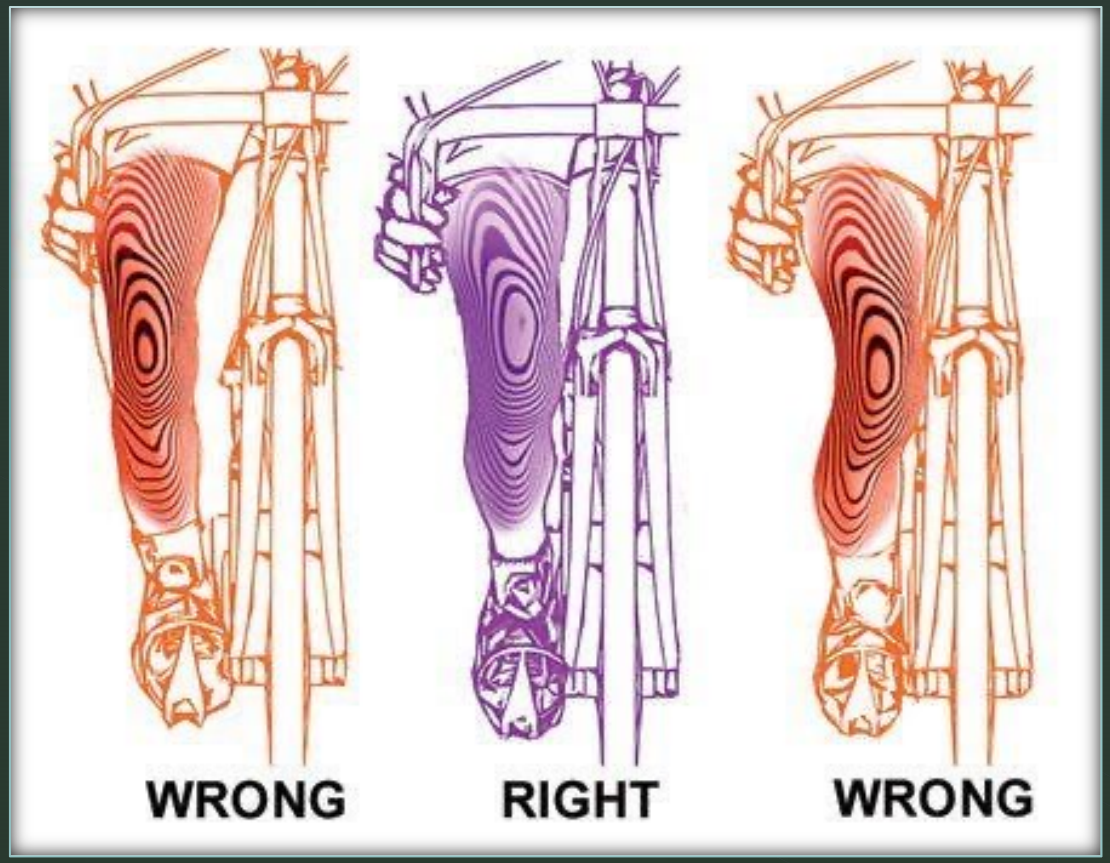
(Knee Oscillation check)



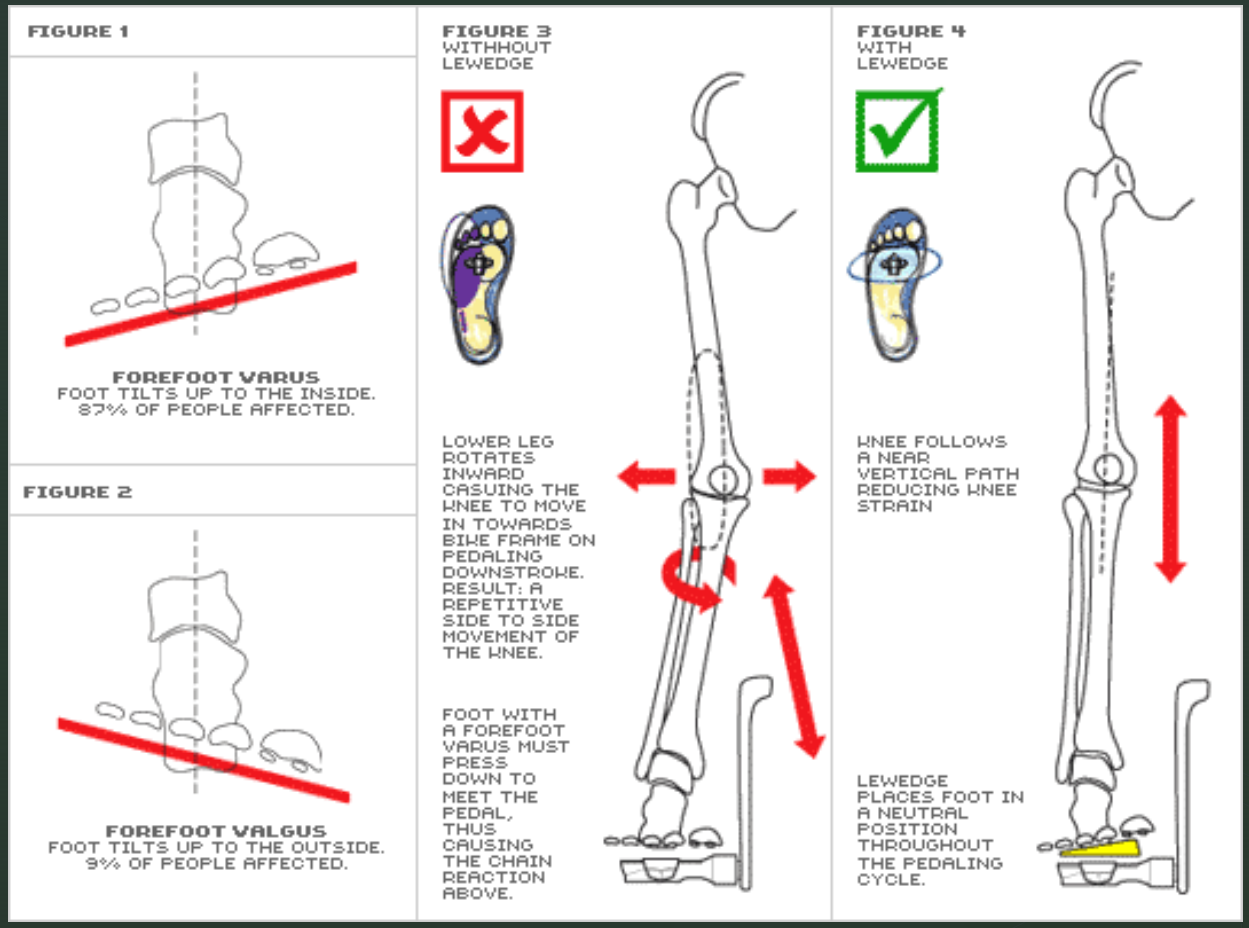
What is “normal ” pedaling action?



