Individualising conditioning programs for large tactical groups

Mick Stierli BPhysEd, MExSc, CSCS

Goals of this presentation

• Understand the importance of prescribing individual training intensity during conditioning sessions.
• Be able to prescribe individual training programs for tactical athletes.
• Individualise a group training session to ensure all tactical athletes are training at the same intensity.
Why is this important?

- In large groups especially in Law enforcement, Military, Fire and Rescue there will generally be large differences in fitness levels.

What’s the difference?

Professional sport
- Monitoring Programs
- Well being reviews
- GPS
- Heart rate monitoring
- RPE

Law enforcement
- Monitoring Programs
- Well being reviews
- GPS
- Heart rate monitoring
- RPE

Differences

Professional sport
- How long is a piece of string?
- Funding
- Every one is different
- Numbers

Law enforcement
- How long is a piece of string?
- Funding
- Every one is different
- Numbers
Differences

Professional sport

Law enforcement

How can we as coaches cater for everyone?

• Age
• Sex
• Different fitness levels
• Yet still ensure that all individuals get the training that they need.

Non individualised programs
Ways to determine your maximal aerobic speed (MAS)

• Distance / Time = MAS in metres a second
• For example, if your running time trial for 2km was 10 minutes, then your MAS = 3.33m/s (2000 m/600 s).
• If your 5 min max rowing time trial was 1500m, then MAS = 5m/s (1500 m/300 s).
• If your 10 min cycling time trial was 6000m, then MAS = 10 m/s (6000 m/ 600 s)

Different MAS speeds for different intervals

• Using our running example test example(3.33 m/s) running intervals at 100, 110, 120 or 130 % MAS would mean the following distances in the specified times.
• Important point MAS above 100% can only be maintained for shorter intervals, but can be repeated a number of times.

MAS speed for different intervals

<table>
<thead>
<tr>
<th>3.33 m/s</th>
<th>10 secs</th>
<th>15 secs</th>
<th>20 secs</th>
<th>30 secs</th>
<th>60 secs</th>
</tr>
</thead>
<tbody>
<tr>
<td>70%</td>
<td>23 m</td>
<td>34 m</td>
<td>47 m</td>
<td>70 m</td>
<td>140 m</td>
</tr>
<tr>
<td>80%</td>
<td>27 m</td>
<td>40 m</td>
<td>53 m</td>
<td>80 m</td>
<td>160 m</td>
</tr>
<tr>
<td>90%</td>
<td>30 m</td>
<td>45 m</td>
<td>60 m</td>
<td>90 m</td>
<td>180 m</td>
</tr>
<tr>
<td>100%</td>
<td>33 m</td>
<td>50 m</td>
<td>66 m</td>
<td>99 m</td>
<td>198 m</td>
</tr>
<tr>
<td>110%</td>
<td>37 m</td>
<td>55 m</td>
<td>74 m</td>
<td>110 m</td>
<td></td>
</tr>
<tr>
<td>120%</td>
<td>39 m</td>
<td>59 m</td>
<td>78 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>130%</td>
<td>43 m</td>
<td>64 m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Basic mathematics

• Just to make sure that you understand how we have calculated the distances.
• Speed = Distance/time
• Distance = Speed x Intensity x time
• 59.94 m = 3.33 m/s x 1.2 (120%) x 15 sec

Prescription tests

• Tests that produce a termination velocity at or very close to VO2 max are useful when the goal is to design high intensity aerobic training programs for large tactical groups.

What are some of the tests that we can use?

• Beep test (multi stage shuttle run)
• University of Montreal Track Test (MAS)
• 30:15 Intermittent Fitness Test (Buchheit)
Beep Test (multi stage shuttle)

<table>
<thead>
<tr>
<th>Beep Shuttle Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
</tr>
<tr>
<td>3.8</td>
</tr>
</tbody>
</table>

**Beep test (multi stage shuttle)**

- MAS = 2.4 x max shuttle speed – 14.7
- Multi stage shuttle (beep test) results over 10 km.h⁻¹ underestimate MAS and should be adjusted using the formula above.

