Modelling response times in multi-alternative categorization with TVA
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In TVA it is assumed that encoding in VSTM is a race between competing categorizations. Previously, we presented a Poisson Counter model of visual identification of mutually confusable stimuli in pure accuracy tasks. Here we propose and test a multi-dimensional Poisson Random Walk model to explain response time distributions in four alternatives.

**Experiment**

**Fixation**

**Stimulus**

**Response**

**Speeded response time task**

*Respond as quickly and accurately as possible (4-AFC).*

**Task:**

Judge the orientation of a Landolt C-ring

Varying difficulty:

±33 deg, ±39 deg, and ±42 deg

Three participants were tested in 4800 trials

**Multi-alternative random walk model**

\[
egin{align*}
 p_A &= \frac{v_A}{v_A + v_B} \\
 p_B &= \frac{v_B}{v_A + v_B} \\
 p_C &= \frac{v_C}{v_A + v_B + v_C + v_D} \\
 p_D &= \frac{v_D}{v_A + v_B + v_C + v_D}
\end{align*}
\]

**Competitive Poisson accumulator model:** Evidence for one alternative counts as evidence against all other alternatives. Inhibition can never lead to negative activation. For two alternatives, the model is equivalent to the standard random walk.

**Results**

**Conclusions**

The assumption of a relative response rule with exponential processing leads to a simple Poisson random walk model that can easily be generalized to multiple alternatives. The Poisson Random Walk model accounts well for observed performance in a speeded response time task with multiple alternatives.

**References**


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