

A Battle Worth Fighting: a Comment on *The Vindication of Magnitude-Based Inference*

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PI am not a qualified statistician, but after 20 years of sport research and applied field work with elite athletes (6), I consider myself an experienced user of statistics. Applying statistics to athletes' data was not easy when I started (3): effects in the small sample sizes encountered by coaches and sport scientists were almost always statistically non-significant, and nothing practical existed for assessing changes in individual athletes probabilistically. Discovering magnitude-based inference (MBI) and using it on every type of dataset—from individual athletes especially—was more than a game changer. As I have repeatedly said, MBI changed my life, and I am forever indebted to its progenitors, Will Hopkins and Alan Batterham (1). It is within this context that I want to contribute to the current debate over MBI. It seems to me that the people already skeptical of MBI are using the debate to reject the method before the debate is over. Following the recent critique (15), the editor-in-chief of *Medicine in Sports and Exercise* (MSSE) has even instructed his associate editors to reject manuscripts using MBI, and his decision is to be enshrined in editorial policy. This astonishing decision was made without waiting for the rebuttal letter from Will and Alan and in spite of what seems to me to be convincing evidence that the claims in the critique are all either misguided or wrong (12). The debate has now shifted toward a battle of position or power and away from an objective discussion about advantages and disadvantages of the different methods, as good science requires. Science is supposed to be self-correcting, but I am rather afraid to see the overall scientific community going backwards with these close-minded attitudes (4, 5). Like the protagonists in the never-ending battles of religion, researchers are now adopting extreme positions (14)—statistical methods included—and the very recent trend here seems to be that MBI should be scrapped! This is too sad and bad for me not to react.

As an early adopter of MBI (3), I can testify to the challenge of getting it accepted by our peers in most journals. It seemed to me that there was a lack of understanding and an unwillingness of editors and reviewers to see outside their box (5). The dozens of reviewers' comments that I compiled attest to those difficulties. Colleagues who wanted to reduce the risk of rejection or did not understand the incompatibility of MBI and null-hypothesis significance testing (NHST) would sometimes put both in the same paper, a strategy that often resulted in contradictory conclusions within the same paragraph. I am proud to say that sometime around 2010 I decided never again to test the null-hypothesis and report p values in my research. I have even taken my name off papers, when co-authors insisted on including p values.

The point that I want to make here is that NHST is not a viable alternative to MBI for sport science, because it systematically misses two important aspects in our research and service work:

- Consideration of the magnitude for the effect of interest. “Are the changes observed in my athletes worthwhile; for example, are we going to see any performance benefit after this novel training block?” Using NHST with small samples, changes can be non-significant but substantial in magnitude—in other words, a potentially useful intervention can be interpreted as worthless. A rare occurrence in sport science is the equally perverse conclusion: with large samples, changes can be significant but trivial in magnitude—in other words, a useless intervention can be interpreted as worthwhile. With MBI, the focus is first on understanding if the magnitude is relevant in relation to the so called smallest worthwhile change (7, 8), and then on the probabilities for the magnitude to be worthwhile, worthless, and harmful. Irrespective of the claim about error rates with MBI, using NHST alone will never help to understand magnitudes of an effect (3, 9).
- Consideration of individual responses. “Has this player improved on that test?” I have written extensively on the subject, but this is clearly the aspect where MBI has been the most influential for me. Every day, sport scientists need to make inferences on potential changes in various measures (e.g., locomotor performance, body composition, strength tests) to help the performance managers and coach make decisions (6, 13). Before MBI, practitioners were left alone to decide on which changes were important or not, leading to very subjective decisions. However, in elite sports, where every decision can have large consequences, bringing objectivity is key to reduce error and in turn, improve precision. The overall concept of using both the typical of error of measurement and a well-defined smallest worthwhile change to assess likelihood of a substantial change within an individual athlete (10, 11) is now close to becoming the norm, thankfully (6). In fact, MBI has made individual monitoring one of the more interesting activities in sport science (2, 13).

In conclusion, MBI has changed the practices of thousands of sport scientists in the academic world and in the field. There is nothing to replace MBI when monitoring athletes, and I trust the analytical foundations of MBI for research with samples. My trust is based on the following: Alan and Will are amongst the most highly cited researchers in exercise and sport, their knowledge of the inference literature is clearly beyond reproach, and their logic is impeccable. I will keep using MBI for my daily work with athletes (6, 13) and for publishing research. If I cannot submit the research to MSSE, no problem, provided we still have good journals with reviewers and editors who understand the value of MBI. We must fight and win this battle.

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