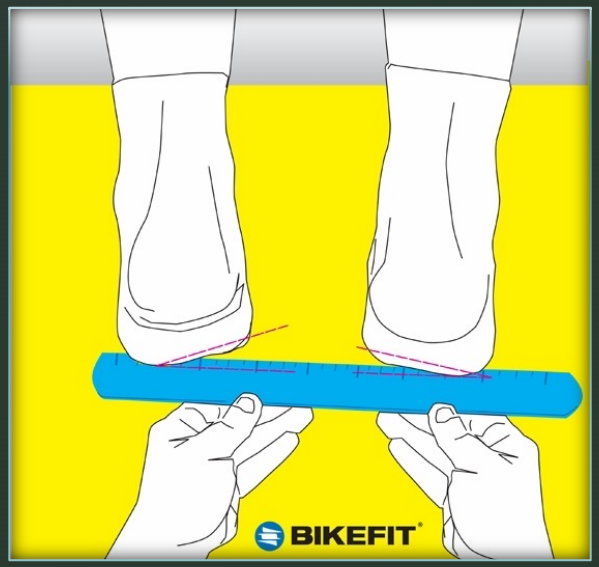
How does the knee track?



Knee Oscillation



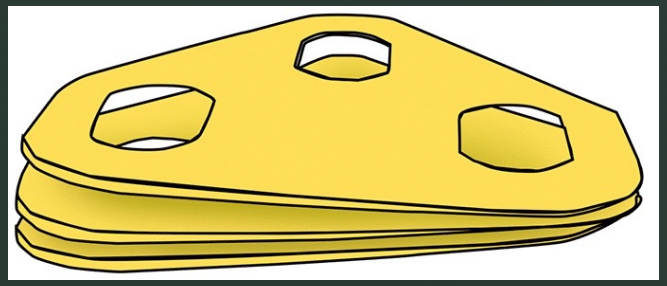
What to look for

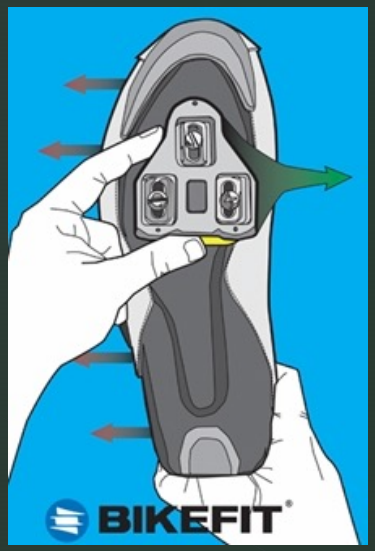


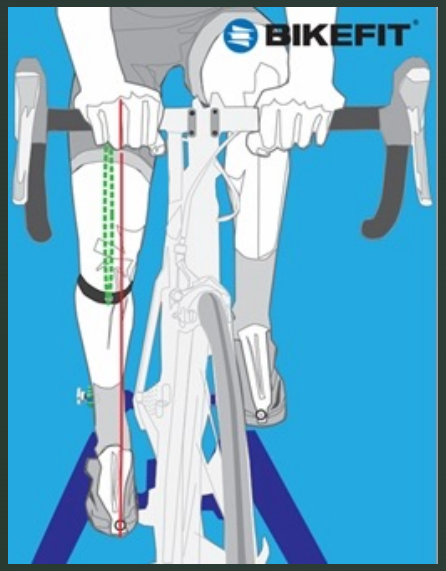
You May Need to . . .

