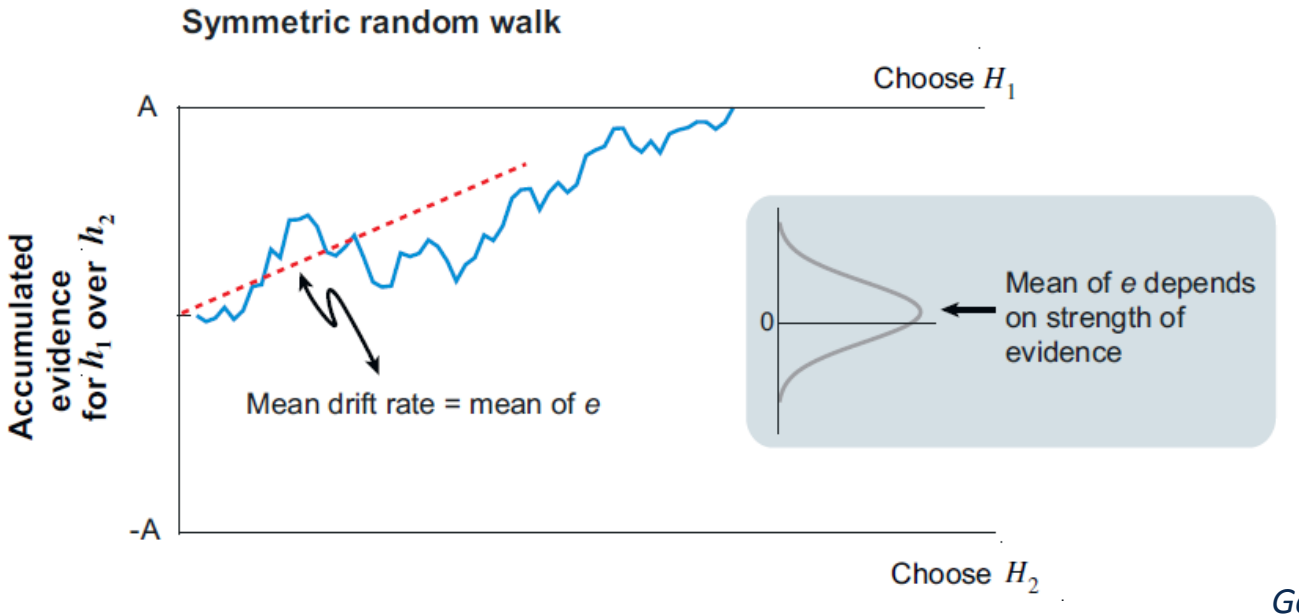
The Drift-Diffusion model (DDM)

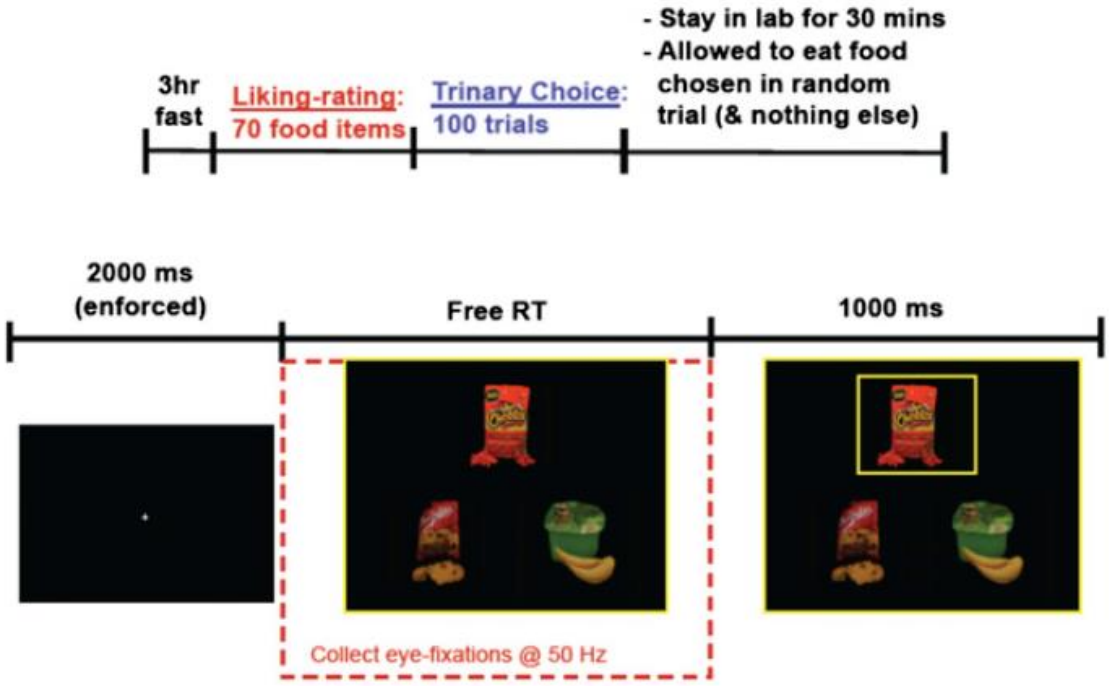
- Computational model for reaction times and choice in two-alternative forced choice tasks
- Usually applied in ‚perceptual decision making', where sensory input is noisy and must be accumulated over time



