Coaches Toolbox

* Demands of ITU Competition
* Running Biomechanics
* Running Physiology
* Training Strategy/Tactics
* Skills/Drills
* Training tools
* GPS Timing Filming
* Injury Prevention
* Injury Management
* Shoe selection
* Pacing
* Load and progression monitoring

Building the Blueprint …. Run Performance Categories

* Biomechanically
* Physiologically
* Psychologically
* Tactically

Running in our game

* Greatest fitness gains can be attained from running.
* It can also be the discipline that has the greatest potential to INJURE a triathlete.
* For this reason it is the discipline that triathlon coaches MUST understand the most and monitor the closest.
* Be patient
* If unsure, err on the side of caution.
* Basis of running is a strong body.
* Consistency always wins

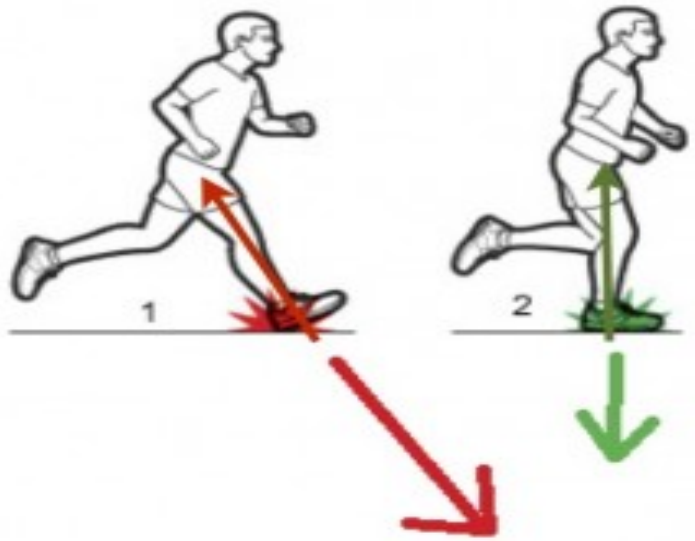
Running in our game

* Basis of effective running is:
* Highly developed aerobic system
* Specific running strength that allows the maintenance of speed or pacing strategy for the event duration.
* Specific anaerobic energy qualities that allow runner to deal with demands of the race.
* Efficiency of movement & physiological demand (economy)
* Body Weight dependent
* The key is their integration & application.

Challenges to overcome… Areas of opportunity …

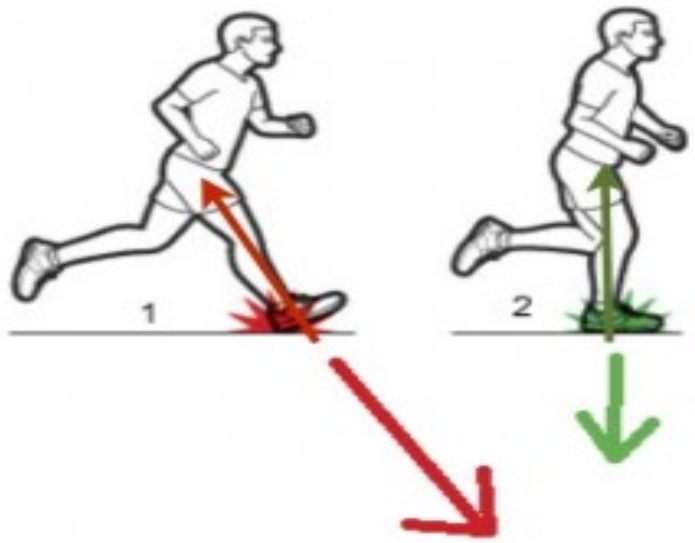
* Limited running background
* Reduced training time
* Increased muscle damage (eccentric) – Final discipline…pre-fatigued
* Increased muscle mass
* Reduced flexibility

Over striding



Over-striding is a dirty / nasty because it slows you down. Sir Isaac Newton explained in his laws of physics: Every action (force) has an opposite and equal reaction (reaction force).

Over striding

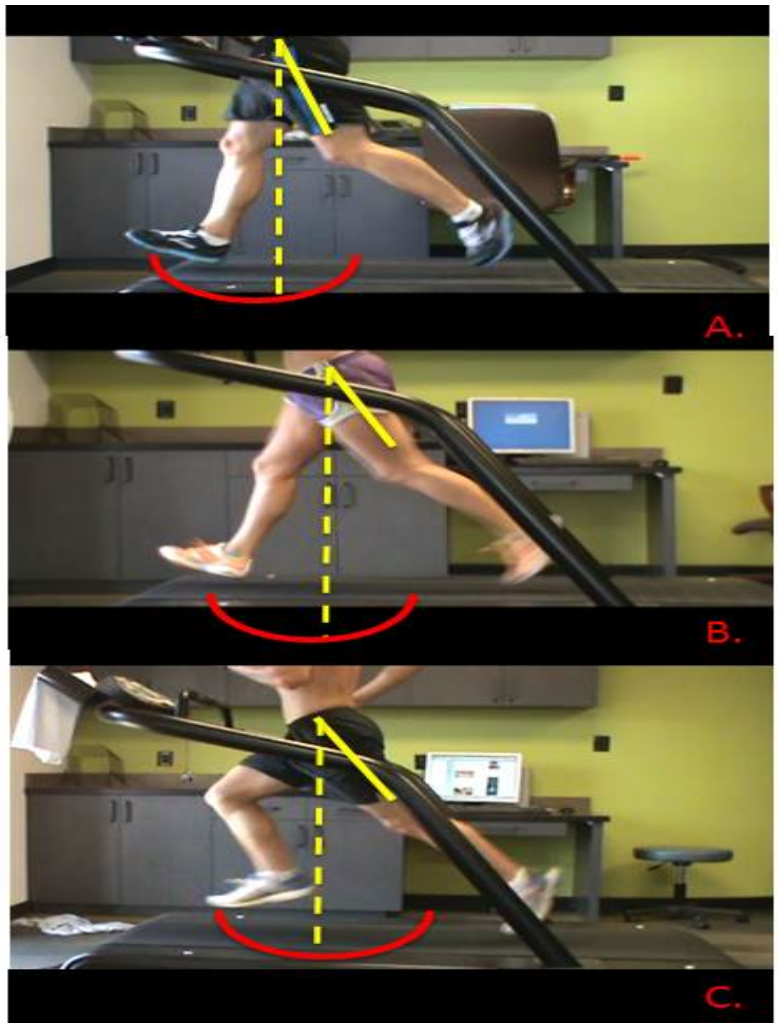


The runner in image one is over-striding, causing the force into the ground to be applied in a forward and down direction resulting in up and backward reactive force.

That reactive force is slowing the runner down by pushing his center of gravity backwards!

The runner in image two is landing with the foot below the body resulting in a reactive force in an upward direction, pushing the center of gravity up. Not slowing the runner down.

Limited Hip Extension



* Having tight hip flexors (muscles in the front of your hips) can restrict the motion you are able to use at the back end of your running stride (hip extension).

* Restricted hip extension in the running stride will reduce the amount of energy that you could use (stored in the muscles and tendons from the previous stages of gait) to propel your body forward.