Maximal Aerobic Speed (MAS) Test

- 200 metre oval
  - 25 metres
  - 2 metres
Maximal Aerobic Speed (MAS) Test

- Set up a course over 200 or 400 metres
- Place in colour cone (red) 25 metres apart around circumference of marked track
- Place second colour (yellow) 2 metres behind each of the red cones (safety zone)
- Athletes start on red cone

Maximal Aerobic Speed (MAS) Test

- Athletes commence running at 10 km/hr for two minutes
- Must be within coloured cones at audible CD beep
- Test is continuous in nature
- Velocity increases by 1 km/hr every 2 mins
- Test termination – miss cones on 3 consecutive occasions or voluntary exhaustion

MAS can be used to predict VO₂ max

- The following formulae can be used to predict VO₂ max from MAS results:
  - VO₂ max (ml.kg⁻¹. min⁻¹) = 3.5 x MAS (in km.h⁻¹)
  - Or 0.0324 x (MAS)² + 2.143 x MAS + 14.49
30:15 Intermittent Fitness Test (IFT)

- Martin Buchheit
  [http://www.martin-buchheit.net](http://www.martin-buchheit.net)

---

30:15 Intermittent Fitness Test (IFT)

- An intermittent shuttle run beep test conducted over a 40 metre course
- 30 seconds running – 15 seconds passive recovery (walking to next starting position)
- Velocity progressively increases with each stage
- Starts at 8 km/hr and increases at 0.5 km/hr per stage
30 – 15 Intermittent Fitness Test (IFT)

• Termination criteria – Fail to reach within 3 metre safe zones at time of audio beep on 3 consecutive occasions
• Excellent choice for any intermittent based sports
• Gold standard for tactical athletes (I believe)
• Final velocity (VIFT) can be used to set interval training intensity

30 – 15 Intermittent Fitness Test (IFT)

• The following formulae can be used to predict VO₂ max from IFT results:
  • VO₂ max (ml·kg⁻¹·min⁻¹) = 28.3 – 2.15 G – 0.741 A – 0.0357 W + 0.0586 A x VIFT + 1.03 VIFT
  • Where G stands for gender (female = 2, male = 1)
  • A stands for Age, and W stands for weight

30 – 15 Intermittent Fitness Test (IFT)

• Why do I prefer this test?
  1. Can determine a similar training load for tactical athletes.
  2. Levels the field between endurance athletes and anaerobic athletes.
  3. More specific to the tactical athlete.
  4. Takes into account acceleration/deceleration and change
  5. Room needed to conduct the test.
Compare the UMTT and 30:15 IFT

UMTT 30 : 15 IFT

Valid and reliable

Important to note

• That the VIFT is much faster then the vVO₂max and the anaerobic contribution is much higher during the 30-15 IFT than during a continuous straight line running test.
• Generally 2 – 5 km/hr faster.
**Training intensities**

- **UMTT**
  - 15-18 at 110% \(v_{\text{max}}\)
- **30 – 15 IFT**
  - 15-18 at 85% \(v_{\text{max}}\)

---

**Distance is important**

- 1.35% of MAS
- 120% of MAS

1.35% and 120% of MAS for a MAS = 10 km/h

---

**UMTT (MAS)**

- Graph showing the total distance covered at different MAS levels (105%, 110%, 120%, 130%, 140%)

---

**Buchheit M, JSCR 2008**

**Dupont et al., EJAP 2003**

---

**Dupont et al., ESP 2003**
30 – 15 IFT

• While high intensity intermittent shuttle runs are generally performed above vVO₂max.
• Vift constitute the upper limit for these exercises (with the exception of all out repeated sprints sequences)

Changes in elite professional athletes

![Graph showing changes in elite professional athletes]

Designing the training program

![Image of a helicopter]
Rest v active recovery?

