BOOK OF ABSTRACTS

The analysis & forecasting of British cycling time trial records

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Abstract

Background: The sport of cycling time trials in Great Britain has taken place over several distance or time based formats since 1935. The format of this sport typically involves riders competing individually over several fixed race distances of 10-100 miles in length or using time constrained formats of 12 and 24 hours in duration. The aim of the sport is to cover the fixed race distance or duration at the highest possible speed. Each of these events has its own national record. A new record can be established and ratified at any point of the year when achieved in an event of the same race length.

Purpose: An evaluation of British cycling time trials over a maximum period of 80 years may provide some insight into the progression of the sports records and what performances may be possible by athletes in the future.

Methods: The progression of time trial records across six events were plotted and reviewed. This data was obtained from the sport's governing body website and annual handbook. The fixed distances that were investigated were the 10, 25, 50 and 100 mile distances. In addition, the 12 hour and 24 hour fixed duration events were also analysed. To determine forecasts for each records future progression, the 'Singular Spectrum Analysis' (SSA) technique was applied to the historical record data. This time series analysis technique has not been applied to sports-based data to date.

Results: The data from all 6 events typically follows a non-linear progression of performance. Excluding the relatively recent introduction of the 10 mile distance, the five other datasets all saw a high frequency of new records being established from 1950-1969 and a reduction in the frequency after this. Conversely, since 1970 these records have indicated a larger percentage improvement when they have occurred. The SSA technique provided forecasts using a line of best fit with a minimum of 99% goodness of fit for all six datasets. The SSA forecasts projected that by 2030, the records would stand as 16:51 (10 miles), 41:48 (25 miles), 1:27:40 (50 miles), 3:03:57 (100 miles), 323.76 miles (12 hour) and 550.937 miles (24 hour).

Discussion: The non-linear nature of the records is typical of the characteristics recorded in other endurance sports over long term time periods. However, to achieve the SSA forecasts, these would then require substantial improvements in a riders physiological power output and/or reductions in their aerodynamic drag. However, cycling time trials have historically also been subjected to the influence of sociological factors such as traffic flow, weather and favorable course design. As a result, such targets may well be assisted by the impact or development of positive factors outside of the rider's control. Further research into the impact of traffic drafting and course topographies may well provide further evidence to reinforce the projections successfully modeled here.

Conclusion: A review of six British cycling time trial records generally demonstrated a decreasing frequency of attainment but larger margins of improvement over time. Further improvements in performance were forecasted with a high percentage of line fit using the Singular Spectrum Analysis technique. These forecasts provide challenging targets and would require a combination of favorable improvements in physiological power generation, reductions in total aerodynamic drag and other conditions outside of the riders' direct control.

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