

# Stag-hunt Behavior Analysis

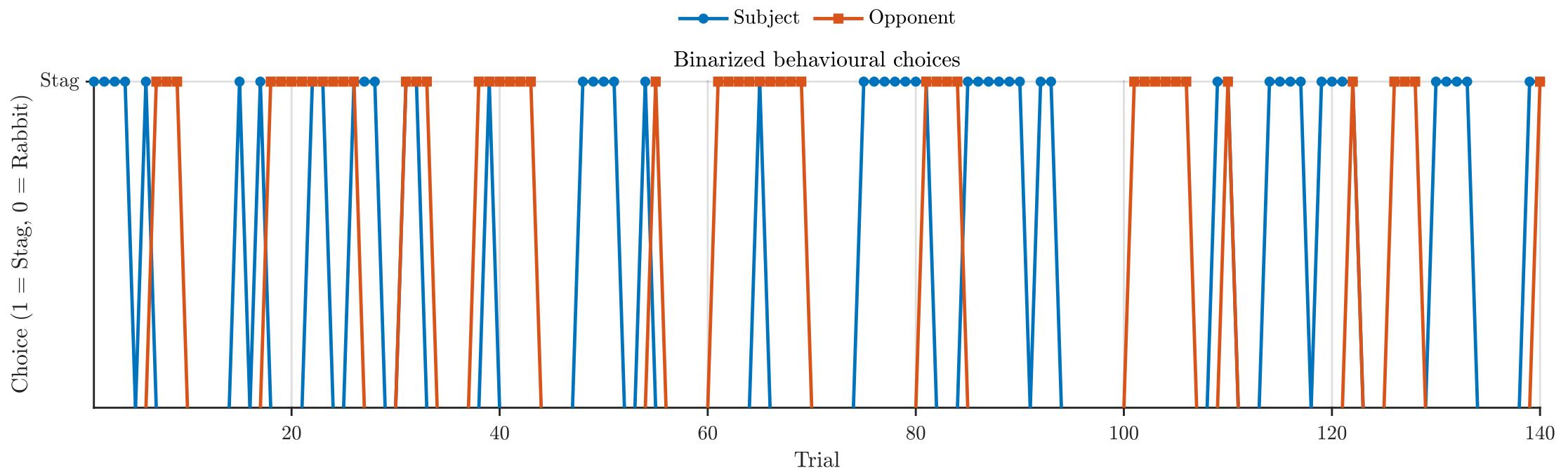
V1.0

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# Mapping to binary sequence

- Variable p (4 directions: 0,1,2,3) → choices(0: rabbit, 1: stag)



K=2

Date: 12-Nov-2025 15:14:44

VB converged in 1 iterations (took ~7 min)

Dimensions of the model:

- data: p=1
  - time samples: t=140
  - hidden states: n=35
  - evolution parameters: n\_theta=1
  - observation parameters: n\_phi=2
  - inputs: n\_u=2

This was a deterministic dynamical system

- observation function:  $g_{\text{kToM}}$  (binomial data)
  - evolution function:  $f_{\text{kToM}}$

