Gloucester City Cycling Club

Training with Power

Power Training Fundamentals

- Lot’s of Flavours – no silver bullet:
  - Hubs – Powertap
  - Chainring spider – SRM, Quarq, Power2Max, Pioneer, Shimano, etc
  - Chainrings – Powertap
  - Crank Arms – Infocrank, 4III, Stages, etc
  - Pedals – Garmin, Powertap, Favero
  - Smart Trainers – Wahoo, Tacx, Elite, CycleOps
  - Indoor Bikes – Wattbike, Cycleops

- See DCRainMaker for good review information

Power Training Fundamentals

- Training Apps
  - Zwift
  - TrainerRoad
  - Sufferfest
  - Virtual Training
  - Rouvy
  - PerfPro
  - Kinomap
  - Tour de Giro
- Training Logs and Analysis
  - Online
    - TrainingPeaks
    - Garmin Connect
    - My Training Diary
    - Strava
    - Cycling Analytics
  - Apps
    - WKO4
    - GoldenCheetah

Power Training Fundamentals

- What is Power?
  - Defined as **Force x Velocity** or **Torque x Rotational Velocity**
  - In simple terms – **how hard you pedal x how fast your pedal**
  - This means that we can produce the same power by pedalling hard and slowly, or pedalling softly and fast

  - POWER is what propels the bike at a certain speed.
  - The power you are producing is what is overcoming the forces you are working against – wind resistance, rolling resistance and gravity

Power Training Fundamentals

- Metrics
  - **Average Power (AP)** – the average power produced of a duration
  - **Normalised Power (NP)** – a weighted average power, that placed more weighting on high intensity efforts.
  - **Functional Treshold Power (FTP)** – maximal steady state power, typically power sustainable for 20mile TT or 60min
  - **Intensity Factor (IF)** – NP/FTP – fraction of FTP sustained for a period – e.g. 0.8 is 80% of FTP.
  - **Training Stress Score (TSS)** – a measure of the training load provided by a workout. **IF^2 x 100 x duration** e.g. $(0.7)^2$ x 100 x 1.5hours = 75tss

Power Training Fundamentals

- Training Tests – establishing FTP etc
  - 20min max test
  - 60min TT
  - MAP Test
  - Power Profile Test
  - Monod CP Test