Barrier

Tight hip flexors

=

*barrier prevents full release

Energy Release

*stiffness prevents full hip extension


MATER CARA

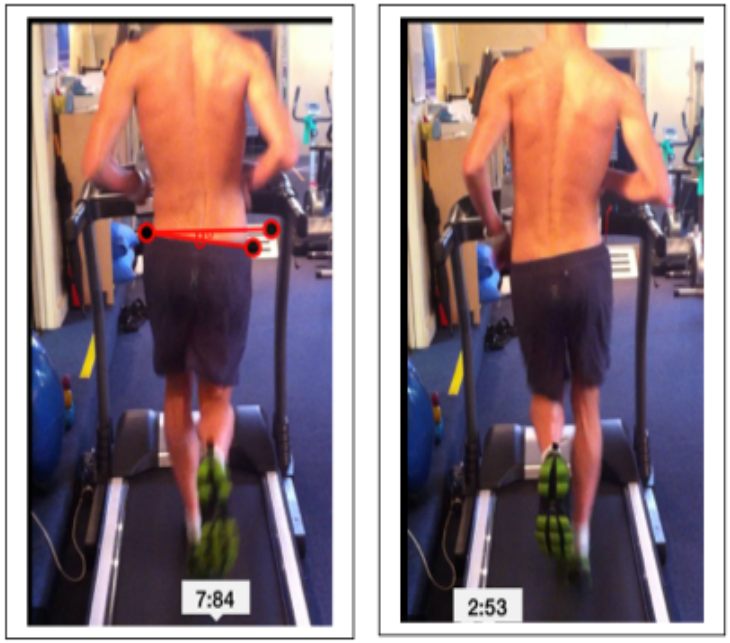

AUSTRALIA
MOTTRAM
142

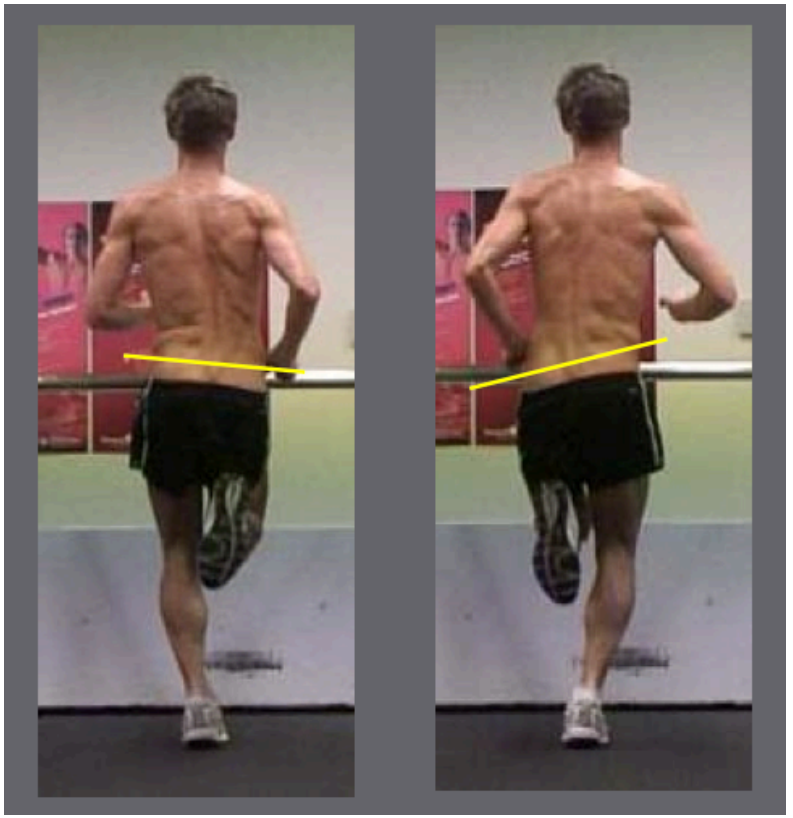
Asymmetries / Power Losses

Pelvic Stability

Lateral pelvic tilt (Normal 2-4° for males)

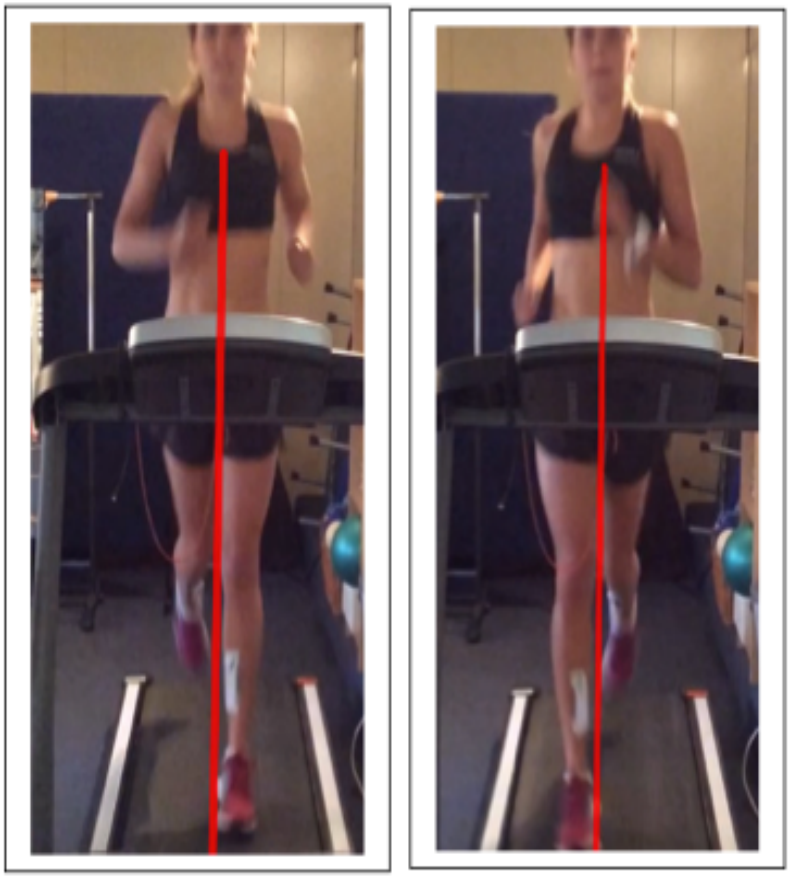
Left: ~ 8° **Right: ~12°**





Asymmetries / Power Losses

Foot-COM Placement:

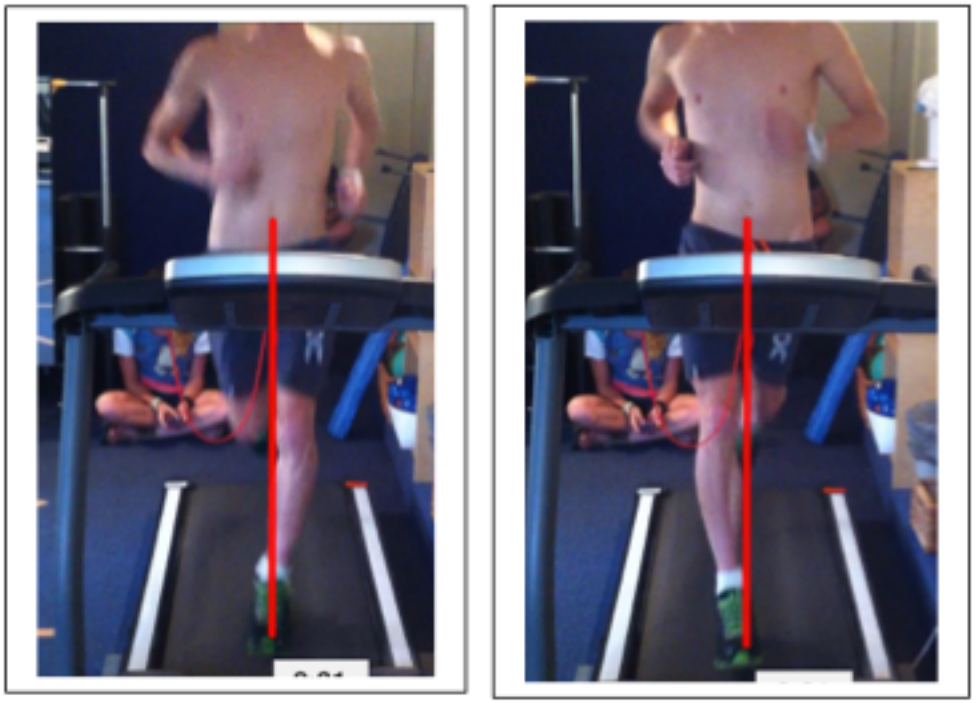


No significant problem detected

Foot-COM Placement:

Midline strike – worst on the left

Problem here with foot placement in frontal plane.



Excessive Vertical Bounce

Gait Analysis Report

Biomechanics | Sport Science | NSWIS

PRINCIPAL PARTNER ClubsNSW

Athlete:	Aaron Royle	Condition:	Tredmill
Date:	25/01/2011	Speed:	20.0 km/h
Location	NSWIS	Gradient:	0 %

Current Injuries:
Previous Injuries:
Orthotics: Shoes:

Front/Rear View

Stance	Left	Right
Foot Pronation Range	low-medium	low-medium
Foot Pronation Rate	low-medium	low-medium
Foot Relative to Midline	low-medial	low-medial
Medial Knee Deviation	low	low
Lateral Pelvic Drop	low-medium	low-medium
Pelvic Rotation	low	low
Lateral Trunk Flexion	low-medium	low-medium
Trunk Rotation	low-medium	low-medium

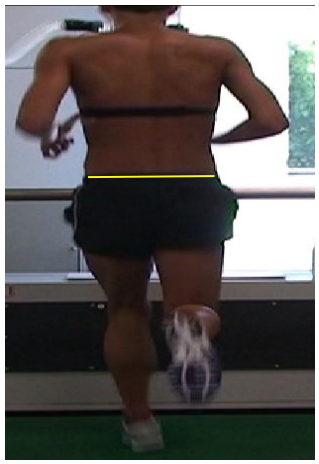
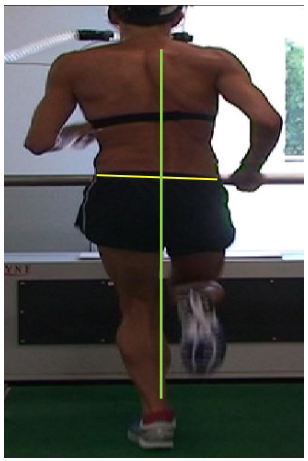
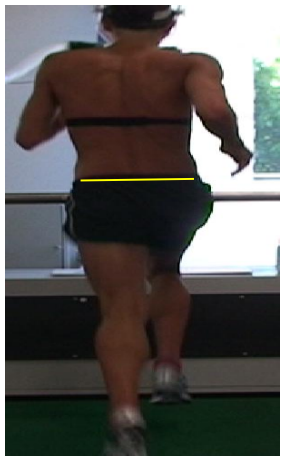
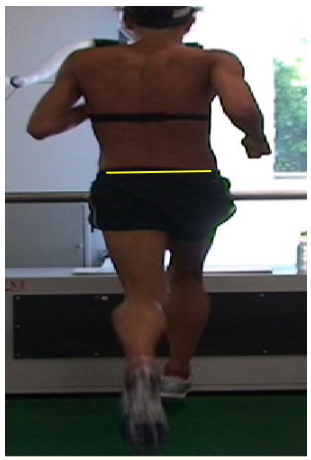
Flight	Left	Right
Med-Lat Foot Position	Neutral	Neutral
Pelvic Motion	low	low

General Body/Overall	Left	Right
Arm Control	medium-high	medium-high
Lateral COG Displacement	low-medium	
Vertical COG Displacement	low-medium	

Key

1	Optimal Movement Pattern
2	Some Deviation; Not Detrimental
3	Below Optimal Movement Pattern
4	Requires Attention
5	Requires Immediate Attention

Contact	Mid-Stance	Take-Off	Flight

Comments & Recommendations

1. Foot Contact Position is across the mid-line of the body and is responsible for some foot pronation stress.
2. Pelvic & Trunk Control is consistent with previous testing conducted on 15 Nov 2010.

