

## UNIVERSIDAD DE GRANADA

Centro de Investigación Mente, Cerebro y Comportamiento

## **CONFERENCIA DE MARKUS BRAUER - "Recent developments in Linear Mixed-Effects Models**" 19/04/2014

Jueves 24 de abril a las 12 pm en la Sala de Conferencias 1

## "Recent developments in Linear Mixed-

**Effects Models**" It turns out that we have all analyzed our data incorrectly, because we have usually failed to include by-stimulus random effects. When participants are exposed to multiple stimuli, it is not enough to treat only participants as a random factor (which is what we do in our standard ANOVAs), but we also have to treat stimuli as a random factor. Failure to do so increases the type-I error rate drastically, sometimes as high as 60%. Judd et al. (2012) were



the first to raise awareness about this point. The problem: In order to treat both participants and stimuli as random factors, we have to run linear-mixed effects models, a rather complicated statistical procedure. Recent work by Barr et al. (2013) shows that many people run incorrect linear-mixed effects models. Many researchers include only by-stimulus random intercepts but fail to include by-stimulus random slopes. This leads once more to increased type-I error rates. The correct analytic procedure is to include both random intercepts and random slopes and, if the model doesn't converge, to take a number of "corrective actions" that can be ordered from yielding the most correct to the least correct estimates and that should be taken one by one (i.e., a corrective action further down on the list of corrective actions, the action "remove the random-intercept (but keep the random-slope)" comes much earlier than the action "remove the random-slope". Removing the random slope is the very last thing we want to do, and should be done only in extreme cases

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