

**MUNI
SPORT**

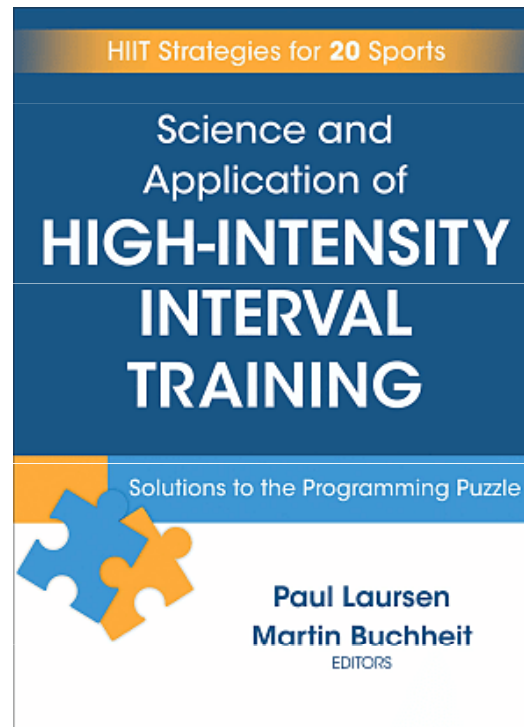
High-intensity interval training (HIIT)

E022

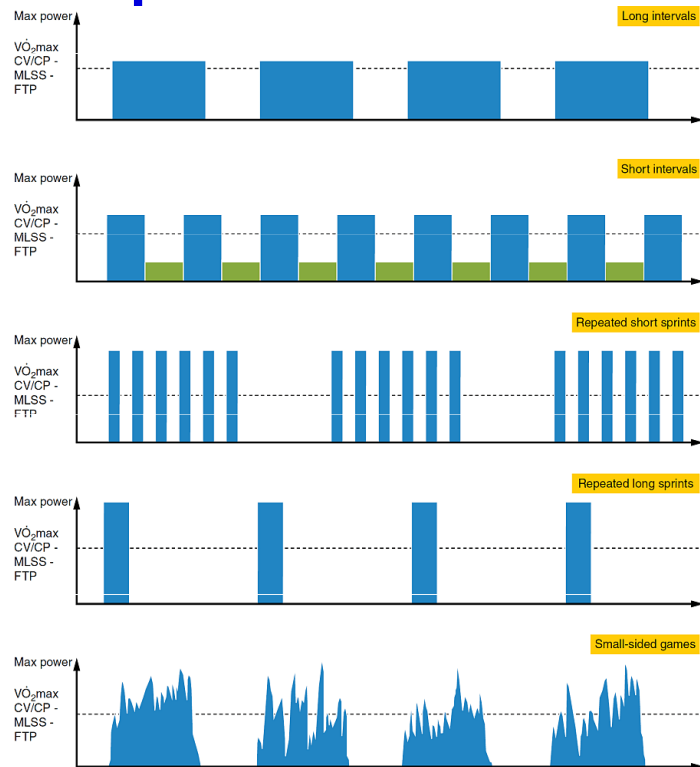
Science and Application of HIIT

Laursen & Buchheit, 2019

MUNI VPN: <https://www.humankineticslibrary.com/encyclopedia?docid=b-9781492595830>

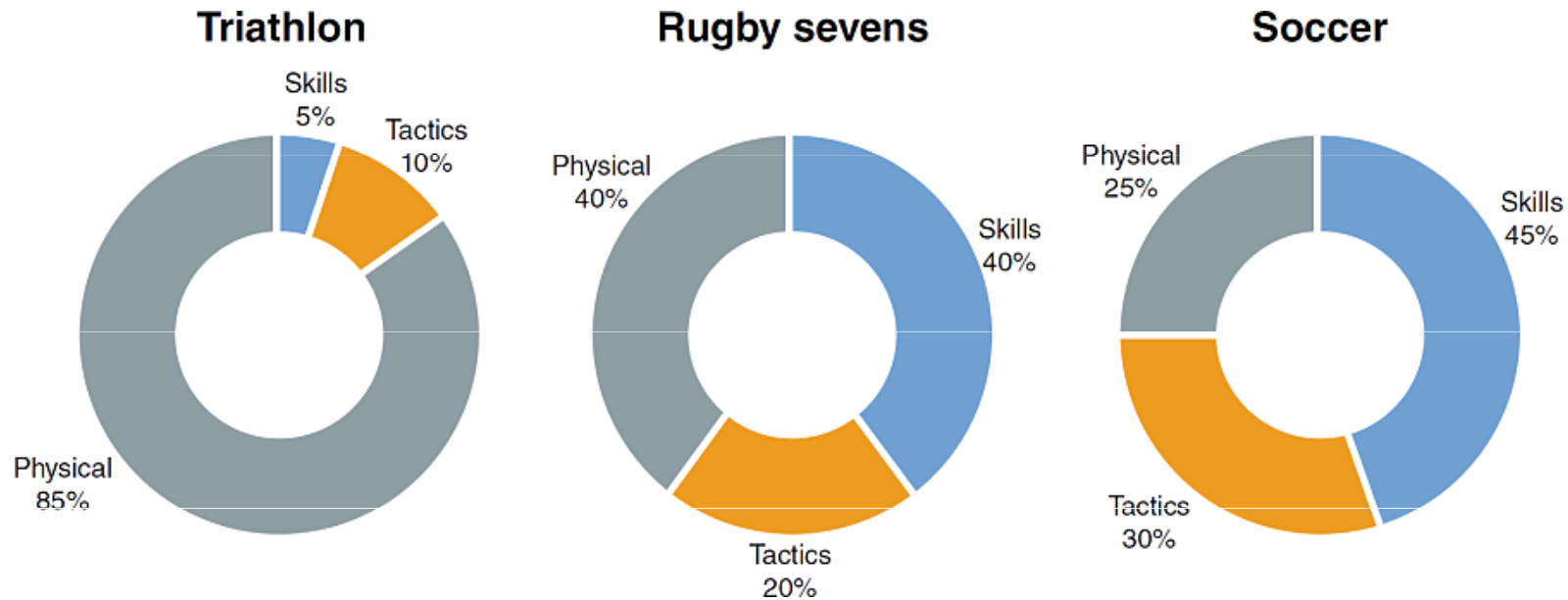


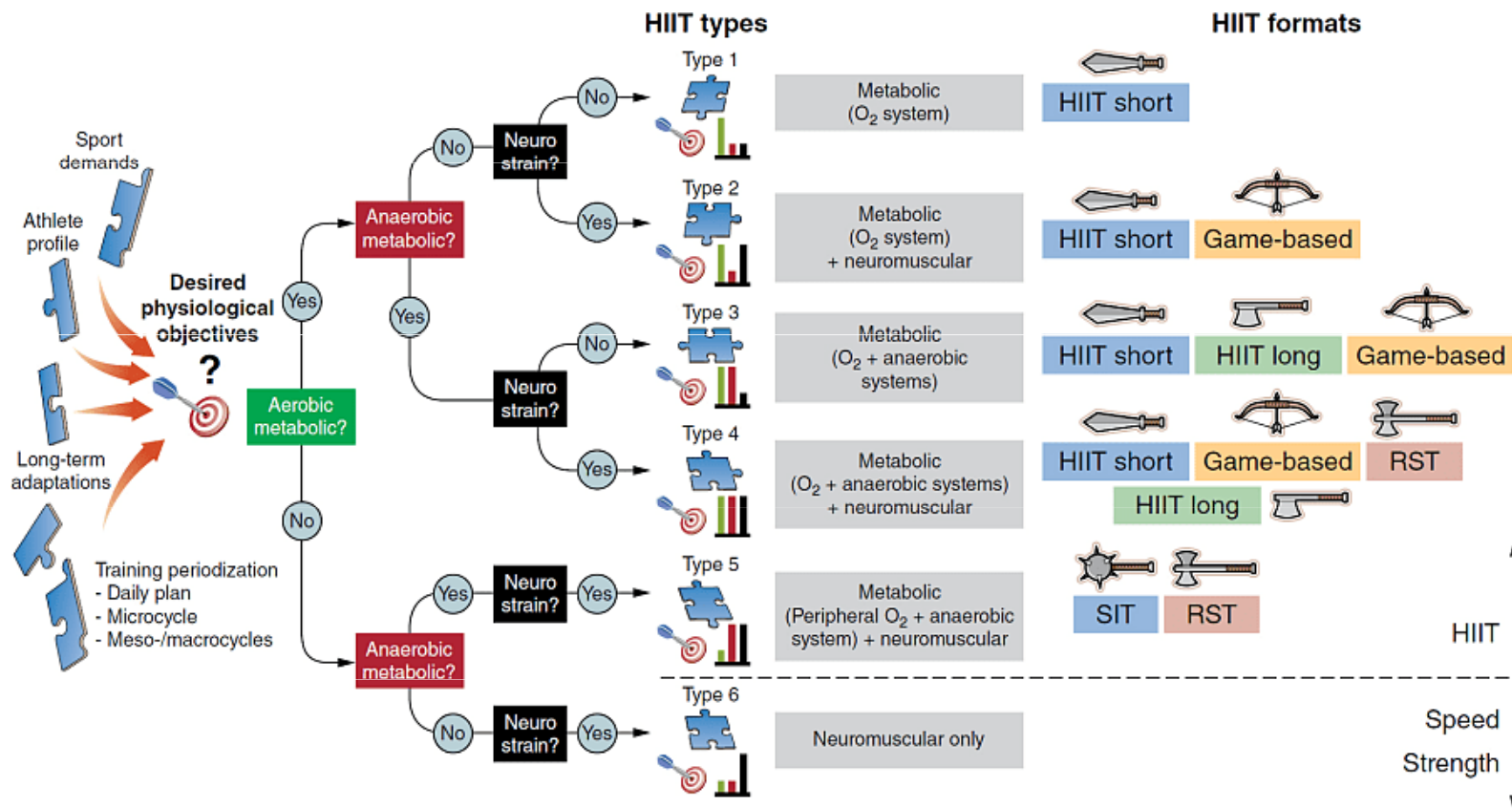
Schematic diagram illustrating the general concept of HIIT