PRINCIPAL PARTNER

Gait Analysis Report

Biomechanics | Sport Science | NSWIS

Athlete:	Aaron Royle	Condition:	Tredmill
Date:	25/01/2011	Speed:	20.0 km/h
Location	NSWIS	Gradient:	0 %

Side View

Stance

Braking	Left	Right
Braking at Contact	low	low
Knee Flexion	low-medium	low-medium
Propulsion		
Hip Extension	medium-high	medium-high
Pelvic Tilt	Neutral	Neutral
Lumbar Lordosis	low-medium	low-medium

Flight

	Left	Right
Leg Recovery	low-over	low-over
Hip Flexion	medium	medium
Pelvic Tilt Control	medium-high	medium-high
Pelvic Rotation Control	high	high

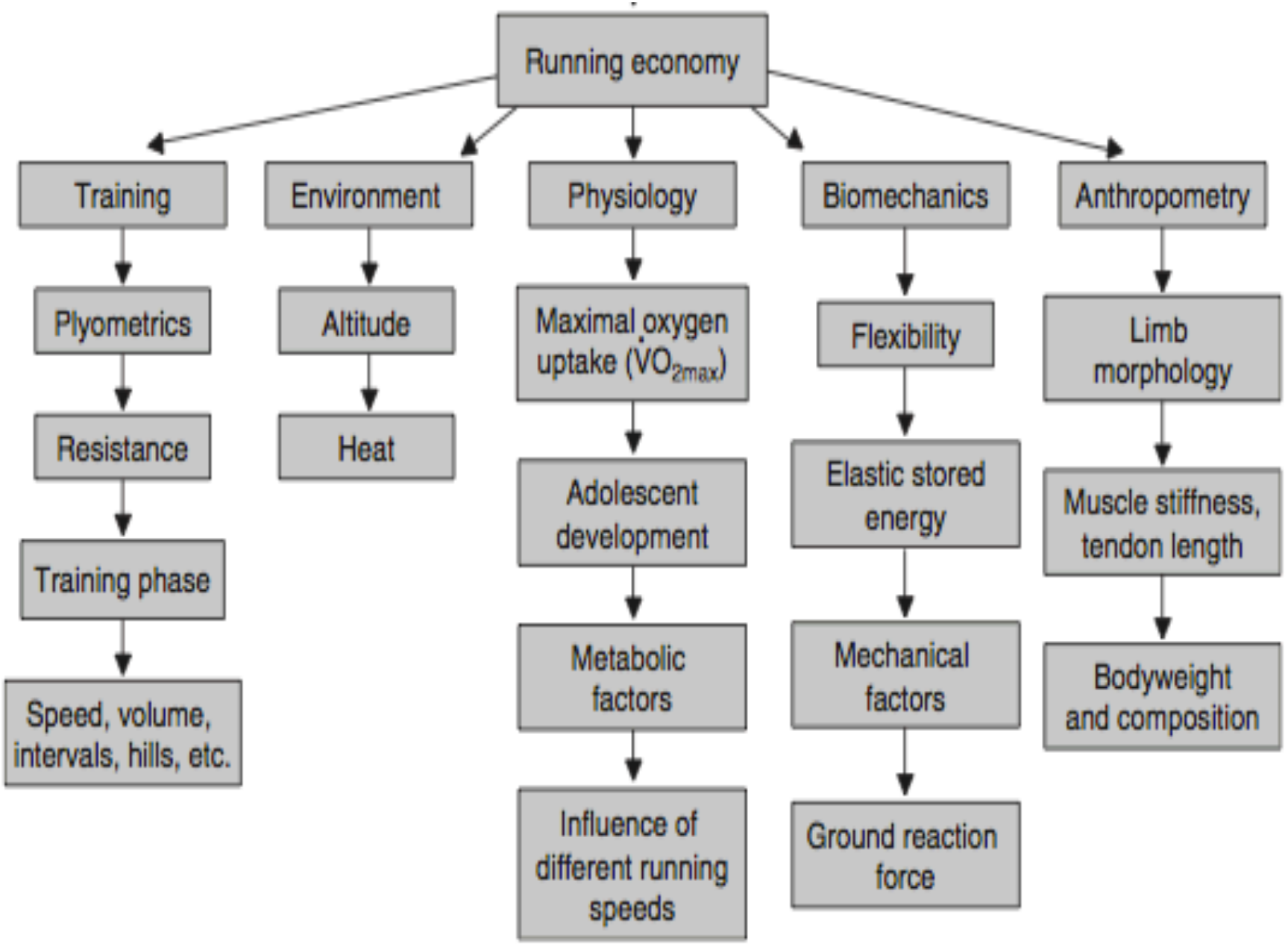
Key

1	Optimal Movement Pattern
2	Some Deviation; Not Detrimental
3	Below Optimal Movement Pattern
4	Requires Attention
5	Requires Immediate Attention

Contact	Mid-Stance	Take-Off	Flight

Comments & Recommendations

Consistent results with previous testing on 15 Nov 2010.



Adapted from: Saunders et. al. (2004)

Developing form / technique

There are two views on running technique.

One school of thought believes that proper training improves technique and no additional time needs to be spent on it.

The other school of thought is that many runners do not achieve the results they should because their technique does not let them exploit their fitness to the maximum.

Speed is always a product of economy

Classifying Run Improvement

* The components to review are:

* 1. Patterning – correct posture, form, gait analysis
* 2. Strengthening – can hold body positioning and execute movements required in pattern
* 3. General Conditioning (both structural and aerobic)
* 4. Specific Conditioning

Role of Strength and Conditioning

* 1. Patterning – correct posture, form, gait analysis
* 2. Strengthening – can hold body positioning and execute movements required in pattern
* 3. General Conditioning (structural)

* Who drives this ?
* Who sets priorities ?

* Running Speed is Stride Rate x Stride length
* How do you define improvement in running performance?

Cadence – Stride Rate

* Slower cadence more muscles work – increased chance of injury
* Cadence / SR - outcome we are looking for ??

Measuring Cadence

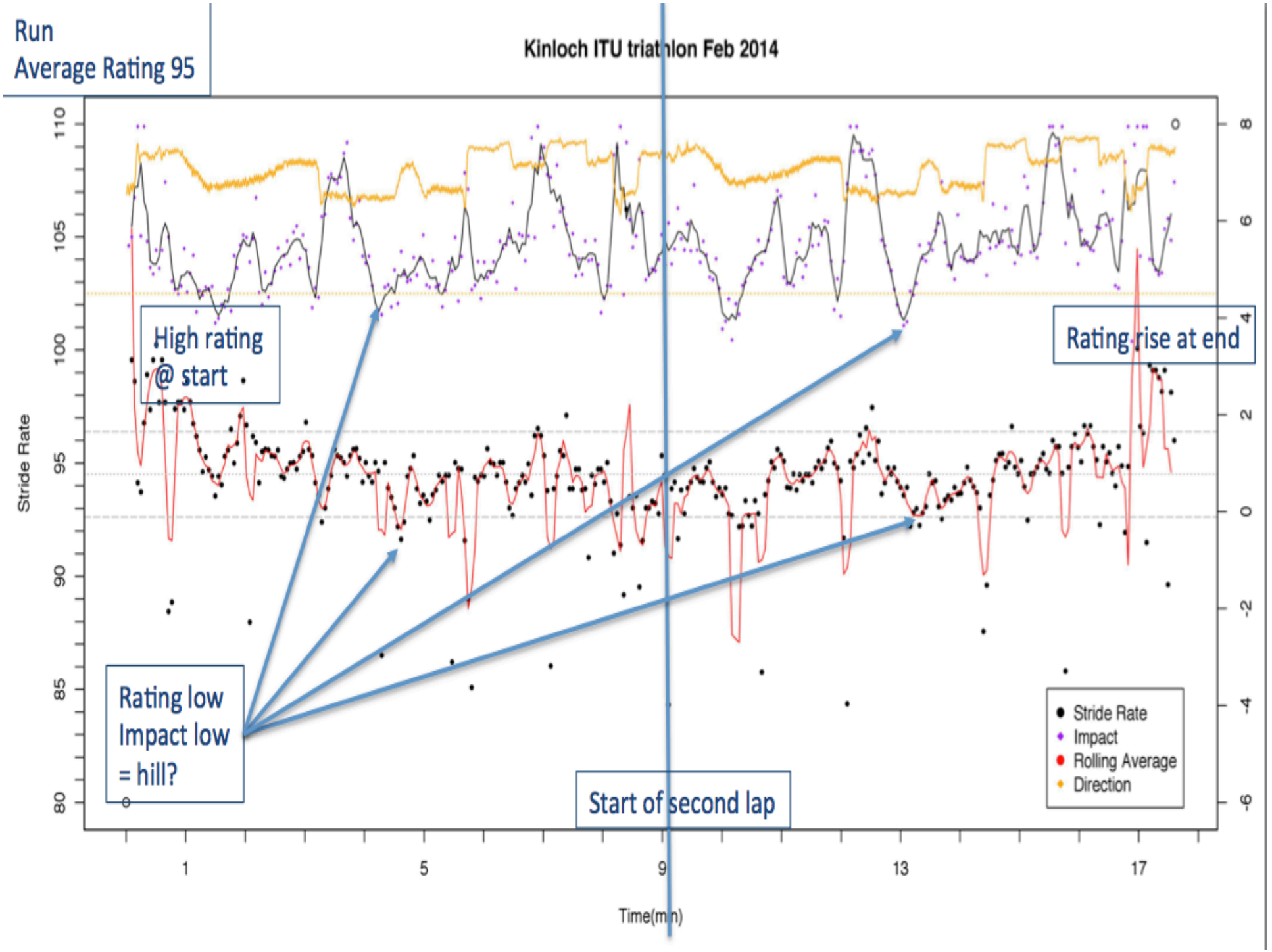
* Count foot strikes in 15 seconds and multiply by 4
* Stop Watches – base 3 function over 3 / 6 / 12 cycles

