Strive's Capture of 20 Repetitions of 400 Meters, All Ran at Approximately 90 Seconds

Introduction:

Currently, athletic organizations relate "Player Load" as a metric of output. IMU tech measures the output of an athlete's session and then a load is provided for use in comparison with the athlete's body of data to detect longitudinal trends and outliers. This number is then used as insight into how hard a session was for an athlete in relation to all other sessions, and sometimes even used as an injury risk indicator.

In reality, the term Player Load is much broader than a simple movement score provided by an accelerometer. The amount of stress that an athlete's body is under, influences the difficulty of a session. A movement score is not without value, and it plays an important role in the idea of a player's load. However, there is additional context that is needed to fill out the picture that is true Player Load.

Strive is able to offer Muscle Load. Strive uses "sticker-like" EMG sensors placed on the right and left glute, quad, and hamstring regions, via sliding shorts, to capture amplitude in microvolts. This number is then added up and converted to Muscle Load. Muscle Load is comparable to numbers provided by the external load, IMU metric, that is also provided. Muscle Load provides an undeniably important component of true Player Load. Muscle Load is essentially a measurement of how many motor units were recruited to perform a task. When analyzing this metric in comparison to the external load provided by the IMU an idea of true Player Load begins to take shape.

Real World Example:

A collegiate triathlon athlete performed a workout while wearing shorts outfitted with Strive technology. The premise of the session was to run 20 laps around a 400-meter track. The athlete would aim to finish each lap in 90 seconds and then take a 90 second rest between each repetition. Thus, the output remained approximately constant. The distance was the same and the speed should be approximately the same for every lap as well. The athlete did an excellent job at keeping the output of

each repetition similar. Her average time was 89.65 seconds. The first 17 repetitions were all put between 88 and 90 seconds and the last three were completed in 93 seconds.

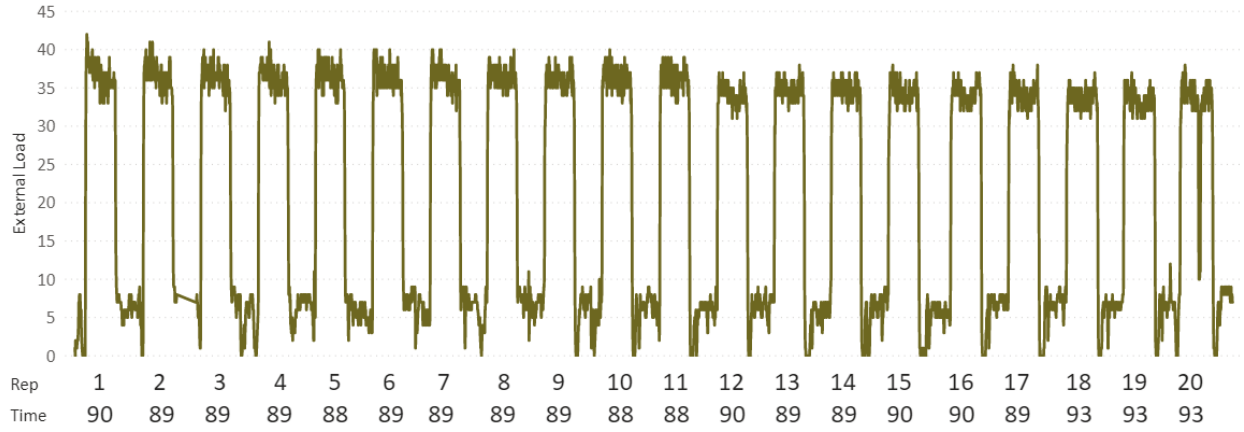

Figure 1 The external load, IMU based, metric has very little variation as expected. The times show that the athlete's output was kept relatively constant.

Figure 1 shows the second by second depiction of the external load metric that was being collected. As expected, it changes very little. Each repetition has essentially the same output. The athlete runs 400 meters at approximately the same speed every time. Traditional "Player Load" is a movement score. It is not without value, but it measures how an athlete moves.

This exercise was completed outdoors, in 95-degree weather. Fatigue played a role in each of these repetitions. Each individual repetition did not feel the same to the athlete, and Muscle Load tells this story. The first rep was not the same as the 10th rep, which was not the same as the 20th rep. Strive's Muscle Load provides insight on the motor unit recruitment of the muscle groups during each repetition.

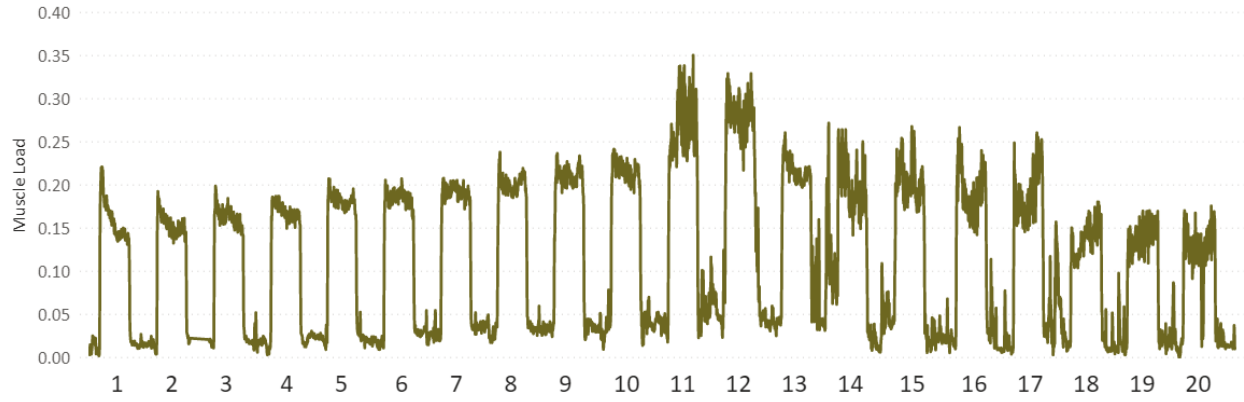

Figure 2 The Muscle Load, an EMG based metric, shows an increase in amplitude throughout the first 12 repetitions and then a decrease as the athlete's motor units become exhausted throughout the last 8 repetitions.

