DPSS
Dipartimento di Psicologia dello Sviluppo e della Socializzazione

Università degli Studi di Padova

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Dear Editors,

I am submitting our brief methodological report titled *How do my distributions differ? Significance testing for the Overlapping Index using Permutation Test* authored by Ambra Perugini, Giulia Calignano, Massimo Nucci, Livio Finos, and Massimiliano Pastore, for consideration for publication in *Psychonomic Bulletin & Review*.

The present work introduces the application of the Permutation Test to the Overlapping Index, a measure for comparing density distributions of groups or conditions in psychological science. Until now, this index has not allowed for statistical inferences, despite its widespread citation, (https://doi.org/10.3389/fpsyg.2019.01089e). The present work expands the Overlapping index in a statistical testing framework by comparing its performance to common statistical testing used in Psychology. Of notice, the present advancement is particularly valuable given the absence of such robust statistical testing methods that allows for inference in the original work.

Additionally, we support the present work with the updated version of the *overlapping* an R package that implements the permutation test (https://dx.doi.org/10.21105/joss.01023). The present work allows for easier application of the proposed Overlapping Index and contributes to improving the reproducibility and transparency of psychological data analysis.

The present contribution emphasizes the importance of relying on statistical methods that face, and deal with, the inherent complexities of psychological data where assumption violations are often unavoidable. Our simulation study shows that the proposed Permutation Test applied to the Overlapping Index outperforms traditional methods in controlling Type I error and demonstrates greater power, even with small sample sizes.

We believe this contribution will be of substantial interest to the readership of *Psychonomic Bulletin & Review*, as it enhances the rigor and transparency of data analysis in psychological research and shifts the focus from traditional significance testing to more informative and robust distributional evaluations.

Thank you for considering our manuscript. We look forward to your feedback.

Kind regards,
Ambra Perugini
on behalf of the co-authors

Ambra Perugini, PhD student
Department of Developmental and Social Psychology, University of Padova, Italy
Via Venezia, 8, 35131 Padova - ITALY
e-mail: ambra.perugini@studenti.unipd.it
tel: + 39 049.827.7481