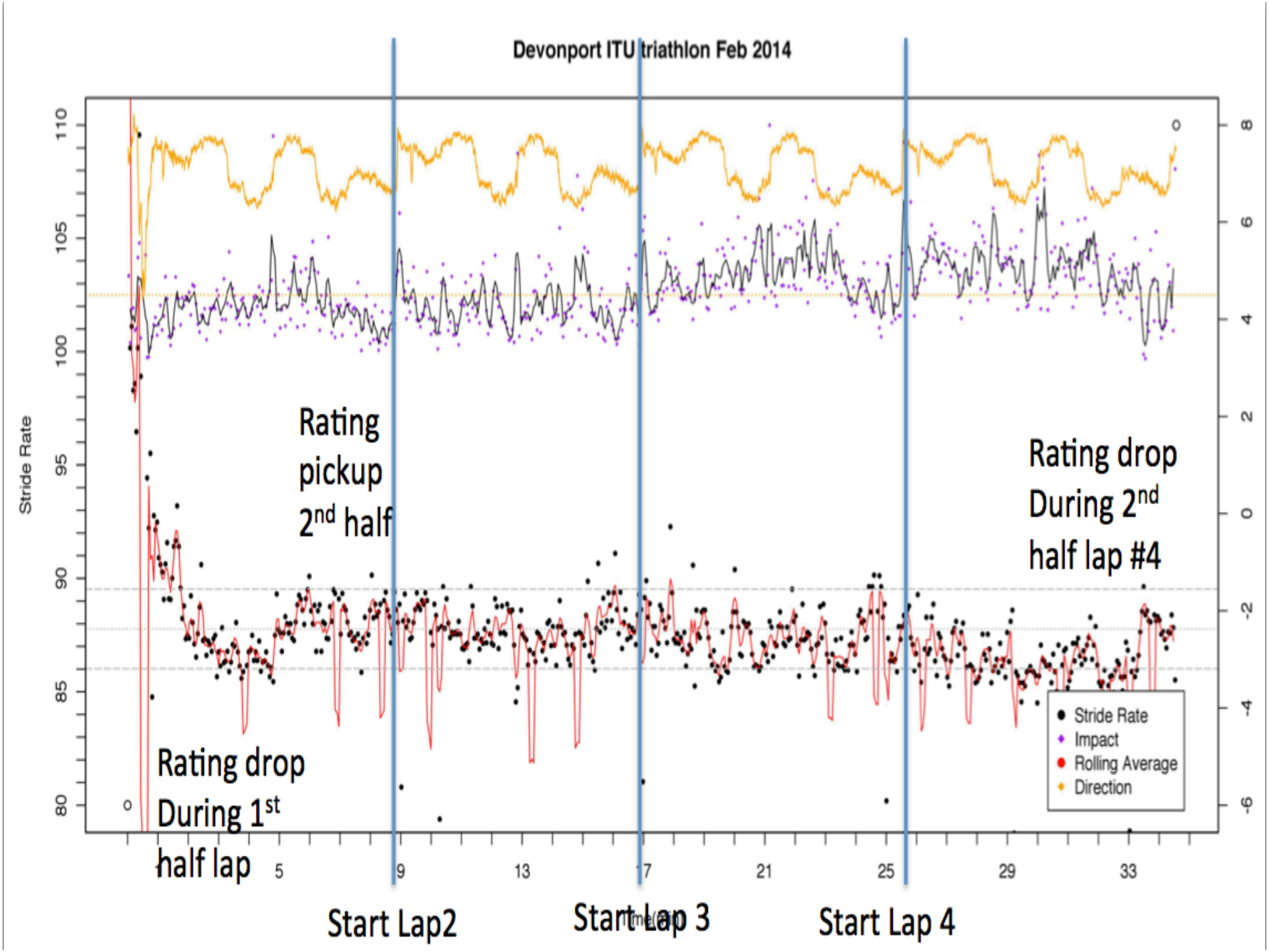
How do you develop cadence?

* 1. Posture – stacking and connection of the athlete
* 2. Forward Lean (angle of attack)
* 3. Power Application - **stretch-shortening cycle (SSC) is an active stretch (eccentric contraction) of a muscle followed by an immediate shortening (concentric contraction) of that same muscle.**
* 4. Arm Movements

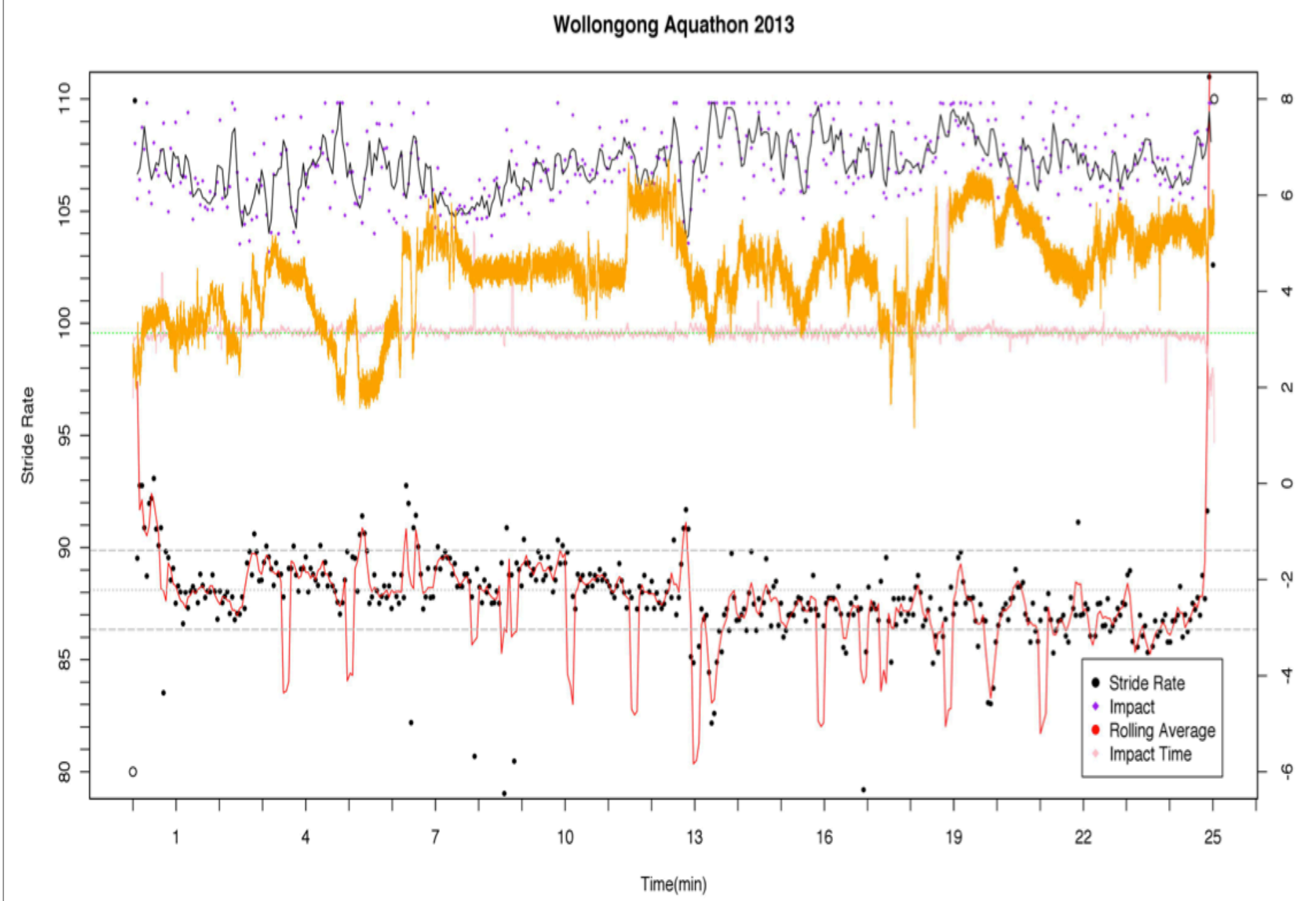
Other Technique Areas to Consider

* Parts we are looking for and are components of the key points above:
    1. Relaxed
    2. Compact
    3. Balanced
    4. Running quiet
    5. Limited Vertical component
    6. Limited breaking moment
    7. Symmetrical movements