- Check for excessive Valgus (inward tilt of the Foot/Ankle Joint)
- Varus (outward tilt of the Foot/Ankle Joint)

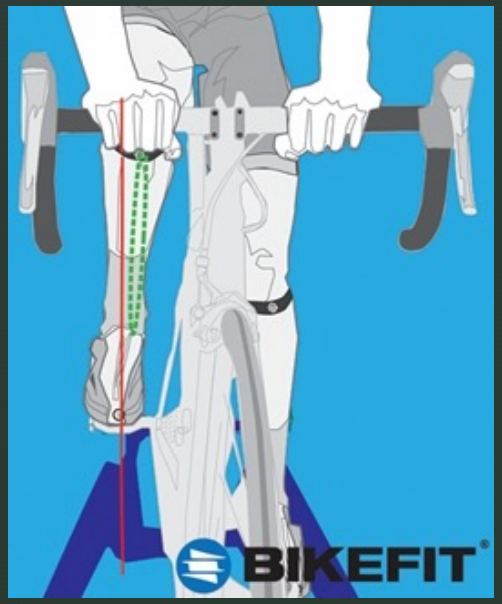
Cleat Shimming

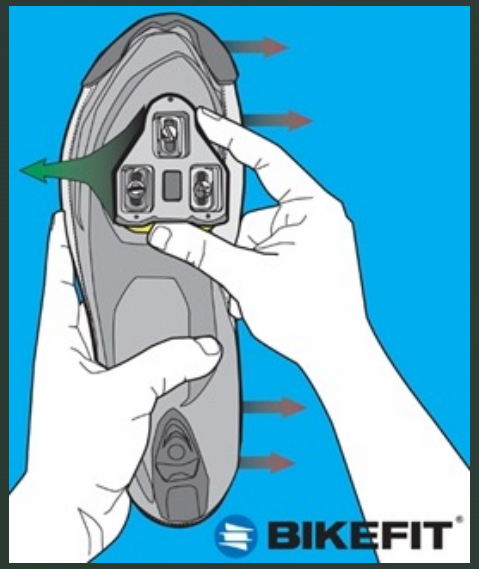






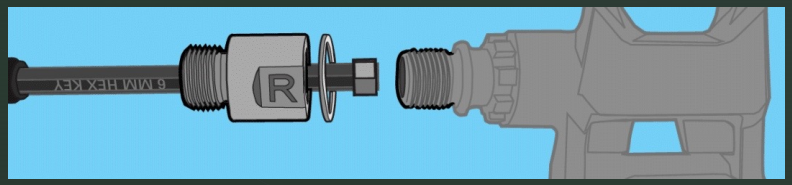
Knee over foot
Q-factor - too little





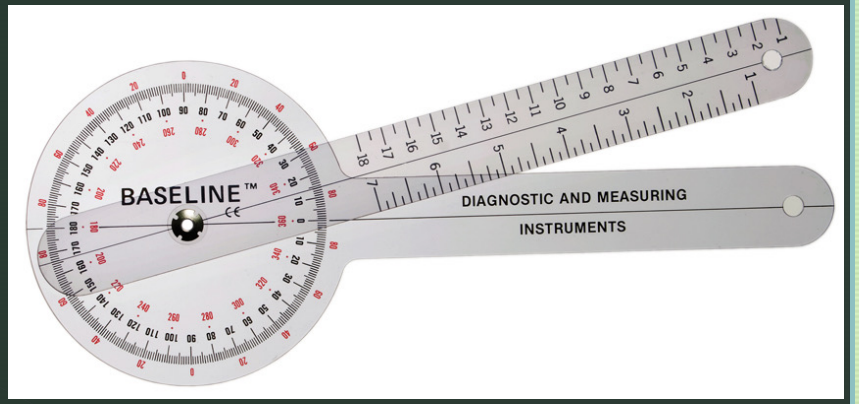
Knee over foot
Q-factor - too great

Adjusting for Q-Factor



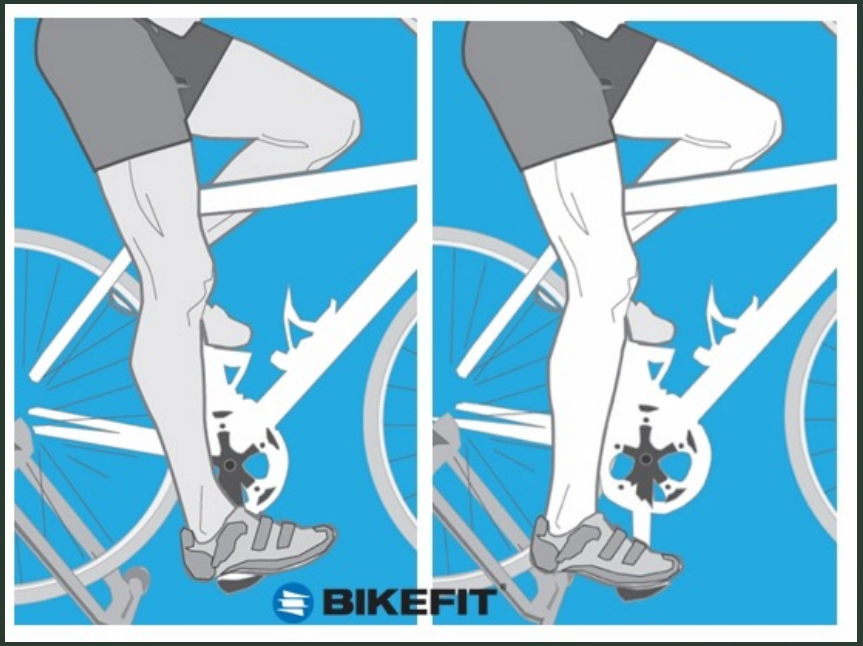
The Goniometer

- Now that we have the cleat setup.
- Move up to the legs
- Using the Goniometer (GO-KNEE-O-METER) or “G-meter”
- Measures leg, torso, and arm angles



Initial Saddle Height

- This is often the beginning and end of your “bike fit” at Big Box stores.



