A CONCEPTUAL BASIS FOR A NEW APPROACH TO THE PLANNING AND STATISTICAL ANALYSIS OF EXPERIMENTS

J.G.C. da Silva, A.A. Machado[1]

[1]*Federal University of Pelotas, Pelotas, Brazil*

Email: *jgcs@ufpel.edu.br*

Almost all texts of Experimental Statistics emphasize the statistical analysis of experiments, just making references to the conceptual and methodological foundations of the experimental research. Basic concepts are defined in a vague, incoherent and incomplete way, which drives to the incomprehension of their meanings. That is the case, for instance, of the concepts of experimental material, experimental unit and experimental error. The lack of understanding of the foundations of the experimental research is an important origin of flaws of the planning of experiments that imply inadequate analysis and inefficiency of many researches. This article proposes a reformation of important concepts with the purpose of establishing a rational, coherent and complete conceptual, methodological and computational basis for the experimental research. The approach to the generation of the experimental design is based on the separate definitions of the structures of the experimental factors and of the unit factors, and the association between these two structures determined by randomization. It leads to a clear identification of the confounding of effects of these two structures and of the appropriated errors for inferences about the experimental factors. Algebraic representation through the operators of Wilkinson & Rogers and graphical representations through Hasse diagrams are used to describe the structures. A classic example is considered to contextualize the proposed approach.