The hierarchical organisation of training

A practical application of an adapted model of Bondarchuk's transfer of training for sports performance

Gurdeep Singh – Central Districts

Diederick Kruger - Auckland

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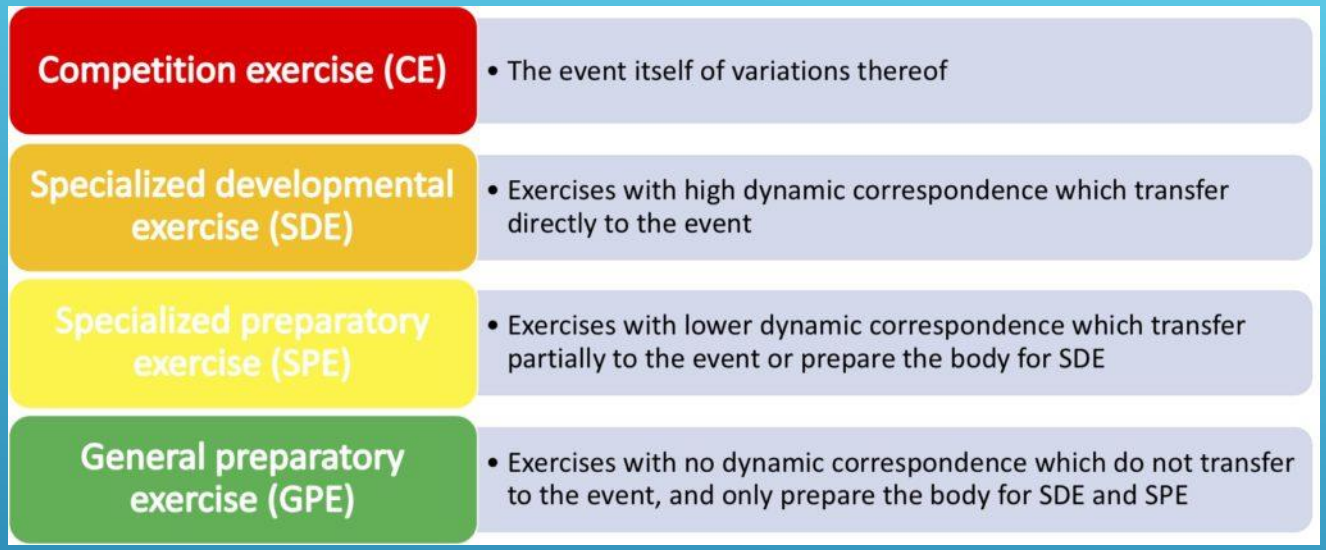

BONDARCHUK'S TRANSFER OF TRAINING FOR SPORTS PERFORMANCE

Classification	Sprinting	Outfielding
Competition Exercise	Live sprint-based drills e.g. outfield scenario-based match fielding	Competitive fielding-based scenarios involving batsman and bowlers.
Specialised developmental exercise	Sprint variations with no tactical or decision-making context i.e. rotated torso running, reactive change of direction	Catching and fielding within controlled scenario
Specialised preparatory exercise	Sprint drill variations, jumps, plyos, med ball throws, ballistic exercises with high dynamic correspondence, gymnastics type dive and roll	Basic skill volume - out field catching, and fielding hit from coaching staff
General Preparatory exercise	General strength training, mobility, conditioning, speed etc	

SPRINTING / OUTFIELDING CONTEXT

Hierarchical Model of Training with-in Cricket

Competition Match Play

Practice Match

Open Wicket Scenario

Net Session Scenario

Fielding Session Scenario

Net Based Specific Drills

Fielding Based Specific Drills

Net based general skill

Fielding based general skill

Position specific athletic development

Role specific athletic development

Cricket specific energy system development

Movement Competency

Competitive (CE)

Specialised Development (SDE)

Specialised Preparatory (SPE)

General Preparatory (GPE)

