Spatial attention, alertness and anti-saccades: a diffusion model analysis

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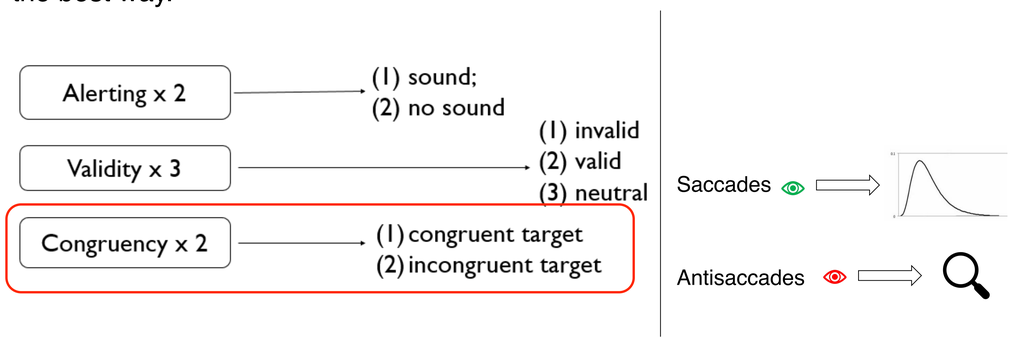
BACKGROUND

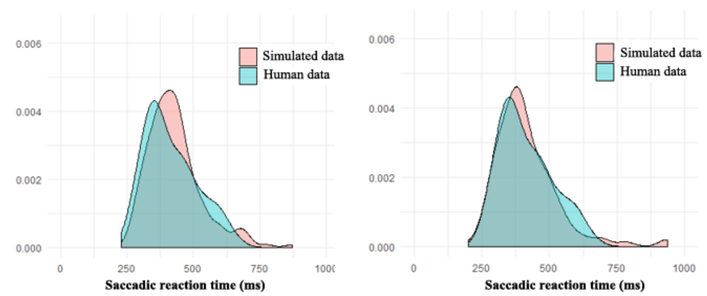
The study initially was based on work done by Fan et.al. (2002) and Callejas et.al. (2004) in the ANT paradigm. We switched the response modality from manual to oculomotor by introducing anti-saccadic task. Anti-saccades could be considered a sufficient replacement for the congruency conflict in the original ANT (Vandierendonck et.al., 2007).

Based on results of two experiments, we run a drift-diffusion model (DDM) with genetic algorithm to derive the parameters that explain RT distribution in the best way.



MODELLING

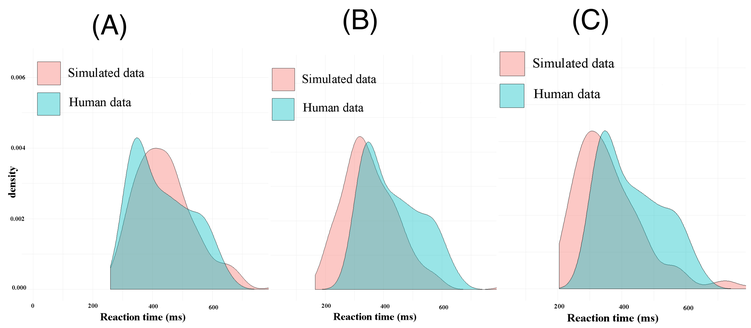
SACCADES



After 300 generations: k value ~ .1000

After 500 generations: k value ~ .0647

ANTI-SACCADES



(A) **Drift rate**: k = .1128, p = .3466
slower than in saccadic trials

(B) **Noise**: k = .1353, p = .1614
three times higher than for saccades

(C) **Bias**: k = .0977, p = .5278
smaller than for saccades

DRIFT-DIFFUSION MODEL

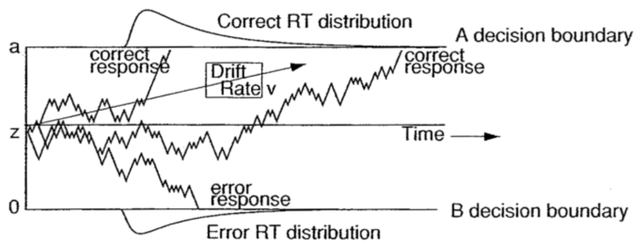


image from Ratcliff (2012)

Model	Information accumulation	Nondecision component	Bias component
Saccadic baseline	0.0128	35.4612	0.6704
Antisaccadic baseline	0.0042	81.6102	0.1650

RESULTS

- Information acquisition is easier in congruent condition;
- The incongruent stimuli provide more information that significantly affects time needed to make decision;
- Increase of non-decision component is another evidence of an initial saccade being cancelled when anti-saccadic response is needed.