

Training Effects

By Keith Eric Grant, PhD, NCTMB

A three-and-a-half million year-old footprint in East Africa, discovered by Mary Leakey, indicates that, at that time, our human ancestors had clearly diverged from the great apes.

The footprint is of a creature unquestionably standing on two legs. The adjustment from walking on all fours to walking upright encouraged reliance on vision and freed the front limbs for other work, like tool making and carrying. The weight of the body, previously supported by the front limbs, shifted to the legs and pelvis, which thickened to carry the weight of the upper body. This, in turn, refashioned childbirth, causing babies to be born immature.

- James Burke and Robert Ornstein

Humans exchanged difficult childbirth and a longer maturation period for versatile bipedal mobility; dexterity and expression with our arms; an upright environment; and the far-reaching vision that stimulated the development of minds that strive for beauty in movement. We are literally a species designed to adapt physiologically and neurologically to the movements we perform regularly.

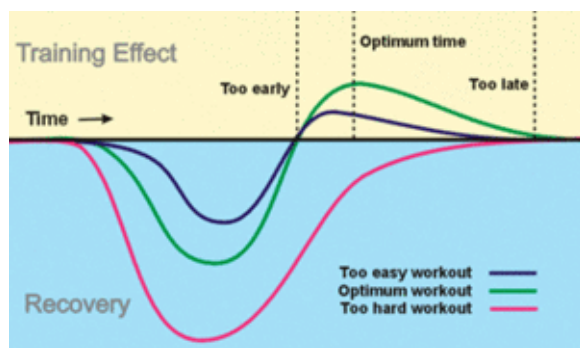


Figure 1: Russian sports scientist N. Yakovlev's model

of training and adaptation. After a workout, there is a recovery period followed by a period of super-compensation. The optimum time for the next workout is at the peak of super-compensation. Too early, and the body is still recovering; too late, and the benefits of the last workout are lost. The intensity of

the workout also must be adjusted to achieve the optimum training effect indicated by the blue curve. The recovery period will also depend on factors such as nutrition, hydration and amount of sleep. We go through three identifiable stages when we learn a motor skill, such as massage or dance. We start learning in a verbal-cognitive phase, in which we derive information on position and direction from demonstration and verbal direction. Our movements typically are created by joining together bits and pieces of our existing movement "vocabulary." In the associative phase, we develop focused movement patterns and continue to perfect and adjust them through practice. In the autonomous phase, there is little need for constant monitoring, because movements are performed consistently, with precision and accuracy. We can turn our attention from the present task back to the surrounding environment.

In powering our movements, we have three different systems for obtaining energy that operate in a continuum. Immediate energy, for high-intensity movement lasting up to 20 seconds, comes from the production of adenosine triphosphate (ATP) from creatine phosphate. Anaerobic glycolysis provides energy for high-intensity exercise lasting 20-180 seconds. Finally, aerobic oxidation provides energy, quite literally, for the long run. With correct training, muscle cross-section and muscle strength increase. Our abilities to use oxygen (VO₂ max) and process the lactate produced by glycolysis, also increase. One of the most dramatic effects of including anaerobic intervals in aerobic conditioning is an increase in the intensity of exercise performance for extended periods - our lactate threshold.

Some years back, Russian sports scientist N. Yakovlev devised a conceptual model that captured the concept of optimal training, both in intensity and repetitive timing, for maximum improvement (Figure 1). If we train too hard for our current conditioning and recovery rate, we head ourselves into deepening fatigue and, ultimately, breakdown. If we don't train hard enough, we obtain too little benefit. The right intensity of training allows us to recover fully and enter a period of super-compensation. If we train again during the maximum super-compensation period, we gain the greatest effect. If we wait too long, we lose the benefit of what we did before.

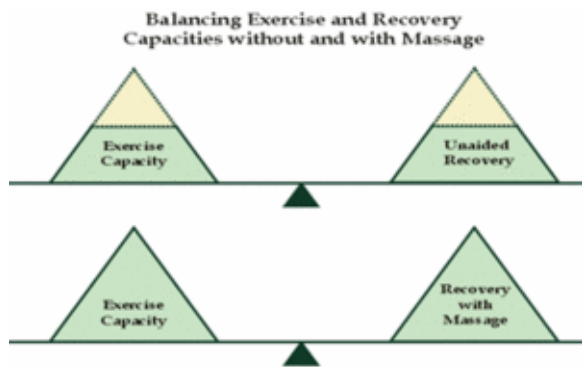


Figure 2: Exercise capacity and recovery capacity form a

delicate balance. By normalizing hypertonicity, massage acts to increase recovery capacity. Increased recovery capacity allows for increased exercise capacity and a higher level of training. The benefits of massage come partly, I believe, in shortening the recovery time in Yakovlev's model. When recovery capacity is increased, exercise capacity can increase, yet stay in balance (Figure 2). Thus, we facilitate the gains of super- compensation. I believe the mechanisms for this lie in the interactions between the psychological and neurological. Daniel Arnhem noted both aspects of staying focused and relaxed in discussing injuries in dancers: The psychological aspect of injury prevention is as important to the dancer as is proper conditioning and nutrition. Dancers, like all people, have varying personalities and react to stress in unique ways. What sets dancers off as unique from other individuals is that they are artists seeking perfection in movement. The extent to which the dancer can withstand the psychological stresses imposed by the dance environment is determined by the dancer's total psychoemotional development and lifestyle, both past and present.

When considering injuries associated with psychogenic factors, one must consider muscular tension as a major cause in the dance field. Tension is defined as increased muscular contraction as a result of some emotional state or muscular work. Nervous tension is a syndrome that is characteristic of the so-called fast way of life of our times. It is associated with anxiety that comes from an undefined worry or fear. An overanxious dancer can have an extremely high level of unneeded muscular tension. The person who is outwardly anxious may be less flexible and less able to smoothly coordinate muscles. Organically, he or she may have an increased heart rate and blood pressure. The tense dancer is extremely susceptible to injury, and because of the increased muscular excitability, may over-respond to painful conditions.

We become part of the lifestyle structures of support to which an athlete and kinesthetic artist can turn when viewing massage as an interaction and communication. Beyond this, we can address the tension to which they might unconsciously cling. Among the wonders of our human embodiment is the astounding plasticity

we have, which enables us to learn new kinesthetic skills, and adapt our bodies to their impassioned pursuit. Among the wonders of the massage we pursue is our ability to affect the training of those who come to us.

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