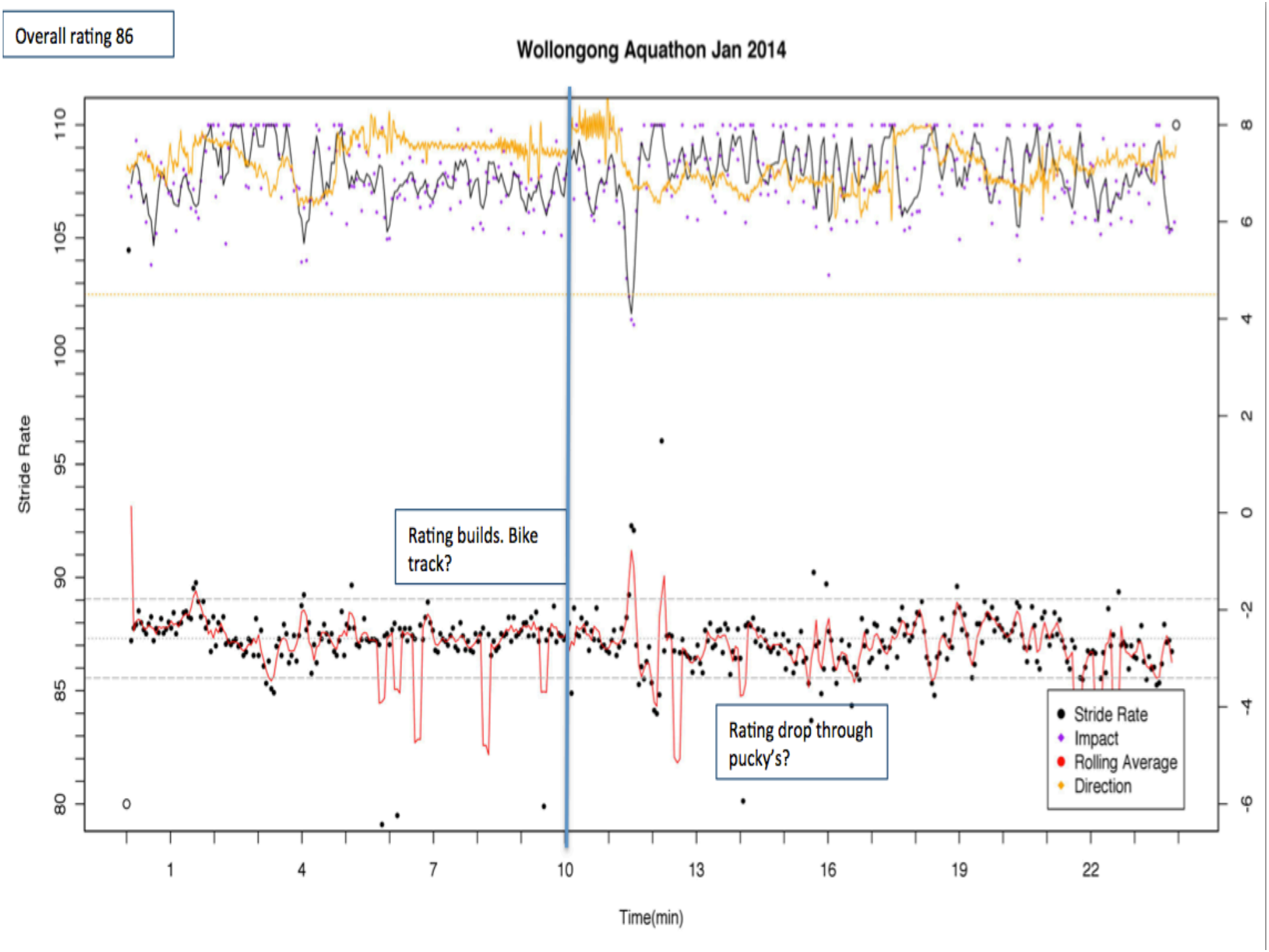

Run
Average Rating 95
Kinloch ITU triathlon Feb 2014
High rating
@ start
Rating rise at end
Rating low
Impact low
= hill?
Start of second lap
Stride Rate
Impact
Rolling Average
Direction
Stride Rate
Time(min)
110
105
100
95
90
85
80
8
6
4
2
0
-2
-4
-6
1
5
9
13
17


Devonport ITU triathlon Feb 2014
Stride Rate
Rating pickup 2nd half
Rating drop During 2nd half lap #4
Rating drop During 1st half lap
Stride Rate
Impact
Rolling Average
Direction
Start Lap2
Start Lap 3
Start Lap 4