Periodisation

In-season

Off-Season

Influence

Skills Coach

Strength and Conditioning

- **Fielding**
  - Generally, will be fielding square boundary when not bowling
  - Speed to the ball
  - Good flat arm
  - Be more confident diving and rolling to attach the ball
  - Need to have good conditioning levels so can keep pace while bowling and maintain top work rate in the field

- **Bowling**
  - To bowl fast
  - Consistent height and speed with my bouncer
  - Consistently hit my wide yorker
  - Able to maintain speed and accuracy throughout my 4 overs
  - Staying tall in my action (developed more of a sling – ongoing patella tendon problems causing front knee to collapse more than it should)

NEEDS ANALYSIS:

TECHNICAL
TACTICAL
PHYSICAL
MENTAL

General Periodization

Use of GPS to drive CE and SDE conditioning

Bowling specific strength training through SPE and SDE

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KEY POINTS TO THE BOWLING ACTION

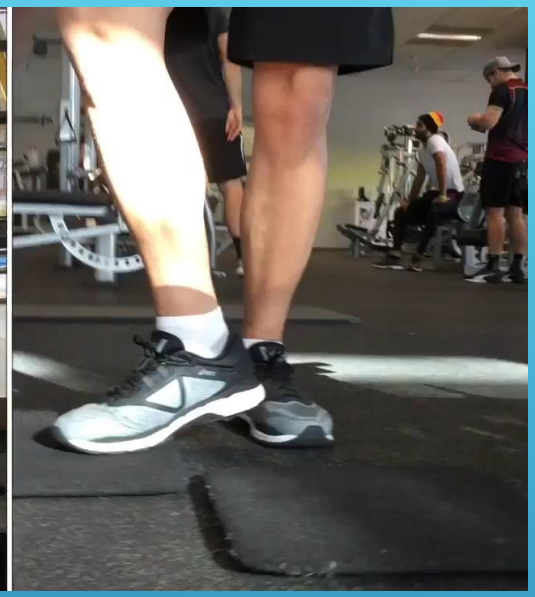
- **Back Foot Contact – ensuring that the athlete can utilise momentum gained in the run up to delivery the ball.**
- **Front Foot Contact – Ensuring that the front leg landing is strong to allow the body to accelerate over top of it.**
- **Back Leg – Using it initially to tension up anteriorly then to pull through to help generate arm speed.**

TRAINING GOALS

Phase	Goal	Skills Focus	S&C Focus	B
Capacity Strength/Aerobic Base	DOMS Protection, neuromuscular coordination, general strength		General lower limb and upper limb strength with special consideration around shoulder and knee	GPE
Slow Eccentric/Anaerobic Capacity	Structural adaptations	Low level technical changes. Run up approach	Build general strength in key identified joints & movement patterns	GPE
Isometric/Anaerobic Capacity	Structural adaptation, RFD, Reactive strength,/stiffness	Getting off the back foot – maintain momentum through crease	Building specific isometric capacity in key hip/knee/ankle positions	SPE
Fast Eccentric/Anaerobic Capacity	Structural adaptation, RFD, Reactive strength/stiffness, explosive strength	Getting off back foot. Absorbing load on the front leg/brace	Building ability to rapidly absorb force in key hip/knee/ankle positions	SPE
Ballistic/Phospho	Maximise SSC performance	Competitive bowling	Build ability to specifically redirect force hip, knee, ankle	SDE

