

On showing similarity of results given by two methods

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Comparing results given by two analytical methods is a common task in environmental sciences. For example, when a new method has evolved for environmental monitoring, one may have to choose between the old and the new technique, which may differ e.g. in performance, costs and practical feasibility. In addition, variables themselves may be obscure and difficult to quantify, such as the bioavailable fraction of a nutrient or harmful substance, which may lead to a practise of using several – more or less deficient – methods in parallel to gain support for the conclusions. In above cases, the question of similarity of results obtained with differing methods is of interest. By **similarity** we mean that the results given by the methods within a specified context are **close enough** to each other.

The problem of showing similarity can not be solved within the conventional ‘there is a difference’ statistical hypothesis setting, included e.g. in Student's t-test. This is true even if power of the test is calculated. Here we present a statistically solid procedure (Schuirmann, 1987) that meets the requirements of similarity studies and that can be performed using standard statistical software. The procedure stems from pharmaceutical context where showing similarity of effectiveness (bioequivalence) of two drugs is often the aim. Although the method is simple, there are only few reported applications of it in environmental sciences (McBride, 1999). A reason for its very limited use may be that the approach requires quantification of the similarity limit. In pharmaceuticals this limit may be set e.g. by authorities, but in environmental sciences the quantification is often more problematic. Therefore, we have further elaborated the procedure and present a data exploration technique that enables quantification of ‘**close enough**’ (i.e. what **similarity** means **quantitatively**) in cases where there is no pre-determined criterion for the similarity limit. At the end of the paper, a simple example of the use of the technique is given.

The similarity point of view has numerous potential application areas involving parallelism of regression lines, homogeneity of variances and lack of interaction.

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