

# Einladung zum ZeSOB Kolloquium

Am Montag, 6. November 2017, um 16:00 c.t. spricht Herr

**Dr. Rüdiger Laubender**

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über

## **Estimation of a joint distribution with two normally distributed treatment responses as marginals generated in a randomized controlled trial based on the parallel-group design by using a normally distributed covariate**

When being interested in administering the best of two treatments to an individual patient  $i$ , it is necessary to know the individual treatment effects (ITEs) of the considered subjects and the correlation between the possible responses (PRs)  $Y_i^1$  and  $Y_i^0$  for two treatments 1 and 0. When data are generated in a parallel-group design RCT, it is not possible to determine the ITE for a single subject since we only observe two samples from the marginal distributions of these PRs and not the corresponding joint distribution due to the 'Fundamental Problem of Causal Inference' (Holland, 1986). A counterfactual approach is presented for estimating the joint distribution of two normally distributed responses to two treatments. This joint distribution of the PRs  $Y_i^1$  and  $Y_i^0$  can be estimated by assuming a normal joint distribution for the PRs and by using a normally distributed baseline covariate  $Z_i$  which is defined to be functionally related to the sum  $Y_i^1 + Y_i^0$ . Such a functional relationship is plausible since a covariate  $Z_i$  and  $Y_i^1 + Y_i^0$  encode for the same information in a RCT, namely the variation between subjects. As a result of the interpretation of the covariate  $Z_i$  as a proxy for the sum  $Y_i^1 + Y_i^0$ , the estimation of the joint distribution is subjected to some constraints. These constraints can be framed in the context of linear regressions with regard to the proportions of variances in the responses explained and with regard to the residual variation. As a consequence, a new light is thrown on the presence of treatment-covariate interactions. This approach is applied to a medical data example on calcium treatment and systolic blood pressure.

**Der Vortrag findet statt am Montag, 6. November 2017, um 16 Uhr c.t. im Seminarraum des KKS an der Universität Bremen, Linzer Straße 4, 28359 Bremen.**

**Alle Interessierten sind herzlich willkommen!**  
(Einladungsvorschlag von Prof. Dr. Werner Brannath)