- Blue bars = effort intervals
- Green = relief intervals

Respective importance of skills, tactics, and physical capacities for successful performance





Type 1, metabolic, eliciting essentially large requirements from the cardiopulmonary system and oxidative muscle fibers;

Type 2, metabolic as per type 1, but with a certain degree of neuromuscular strain;

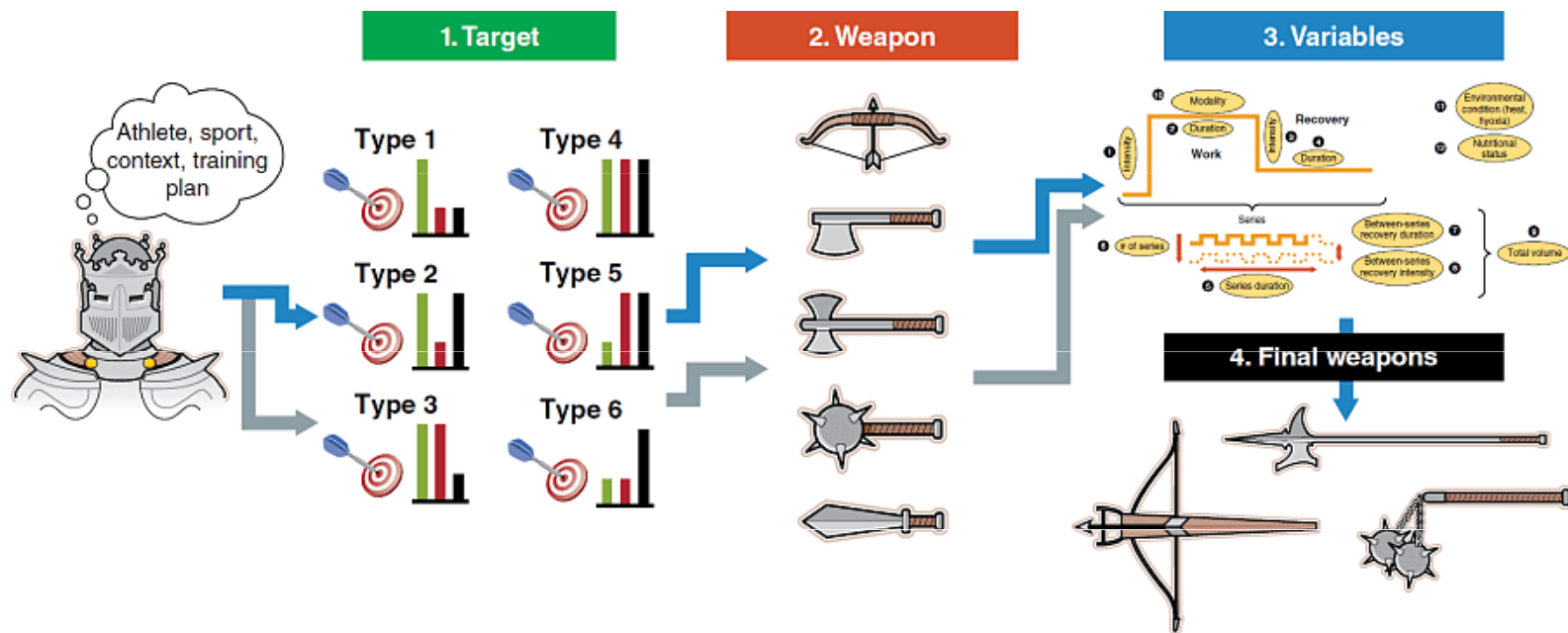
Type 3, metabolic as per type 1, but with a large degree of anaerobic glycolytic energy contribution;

Type 4, metabolic (oxidative/anaerobic) as per type 3 plus a certain degree of neuromuscular strain;

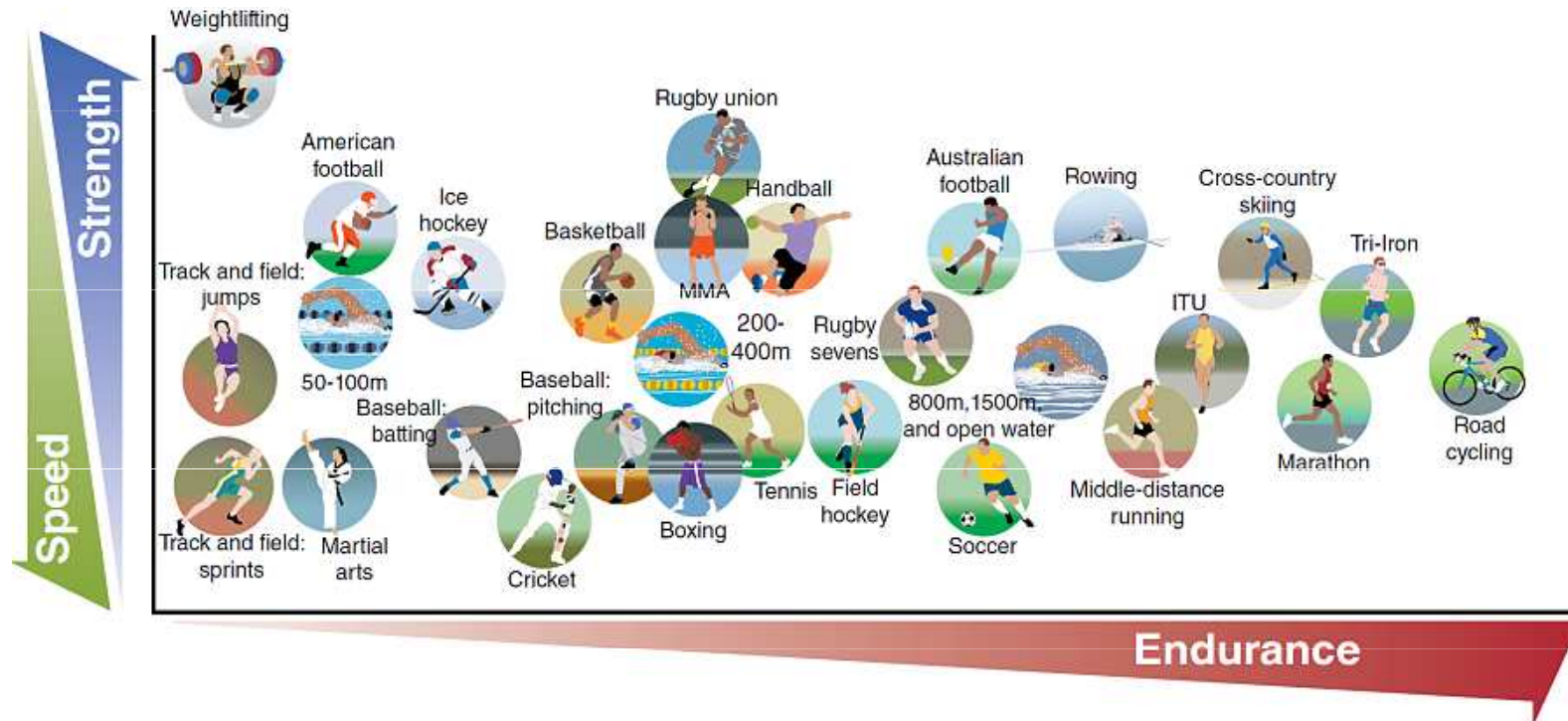
Type 5, essentially a large anaerobic contribution combined with neuromuscular strain; and

Type 6, essentially a large neuromuscular strain, with limited metabolic contribution (neither oxidative nor anaerobic).

