



National Autonomous University of Mexico
Faculty of Psychology



Title:

Bayesian cognitive and statistical modeling of mean performance phenomena: An application to Signal Detection Theory and the Mirror Effect.

Author:

Adriana Felisa Chávez De la Peña

adrifelcha@gmail.com

and

Arturo Bouzas Riaño

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Abstract (250 words):

Most of the empirical phenomena found within Psychology are reported in terms of the mean performance of subjects being tested; this study aims to illustrate the importance of looking for evidence that hold at the individual level, a goal that can be achieved by applying Bayesian cognitive and statistical modeling. In Recognition Memory studies where Signal Detection Theory (SDT) has been applied to describe subjects' performance, a pattern known as the Mirror Effect has shown that when comparing subjects' responses between classes of stimuli that are differentially recognized, this difference appears for the identification of both targets and lure stimuli (hits and false alarms). Since this phenomenon has only been tested in Recognition Memory tasks, most attempts made to explain this pattern tend to do it in terms of high-level processes engaged in the study phase. By designing a perceptual task with the same general structure (two levels of discriminability, in this case defined by manipulating an optical illusion) and replicating the mean-performance based analysis reported in the literature, we are the first to present evidence of the Mirror Effect outside recognition memory. We then present the application of different SDT Hierarchical and non Hierarchical Bayesian cognitive models as well as a Bayesian statistical binomial test model to our data, 1) to compare the evidence obtained by comparing binomial rates versus when a SDT cognitive process is assumed (contaminant model included) and 2) to check if the Mirror Effect can still be found at the individual