

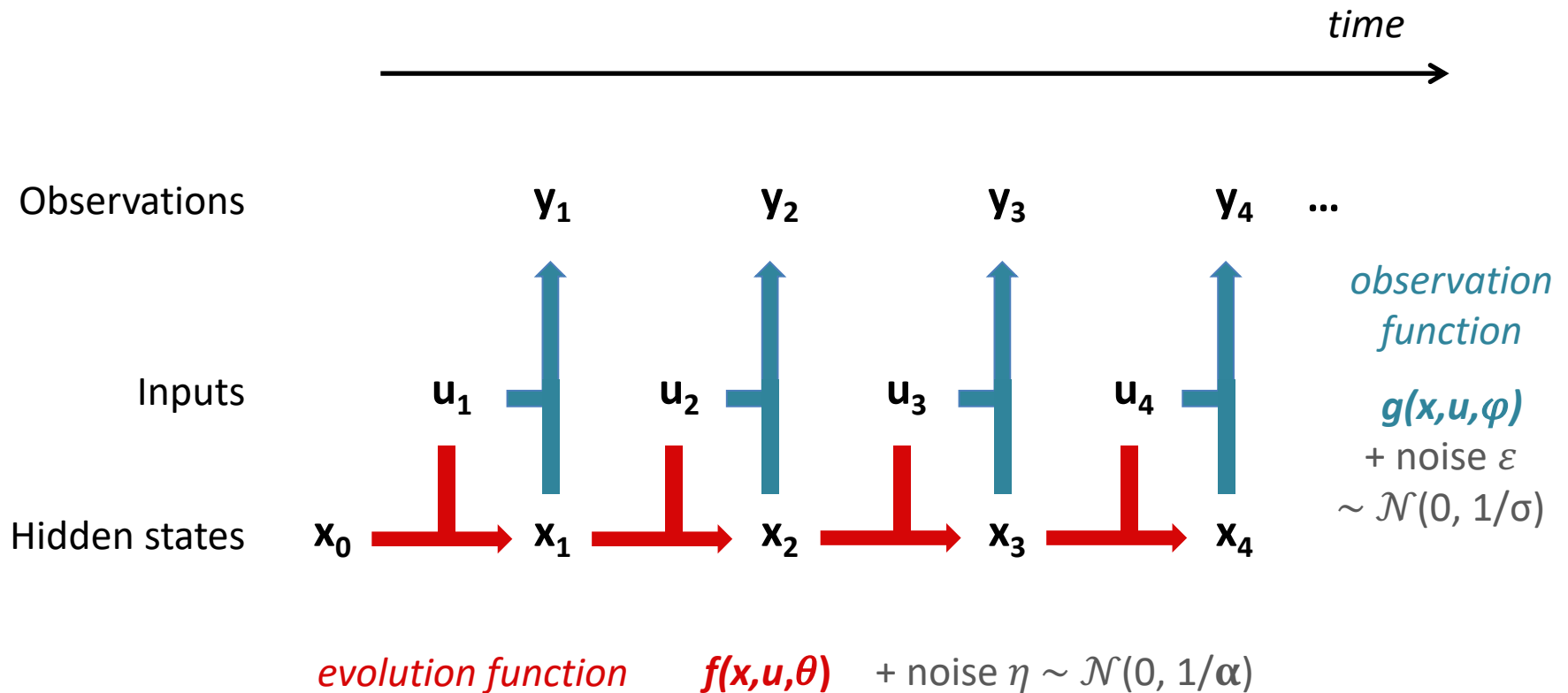
VBA Toolbox

CPC workshop – Zürich 2019

Getting started

<https://mbb-team.github.io/VBA-toolbox>

Structure of a model



General workflow

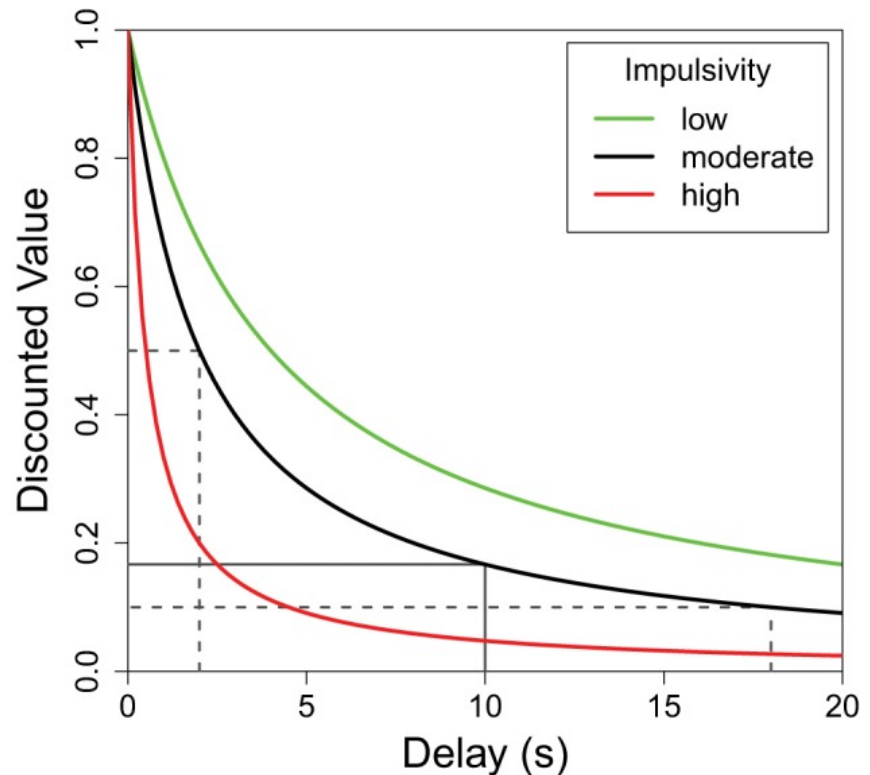
- Write down your design
- Define your models (f and g)
- Simulate artificial *check predictions*
- Invert models *check parameter recovery*
- Compare models *check potential confusions*
- Run inversion and comparison on real data

An example: delay discounting

10 euros
now

15 euros
2 weeks

$$SV = \frac{value}{1 + k \cdot delay}$$



Forward problem

- Pick parameters: $\phi, \theta, \sigma, \alpha$
- Simulate with `VBA_simulate()`
- Do you understand your model?
 - Check model predictions
 - Check parameter influence

Inverse problem

- Define observation distribution
- Define model dimensions
- Invert model using `VBA_NLStateSpaceModel()`
- Check inversion:
 - Does it converge?
 - Does it fit well?
 - Are your parameter correctly recovered?
 - What is the influence of the prior?

Model selection

- Gather evidence for each model (line) and subjects (columns)
- Perform selection using `VBA_groupBMC()`
- Check power on simulated observations (confusion matrix)
- Apply on empirical data and report results:

($E_f = 0.73$, $p_{xp} = 0.953$)

Useful features

- Simulation with online feedback
- Design optimization
- Multisession
- Mixture of observations
- Family inference, between groups or condition selection
- Bayesian Model Averaging