SLOW ECCENTRICS / TIME UNDER TENSION (8 SEC → 2 SEC) - GPE

SLOW ECCENTRICS / TIME UNDER TENSION (8 SEC → 2 SEC) - SPE



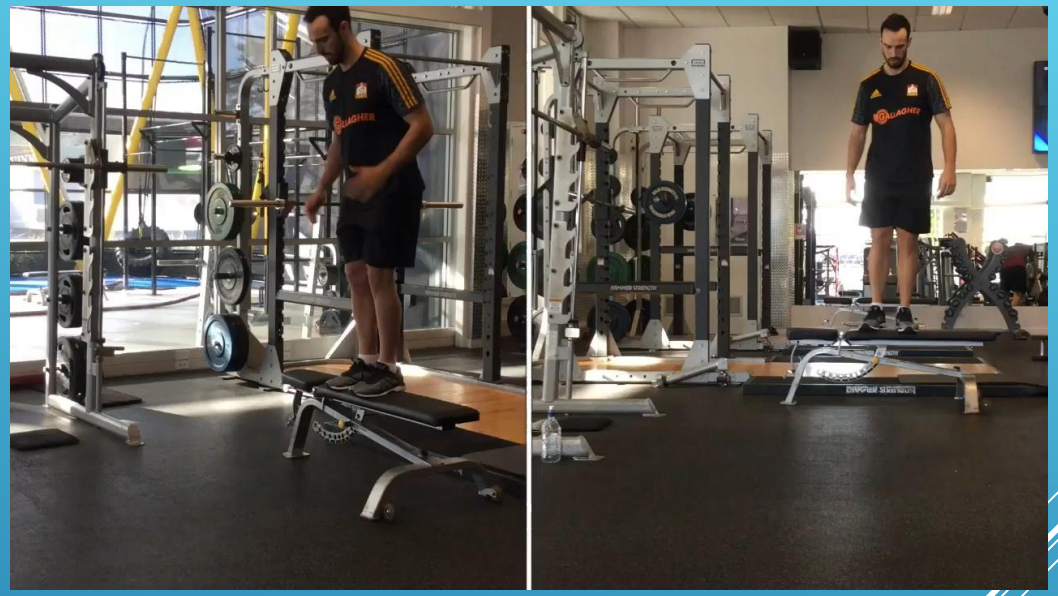
ISOMETRICS (5 SEC → 2 SEC) – GPE & SPE

ISOMETRICS (5 SEC → 2 SEC) – GPE & SPE

FAST ECCENTRIC (QUICK DECEL) - GPE

FAST ECCENTRIC (QUICK DECEL)- GPE

FAST ECCENTRIC (QUICK DECEL)– GPE & SDE



BALLISTIC/PLYO - SDE

General Periodization

Use of GPS to drive CE and SDE conditioning

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"THE MATCH IS THE STIMULUS AND WE MUST TAILOR OUR PROGRAMMING TO THE DEMANDS ENCOUNTERED BY EACH ATHLETE"

- Utilization of GPS data
  - Help support decision making and NOT PRESCRIPTIVE
  - GPS data allows us to identify what stimulus each player has gained from each match and what areas need to be developed during a training day/week

GPS Metrics
- Sprinting > 25 km/h (>6.94 m/s)
- High Speed Running 19-25 km/h (5.20-9.64 m/s)
- Striding 14-19 km/h (3.88-5.20 m/s)
- Jogging 7-13 km/h (1.90-3.60 m/s)
- Walking 2-6 km/h (0.50-1.66 m/s)

Bowling metrics
- Total Bowling Minutes
- Bowling Loads (A:C ratio)
- Total Bowling KM's
- High Speed Distance >18-25km/h
- High Speed Distance >25km/h
- Max and Average Run Up Speed (km/h)
- Distance per min (m/min)