Power Training Fundamentals

- Training Zones

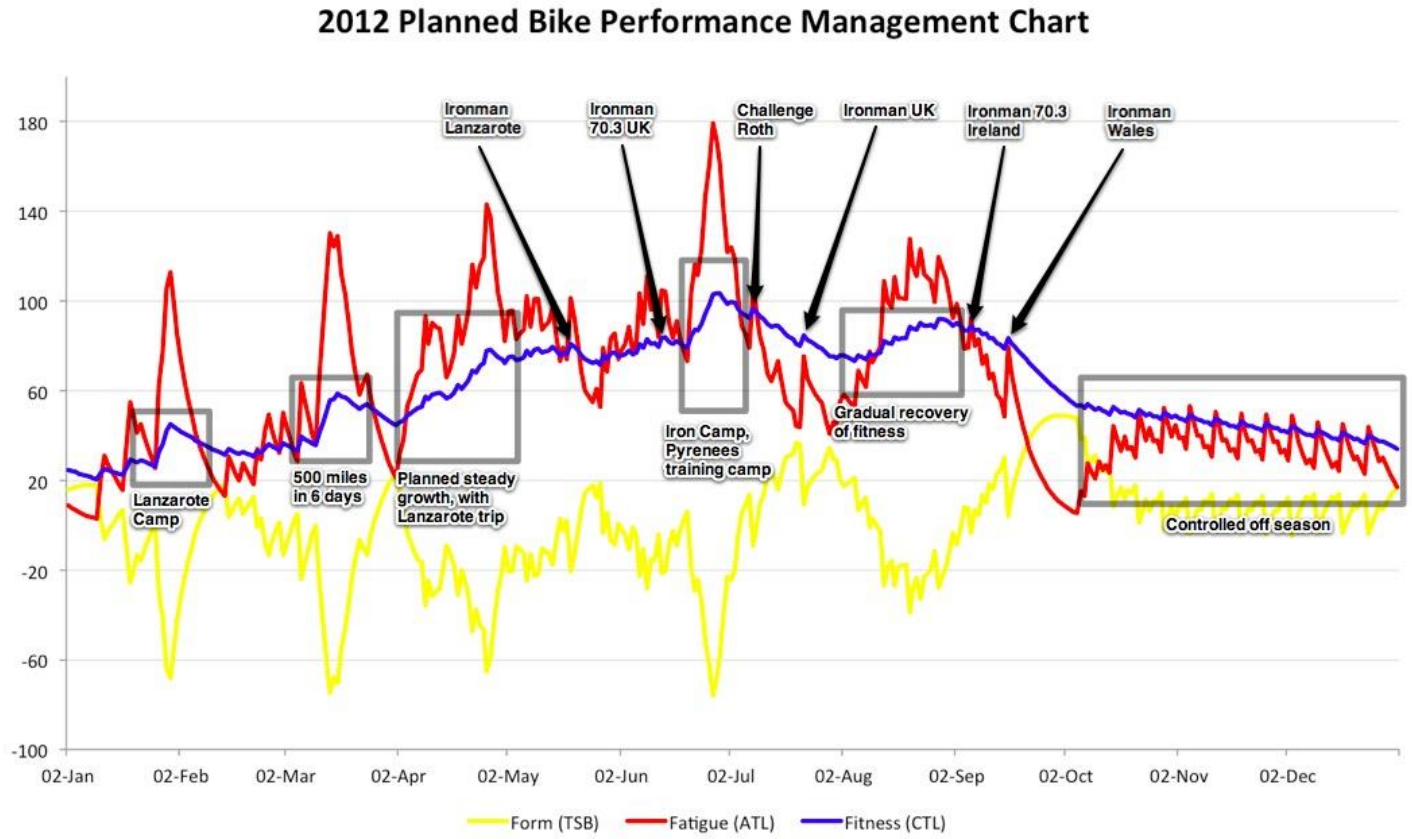
Level	Name/purpose	% of threshold power	% of threshold HR	RPE	Time
1	Active recovery	≤55%	≤68%	<2	70-80 years
2	Endurance	56-75%	69-83%	2-3	2.5 hours to 14 days
3	Tempo	76-90%	84-94%	3-4	2.5 - 8 hours
4	Lactate threshold	91-105%	95-105%	4-5	10 - 60 min.
5	VO_2max	106-120%	>106%	6-7	3 - 8 min.
6	Anaerobic capacity	121-150%	N/a	>7	30 sec. - 2 min.
7	Neuromuscular power	N/a	N/a	(maximal)	5 - 15 sec.

Power Training Fundamentals

- Performance Management
  - **Chronic Training Load (CTL)** – training stress accumulated over a long period, a 42d weighted rolling average. This is an indication of fitness.
  - **Acute Training Load (ATL)** – training stress accumulated recently, a 7d weighted rolling average. This is an indication of fatigue.
  - **Training Stress Balance (TSB)** – TSB = CTL – ATL i.e. fitness – fatigue. This is an indication of form or freshness – used to prepare for events.

