

This newsletter is brought to you by super-glued glasses, a clean bike chain, and lots of birthday cake. If you enjoy it, I'd be grateful if you could share with one or two others!

News (not that news!)

Sara Vaughn was the first American to finish (6th overall) at the New York City Marathon last weekend. Here's a [20-second clip](#) on what she thought about during the marathon! News flash: rhythm and gratitude. Fun fact: she does split stance heel float quarter squats with 365lbs!

A few other thoughts:

- Clayton Young had a great video series leading into the Olympics, and there was another series made in the lead-up to NYC. [Here](#) is the first episode of that series. He strikes me as patient, intentional, and thoughtful. The videos are about 20 minutes each and quite well done--well worth a watch!
- 25-year-old double amputee Billy Monger [set a new Ironman course record](#) by over 2 hours last weekend at the World Championships. [This is an older but nice video](#) about some of his story as a race car driver, the accident, and setting no limits.
- Something to look out for this weekend: Adam Peterman announced he's going for [Jim Walmsley's R2R2R FKT](#).

Coaching snapshot: economy vs efficiency!

Question: "What is the difference between running economy and running efficiency, and how do I train one vs the other?"

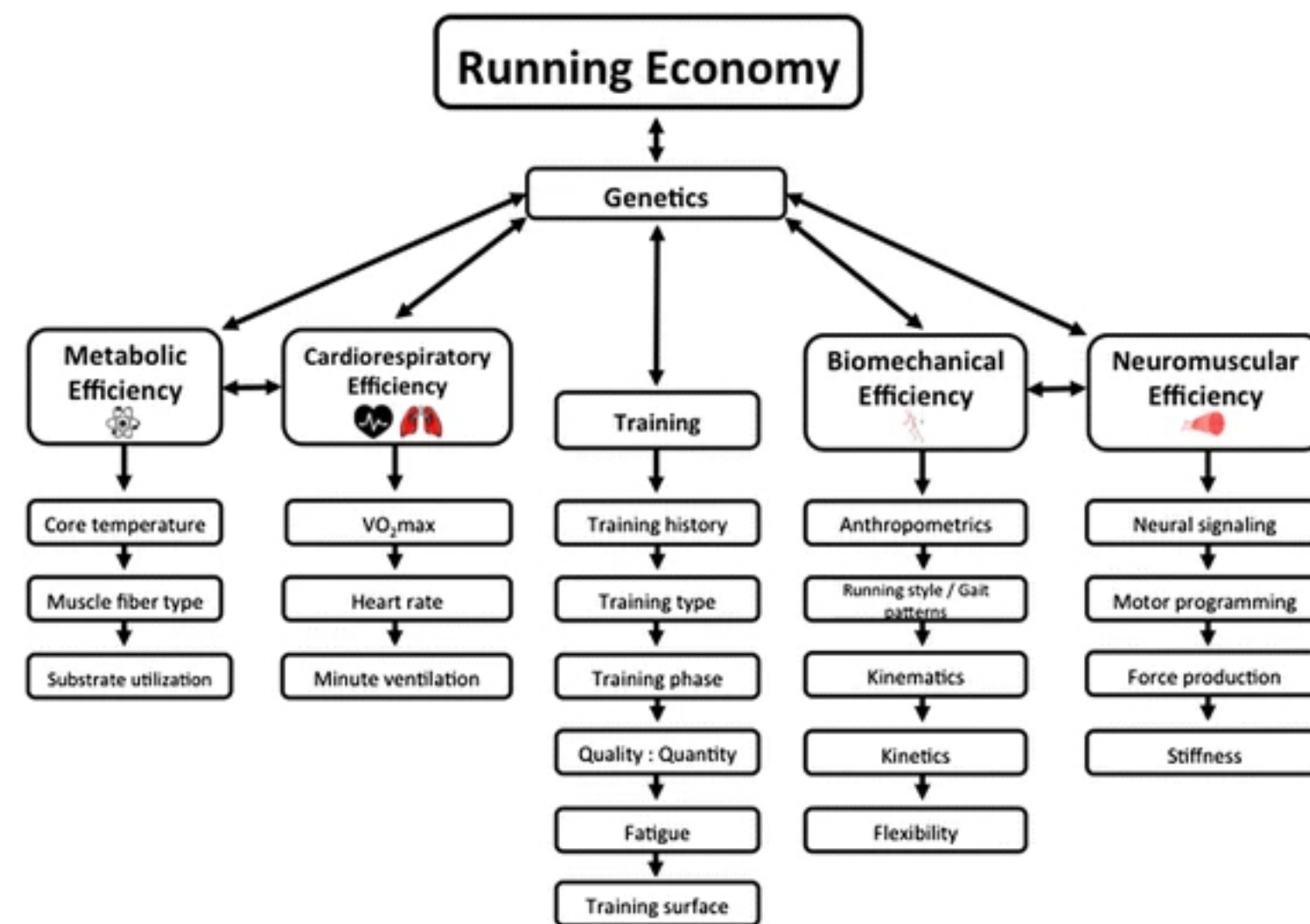
The [framework](#) proposed by leading exercise physiologists is that VO2 max, lactate threshold, and running economy/efficiency are the strongest predictors of endurance performance (of course, I'd add fatigue resistance). In fact, in 1991 Dr. Joyner published an [article](#) modeling a runner with ideal values in all three categories and predicted a possible marathon time of 1:57:58!