PHYSICAL PERFORMANCE PREPERATION

Lessons from using GPS for a season

1. Training Load vs. Match Load – Formats, Batters, Bowlers, Fielders

2. Bowling Loads – Optimal vs. Practical vs. Actual

3. Challenging cricketer's energy system development – What % of conditioning at what ratios?

4. Training scenarios/Fielding/Bowling - Classical speed vs Game speed

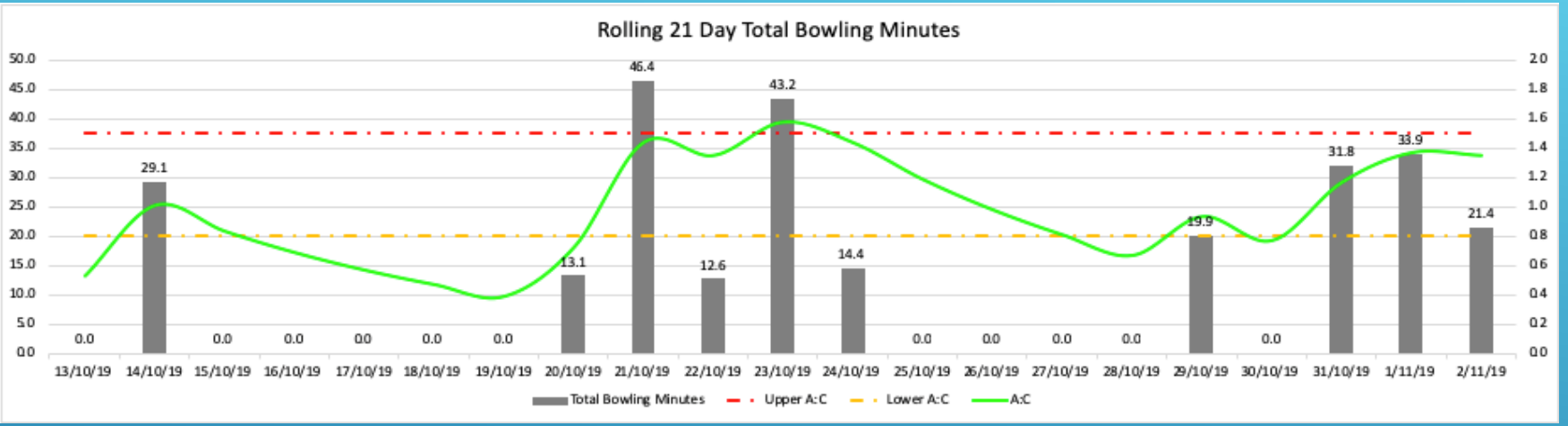
5. How do we introduce pressure/decision making under fatigue (T20/50-Overs/4-day match)

"data" should be a tool that supports our decision making instead of becoming the driver of prescription…

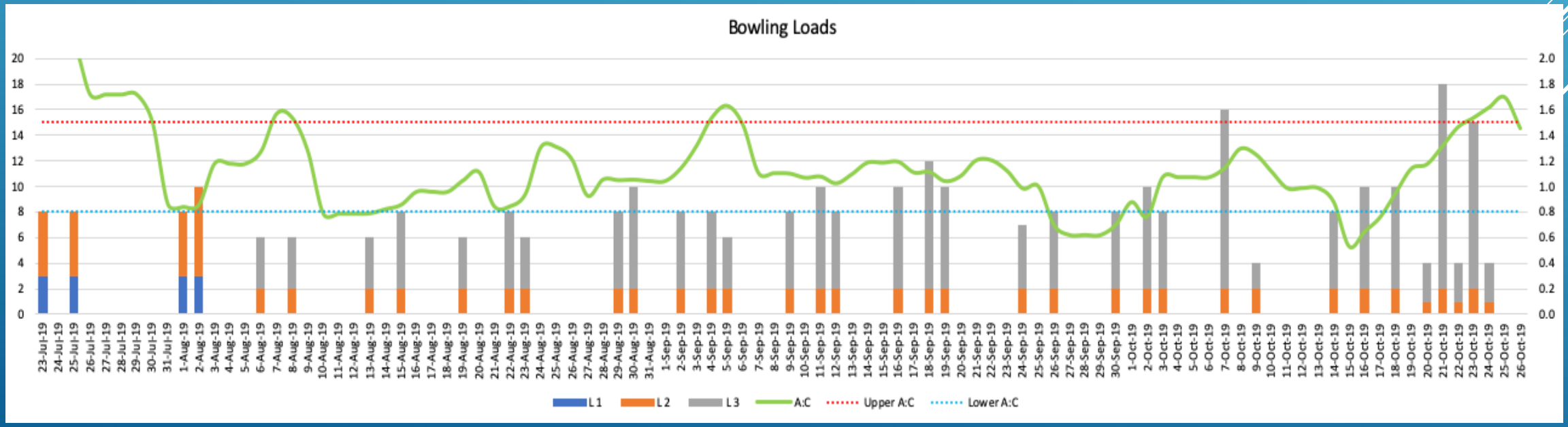
How do we use this information to physically prepare cricketers?