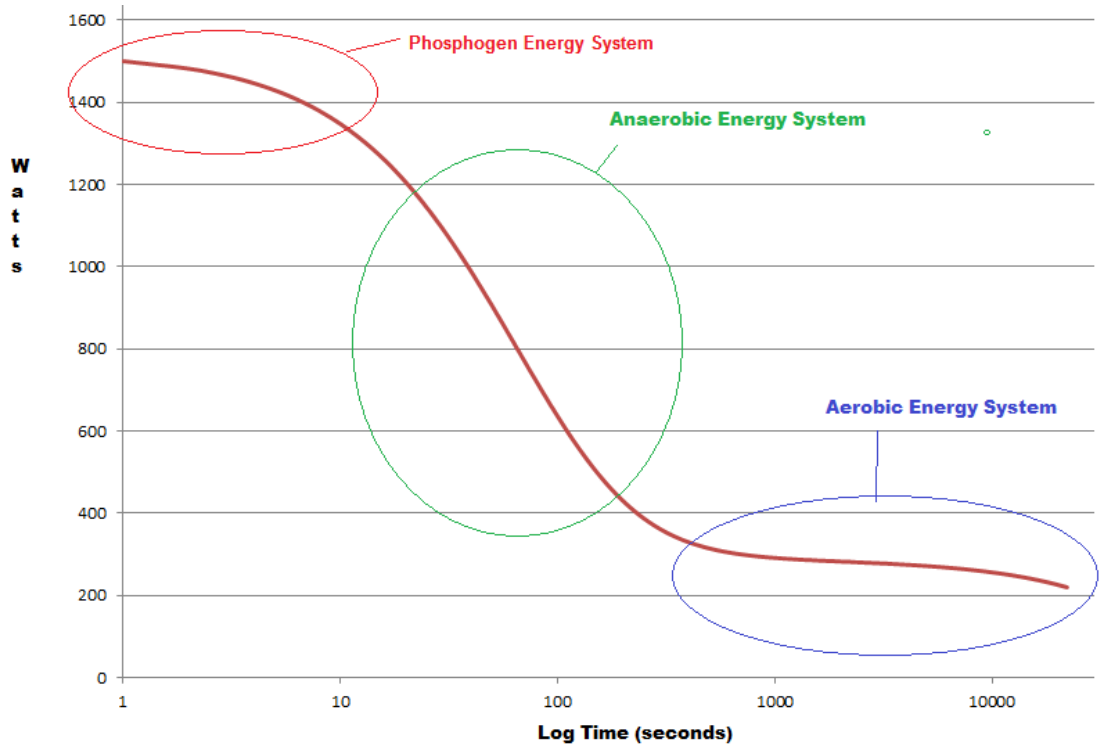
Power Training Fundamentals

- Performance Management Chart



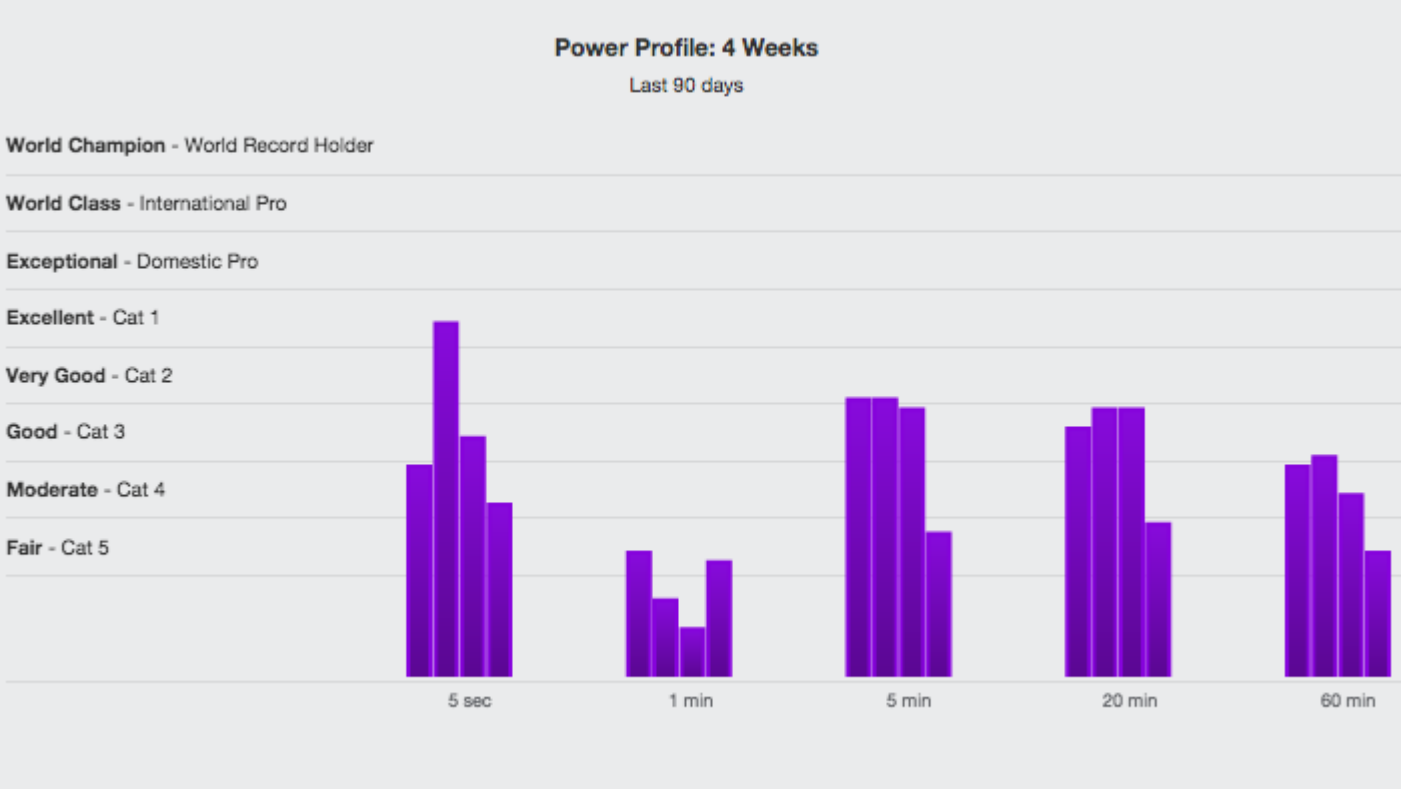
Power Training Advanced

- Power Duration Curve



Power Training Advanced

- Power Profile

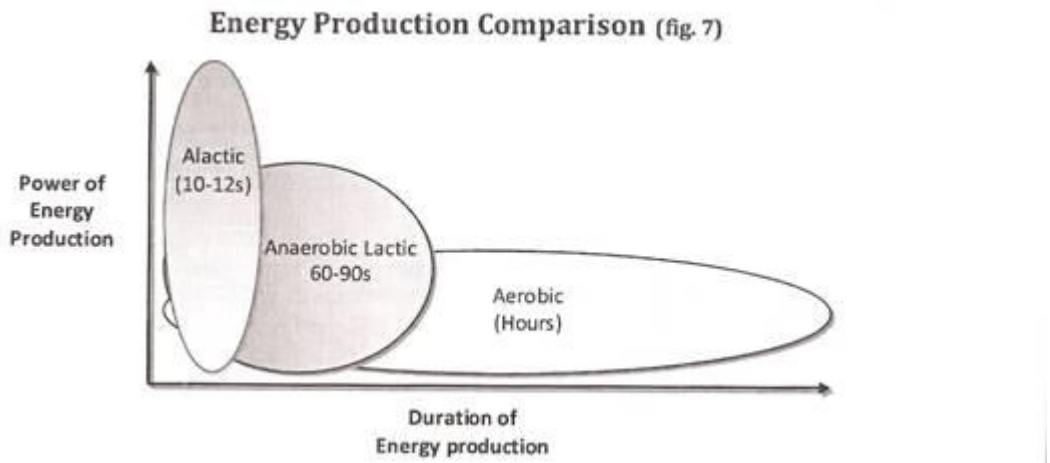


Power Training Advanced

