JST Educational Online Support

Modul: Modul 2 Bigger Picture - Lesson 1 The Foundations

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Fatigue

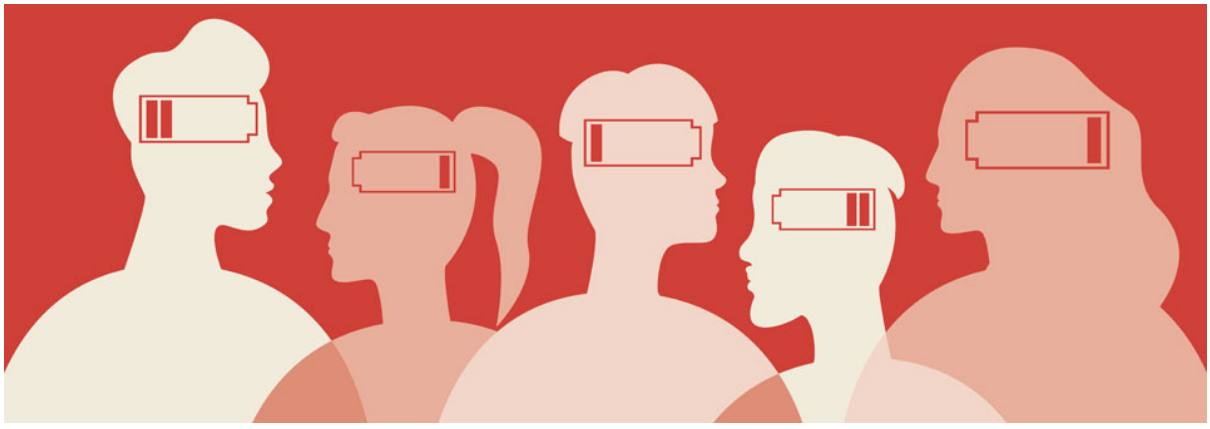
Knowing Fatigue

Managing Fatigue in the context of everyday life and training planning.

Fatigue is defined as a breakdown in internal homeostasis caused by an increase in energy production due to an external stimulus. Fatigue can be broadly defined as a decrease in physical or mental performance. We also can say that fatigue is classified as that which determines one's ability to sustain a specific type of effort. With endurance being defined as one's ability to resist fatigue.

The development and effects of fatigue from various activities/stressors have been widely studied but are not fully understood given the complex, multifactorial mechanisms involved.
It is important for us to understand that everything is input. You already know this now from the About The Bigger Picture document. Further, it is important for us to understand the fatigue mechanism in order to help students, clients, patients or ourselves create an appropriate training load.

Fatigue, much like strength is very specific (Siff & Verkhoshansky). This is SUPER important to understand because this means that the idea of "being in shape" is quite misguided. Adaption is specific. We adapt to resist the fatigue of specific things or disciplines, or even specific patterns/ movements inherent in those things/disciplines. So the idea of being "in shape" as an overall idea is incompatible with knowing this.



Central vs. Peripheral Fatigue

Specifically regarding training now some might ask what about runners who seem to have better oxygen transport than other athletes when put on a bike? Yes, there are spill-over effects due to cardio-vascular adaptations, studies by Saltin & Rowell and Gollnick & Saltin attributed long-term endurance as much to specific metabolic changes in the musculoskeletal system. This means that there are specific metabolic changes in the muscles to adapt to different endurance exercises, and they don't necessarily transfer between activities. We will dig more into fatigue in the context of training at some other point but here is a short summary of the types of fatigue we have which is also interesting to know when looking at your stressors and how they fatigue you:

a) Central Fatigue
- Rapid
- Delayed

b) Peripheral Fatigue
- Low-Frequency Fatigue
- High-Frequency Fatigue

Central and peripheral fatigue are two concordant constructs that are part of the Integrative Regulator theory, in which both psychological and physiological drives and demands are underpinned by homeostatic principles. The relative activity of the two is regulated by dynamic negative feedback as a basic general control element. Fatigue is conditioned by factors such as gender and affects men and women differently[1]. Lack of sleep or psychological disturbances, such as those caused by stress, can affect neural activation patterns, realigning them and slowing simple mental operations in the context of fatigue. Thus, fatigue can have various causes that are not related only to physiological factors. See The Bigger Picture.

Central Fatigue happens in your central nervous system and can be induced rapidly or as a delayed response. As we talked about already, many, if not all, external factors can have an effect on your Central Nervous System.
An interesting note is that Rapid Fatigue is usually perceived as very important, especially by dancers, but usually doesn't last very long and usually doesn't have an overall effect on your long term training. Whereas Delayed Fatigue is generally quite hard to perceive and not paid much heed to but it has a much bigger impact on your training and general wellbeing.

Peripheral Fatigue is the fatigue of your musculoskeletal system and there are two kinds: Low-Frequency which occurs early and for any exercise with muscle activity above (around) 15 % and disregards the characteristics of muscle contraction, and High-Frequency Fatigue which appears at intensities above 70 %.

An important implication of the Low-Frequency Fatigue is this: EVERYTHING requires energy and EVERYTHING fatigues you. This, we believe, is especially important for teachers, as we might sometimes make some students do some time-filling low-intensity activities, to keep them busy while focusing on other students. While this makes sense in short duration classes, to keep the students engaged, in longer workshops and classes it could be better to give the students time-off to recharge, rather than wasting their energy in an attempt to make the class "seem busy".

[1] Central and Peripheral Fatigue in Physical Exercise Explained: A Narrative Review