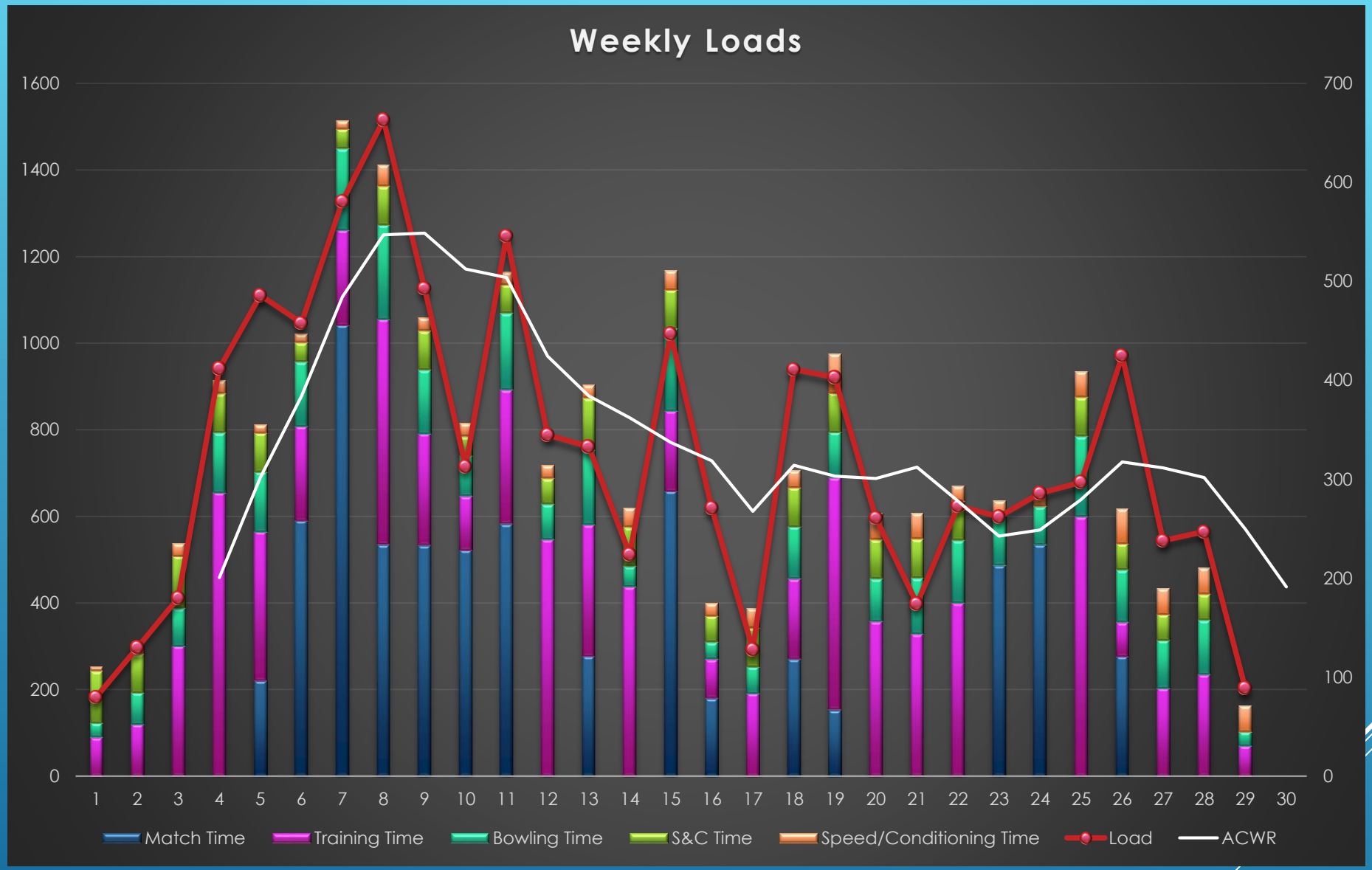
Consider the nature of cricket and the dynamic demands per match that varies from fielding positions, overs bowled, time spent batting and what format.