Figure 2 shows the corresponding Muscle Load for each 400-meter repetition. The Muscle Load shows an increase in amplitude throughout the first twelve repetitions. Essentially, the athlete is fatiguing and is requiring a higher muscle input to complete the approximately constant output. This leaves repetitions 13 through twenty to explain.

During fatigue, an athlete's form can tend to break down or change. This can be further explored using Strive, by viewing the individual amplitudes of the quads, glutes, and hamstrings of the left and right legs. *Figures 3* and *4* show relatively stable increases from muscle groups throughout the first 12 repetitions. The overall increase in amplitude seems to mostly come from the quads and hamstrings, as the glutes remain relatively stable. However, the engagement pattern and trends remain similar. The latter half of the repetitions where the Muscle Load was seen to decrease correspond with the breaking of the engagement pattern. The athlete has exhausted her available motor units and is compensating by breaking her form. She is only able to keep up the pace with her compromised form for five more repetitions at which point she slows to a time of 93 seconds.

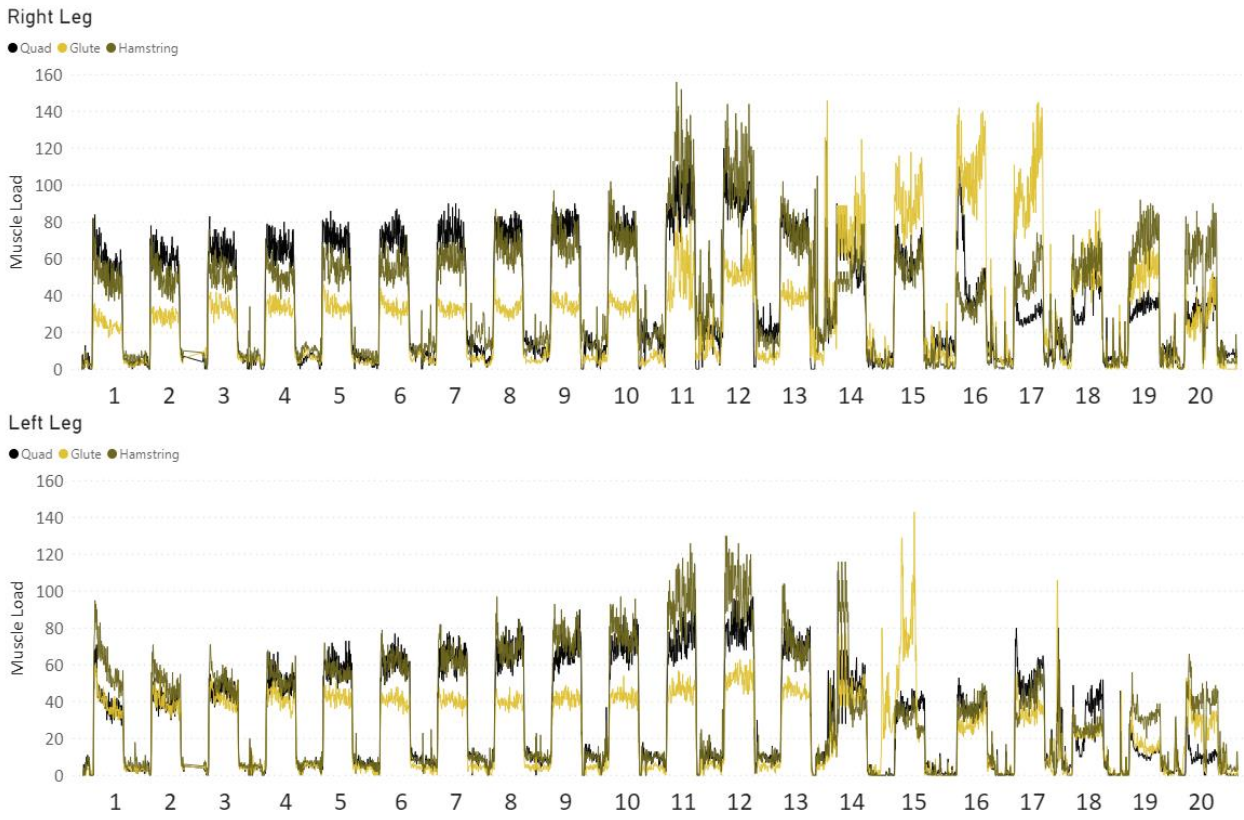

Figure 3 and 4 Looking at the quads, glutes, and hamstrings individually can provide insight into form, asymmetries, and engagement patterns.

Strive's Muscle Load provides real insight to a player's load and capture's more information than just a movement score. Together, Muscle Load and external load can be used to capture the essence of a player's actions. By comparing input to output, a practitioner can make more informed decisions based on how their athletes' bodies are actually responding. External load is a pretty good estimate of an athlete's total output for the day. It can be useful in recognizing when athletes put in extra work through means of pure output. However, when analyzing external load with the added context of Muscle Load, the image of the athlete's true player load becomes clearer. The efficiency of input to output can be examined and decisions can be made based on how hard the session actually was for the athlete.

Muscle Load places an importance on muscles where it was previously unseen. Movement scores are good, but Muscle Load brings practitioners multiple steps closer to evaluating complete Player Load.

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