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Thema: **A Poisson Random Walk Model for Response Time and Pure Accuracy Tasks**

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Based on a simple 'what first comes to mind' rule, a Theory of Visual Attention (TVA; Bundesen, 1990) provides a well interpretable model account of visual attention that has been successful in explaining performance in perception and classification tasks. One classical domain of TVA has been tasks of divided attention which often involve partial or whole report of highly discriminable stimuli such as letters or digits. The primary variable of interest is the accuracy of report with response times (RT) being of little practical use. Based on this work we propose a model of visual identification of less discriminable single stimuli in both speeded RT and pure accuracy tasks. We assume that tentative classifications are made during the identification of a stimulus, by Poisson generators (Bundesen & Harms, 1999; Townsend & Ashby, 1983). In the special case of a categorization task with two alternatives, A and B, evidence accumulation then follows a simple random walk with exponentially distributed interstep times. Visual identification is made conclusively in favor of A once the number of tentative categorizations favoring A exceeds the number favoring B by a criterial number (the threshold for response A). When the target stimulus is followed by a mask, it is conceivable that neither the threshold for A nor B is reached before identification of the target is interrupted by the mask. Then, a response based on a 'what has the most evidence' rule is made (Kyllingsbæk et al., 2012). We fitted the model to data of both a speeded RT and a pure accuracy task collected in the same participants. The model provides a good description of RT distributions as well as accuracy rates with comparable Poisson rates across conditions. The RT model inherits favorable properties of TVA such as well interpretable parameters of the visual identification process.