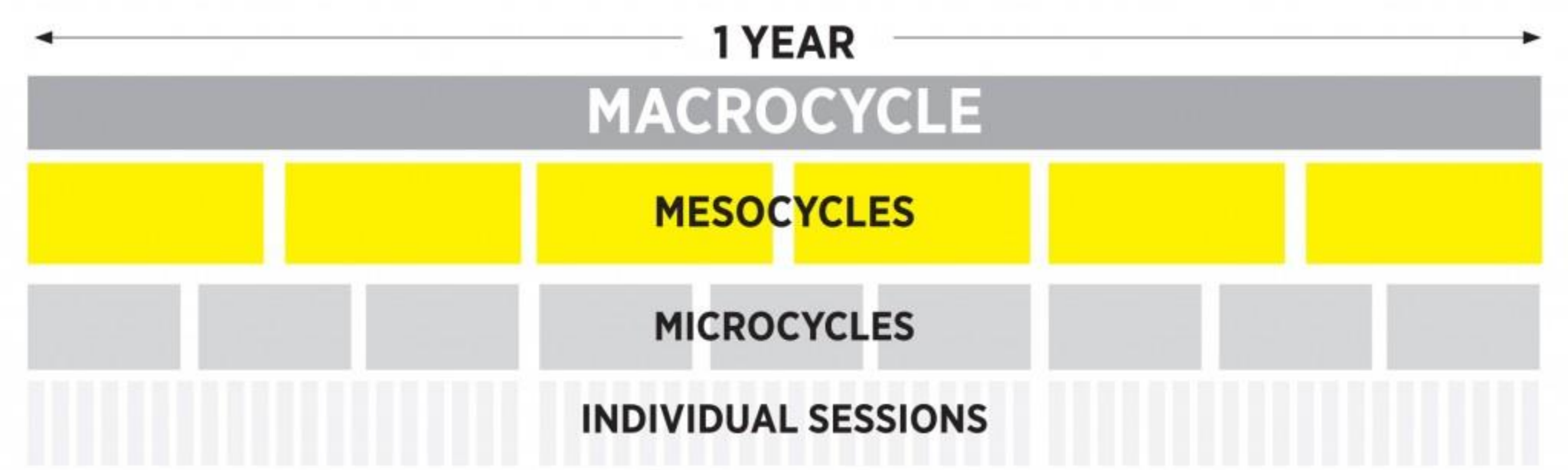
- Interval Training – Targeting the Energy Systems
  - 5sec – 30sec – neuromuscular power – ATP-PC
  - 30sec – 2min – anaerobic capacity – AC
  - 2min – 8min – Ventilatory threshold – VO_2Max
  - 8min – 60min – Functional Threshold (Lactate Threshold) – FTP
  - > 60min – Aerobic efficiency

