

Commentary on *How to Interpret Changes in an Athletic Performance Test*

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This [presentation](#) makes a clear and persuasive justification for adopting new approaches to data interpretation of performance testing in elite athletes. The traditional approach in many sports science laboratories, and elite athlete and professional sports programs, has relied on subjective or "on-the-fly" interpretation of the results of performance tests. Although some laboratories have established the typical error (TE) of commonly used tests for purposes of accreditation, these values are often not used in practice. Mere citation of TE values on the bottom of printed reports, without direct consideration in the interpretation of results, is a rather limited approach to the issue. In many laboratories a more quantitative (statistical) approach to the interpretation of test results is restricted to discrete research projects rather than for routine use in day-to-day testing or servicing of athletes.

It is clear from Hopkins's slide presentation that validity and reliability issues cannot be isolated from the direct interpretation of test results. Too many laboratories have taken a "set and forget" approach to validity and reliability, both in practice, and in the preparation of research manuscripts for peer-reviewed publication. Sports scientists and researchers must be more diligent in citing published values of reliability and validity, or where appropriate, generate their own values specific to the athlete (subject) group or research design.

The distinction between identifying the magnitude of change required in performance time or power output is an important one. As Hopkins indicates, sport scientists need to be aware of implications of their choice of physiological test, particularly for athletes in solo or individual sports undertaking ergometer testing. Scientists need to be conversant with the subtleties of the smallest worthwhile change associated with constant load, incremental, or time trial performance, and the expression of these values in both performance (time) and power output. Presentation of advice to athletes in the form of the percentage (%) change in the fitness test score necessary for a % change in performance or power output is another useful approach: e.g., a 10% improvement in strength is required for 2% improvement in performance.

One approach offered in the quest for reducing the noise of tests is to conduct multiple testing rather than relying on a single assessment. Athletes are understandably reluctant to repeat sustained maximal effort tests, such as the progressive incremental maximal oxygen uptake (VO₂max) test, but other simpler measures, such as routine anthropometric testing, explosive tests, or short duration-high intensity tests like the 20-m sprint, can often be measured in duplicate or triplicate.

Another important issue raised by Hopkins is the treatment of noise in performance tests conducted between different phases in the same season and/or in tests conducted in different seasons and years. In many elite athlete programs the value of performance testing for elite athletes is best realized after repeated or serial testing from phase to phase within a season, or from season to season, over an athlete's competitive career. In the context of sports performance research, incorporation of a control group within the experimental design is critical in establishing the typical variability in performance and

test measures over specified periods of time. The typical test-retest reliability established in tests repeated within a few days may not fully indicate the extent of variability that may emerge over weeks or months.

Incorporation of quantitative approaches for interpreting magnitudes of changes and differences into individual and group athlete reports provides an interesting challenge for sports scientists. Scientists and researchers will need to develop elegant solutions in spreadsheet and database applications, with the ultimate aim of producing simple and user-friendly reports for athletes and coaches.

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