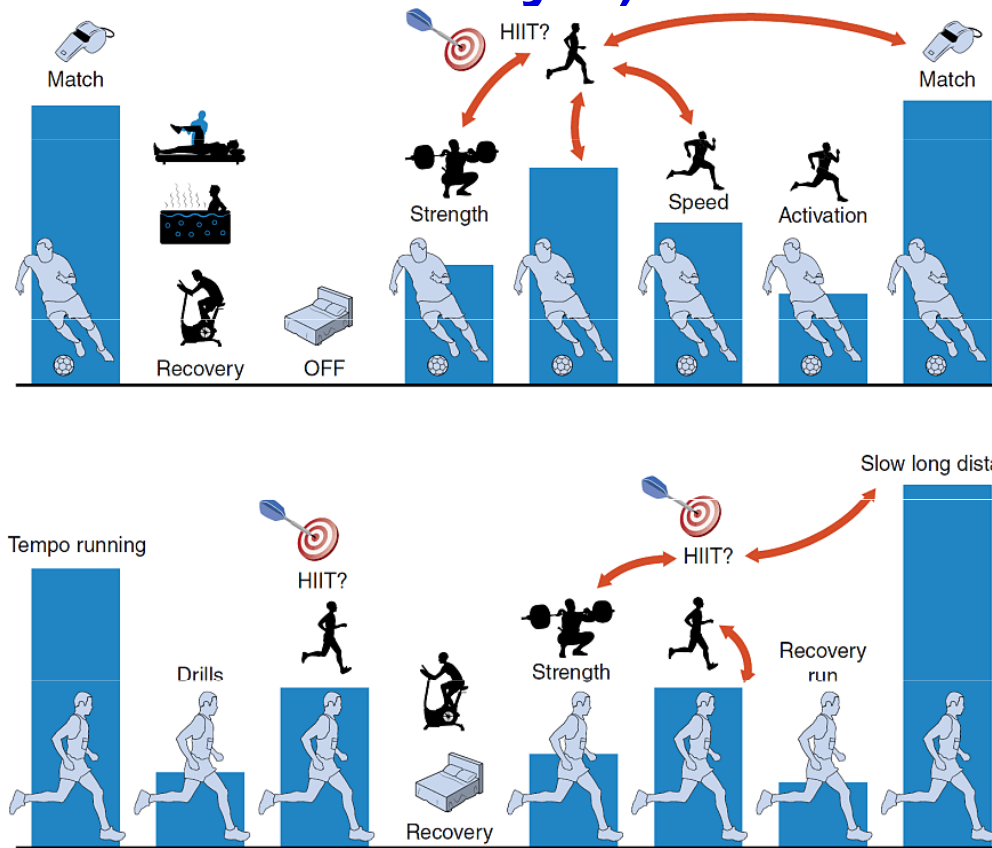
think differently: what do you want (HIIT type/target), how do you do it (format/weapon), what variables do you adjust to hit your targets before final creation of your weapon



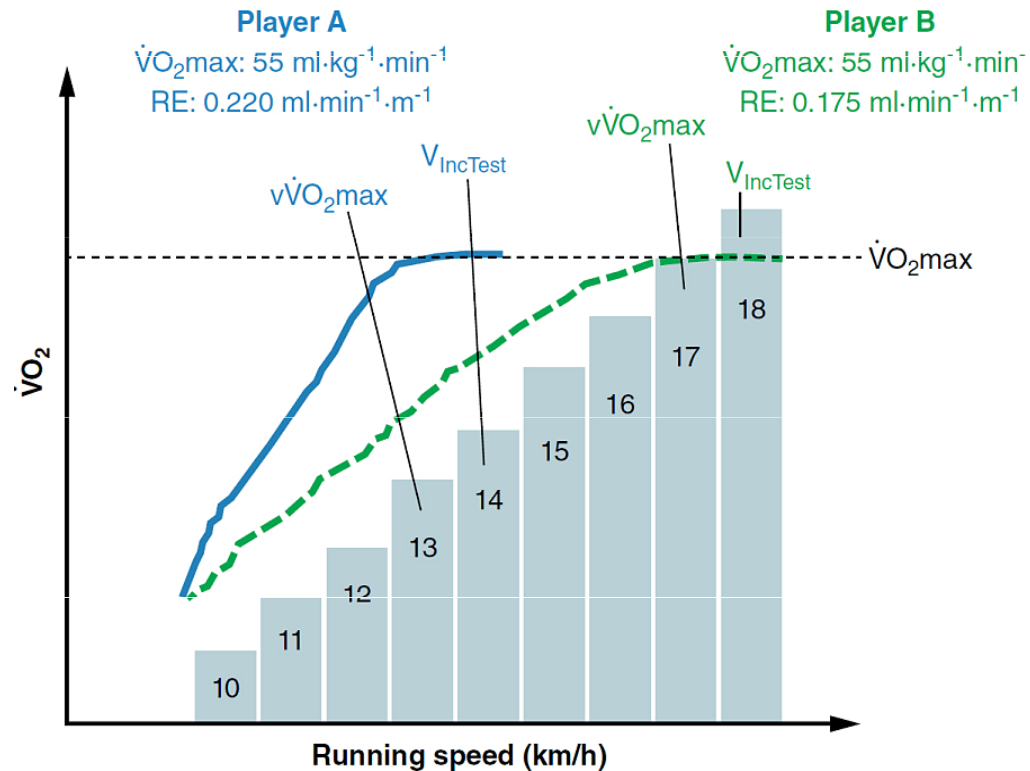
Various sports, their physical demands relative to needed speed, strength, and endurance