Using the Goniometer

- We’re establishing leg extension.
- Too much extension often causes rocking of the hips and saddle sores.
- Too little extension reduces power and puts excessive pressure on the patella.

Determining Optimal Leg Angle

- Optimal leg extension is
  - ~27 to 37 degrees
  - Directly related to seat tube length
- Take into account:
  - The rider's suppleness
  - The point in the season
  - The rider's commitment

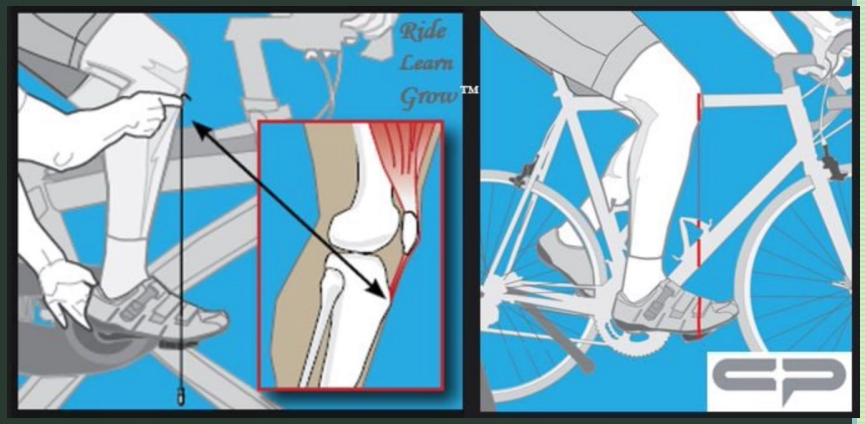
Interactive Nature of Leg Extension and KOPS

- Due to the Seat Tube angle as the saddle is raised the saddle moves backwards as well, changing the KOPS. The saddle must be moved forward to compensate.
- If the saddle is moved lower, it moves forward at the same time, so the saddle must be moved backwards to compensate.
- Whenever the saddle is moved backwards the leg extension increases.
- Whenever the saddle is moved forwards leg extension decreases.
- Bottom line – a great deal of back and forth/up and down adjustments are often necessary.

Knee Over Pedal Spindal

- Directly relates to top tube length
- Move seat fore and aft to adjust.
- We use the laser level for this.
- Saddle rail length is limited.
- May require a lay-back seat post or conversely a 0 degree layback post.
- **May require substitution of the frame.**

Adjusting KOPS



- Very little adjustment.
- DO NOT change the stem to achieve good KOPS.
- Do NOT change saddle height to achieve good KOPS.
- Extended rails on some saddles (Fizik) may give enough adjustment.

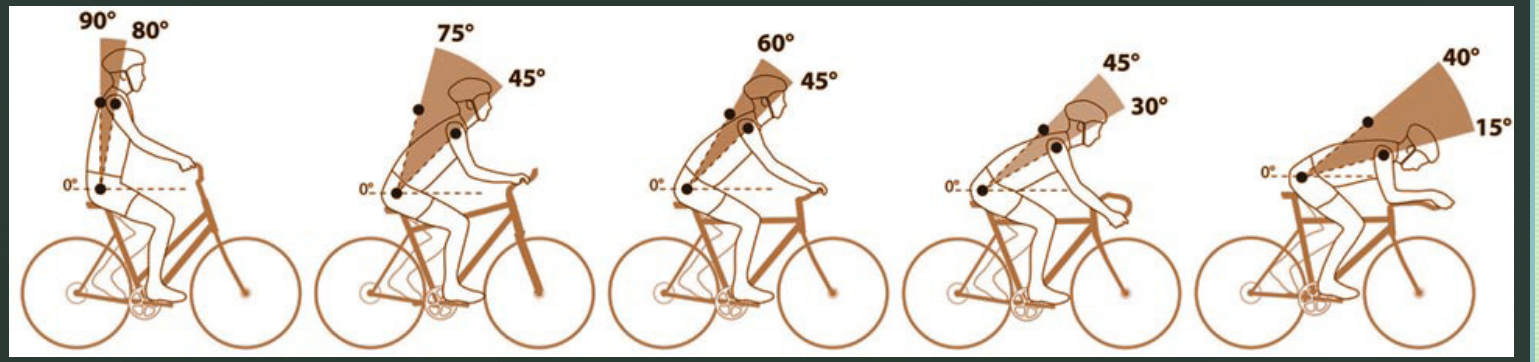
Increasing layback

- Zero offset post to bring the leg forward.
- Layback posts come in 50 to 125 mm layback.
- “Bent” posts (Thompson) may increase layback further.

