Use of SUDOKU Design to Assess the Implications of the Block Size and Testing Order on Efficiency and Precision of Dulce De Leche Preference Estimation

Authors : Jéssica Ferreira Rodrigues, Júlio Silvio De Sousa Bueno Filho, Vanessa Rios De Souza, Ana Carla Marques Pinheiro

Abstract : This study aimed to evaluate the implications of the block size and testing order on efficiency and precision of preference estimation for Dulce de leche samples. Efficiency was defined as the inverse of the average variance of pairwise comparisons among treatments. Precision was defined as the inverse of the variance of treatment means (or effects) estimates. The experiment was originally designed to test 16 treatments as a series of 8 Sudoku 16x16 designs being 4 randomized independently and 4 others in the reverse order, to yield balance in testing order. Linear mixed models were assigned to the whole experiment with 112 testers and all their grades, as well as their partially balanced subgroups, namely: a) experiment with the four initial EU; b) experiment with EU 5 to 8; c) experiment with EU 9 to 12; and b) experiment with EU 13 to 16. To record responses we used a nine-point hedonic scale, it was assumed a mixed linear model analysis with random tester and treatments effects and with fixed test order effect. Analysis of a cumulative random effects probit link model was very similar, with essentially no different conclusions and for simplicity, we present the results using Gaussian assumption. R-CRAN library lme4 and its function lmer (Fit Linear Mixed-Effects Models) was used for the mixed models and libraries Bayesthresh (default Gaussian threshold function) and ordinal with the function clmm (Cumulative Link Mixed Model) was used to check Bayesian analysis of threshold models and cumulative link probit models. It was noted that the number of samples tested in the same session can influence the acceptance level, underestimating the acceptance. However, proving a large number of samples can help to improve the samples discrimination.
Keywords : acceptance, block size, mixed linear model, testing order, testing order
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