CORRESPONDENCE

Descriptive Statistics: The Specification of Statistical Measures and Their Presentation in Tables and Graphs

Part 7 of a Series on Evaluation of Scientific Publications

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Non-uniform Box Plot

In the article of Spriestersbach et al. (4), it was stated that, in contrast to the box, the definition of the so-called “whiskers” in the box plot diagram is not uniform.

A diagram designated as a “box and whiskers plot” was first described by Tukey in 1977 (1). In this plot, the whiskers extended to the greatest or to the smallest values within a limit, the so-called “inner fence”.

The width of the “inner fence” is defined as one and a half times the interquartile distance. An additional “outer fence” extends to three times the interquartile distance. Measured values outside these limits may be outliers and are designated with special symbols.

A similar diagram had already been described in 1952 by Spear and designated as a “range bar” (2). This diagram corresponds to the description in the text.

On the other hand, Altman set the ends of the whiskers at the 2.5% and 97.5% quantiles (3). The box plot provided by statistics programs is likewise non-uniform. Whereas SAS presents the range bar as standard and only provides the original box and whiskers plot as an option, many other programs (S Plus, R, SPSS, Mathematica) use Tukey’s algorithm as standard.

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In Reply:

We wish to thank Dr. Goralczyk for his additional comments, with which we fully agree. Although the Tukey algorithm is standard, there is a variety of other conventions. This is not unreasonable. The presentation suggested by Altman is particularly suitable for large case numbers with hundreds of observations, while the Tukey algorithm is intended for smaller numbers of cases, which are nevertheless too large to present the individual points (>20 to a few hundred). Within this range, Tukey box plots show no, or very few, outliers.

It is quite clear that the legend to a box plot must be read carefully and that it must mention the convention used.

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