Making changes to meet the target

Area of Pain	Possible Fix
Front of Knee	Saddle ↑ & BACK ←
Back of Knee	Saddle ↓ & FORWARD →
Outside of Knee	Foot OUT (cleat in - towards crank)
Inside of Knee	Foot IN (cleat out - away from crank)
Achillies	Foot Forward (cleat back - towards heel)
Saddle front & center pain	Bars UP & or Tip of saddle DOWN
Saddle seat soreness in middle groin	Saddle ↓ & FORWARD →
Palm of hand or wrist sore	Saddle ↓ & FORWARD or BACK ← →

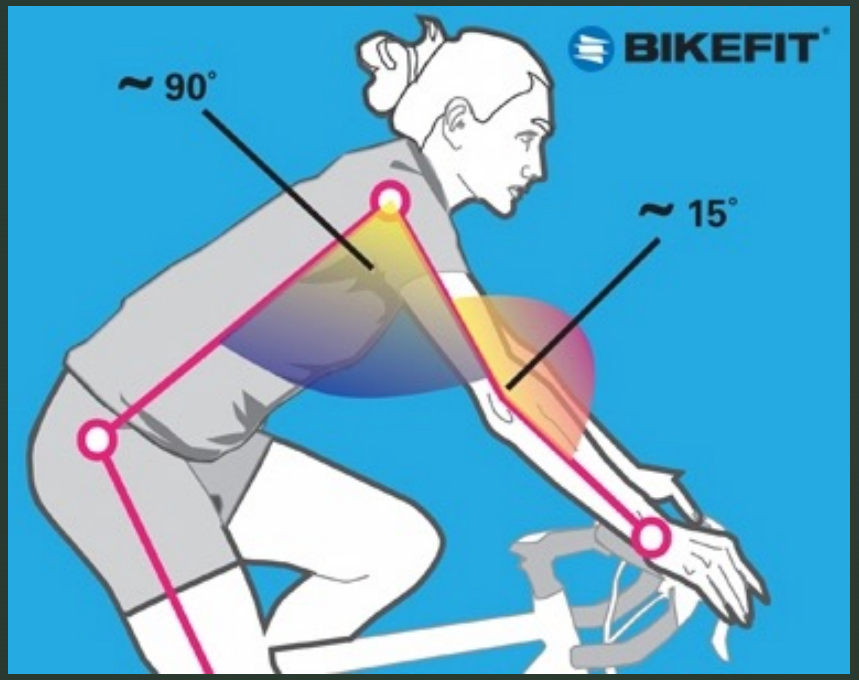
Torso angle varies with rider type



“Penny Farthing” Urban	Recreational Mountain/Urban	Performance Mountain	Performance Road	Time Trial/ Triathlon

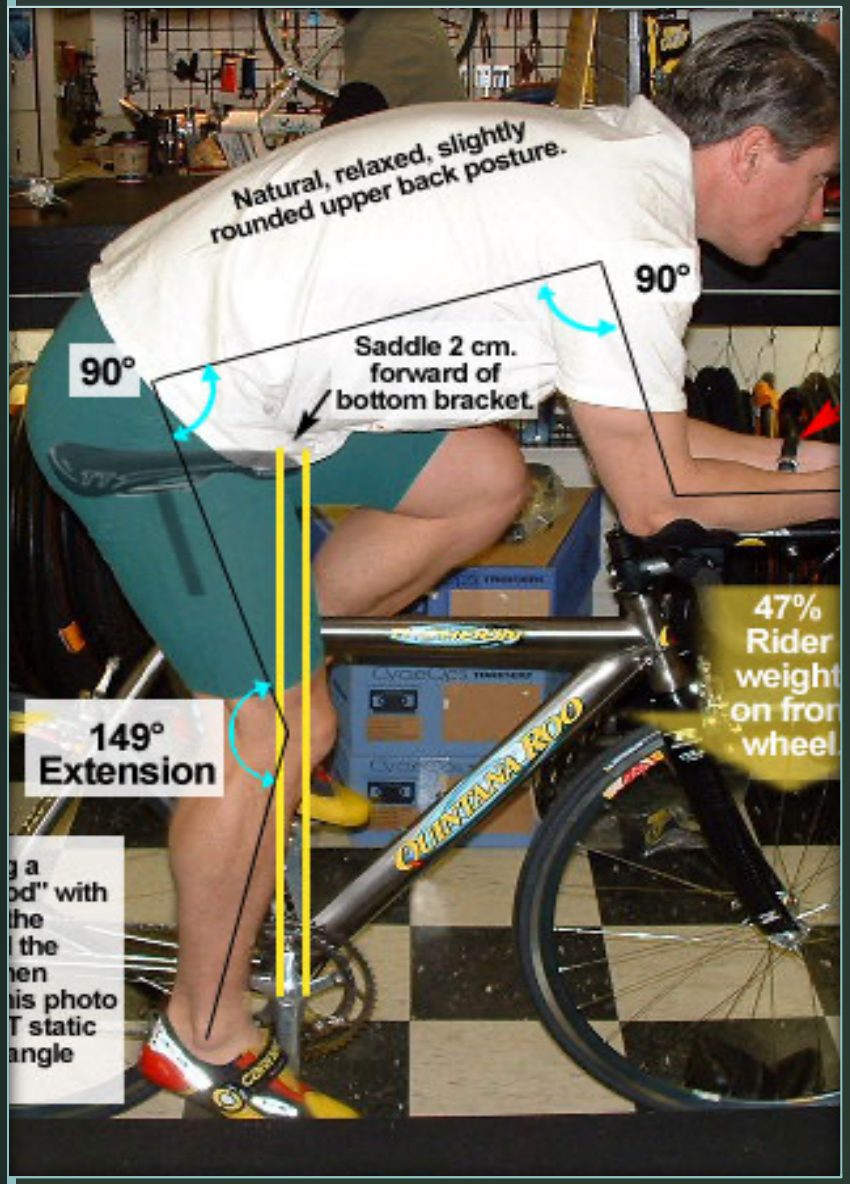
Determining Optimal Shoulder Angle

- Optimal body to shoulder angle
  - ~90 degrees
- Directly related to top tube length and stem length
- Optimal Humerus to Ulna angle ~15 degrees
- More information further when we see the Size-O-matic



Interactive Torso/Shoulder Angle Adjustments

- As stem length increases, shoulder angle opens and torso angle lowers.
- As stem length decreases, shoulder angle closes and torso angle rises.
- As stem angle drops, torso angle lowers shoulder angle can open due tightness in the lower back and hamstring.
- As stem angle rises, torso angle rises and shoulder angle can close up.