WORKLOAD MANAGEMENT



What is;
Optimal?
Practical?
Actual?





What stimulus is the game providing and what stimulus is the training providing?

How do we use GPS data and monitoring from a physical performance perspective?

- **Total distance vs High Speed distance**
  - **Dosages**
    - *1800m – 3000m HSd*
    - *15000m – 18000m Td*
    - *Acceleration, Decelerations (bands) and COD/Reactive agility*
    - *Max speed – 30 – 35 km/h (8.3 m/s – 9.7 m/s)*

- **Monitoring (Preparedness and Readiness)**
  - **Weekly**
    - *RSI (30cm) and FV profiling Jump Squat @ 40kg*
    - *Wellness Questionnaire (9 pts)*
    - *AU Load (GPS) and sRPE*

GPS – Standardisation

Recorded and Investigated

- Total distance?
- High Speed Distance
- High Intensity Efforts
- Accelerations and Decelerations? – What bandwidth?
- Max Speed
- External Load

T20 Match Performance Outputs

	Total Distance (km)	HSD 18-25km/h (m)	HSD >25km/h (m)	Top Speed (km/h)	Distance Per Minute (m/min)	Accels 3-4 m/s/s	Decels 3-4 m/s/s
Player 1	7.3 ±± 0.5	675 ±± 62	173 ±± 66	31.8 ±± 1.8	71.7 ± 2.	21± ± 7	15 ±± 7
Player 2	6.5 ± ± 0.7	651 ±± 78	61 ±± 28	30.8 ±± 1.2	64.6 ±± 4.1	11 ±± 2	10 ± 6
Player 3	7.1 ± ± ± ± 0.8	772 ± 7	112 ±± 24	29.2 ±± 2.8	68.4 ±± 4.7	39 ±± 3	8 ± 3
Player 4	6.7 ±± 0.6	726 ±± 113	123 ±± 36	27.7 ±± 1.2	65.6 ±± 2.7	16 ±± 7	18 ±± 6
Player 5	6.8 ± 1.3	658 ±± 131	503 ±± 102	31.0 ±± 1.2	72.5 ±± 7.2	36 ±± 9	13 ±± 2

T20 Per Over Performance Outputs

	Total Bowling Mins	Bowling Meters (m)	HSD 18-25km/h (m)	HSD > 25km/h (m)	Avg Run Up Speed (km/h)	Distance Per Min (m/min)
Player 1	4.7 ±± 0.8	501 ±± 63	115 ±± 16	26 ±± 0.2	25.7 ± 0.65	108.1 ±± 10.1
Player 2	4.8 ±± 0.7	494 ±± 50	102 ±± 18	0 ±± 0	23.3 ±± 1.1	105.2 ±± 13.5
Player 3	4.3 ±± 0.5	486 ±± 53	123 ±± 12	19 ±± 0.8	25.6 ±± 0.6	112.5 ±± 8.0
Player 4	4.8 ±± 1.0	500 ±± 77	114 ±± 17	26 ±± 0.1	25.6 ±± 0.4	105.8 ±± 10.7
Player 5	5.0 ±± 1.1	552 ±± 99	71 ±± 12	111 ±± 20	27.8 ±± 0.3	112.2 ±± 13.2

How do we use GPS data and monitoring from a physical performance perspective?

