

What Trains Together Gains Together: The Inter-Relationship Between Learning And Strength Gains

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“Neurons that fire together, wire together” is a common phrase associated with the adaptive process that occurs during some forms of motor learning. The strengthening or wiring of specific neural networks following repetitive stimulation can lead to long-lasting improvement in motor skill. Are strength gains following strength training also governed by such principles? I will attempt to answer this question by discussing the idea that, for strength to improve, the nervous system “learns” to optimize muscle activation patterns of agonist, synergist and stabilizers and suppresses antagonist activation for the desired force produced. In my presentation, I will first highlight some of the similarities between motor learning and strength training, with the focus on neural adaptation and the likely mechanisms involved (i.e. LTP). The discussion will include information on familiarization, early and long-lasting adaptation that involves changes in synaptic efficacy and remodelling. Next, I will discuss some of the common training features such as high vs low force and ballistic vs slow contractions. Here I will present the results of different outcome measures, including those using electrophysiological techniques. I will then discuss new evidence on the generalization patterns of strength training and its influence on motor learning. Finally, I will talk about the concept of “transfer of learning” for application purposes and propose some ways in which “learning” can help enhance strength.