To take a step back, efficiency and economy are terms not just reserved for running. All endurance sports have an [economy](#) factor -- the oxygen consumption at a given speed. All endurance sports also have an efficiency factor -- the energy expended to produce a certain amount of work. These are very, very related terms and not always distinguished in the literature. To train one is to train the other.

So, what determines sport economy? This [2015 Review](#) in *Sports Medicine* outlines metabolic, cardiorespiratory, biomechanical, and neuromuscular demands of running economy (also see figure below). These ideas are certainly translatable to other sports like cycling, swimming, and rowing, with the kinematics and biomechanics slightly different. I used these categories in [a previous newsletter](#) and will contextualize them for running economy here:

1. Metabolic: efficiency of carbohydrate and fat utilization
2. Cardiorespiratory: efficiency of oxygen transport (i.e. heart pumping, capillaries) and utilization (i.e. mitochondria)
3. [Biomechanical](#): efficiency of movement, including running style like vertical movement, hip extension, stride rate, [foot strike](#), shoulder rotation, [forward lean](#), foot contact time, [footwear](#), and lower leg anthropomorphic measurements
4. Neuromuscular: nerve-muscle signaling, muscle fiber recruitment, [muscle fiber type](#), muscle contractility, muscle and tendon stiffness, tendon [elastic energy](#) storage and release



All the training you do can be tied back to running economy. It's clear that doing more running itself would help improve metabolic and cardiorespiratory efficiency. There are a few ways to target biomechanical and neuromuscular efficiency for running, including doing [heavy resistance training](#) and/or [plyometric training](#) (up to 8% increases in running economy for trained runners) and strides!

What questions do you have about training and racing? Reply to this newsletter or [email me](#), and I'll answer one next week!

Also, let your friends know that I'm taking more athletes! I'm looking to work with runners and triathletes and depend on you to help spread the word :) Send them to my [website](#) to submit an inquiry or just pass along my email. Thank you so so much!



Ermine icing!

Ermine icing is traditionally for red velvet cake, but I like it for any chocolate cake, like these cupcakes, too. It's made mostly with milk and flour, so it isn't too sweet or buttery!

1. In a pot over medium heat, whisk together 1 cup milk, 5 tbsp flour, and 1 cup granulated sugar. Boil, whisking intensely, for about a minute until it thickens. Transfer to a mixing bowl and let cool. Cool further in the fridge.
2. Beat in 2 tsp vanilla and 6 tbsp room-temperature butter. The icing should be spreadable/pipe-able now. If not, it likely did not cool enough and you can refrigerate it again. Just whip it immediately before use!

[Ermine icing recipe](#)

Order pickup or delivery!

S.S. Endurance is done vending at the Harvard Farmers Market for 2024. Instead, I have a new pickup system! [Order online](#) 24 hours in advance for pickup. Remember, I also do delivery or pickup from spots determined by you! For updates, make sure to follow me on Instagram [@coach_serena326](#). For questions, feel free to email me by responding to this email!



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