- **Match "Loads" – How do we prescribe daily/weekly/format conditioning?**

- **Sprinting volume – How much and at what ratios?**
  - *240 – 360m/session (every 20m sprint:30-45sec rest)*
  - *Time constraints at practice*

- **MAS/Conditioning – Running outputs in cricket are not challenging enough in isolation (0.3 m/s – 0.5m/s covering ave Td)**
  - *Bowlers ACWR or implement game plans*
  - *Players who can tolerate high chronic training/match loads*

T20 Burger King Super Smash Case Study

Boundary fielder (Deep Square leg and Cow) vs.
Inner Ring fielder (Square leg and Mid-Off)

	Accelerations	Deceleration	Sprint Total - >25km/h	High Speed Running Distance – 20-25km/h (m)	High Intensity Efforts	Max Speed (m/s)
Boundary fielder (Deep Square leg and Cow)	55	32	95+-22	791 +-132	151+-23	7.69
Inner Ring fielder (Square leg and Mid-Off)	22	10	55+-31	339 +-67	60+-18	6.85

"Training Rhythm" is the ability to react and prepare by using the amount of training days effectively with the format sequenced.

General Conditioning Tools

Drill	GPS Metrics	% of Match Load	S&C Focus
60m and 80m Tempo Pyramids x 2 sets	TD – 2.1km HSD > 18km/h – 1000-1200m m/min – 126 m/min Top Speed - >24km/h	TD = 28% HSD = 117-141% m/min = 56% Top Speed = >83%	*Linear tempo running/run throughs *Low Match/Bowling Load Top Up
Bronco Beep Test (Continuous) x 1 set	TD – 1.2km HSD >18km/h – 58-60m m/min – 170 m/min Top Speed - > 21km/h	TD – 16% HSD >18km/h – 7-8% m/min – 150% Top Speed – 72-80%	* Shuttle/COD based conditioning * High Match/Bowling Load
50m and 100m Tempo Running x 10 reps x 1 set	TD – 2km HSD > 18km/h – 460m m/min – 107 m/min Top Speed - > 22km/h	TD – 27% HSD > 18km/h - 54% m/min – 100% Top Speed – 73%	*Linear tempo running/run throughs. * Standard match/bowling loads

Specific Conditioning Tools

Energy System	Bowling Drills	Skill + S&C Focus	GPS Metrics
Aerobic Power	18 Ball Over	Execution, performance under fatigue, consistency, variations	TD – 1,458-1,617m HSD > 18km/h – 430-465m m/min – 112-115 m/min Avg Run Up Speed – 25.6km/h
Anaerobic Capacity	12 Ball Over	Execution, performance under fatigue, match intensity/bowling speeds	TD – 972-1,078m HSD > 18km/h – 295-310m m/min – 112.5 m/min Avg Run Speed – 25.6km/h
Anaerobic Power	6 Ball Over	Execution, performance under fatigue, match intensity/bowling speeds	TD – 486-539m HSD > 18km/h – 130-155m m/min – 112.5 m/min Avg Run Up Speed – 25.6km/h

How do we use GPS data and monitoring from a physical performance perspective?

- **Match/Format demands vs Training**
  - Force production and absorption
  - Amount of Sprints and HSd for different formats
  - Acceleration, Deceleration and COD
  - Bowling ACRW and the paradox of fixture congestion
  - Batting vs non-batting workloads (+- 2000m at MAS)

- **The different formats in isolation and in combination demands quite a few things at different times but its not enough of an exposure to drive adaptation to those demands.**

- **GPS and Monitoring tools allows us to understand what stimulus the game is or isn't providing and then to tailor our training opportunities. Optimizing the schedule via tactical periodisation for format demands.**

AUCKLAND ASSN CRICKET

CENTRAL DISTRICTS CRICKET

NEW ZEALAND WHITEFERNS