Gold & Shadlen, 2007

The Drift-Diffusion model (DDM)

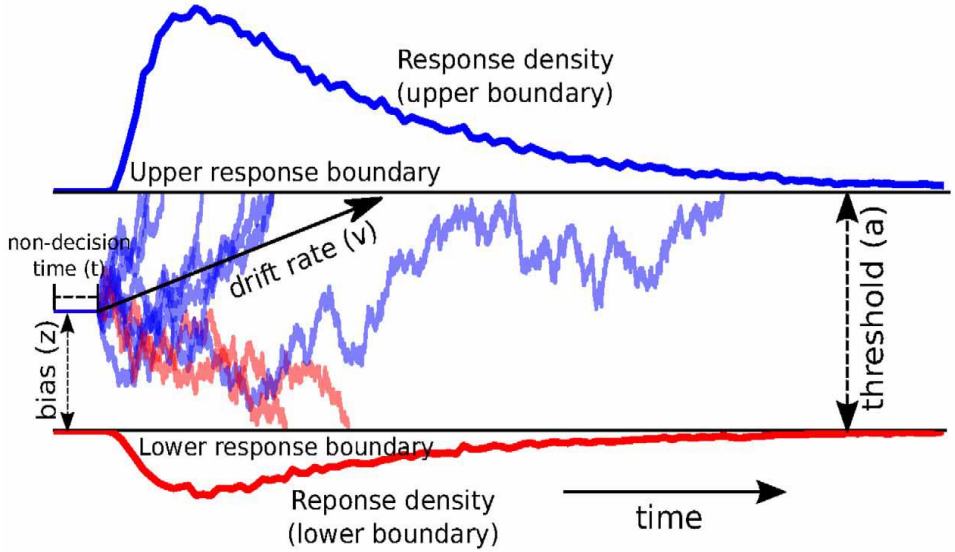
- Can also be used for modelling consumers‘ choices: When in the supermarket, how does one choose a yoghurt from 96 possible choices?



Model explains choices by how much participant is looking at some specific object.

Krajbich & Rangel , 2011

DDM exercise



Exercise goal:
simulate the drift diffusion process using random walks.

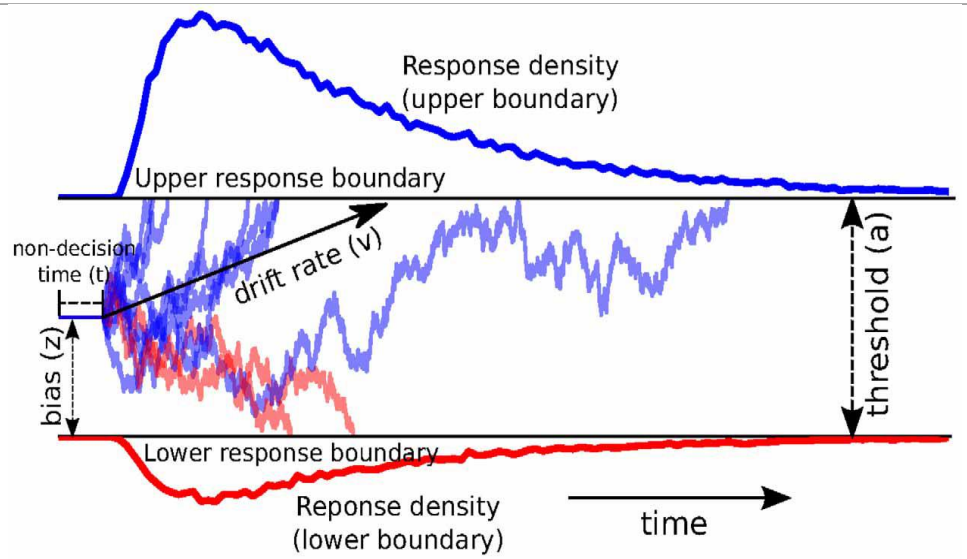
Simulate a drift diffusion process using the formula below:

$$y_t - y_{t-\Delta t} = v\Delta t + \sqrt{\Delta t} s \varepsilon_t$$

where $\Delta t = 0.05,\ v = 0.4$, s$= 0.2, \varepsilon_t = N(0,4), a\ = 0.5$

Plot two trajectories of the drift-diffusion process (one for each alternative) along with the decision boundaries.

DDM exercise



Update a single trace dynamically until one of the processes reaches the threshold.

Repeat this simulation for 10,000 times (without updating the graphics) and plot the histogram for each of the two decision alternatives.

Incorporate the effect of a bias *z* in the drift-diffusion process and discuss the effect of bias on speed and accuracy of decision by using bar plots to compare responses.