# SEMIPARAMETRIC MODELLING OF A DOSE-RESPONSE RELATIONSHIP IN THE TREATMENT OF CHILDHOOD AMBLYOPIA

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In a longitudinal study of dose-response, flexibility is essential to capturing the effects of treatment when the causal model is not fully understood. In addition, patient non-compliance interferes with the ability of the analyst to estimate the true effect of a treatment. To model potentially confounding variables with as few assumptions as possible, a semiparametric additive linear mixed (SPALM) model (Ruppert et al. (2003)) provides tractability and flexibility, and observed treatment effects are not due to the imposition of a rigid model for the relationship between response and treatment and other fixed effects. Another approach to reducing bias due patient-selected treatment level is the Generalized Propensity Score (GPS) (Hirano and Imbens (2004)). The GPS builds on the classical, binary treatment propensity score to account for potential confounding.

In this talk, we present Bayesian versions of the SPALM and of the GPS where the propensity score relies on a novel formulation of the treatment density. The methodology is applied to the Monitored Occlusion Treatment of Amblyopia Study (MOTAS) which investigated the dose-response relationship between occlusion (patching) and improvement in visual acuity. Our analysis quantifies (for the first time) the beneficial effect of occlusion. The use of Bayesian methods are readily implementable in a simulation-based analysis, and allow the analyst a simulation-based approach to finding optimal dosing strategies.