

# Handling outliers in estimating the diffusion model for reaction time data

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## Abstract

In this paper we will study some methods to handle the problem of contaminant observations when estimating the parameters of the diffusion model (Ratcliff, 1978) from two-alternative forced-choice (2AFC) task data. The presented research builds further on the results of Ratcliff and Tuerlinckx (2002). First, we review some issues concerning the computation of the diffusion model's distribution function and the estimation of its parameters. Second, we present a conceptual classification of different types of contaminants that may show up in 2AFC data and indicate how they may influence the parameter estimates. Third, a method designed to reduce the sensitivity of the diffusion model parameter estimates to contaminant observations will be presented. The method consists of trimming the data first to remove the fast guesses. The identification of fast guesses is based on the exponentially weighted moving-average (EWMA) method, borrowed from statistical quality control (Montgomery, 1996): The reaction times are ordered (together with the choice responses), and all reaction times for which the EWMA control chart of the accuracy exceeds a predetermined level are retained in the analysis. In a second stage, a mixture model is set up with as a first component the diffusion model and as a second component a distribution representing the contaminant reaction times and choices. The results of simulation studies to evaluate the performance of these methods will be presented.

## References

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