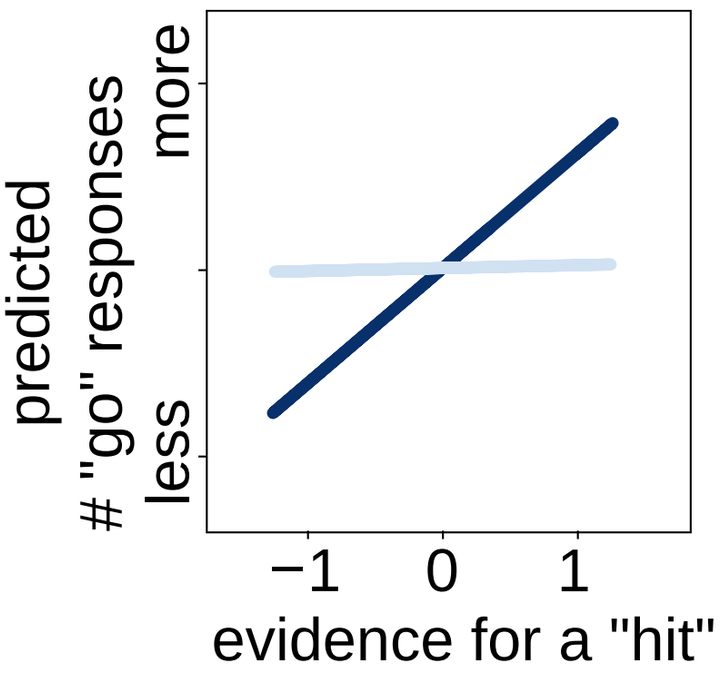
How is new visual evidence used for the preparation of manual movements?

Question

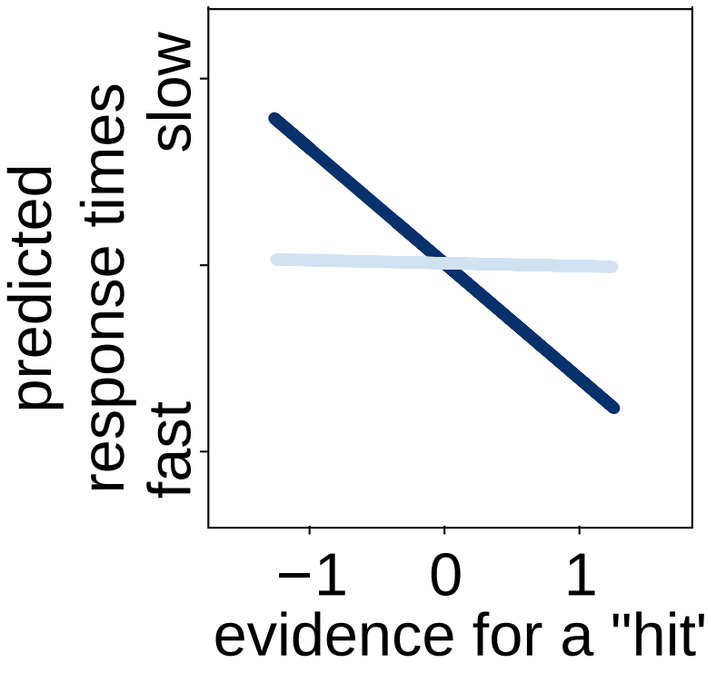
Behaviour

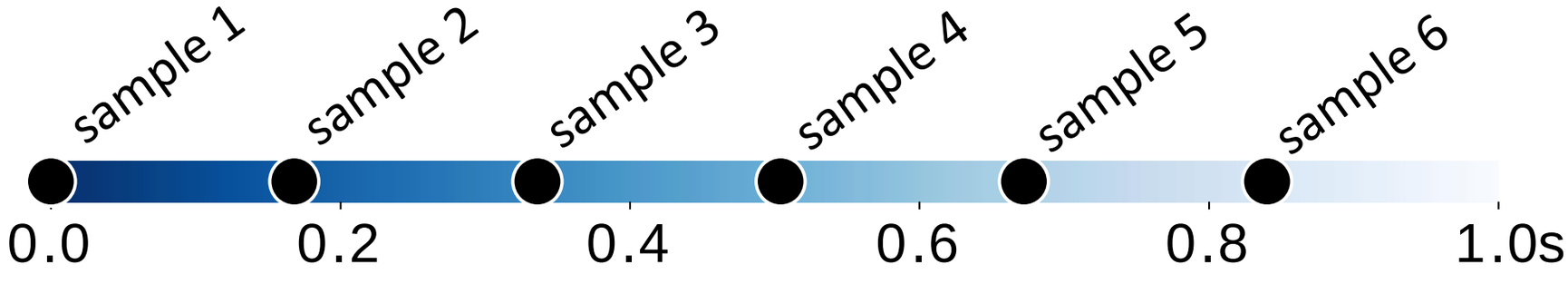
Linear regression models describe response behaviour.

