E-Poster

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A new Approach to Medical Studies using a Logical-Statistical Method (RELAN) for Hypothesis Testing and Data Exploration

Topic: Biostatistics

Rainer Maderthaner[1], Eva Maria Uher[2]

[1]*Department of Cognition, Emotion, and Methods in Psychology, Faculty of Psychology, University of Vienna, Vienna, Austria*
[2]*Beckenboden-im-Zentrum, Vienna, Austria*

BACKGROUND

The so-called replication crisis and shortcomings in statistical analyses have long been discussed in medicine and other empirical-statistical sciences. Questionable Research Practices (QRP), insufficient power of studies, p-hacking, HARKing, lack of correction for multiple testing and pressure to publish are certainly often to blame. However, I believe that too often too vague and too simple hypotheses ('rule of simplicity') are formulated for what are actually complex empirical relationships. For example, relationships between variables are still hypothesized on the basis of correlations (regressions, structural equations, ...), although their methodological weaknesses have long been recognized (linearity, bidirectional association, pairwise associations).

The novel approach of Relation Analysis (RELAN; Maderthaner, 2022), founded on propositional logic, encompasses all potential interactions between binary variables, thereby enabling the examination, exploration and simulation of complex predictive hypotheses for up to 10 variables. It is thus possible to statistically evaluate empirical variable networks (with causes, effects, moderators and mediators) in this manner. This is due to the fact that hypotheses are multi-functional, multi-causal and contextual.

CONCLUSION

Evaluation examples from compliance research show that (1) a number of otherwise uninterpretable data configurations can be explained, (2) moderator and mediator variables are necessary to detect relationships between causes and effects (3) and by including logical links (e.g. AND, OR, IF-THEN) it is possible to provide evidence of multicausality.

Statement of Disclosures

None

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Corresponding Author:
Rainer Maderthaner
Department of Cognition, Emotion, and Methods in Psychology, Faculty of Psychology, University of Vienna, Vienna, Austria
Email: rainer.maderthaner@univie.ac.at