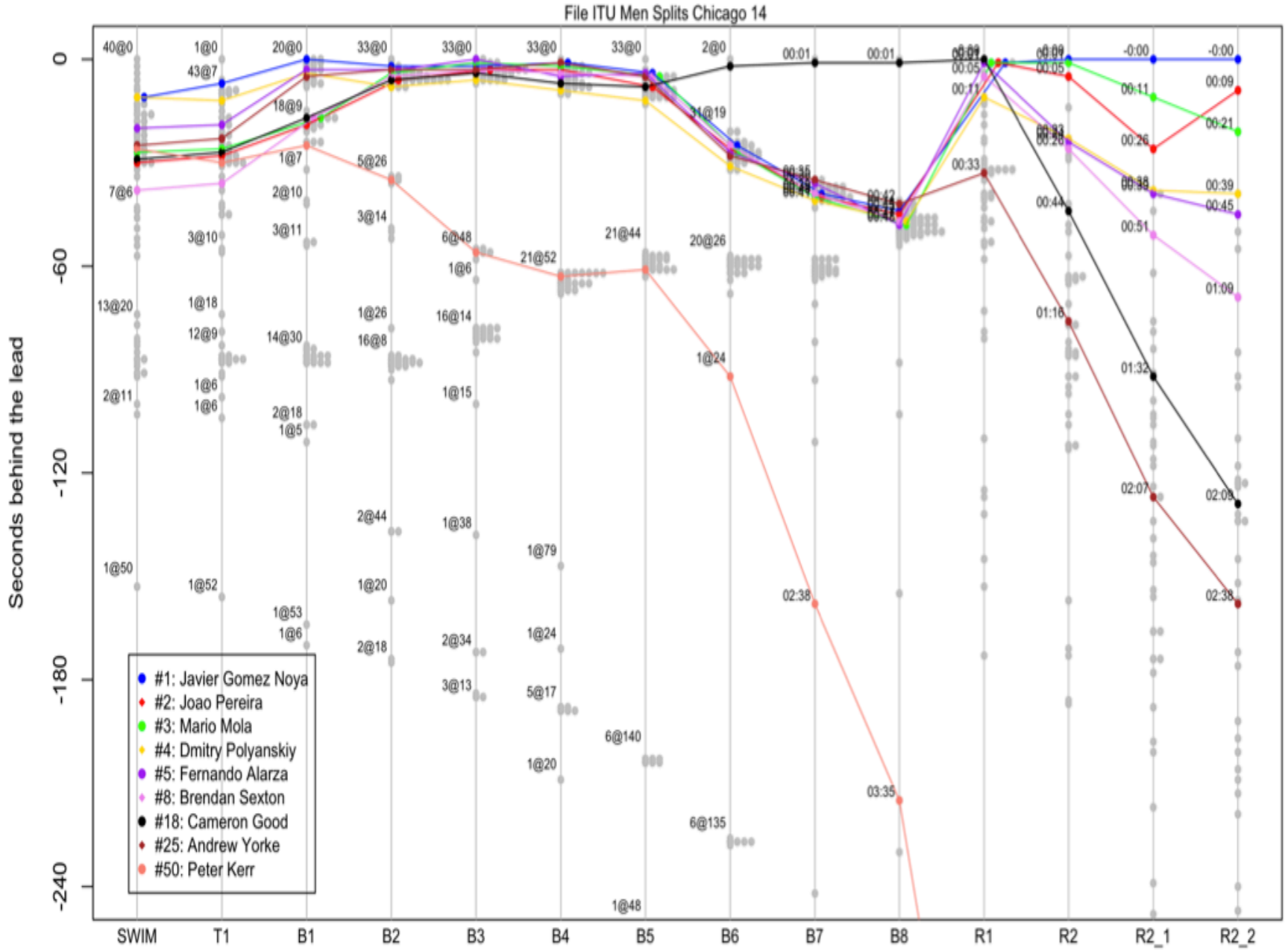
Overall rating 88

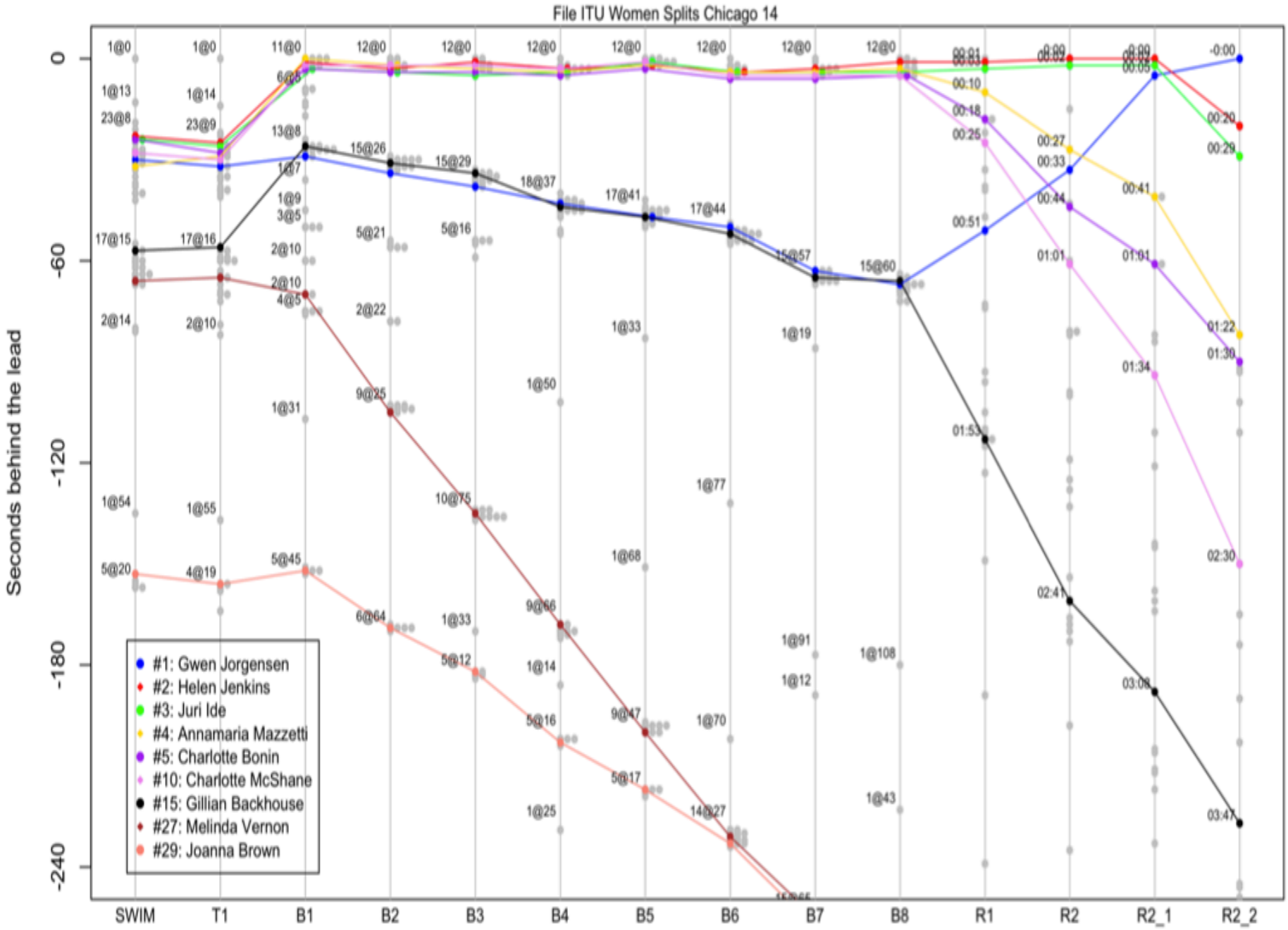


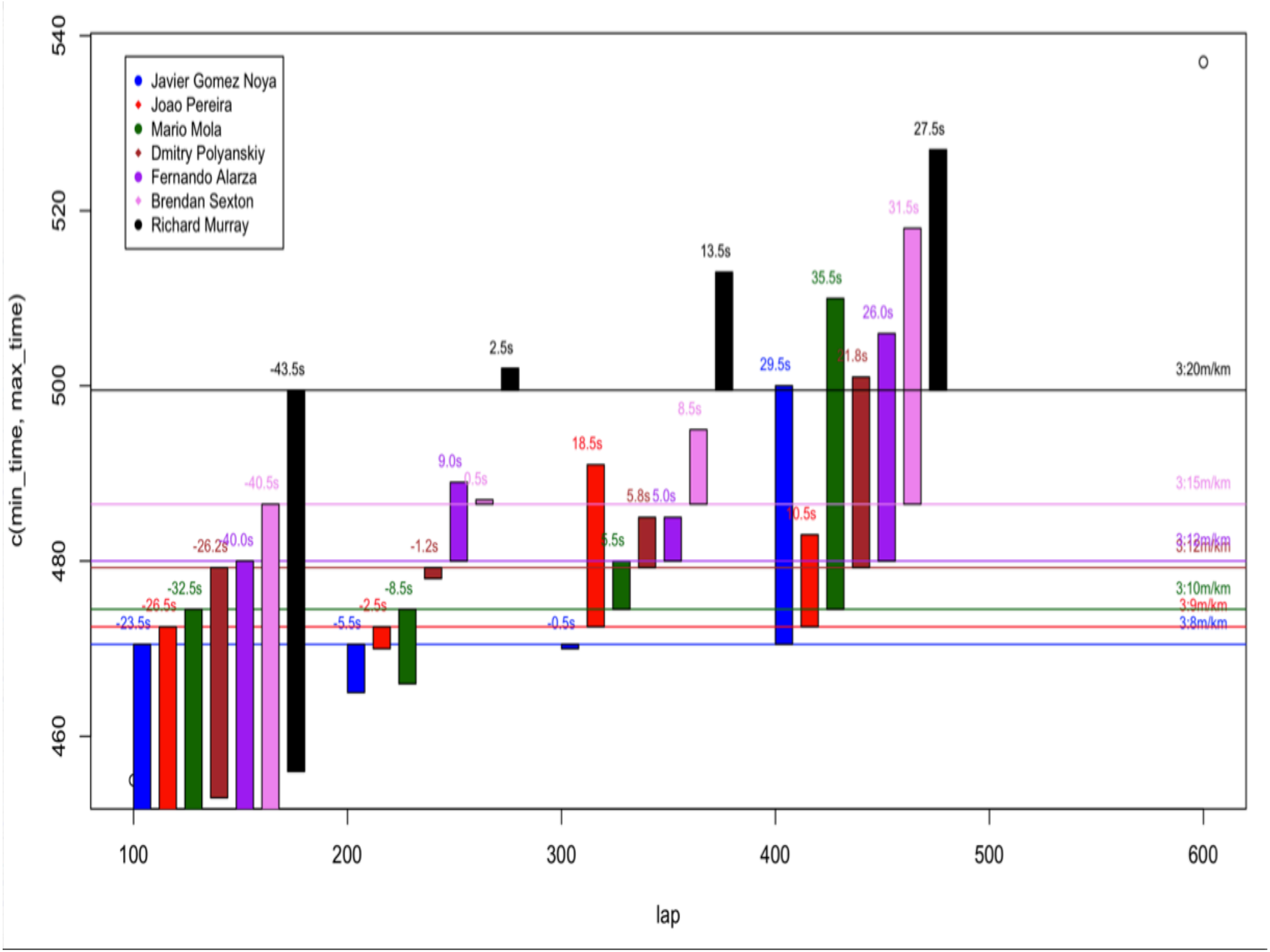
Overall rating 86

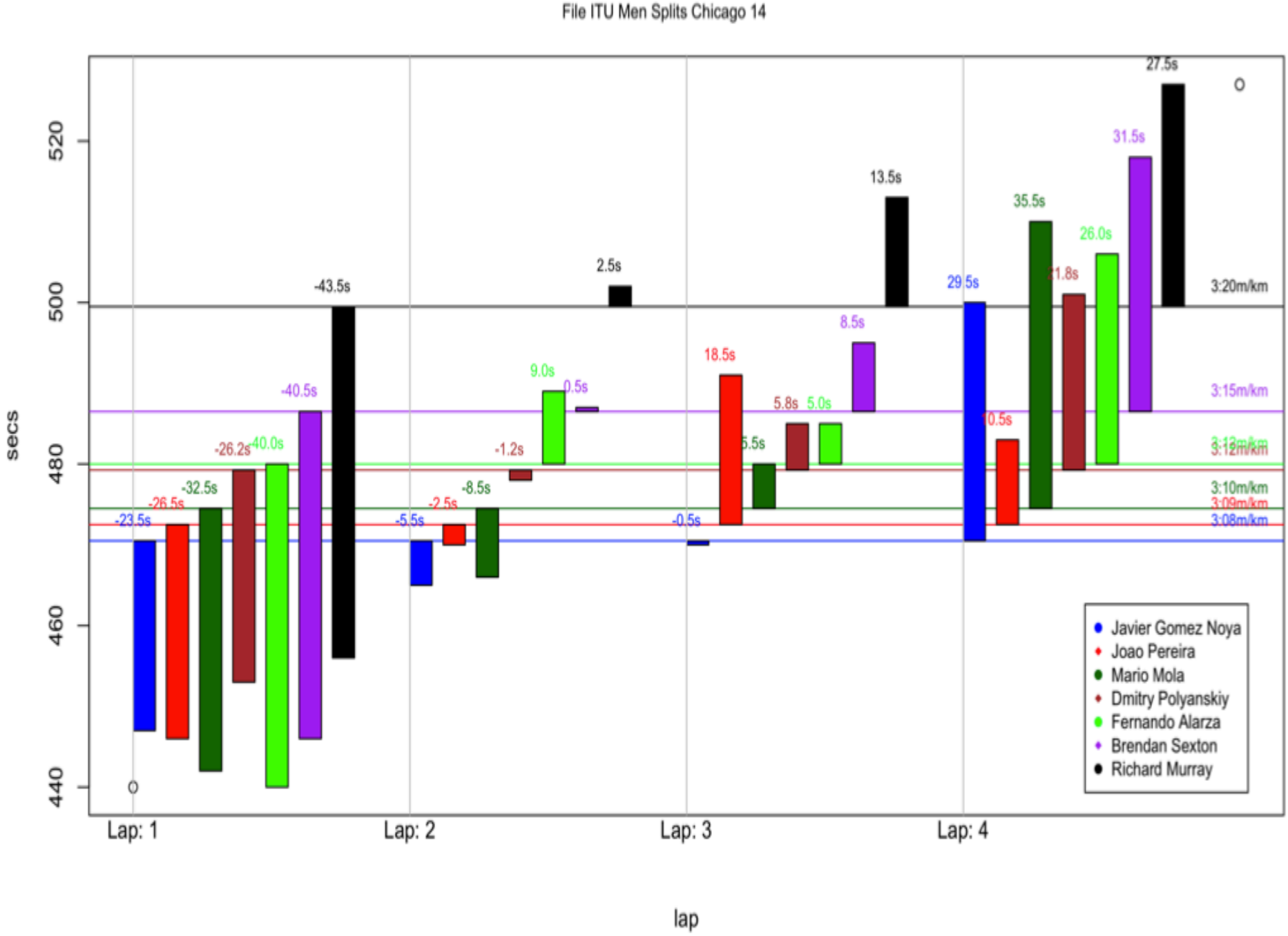


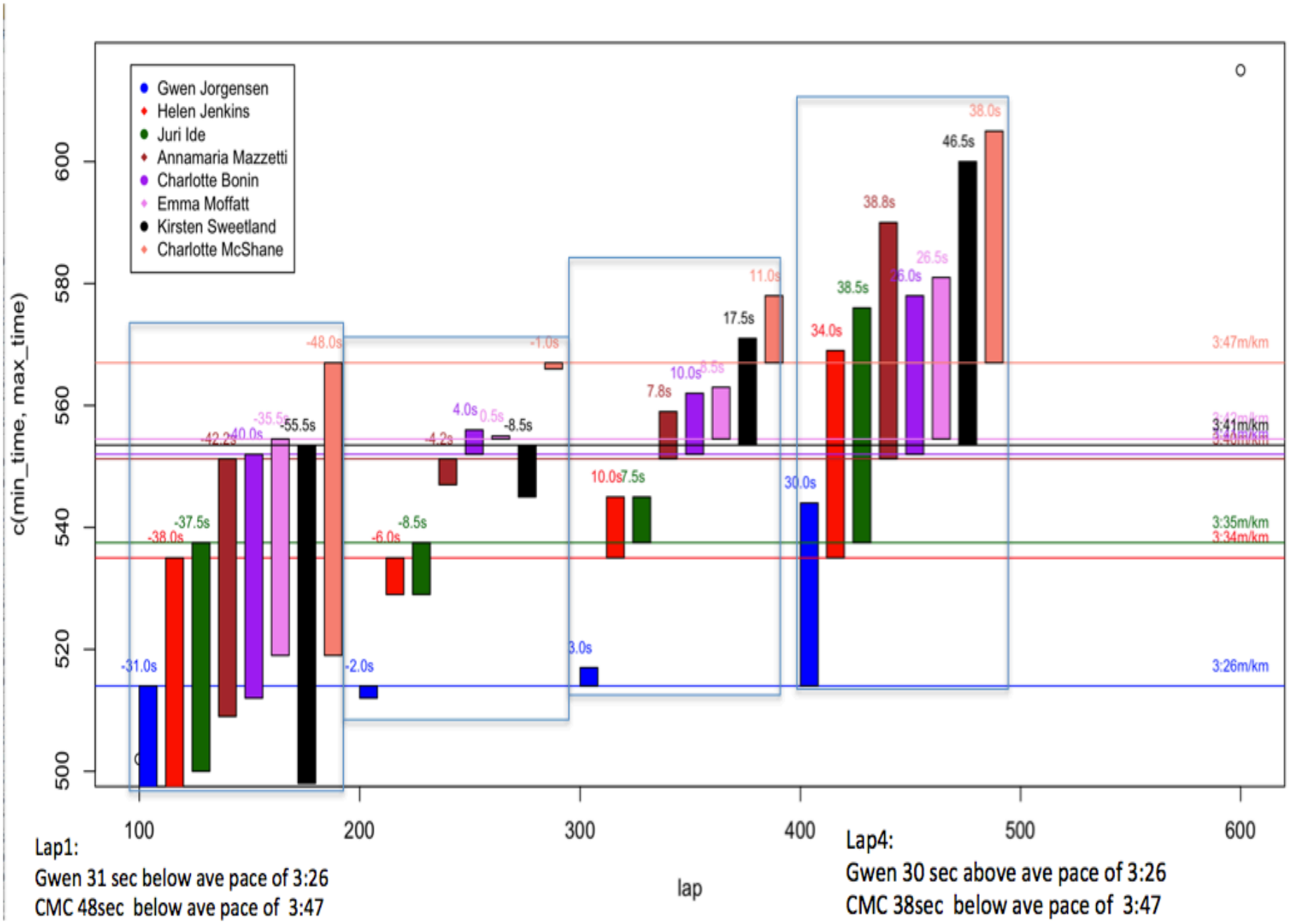
Tactical


File ITU Men Splits Chicago 14
Seconds behind the lead
0
-60
-120
-180
-240
SWIM
T1
B1
B2
B3
B4
B5
B6
B7
B8
R1
R2
R2_1
R2_2
#1: Javier Gomez Noya
#2: Joao Pereira
#3: Mario Mola
#4: Dmitry Polyanskiy
#5: Fernando Alarza
#8: Brendan Sexton
#18: Cameron Good
#25: Andrew Yorke
#50: Peter Kerr


File ITU Women Splits Chicago 14
Seconds behind the lead
0
-60
-120
-180
-240
SWIM
T1
B1
B2
B3
B4
B5
B6
B7
B8
R1
R2
R2_1
R2_2
#1: Gwen Jorgensen
#2: Helen Jenkins
#3: Juri Ide
#4: Annamaria Mazzetti
#5: Charlotte Bonin
#10: Charlotte McShane
#15: Gillian Backhouse
#27: Melinda Vernon
#29: Joanna Brown