Power Training Advanced

- Energy Systems contribution to Power/Duration



Periodised Training



Periodised Training

General -> Specific

Aerobic Efficiency -> VO_2Max -> Anaerobic Capacity

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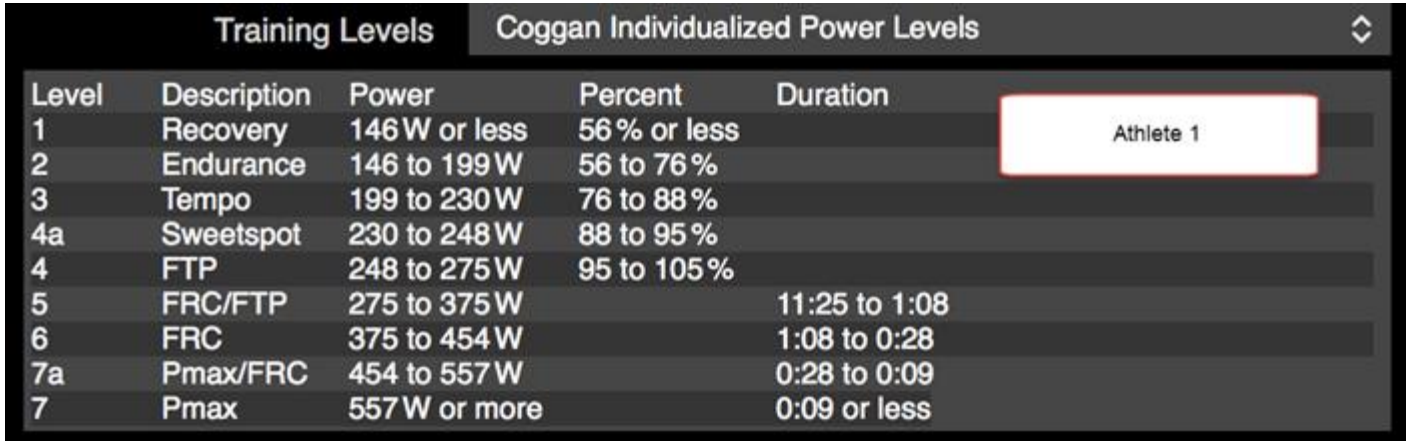
- iLevels



Training Levels | Coggan Individualized Power Levels

Athlete 1

Level	Description	Power	Percent	Duration
1	Recovery	146 W or less	56 % or less	
2	Endurance	146 to 199 W	56 to 76 %	
3	Tempo	199 to 230 W	76 to 88 %	
4a	Sweetspot	230 to 248 W	88 to 95 %	
4	FTP	248 to 275 W	95 to 105 %	
5	FRC/FTP	275 to 375 W		11:25 to 1:08
6	FRC	375 to 454 W		1:08 to 0:28
7a	Pmax/FRC	454 to 557 W		0:28 to 0:09
7	Pmax	557 W or more		0:09 or less

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- Functional Reserve Capacity (or W’)

Functional Reserve Capacity (FRC)

FRC is the total amount of work that can be done during continuous exercise above Functional Threshold Power (FTP) before fatigue occurs. Units are kilojoules (kJ) or kilojoules per kilogram (kJ/kg). This effort is related to your ATP-PC energy system, but other energy contributions need to be considered.