V_{IFT} Spreadsheet

MAS Spreadsheet
30-15 \( V_{\text{IFT}} \) Training Session

20 km/h at 100% for 15secs = 83m
19 km/h at 100% for 15secs = 79m
18 km/h at 100% for 15secs = 75m
17 km/h at 100% for 15secs = 77m
16 km/h at 100% for 15secs = 67m
15 km/h at 100% for 15secs = 62m
14 km/h at 100% for 15secs = 58m

Work 15 secs Passive rest 15 secs

MAS (VO2) Grids

MAS – MRS Grids where
Long side = 100 %
Short side = 70 %

Work 15 secs Active Recovery 15 secs

Sample \( V_{\text{IFT}} \) traditional periodised running program

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>90%</td>
<td>92.5%</td>
<td>95%</td>
<td>97.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Work/Rest</td>
<td>10:10</td>
<td>10:10</td>
<td>10:10</td>
<td>10:10</td>
<td>10:10</td>
</tr>
<tr>
<td>Duration</td>
<td>6 mins</td>
<td>6 mins</td>
<td>6 mins</td>
<td>6 mins</td>
<td>6 mins</td>
</tr>
<tr>
<td>Rest</td>
<td>3 mins</td>
<td>3 mins</td>
<td>3 mins</td>
<td>3 mins</td>
<td>3 mins</td>
</tr>
<tr>
<td>Sets</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total time</td>
<td>15 mins</td>
<td>15 mins</td>
<td>15 mins</td>
<td>15 mins</td>
<td>15 mins</td>
</tr>
</tbody>
</table>
Sample VIFT undulating periodised running program

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:15 IFT</td>
<td>Basic</td>
<td>Basic</td>
<td>Shock</td>
<td>Shock</td>
<td>Unload</td>
</tr>
</tbody>
</table>

Intensity
92.5% 100% 102.5% 90% 95%

Work:Rest
15:15 15:15 15:15 15:15 15:15

Duration
6 mins 6 mins 6 mins 6 mins 6 mins

Rest
2 mins 2 mins 2 mins 2 mins 2 min

Sets
3 3 3 3 3

Total time
24 mins 24 mins 24 mins 24 mins 24 mins

Undulating weekly schedule

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>Shock</td>
<td>Unload</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intensity
95% 100% 90%

Work:Rest
15:15 15:15 15:15

Duration
6 mins 6 mins 6 mins

Rest
2 mins 2 mins 2 mins

Sets
3 3 3

Total time
24 mins 24 mins 24 mins

Aerobic power and capacity

<table>
<thead>
<tr>
<th>POWER</th>
<th>CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAS</td>
<td>MAS</td>
</tr>
</tbody>
</table>

Intensity
120% 100%/70%

Work:Rest
15:15 15:15

Duration
6 mins 10 mins

Rest
2 mins 2 mins

Sets
3 2

Total time
24 mins 24 mins
Aerobic power and capacity

• **POWER:** The absolute power of performance measure for that energy system in a one of maximal effort.
• **CAPACITY:** The ability to repeat or sustain high power levels during the use of that energy system.

30-15 as a predictor of injury

30-15 and the 20m PSRT

Almost Perfect Linear Correlation

Orr, R., Stierli, M. & Hinton, B.
30-15 Training - ABT

- No Difference between 30-15 training program and traditional recruit training program with regards to performance.
- 30-15 training program had less volume and training time then traditional recruit training.

Orr, R., Stierli, M. & Hinton, B.

Things to consider

- Shift rotations
  - When last on shift?
  - When next on shift?
  - Recovery

Appreciation

- National Strength and Conditioning Association (TSAC)
- Dr Mike Newton, Edith Cowan University
- Martin Buchheit
Contact Details

• Mick Stierli
• +61 414 647 645
• katalystperformance@gmail.com

References


References