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Xert's Maximal Power Available and the Modeling of Fatigue

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Power data has revolutionized cycling training and racing, but power output by itself can be meaningless without context of what an athlete is capable of. One desirable advance would be a method to model, in real time, the fatigue that an athlete is experiencing, enabling predicting the wattage that can still be produced or the point of failure with an effort. Maximal Power Available (MPA) is a model that dynamically calculates fatigue and thus predicts the maximal power that can be produced at any one time. This is done using a fitness signature model comprising Peak Power (PP), High Intensity Energy (HIE), and Threshold Power (TP). MPA is dynamic, modeling greater strain with increasing duration at a given wattage as fatigue accumulates. An important aspect of MPA modeling is that it is self-correcting as, theoretically, actual power should never exceed MPA. If this occurs, the fitness signature (PP, HIE, TP) will be remodeled and recalculated. This eliminates the need for dedicated test sessions, increasing training flexibility and the frequency of feedback to inform training prescription and race tactics. MPA can be reviewed either post-ride or even in real time, aiding in pacing a time trial, hill climb, or breakaway. MPA can also be used for highly individualized workouts that target specific thresholds of fatigue, with dynamic rather than static wattages and duration during both efforts and recovery.