The simplest explanation is to think of it as your anaerobic battery. If you have a low FRC, you have a smaller battery, and if you have a high FRC, you have a big battery. However, we also have to think about FRC in relationship to Pmax, maybe like this:

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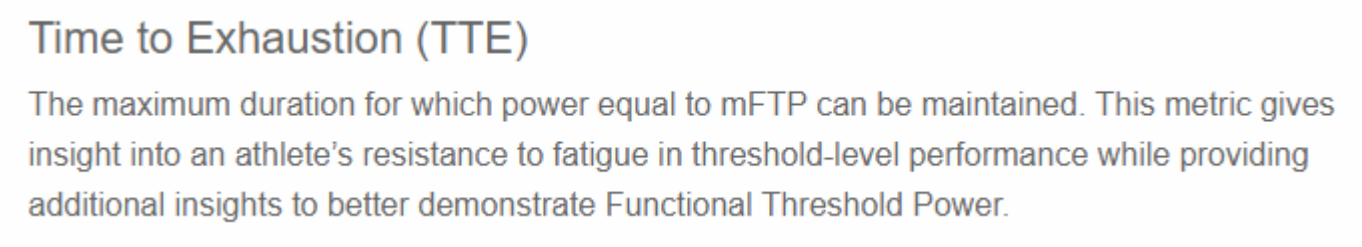
- Time to Exhaustion



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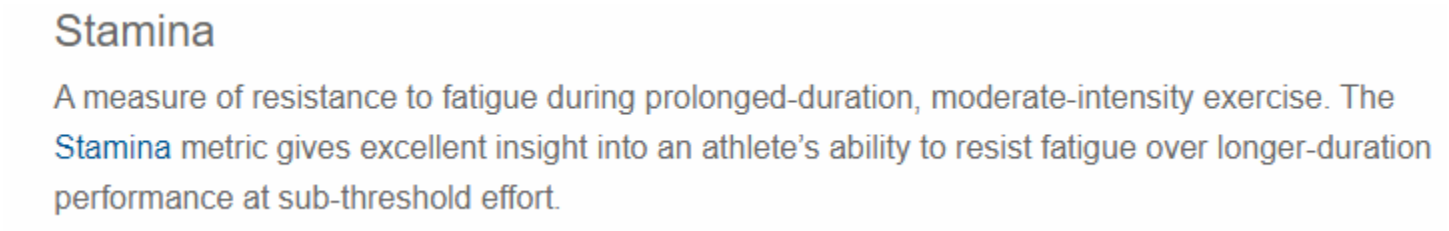
- Stamina



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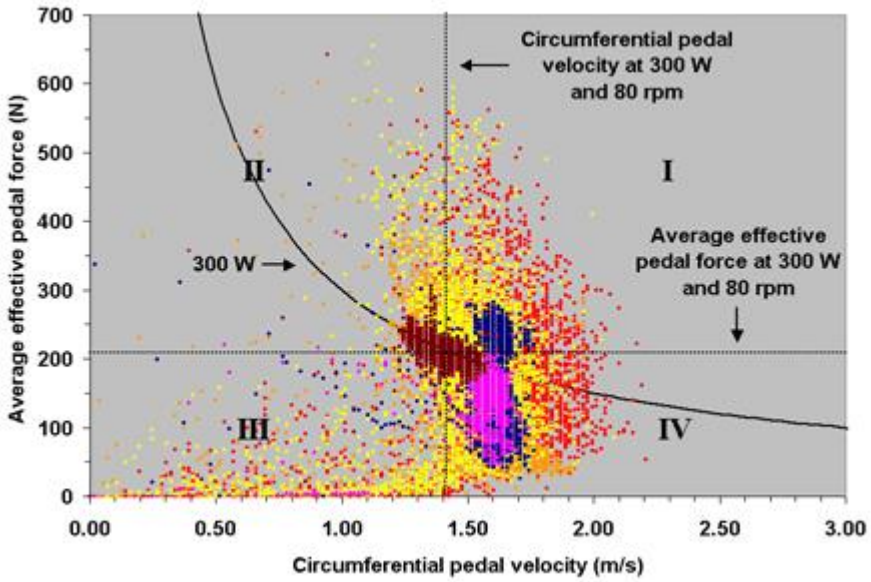
- Quadrant Analysis



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- Aerolab