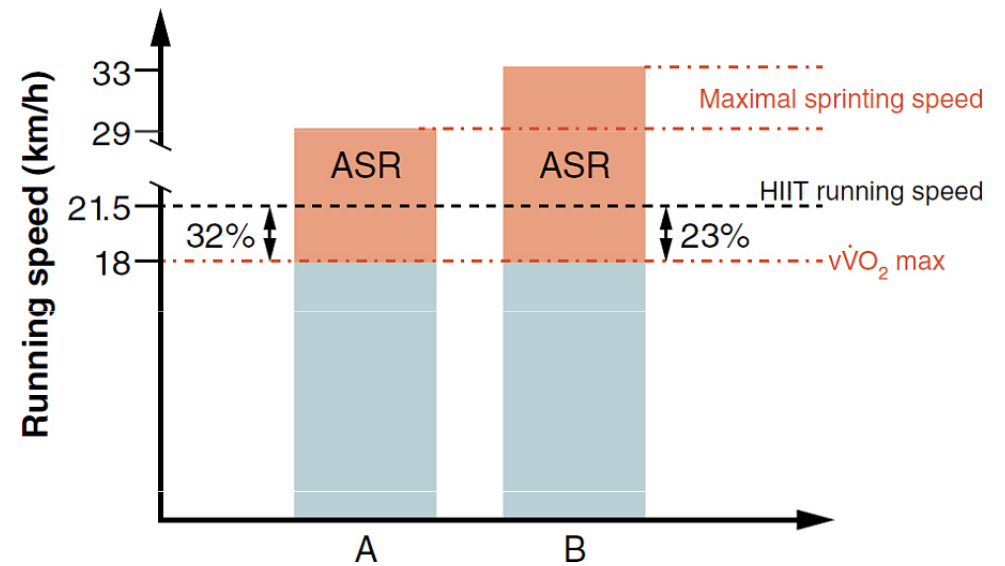
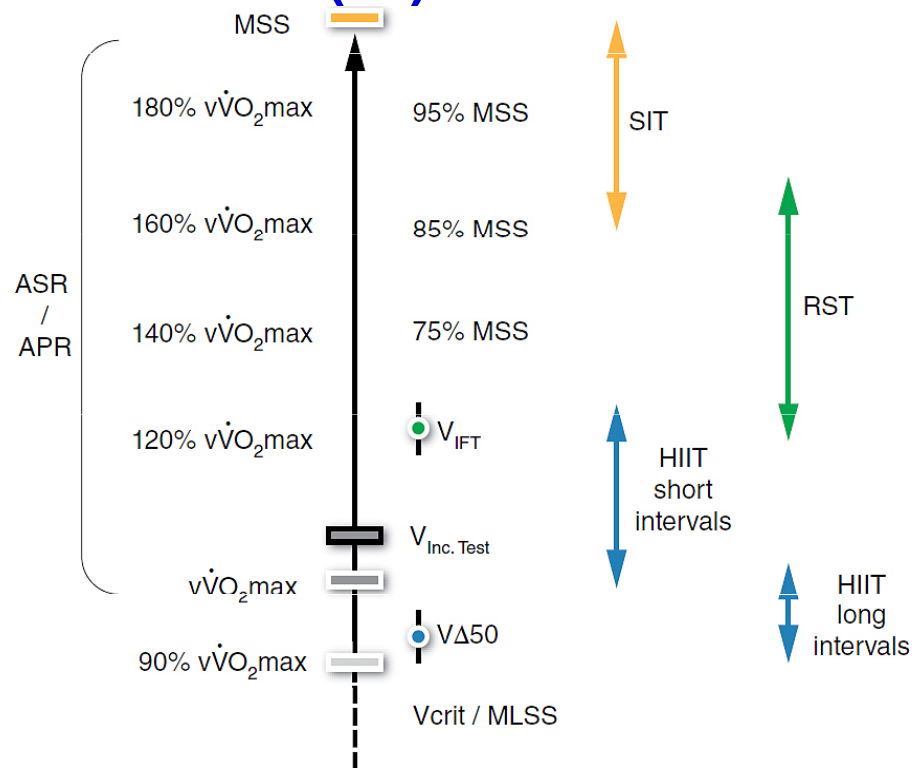
Two different typical weekly patterns (Team sports, with endurance, strength, and speed sessions on different days) and road running



VO₂ during an incremental test for two players with similar VO₂max but with different RE

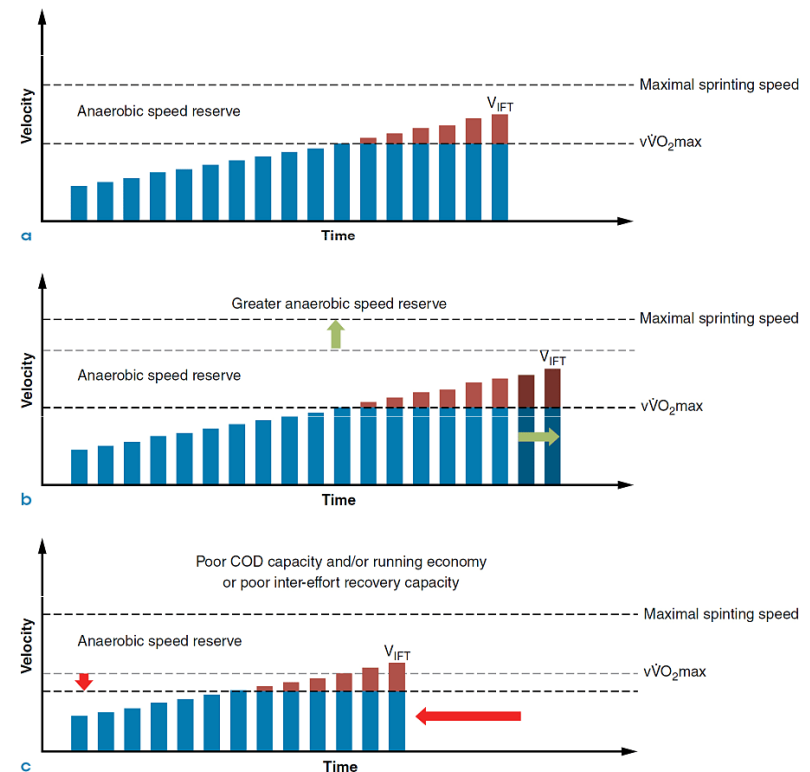
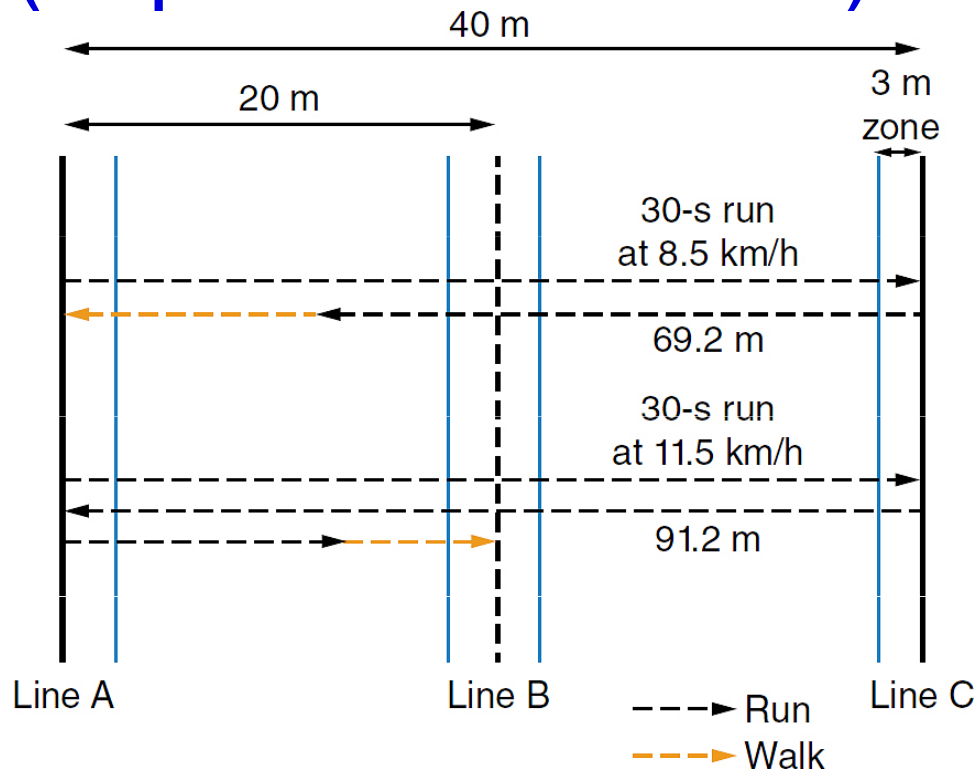


Intensity range used for the various HIIT formats (L). ASR=anaerobic speed reserve (R)

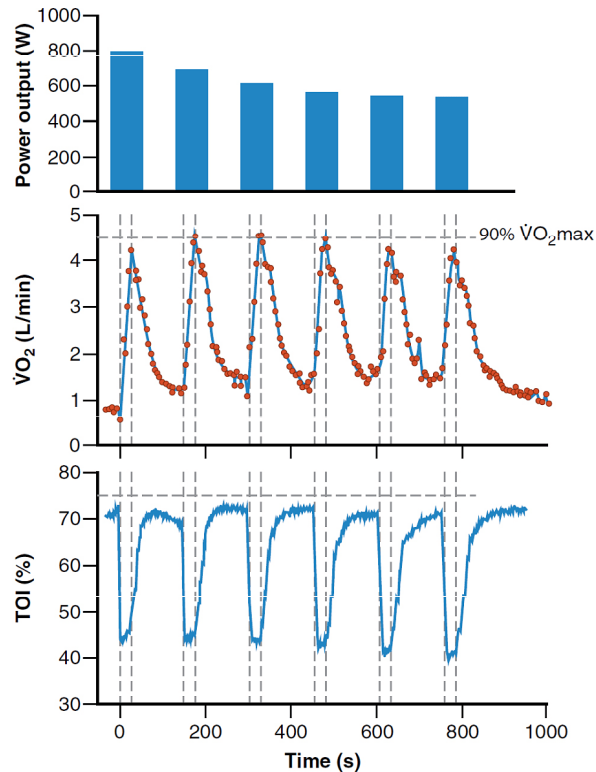


30-15 Intermittent Fitness Test (30-15 IFT)