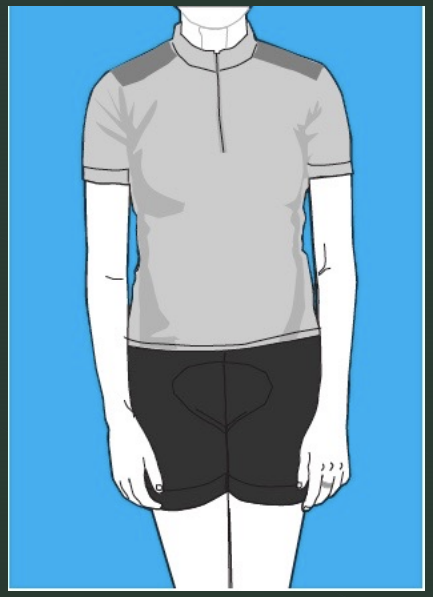
Triathlon/ Time Trial

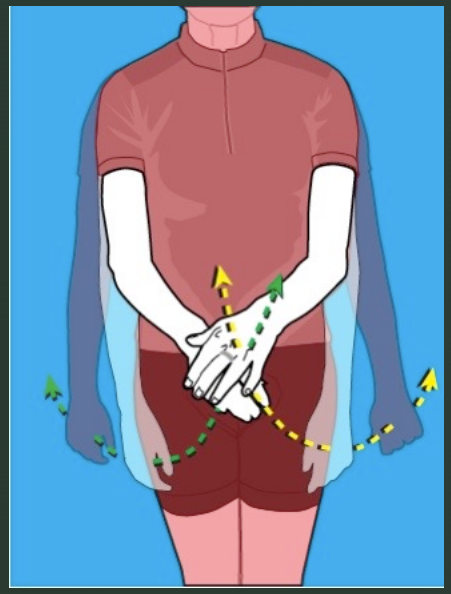
- The Humerus, Torso and Femur form 3 sides of a box.
- Tri frames and TT frames have very steep seat tube angles.
- “Running” on the bike aids transitions to running.
- Weight of the Torso is split between the shoulders/arms and the sit bones on the saddle.

Salsa Size-o-Matic

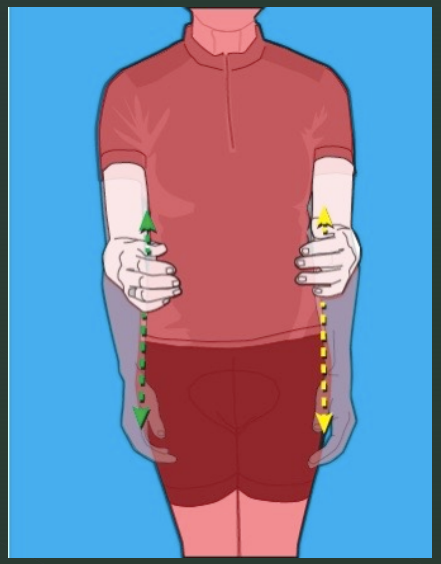
- Now that we made the initial adjustments.
- Fitters dial-in the reach and angle with the Salsa Size-o-matic.
- Angles and lengths created may not exist.
- Most stems come in 10 mm increments.
- Common stem angle are 5º, 7º, 10º and 17º

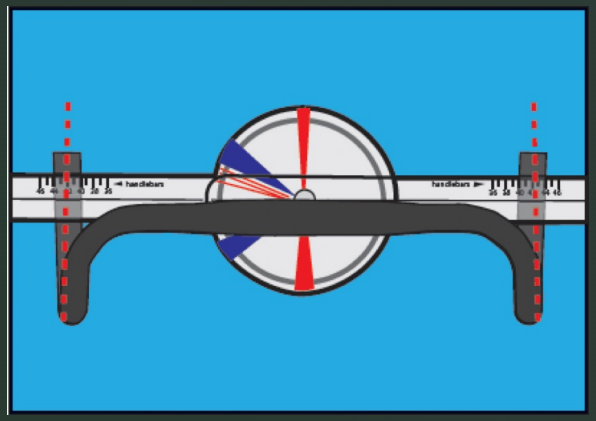
How do the Arms hang and move?