Response choices



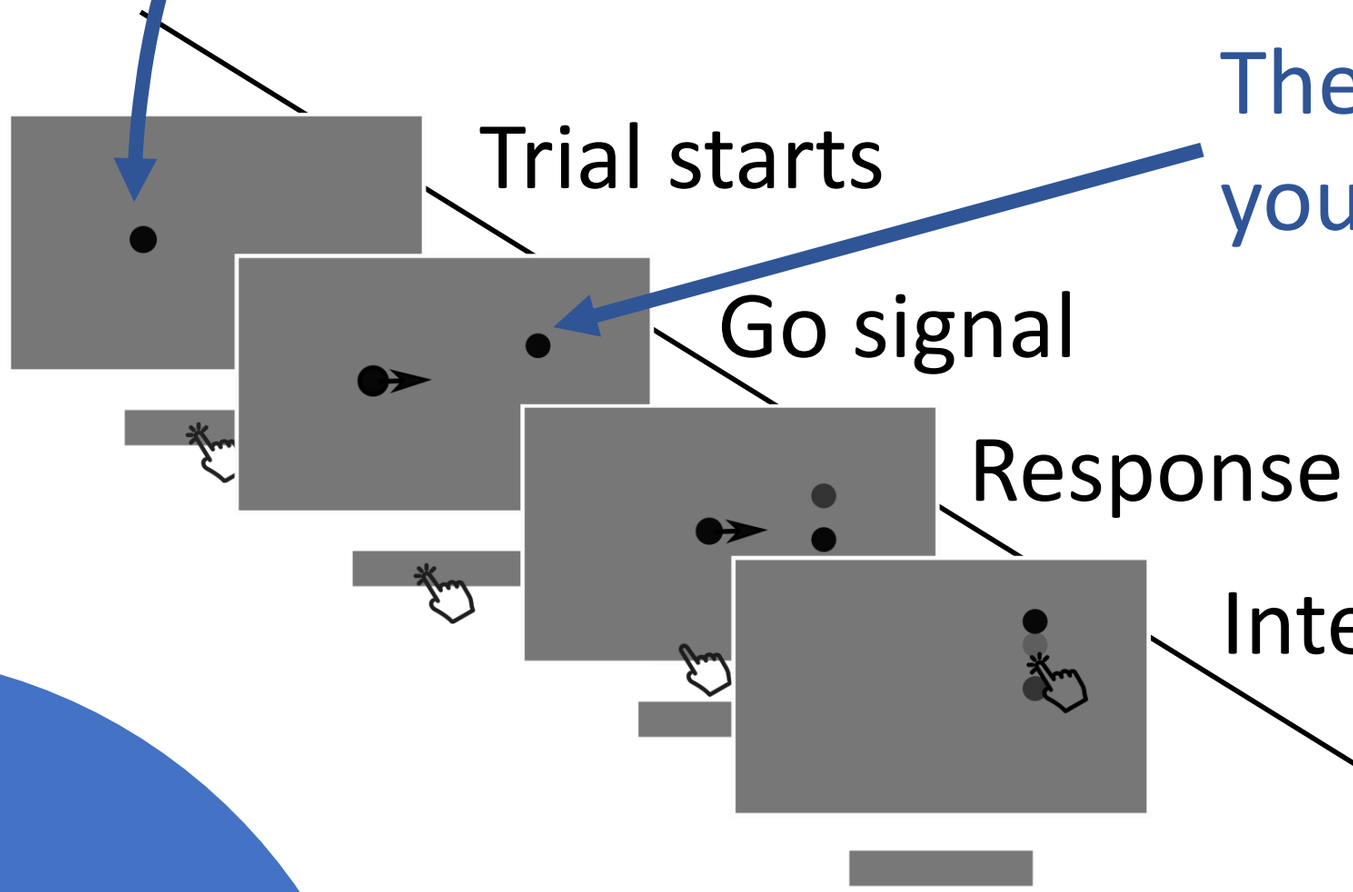
Response times





Paradigm

This attacker will try to hit your goal. But where is your goal?