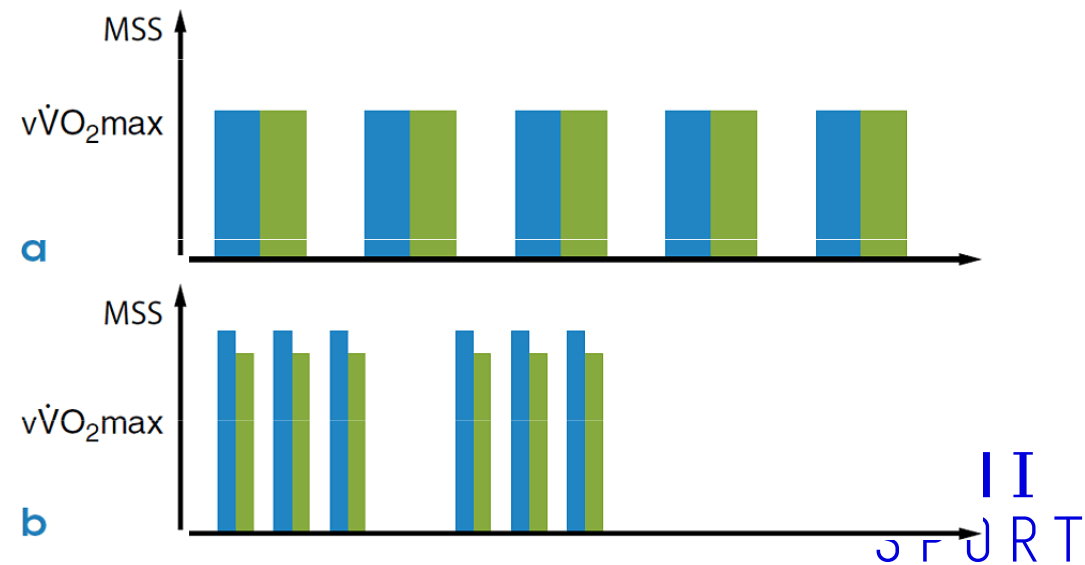
(<https://30-15ift.com>)



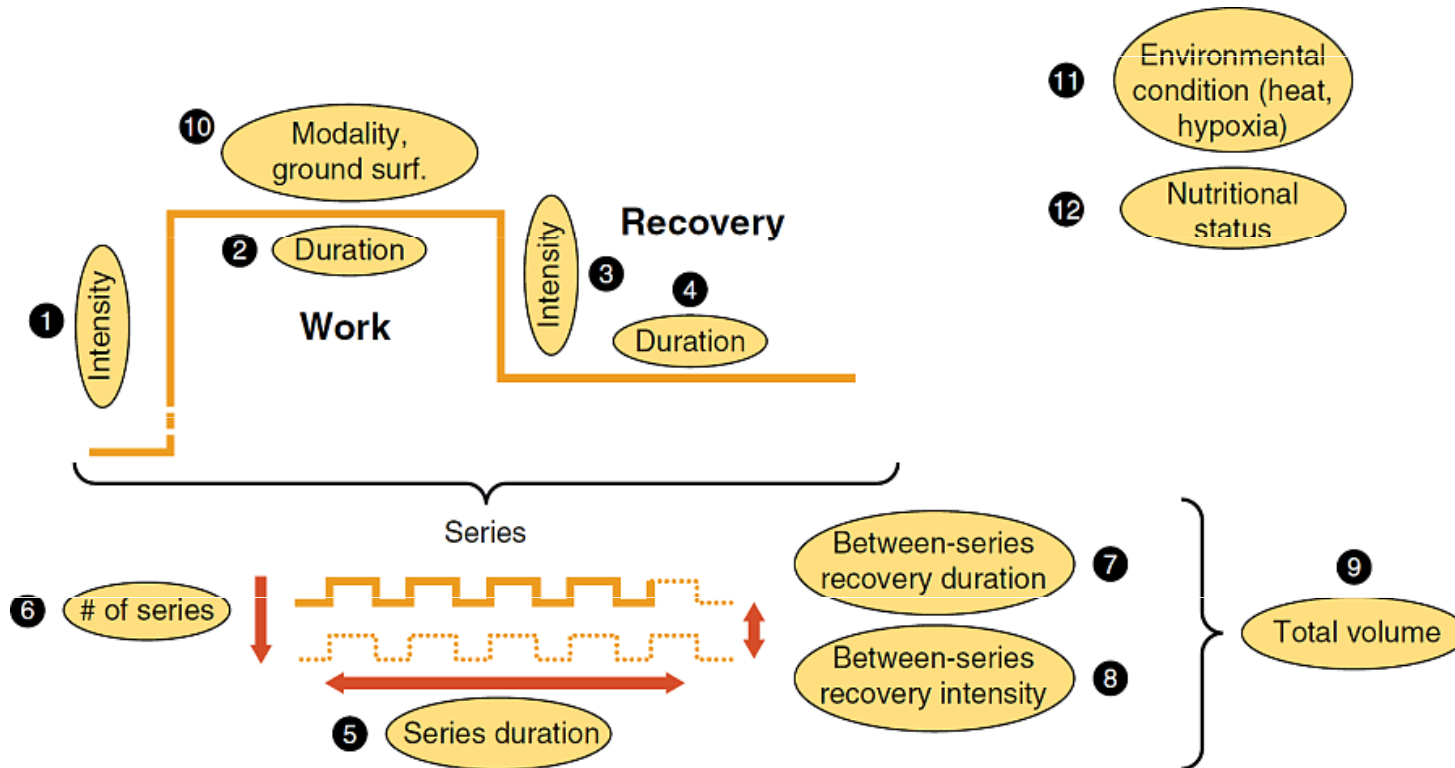
Power output, oxygen uptake ($\dot{V}O_2$), and muscle tissue oxygenation index (TOI) during a sprint interval training session (6 \times 30 s all-out cycling sprints, 2 min passive recovery)



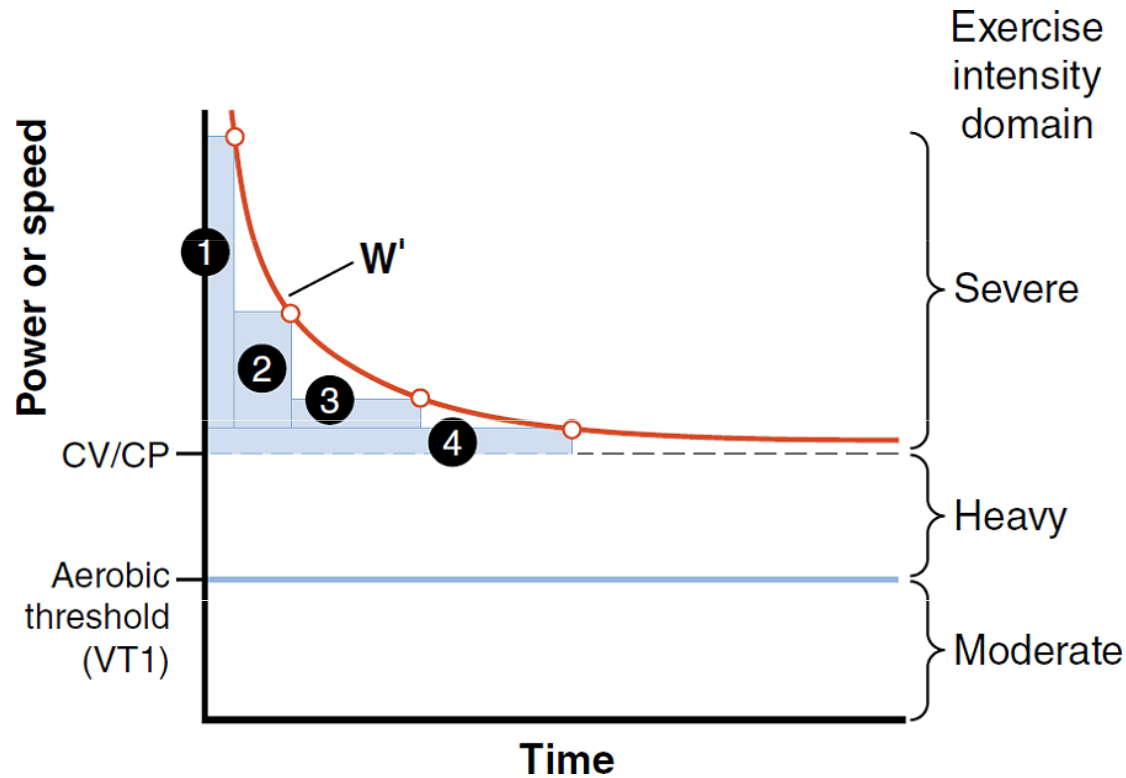
Running objectives during two track sessions for two athletes with different locomotor profiles. Runner A: $V_{IncTest}$ 21.5 km/h, MSS 33.5 km/h; runner B: $V_{IncTest}$ 21.5 km/h, MSS 29 km/h. (a) 12 \times 400 m (only the first 5 repetitions are shown). As runs are performed around the $V_{IncTest}$, they perform the same work in 65 s. (b) 2 \times 3 \times 200 m. As runs are performed at a speed close to MSS, runner A (blue) performs these in 25 s, while runner B (green) performs these in 29 s.