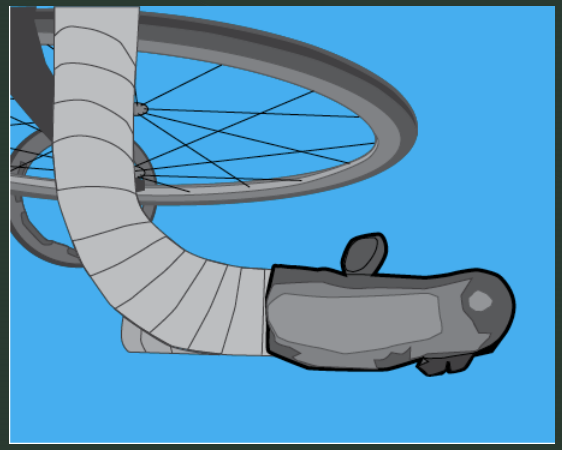


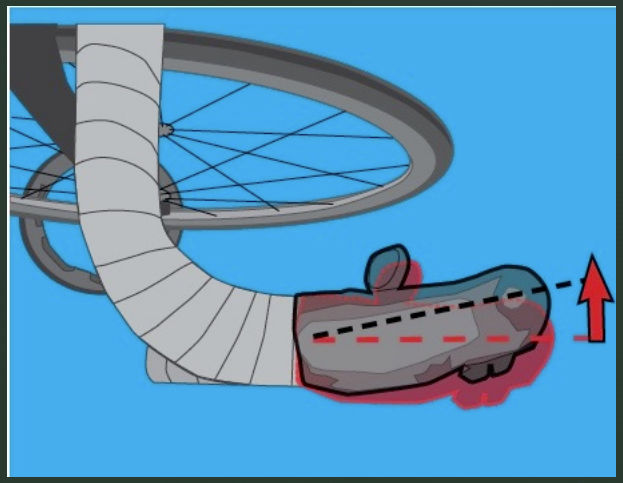


Fitting the bars to the Rider

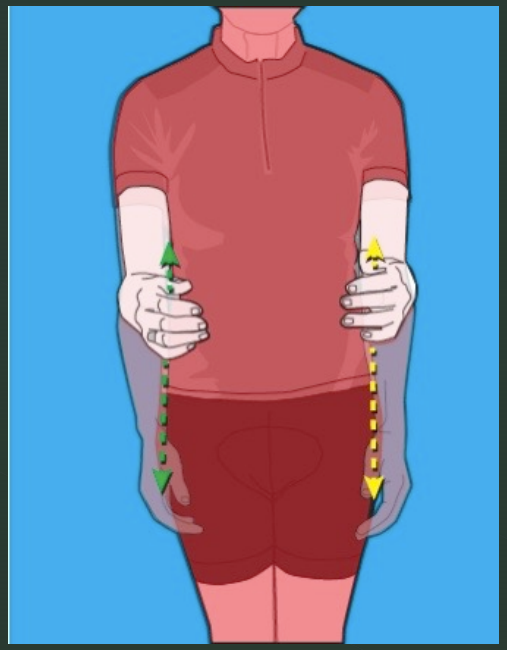








Rider fitted to Bike – Not Good

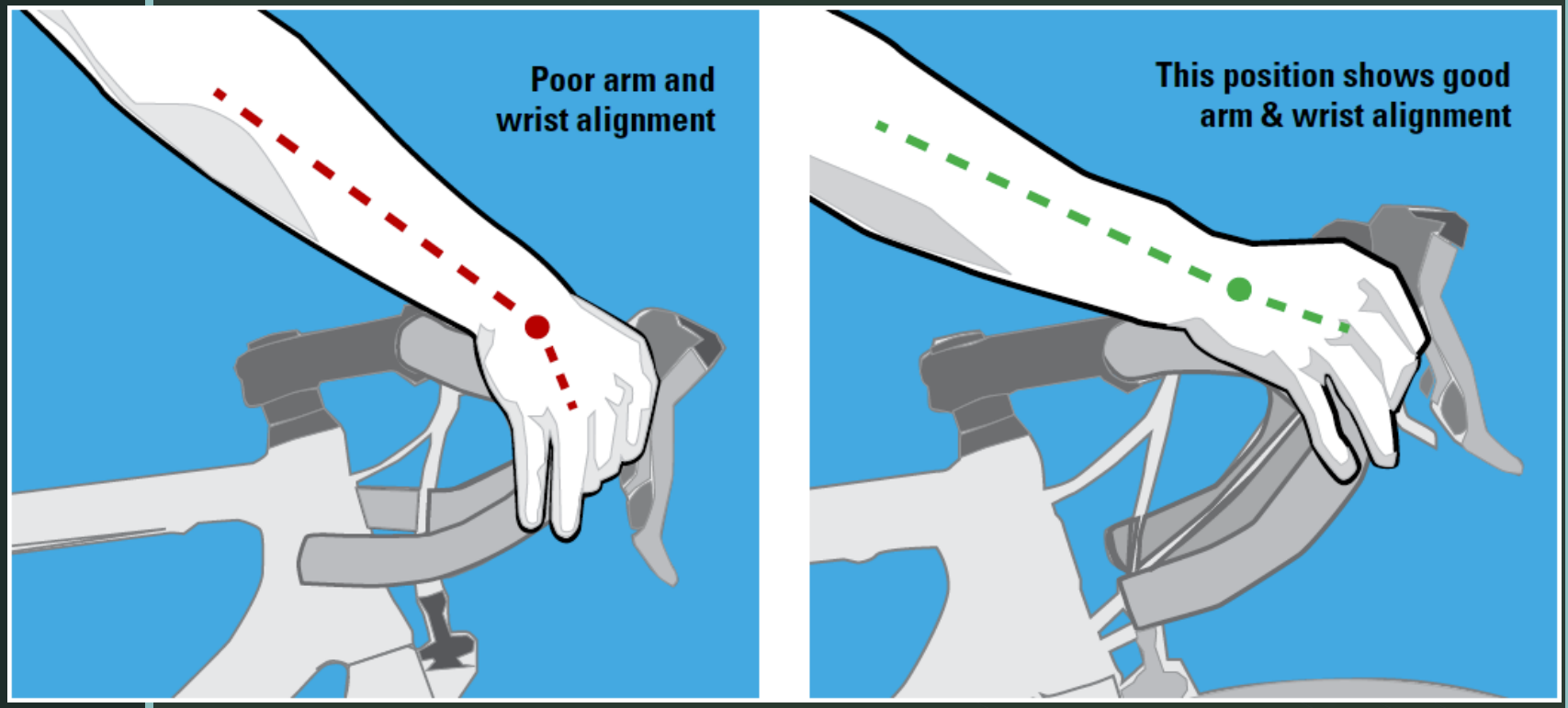


Fine tuning the hands

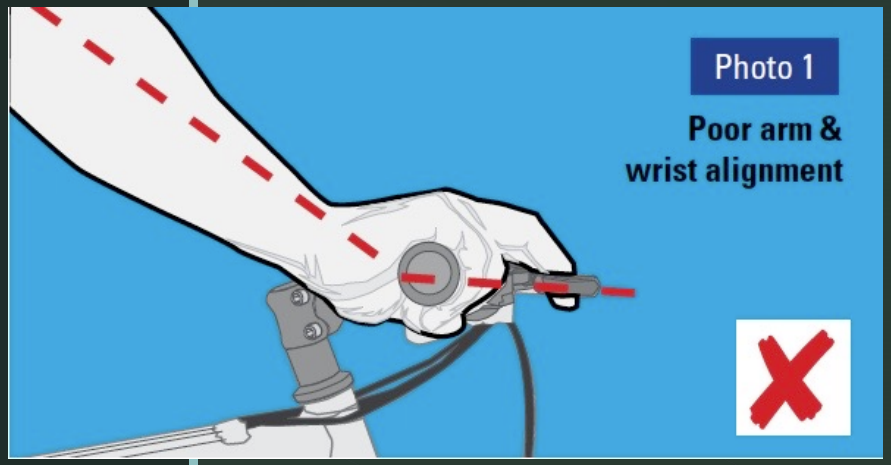
Rotation

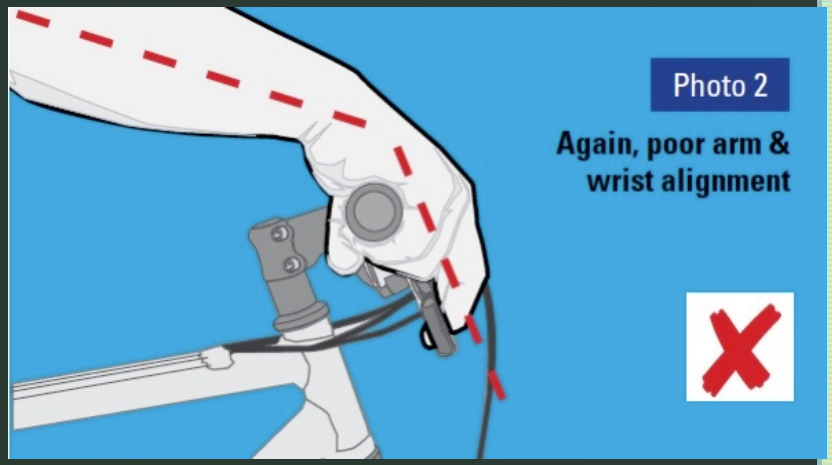
- Road – inwards and/or forwards/backwards
- Mountain - ~45 degrees – joints stacked
- Shift or brake lever reach
  - Road
    - Insert lever shims (if shop has them).
    - Many gruppos have set screws under the hoods.