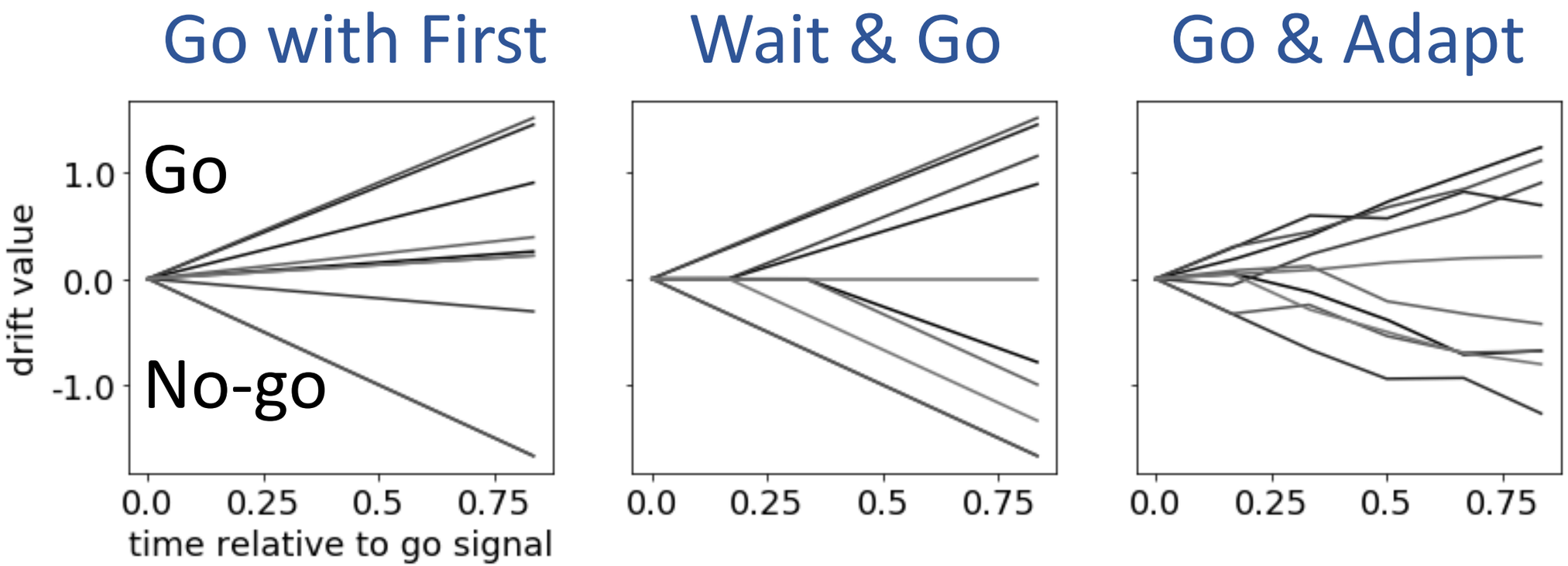
These dots are samples of your goal's location.

Attacker hits: go
Attacker passes: no-go

Trial ends after 1 s

Mechanism

Drift diffusion models describe how motor plans evolve in time.



Control of manual movements…

… is well described as a decision making process.

Gallivan et al 2019, Nat Neurosci Reviews

… gradually changes with the decision variable.

Selen et al 2012, J Neurosci

… rapidly adjusts to new information even after movements are launched.

Nashed et al 2014, J Neurosci

But what if new evidence requires a different response?

Does this also happen during response preparation?

We collected data in a pilot study.

Observers: 4
Sessions: 3
Trials/session: 800
Final Datapoints: 9589

The **hit probability *p[H]*** for each sample is given by the cumulative density function of a uniform distribution, *with parameters that could be known by the observer*:

cdf(x)

x: absolute distance between attacker and sample
a: width of the goal
b: sample position, normalized to zero.

Human observers adjust to early new evidence, but not to late evidence.

Full models included:

p[H] of each sample (sample 1-6)
Trial condition (hit or pass trial)
Fully specified random effects per subject

Not all drift diffusion models adjust well to new evidence.