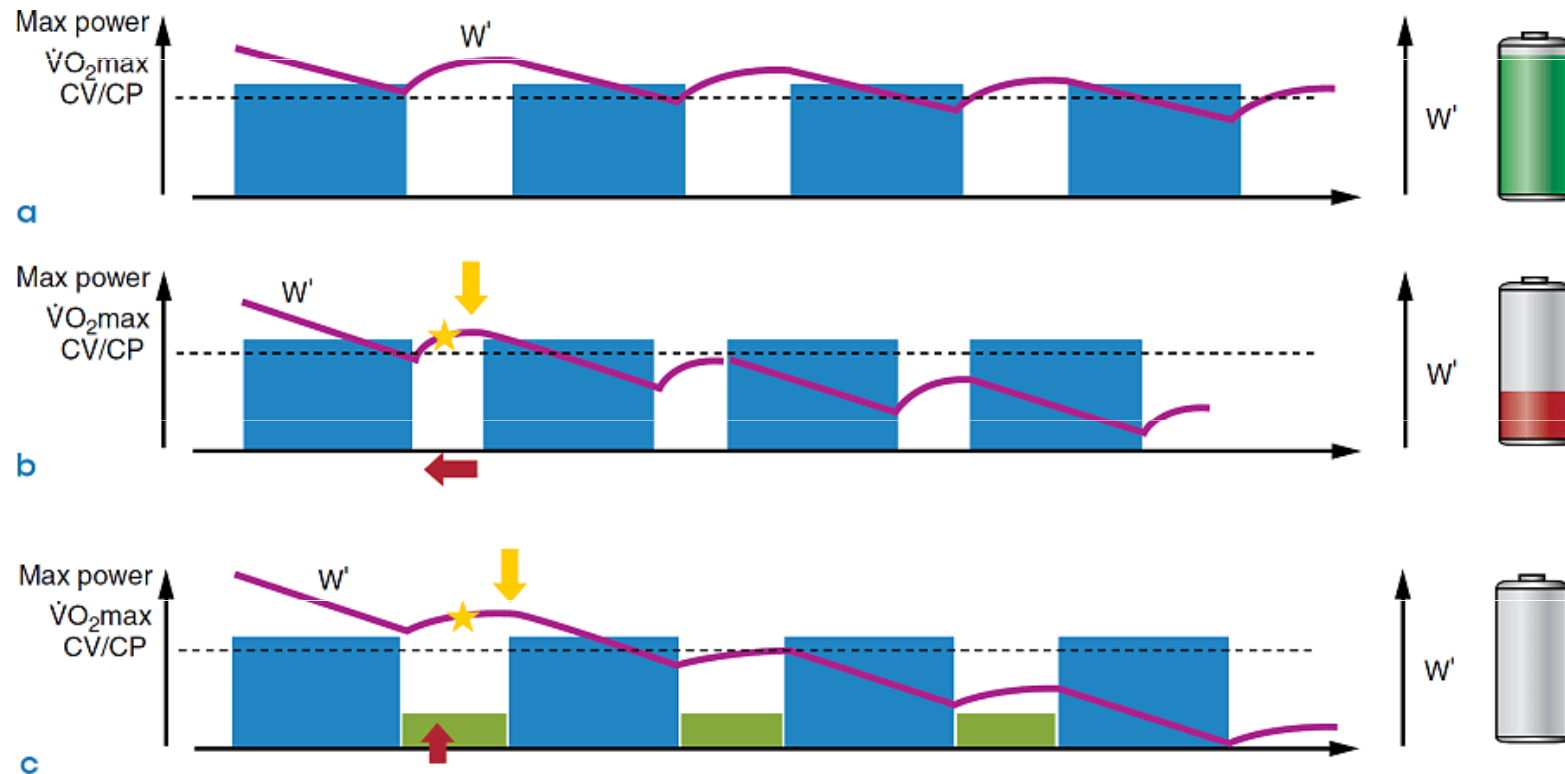
The 12 variables that can be manipulated to prescribe different HIIT sessions



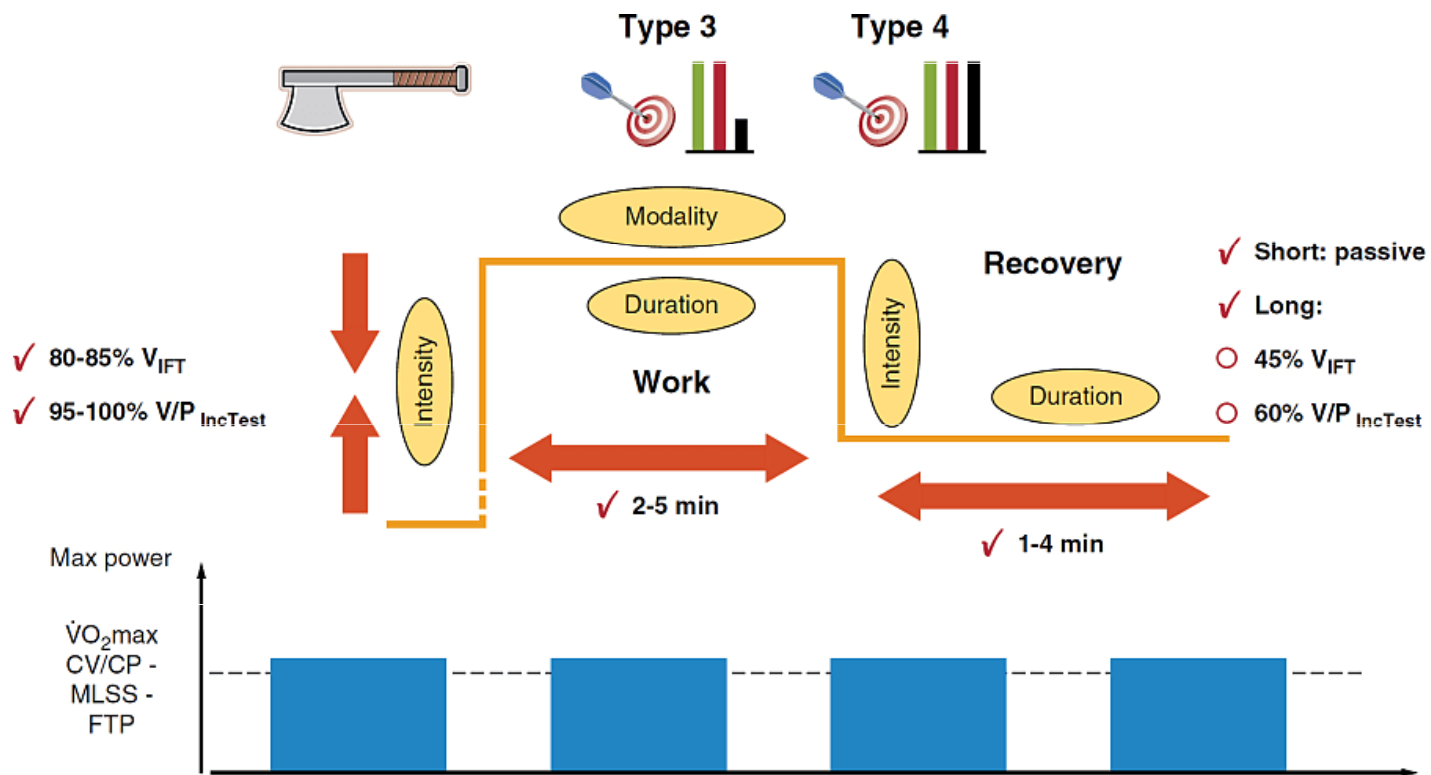
Exercise Period Duration = Critical Power (CP) + Anaerobic Work Capacity (W')