  - Mountain
    - Inset brake levers 1 inch from grip
      - So knuckles do not contact back of lever

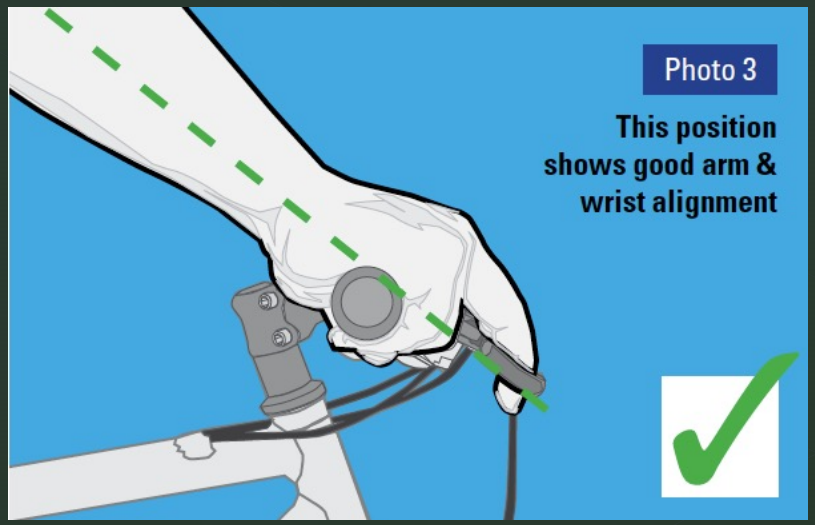
Stacking and aligning of Joints



On Mountain and Hybrid Bikes







Checking Knee Oscillation

Don’t Forget

- To reset headset bearings.
- Re-check all torques.
- Go through the changes that took place (before/after). Do they all make sense?
- Your new measurements are useful for when you travel, need to break down your bike and reassemble it at your destination.

That's All Folks!