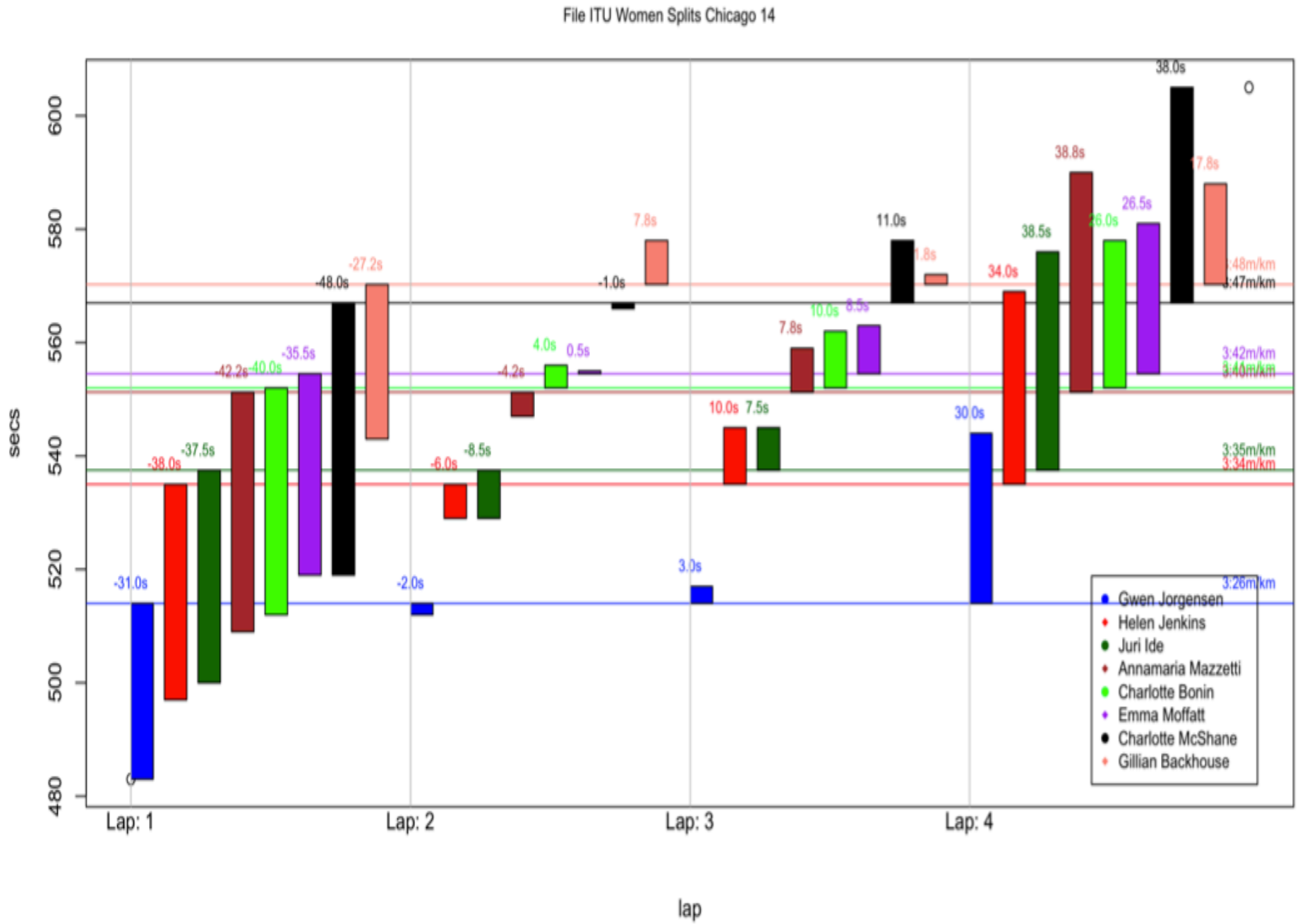

Javier Gomez Noya
Joao Pereira
Mario Mola
Dmitry Polyanskiy
Fernando Alarza
Brendan Sexton
Richard Murray
c(min_time, max_time)
lap
540
520
500
480
460
100
200
300
400
500
600
3:20m/km
3:15m/km
3:12m/km
3:10m/km
3:9m/km
3:8m/km
-23.5s
-26.5s
-32.5s
-26.2s
-40.0s
-40.5s
-43.5s
-5.5s
-2.5s
-8.5s
-1.2s
9.0s
0.5s
2.5s
-0.5s
18.5s
5.5s
5.8s
5.0s
8.5s
13.5s
29.5s
10.5s
35.5s
21.8s
26.0s
31.5s
27.5s

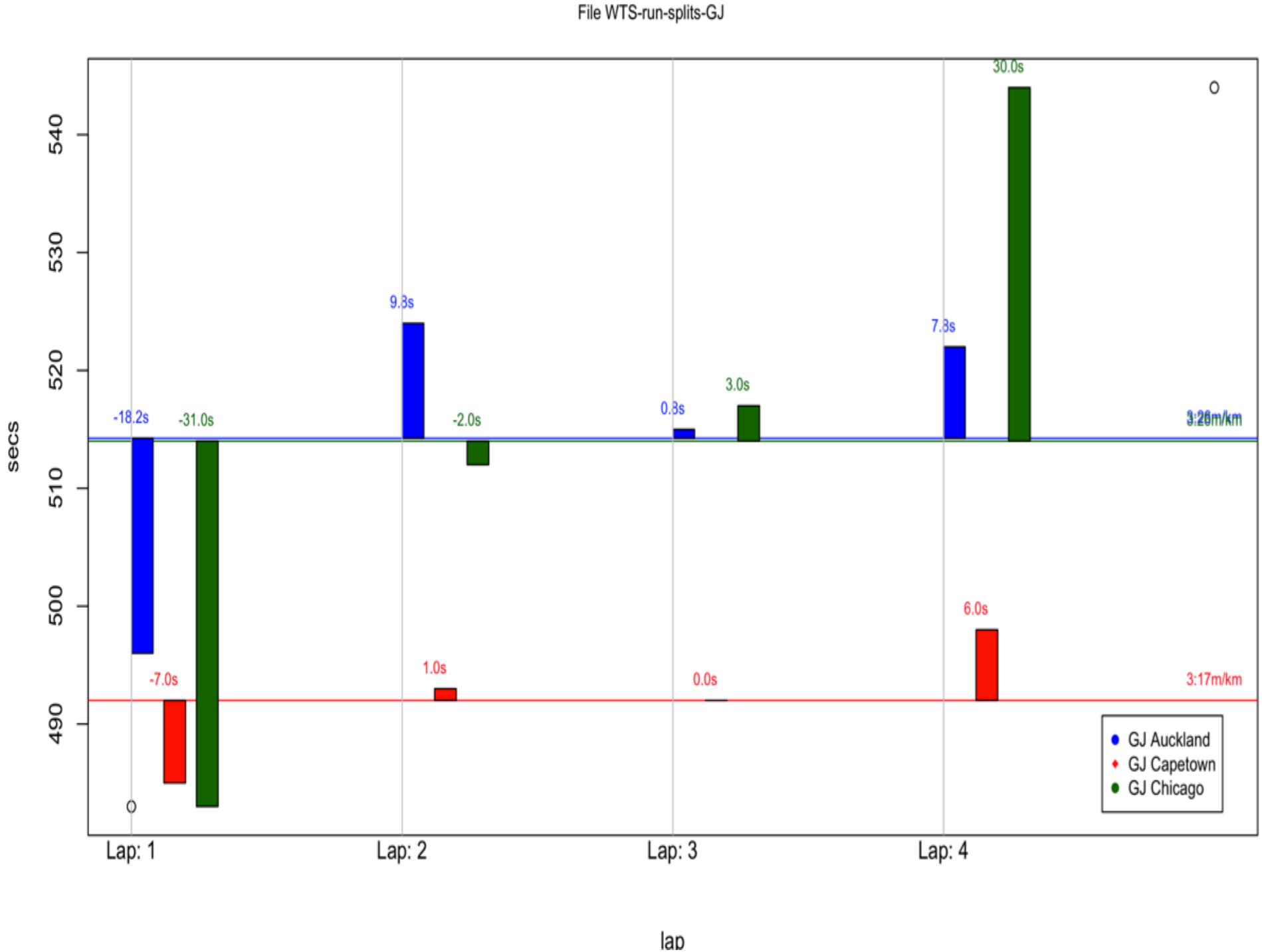

File ITU Men Splits Chicago 14
secs
520
500
480
460
440
Lap: 1
Lap: 2
Lap: 3
Lap: 4
lap
-23.5s
-26.5s
-32.5s
-26.2s
-40.0s
-40.5s
-43.5s
-5.5s
-2.5s
-8.5s
-1.2s
9.0s
0.5s
2.5s
-0.5s
18.5s
5.5s
5.8s
5.0s
8.5s
13.5s
29.5s
10.5s
35.5s
21.8s
26.0s
31.5s
27.5s
3:20m/km
3:15m/km
3:10m/km
3:08m/km
Javier Gomez Noya
Joao Pereira
Mario Mola
Dmitry Polyanskiy
Fernando Alarza
Brendan Sexton
Richard Murray



Lap1:
Gwen 31 sec below ave pace of 3:26
CMC 48sec below ave pace of 3:47

Lap4:
Gwen 30 sec above ave pace of 3:26
CMC 38sec below ave pace of 3:47


File ITU Women Splits Chicago 14
secs
600
580
560
540
520
500
480
Lap: 1
Lap: 2
Lap: 3
Lap: 4
lap
-31.0s
-38.0s
-37.5s
-42.2s
-40.0s
-35.5s
-48.0s
-27.2s
-2.0s
-6.0s
-8.5s
-4.2s
4.0s
0.5s
-1.0s
7.8s
3.0s
10.0s
7.5s
7.8s
10.0s
8.5s
11.0s
1.8s
30.0s
34.0s
38.5s
38.8s
26.0s
26.5s
38.0s
17.8s
3:48m/km
3:47m/km
3:42m/km
3:40m/km
3:35m/km
3:34m/km
3:26m/km
Gwen Jorgensen
Helen Jenkins
Juri Ide
Annamaria Mazzetti
Charlotte Bonin
Emma Moffatt
Charlotte McShane
Gillian Backhouse


File WTS-run-splits-GJ
secs
540
530
520
510
500
490
-18.2s
-31.0s
9.3s
-2.0s
0.3s
3.0s
7.3s
30.0s
-7.0s
1.0s
0.0s
6.0s
3:17m/km
Lap: 1
Lap: 2
Lap: 3
Lap: 4
lap
GJ Auckland
GJ Capetown
GJ Chicago

Observations

* A lot of people have a big difference in their first lap from average.
* Knowing there are some variations on the course etc, but relative to one another, there are big gaps. You are forcing people to react to your run, rather than focus on theirs.
* Lap 3 is the money lap. That is where people start to pay.
* It looks (and I know that looks can be deceiving), that Lap 1 + lap 4 are symmetrical (i.e. The gain on 1 is similar to loss on 4)
* It also looks as though laps 2+3 are symmetrical (gain on 2 is similar to loss on 3). The idea with 2-3 is that they are as close to "average pace" as possible. Which yours are. Remember 3sec/ 2.5km is 1sec/km variation in pace… not really significant.

Physiologically

Training Elements ??

Training Elements

* Aerobic Running
  * Long Slow Distance with varied terrain – 5.15-30 pace
  * Back end Dumps down to 2.55 -3.20 pace over 1600-3200m
  * Tempo (eg. 20-60min @ 20-40 sec slower than slower than 10km pace)
* Intervals
  * Long (eg. >4 min @ goal race pace)
  * Short (eg. < 4min @ 5-10% faster than goal race pace)
* Speed Work
  * Pure
  * Anaerobic Capacity

* Hills (specific strength / power training)
* Fartlek (variable pace training)

* Pace extension
* Back end
* Descending
* Vo2 shuttles
* Assessments
* Key opportunities for developing athletes
* Performance vs fitness workout
*

Comp Planning

* CCUPS
* CCHAMPS
* WCUP
* WTS

* Progression through performance
* LSD opportunities exist after performance
* Seek individual performance and progression there after
* Understand selection and ITU qualification rigors with respect to points and periods