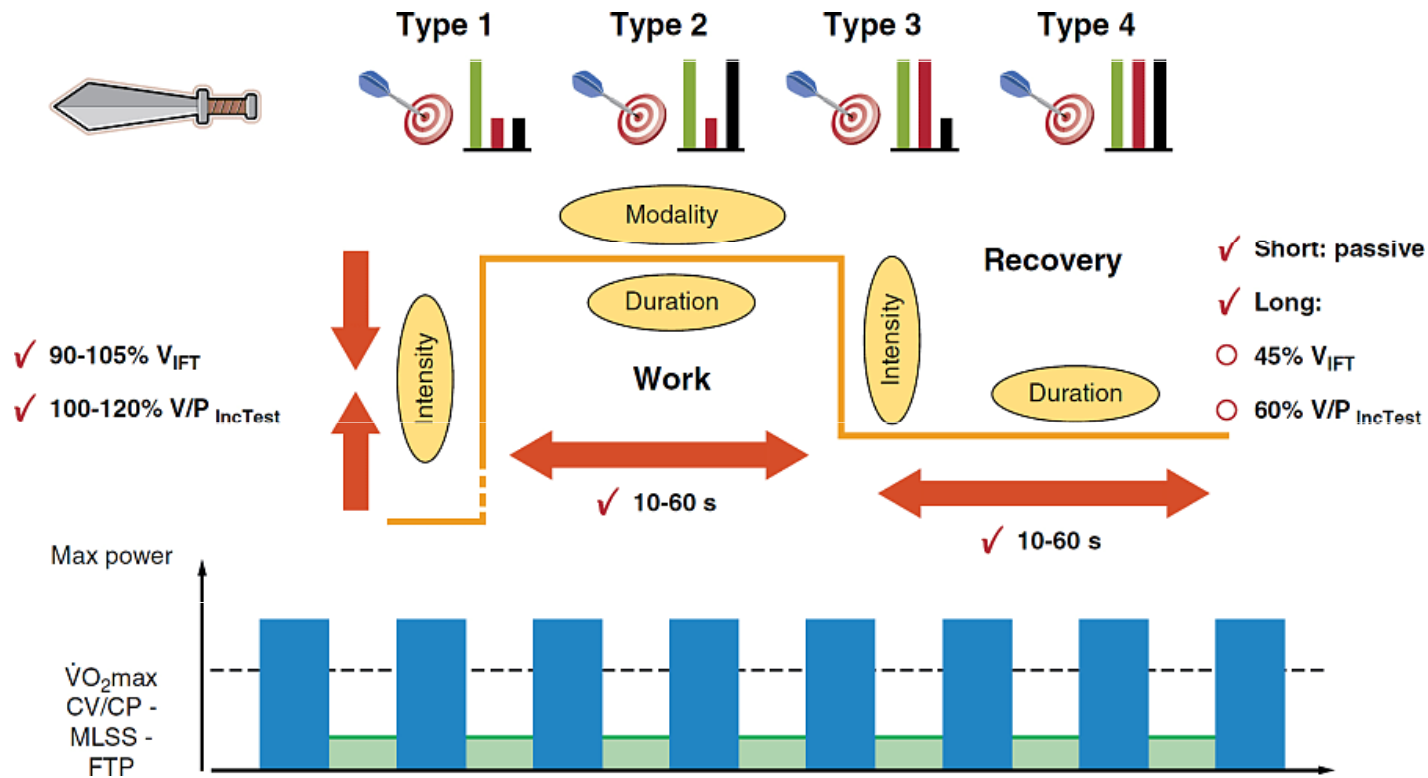
Recovery



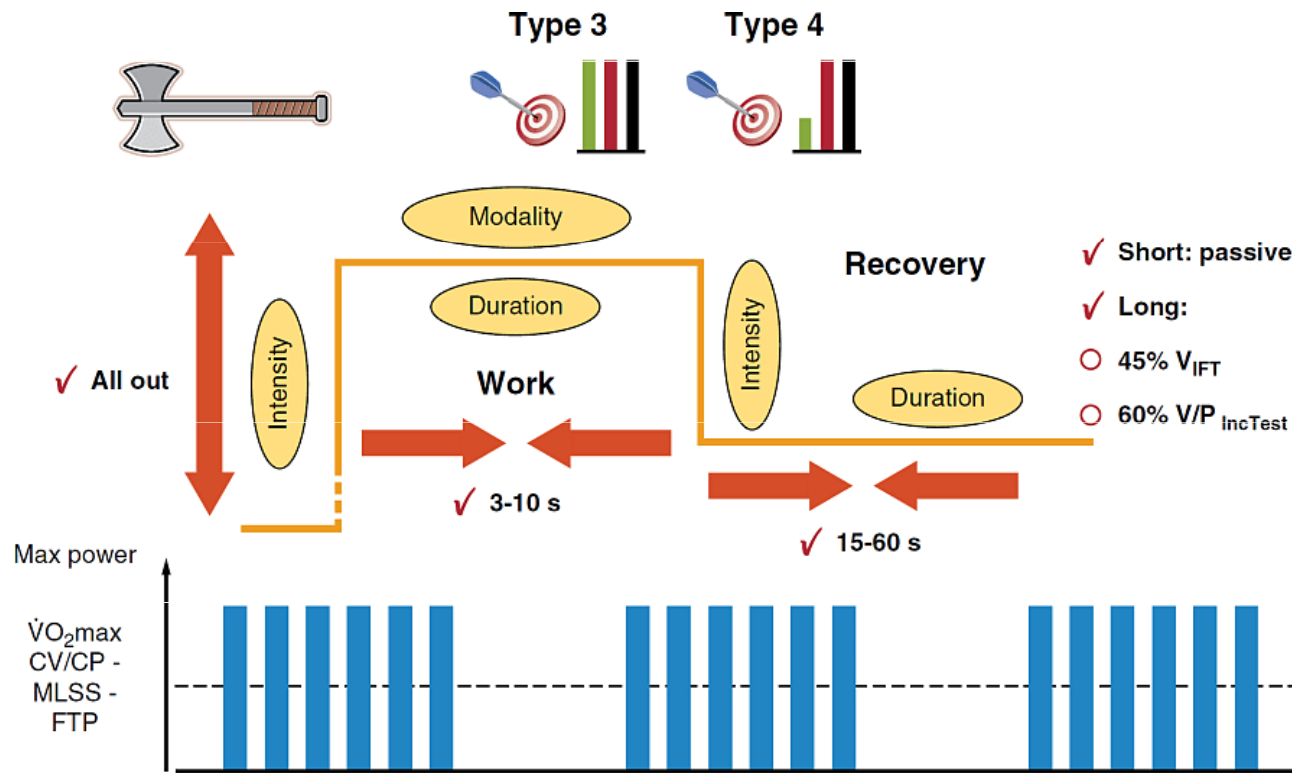
Long intervals



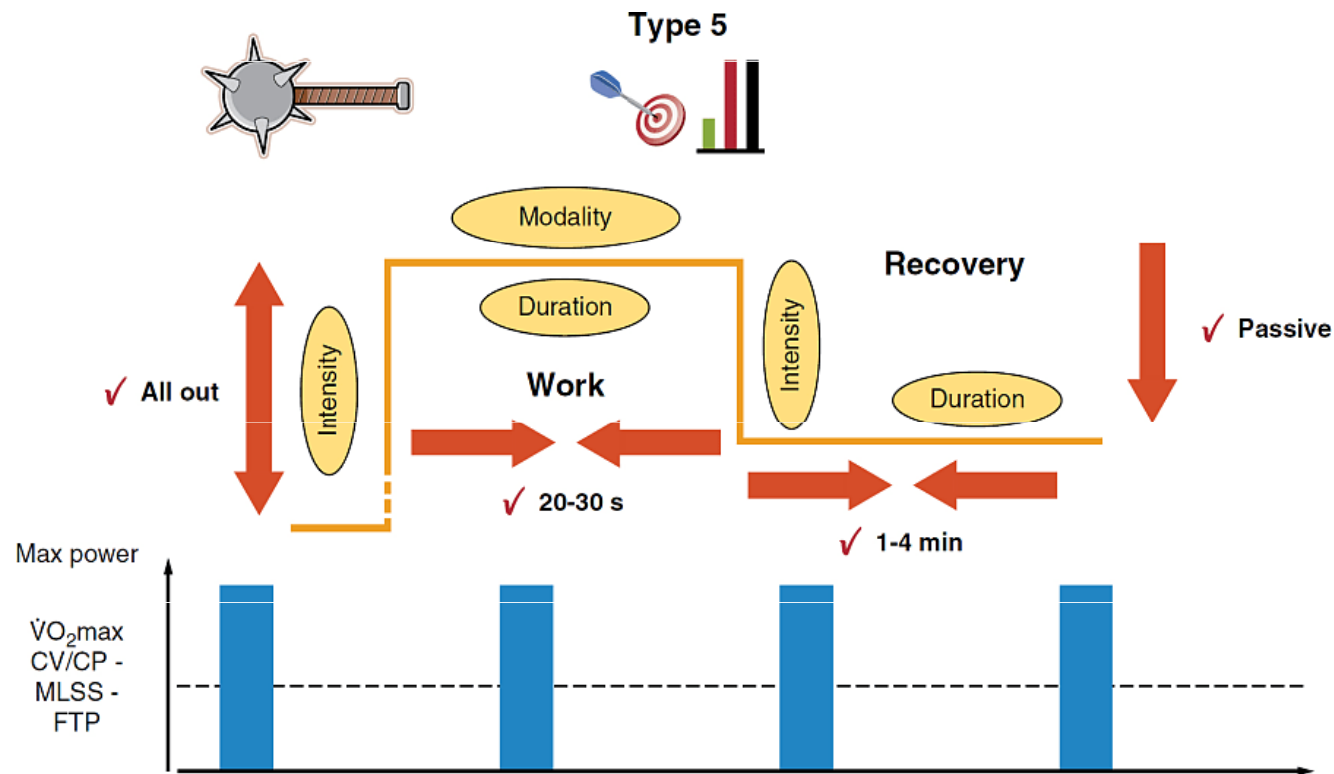
Short intervals



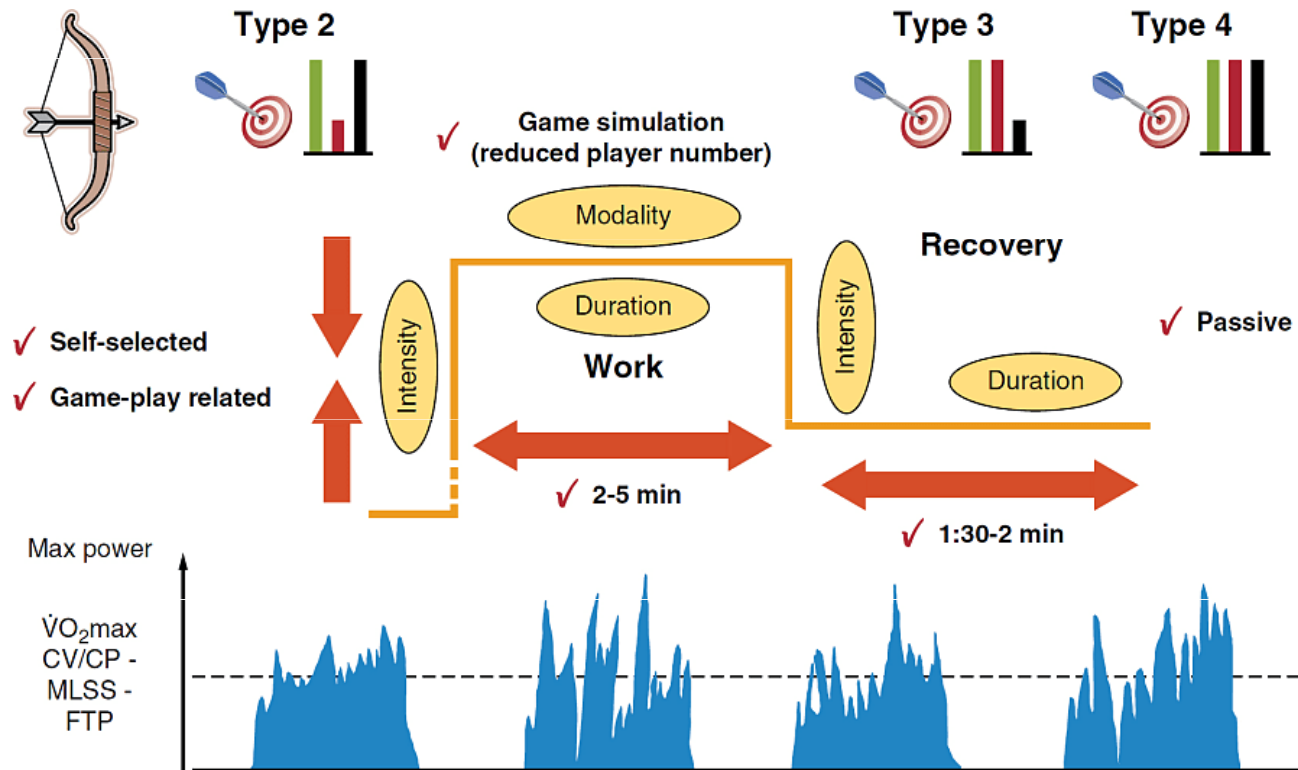
Repeated-sprint training



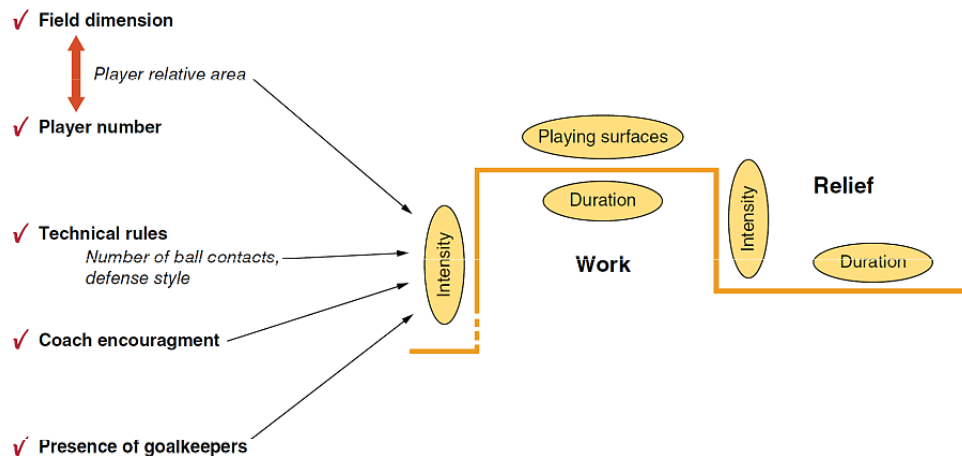
Sprint interval training



Game-based HIIT



Methods used to modulate exercise intensity during GBHIIT



Soccer drills

A small-sided game with specific constraints (scoring, targets, balls, players, rules, and area)

Traditional running

A controlled running session with players exercising for a specific time or distance

Advantages

Improved motivation	Exact work intensity can be easily controlled
Enhanced training of movement efficiency	Improvements can be monitored objectively
Improvements in tactical awareness	Comparisons can be made between players
Improvements in technical skill	Gain insight into player character or motivation
Optimizes training time and physical load	
Potential decrease in injuries	

Disadvantages

Exact work intensity is difficult to control	Less movement associated with match play
Often difficult to organize optimal training structure	Players do not practice technical skills
Increased risk of contact injuries and overuse injuries (repeating over and over the same movement patterns)	No game-based tactical elements
Need numbers to make up session	Players do not like running
Certain degree of technical ability required	May increase risk of some injuries (tendonitis, lumbopelvic problems) due to unaccustomed running
Possible ceiling effect for very fit players	