### Bayesian log model evidences:

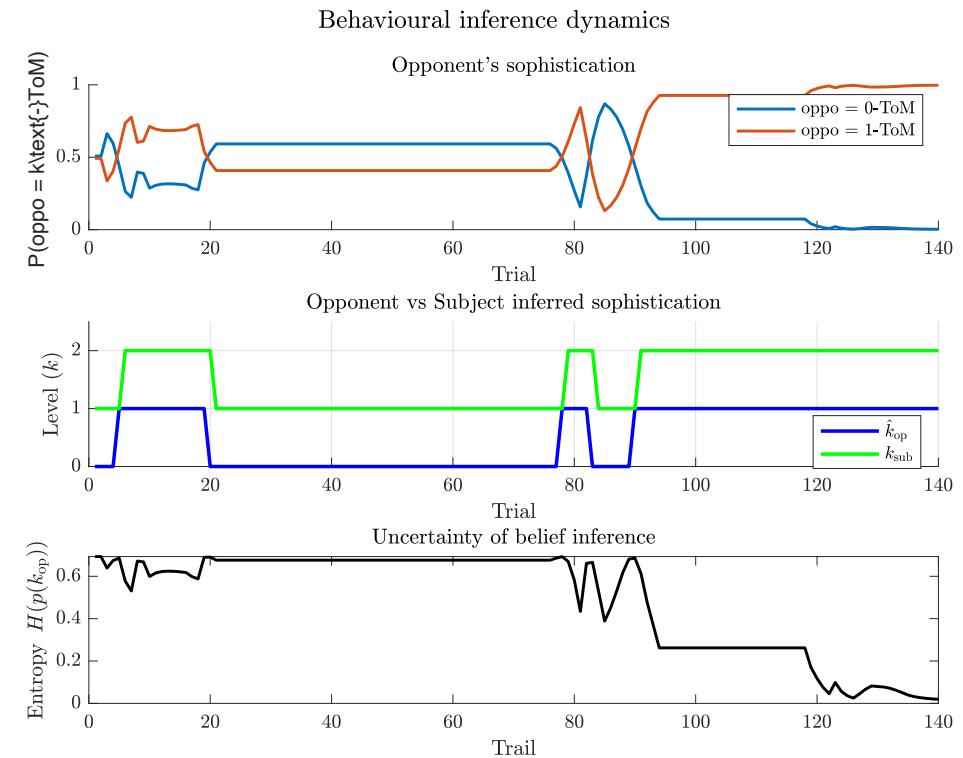
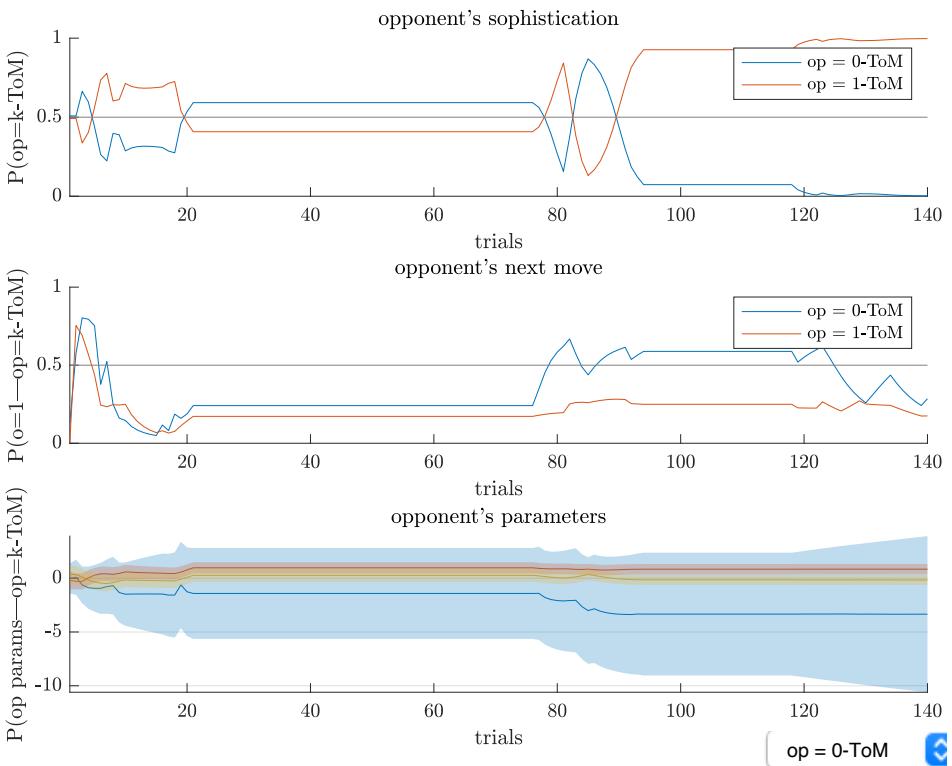
- full model:  $\log p(y|m) > -9.687e+01$
  - null hypothesis:  $\log p(y|H_0) = -9.704e+01$

Classical goodness-of-fit metrics:

- determin. coeff. (R2): 5.3%  
- balanced classif. acc.: 56.4%  
- log-likelihood: -8.880e+01  
- AIC: -1.268e+02  
- BIC: -1.827e+02

Estimation efficiency (minus posterior entropies):

- hidden states: 0.000e+00  
- initial conditions: -4.596e+01  
- evolution parameters: -1.393e+00  
- observation parameters: -6.875e-01



# K=3

Date: 12-Nov-2025 03:20:42

VB converged in 1 iterations (took ~6 min)

Dimensions of the model:

- data: p=1
- time samples: t=140
- hidden states: n=81
- evolution parameters: n\_theta=1
- observation parameters: n\_phi=2
- inputs: n\_u=2

This was a deterministic dynamical system

- observation function: g\_kToM (binomial data)
- evolution function: f\_kToM

Bayesian log model evidences:

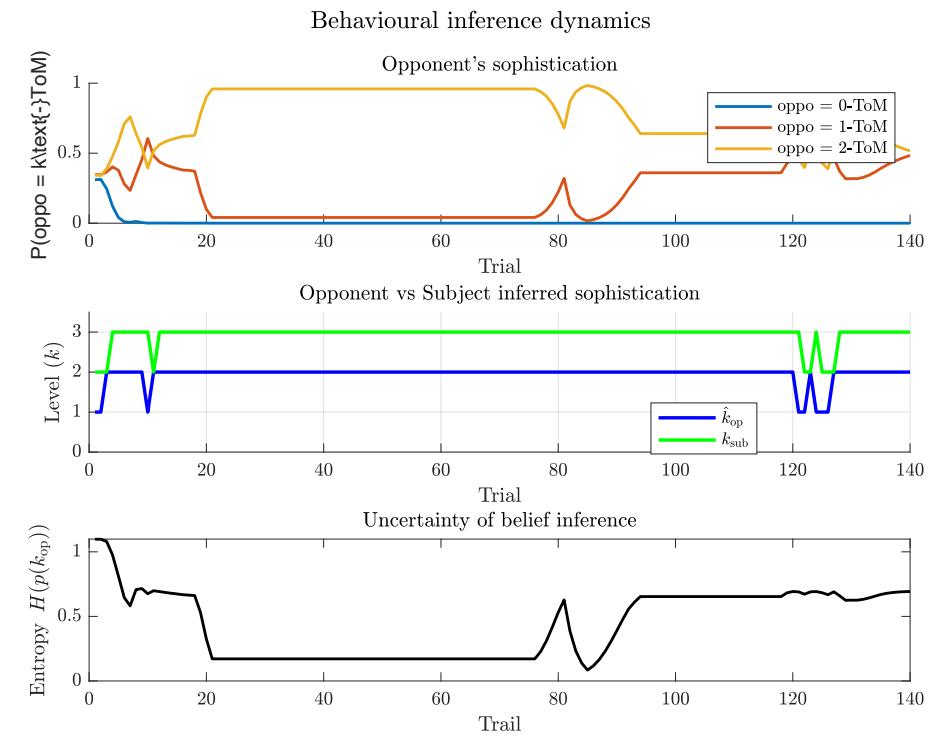
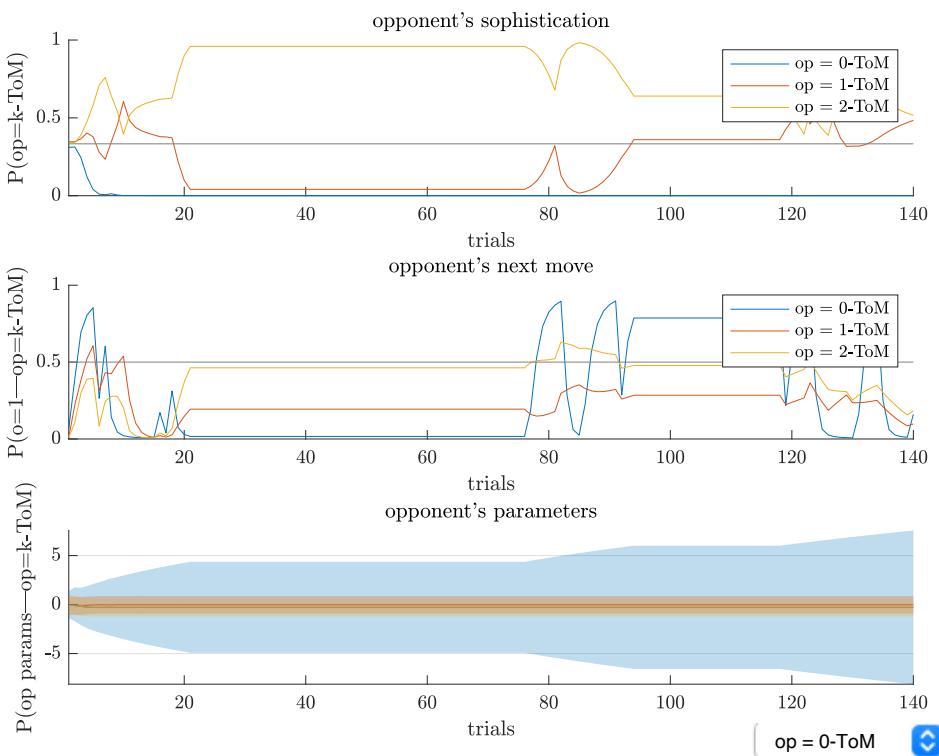
- full model:  $\log p(y|m) > -1.278e+02$
- null hypothesis:  $\log p(y|H_0) = -9.704e+01$

Classical goodness-of-fit metrics:

- determin. coeff. (R2): 0.0%
- balanced classif. acc.: 50.0%
- log-likelihood:  $-1.278e+02$
- AIC:  $-2.118e+02$
- BIC:  $-3.354e+02$

Estimation efficiency (minus posterior entropies):

- hidden states:  $0.000e+00$
- initial conditions:  $-1.149e+02$
- evolution parameters:  $-1.419e+00$
- observation parameters:  $-2.838e+00$



# K=4

Date: 12-Nov-2025 16:07:40

VB converged in 1 iterations (took ~38 min)

## Dimensions of the model:

- data: p=1
- time samples: t=140
- hidden states: n=173
- evolution parameters: n\_theta=1
- observation parameters: n\_phi=2
- inputs: n\_u=2

## This was a deterministic dynamical system

- observation function: g\_kToM (binomial data)
- evolution function: f\_kToM

## Bayesian log model evidences:

- full model:  $\log p(y|m) > -1.300e+02$
- null hypothesis:  $\log p(y|H_0) = -9.704e+01$

## Classical goodness-of-fit metrics:

- determin. coeff. (R<sup>2</sup>): 0.0%
- balanced classif. acc.: 48.9%
- log-likelihood: -1.300e+02
- AIC: -3.060e+02
- BIC: -5.649e+02

## Estimation efficiency (minus posterior entropies):

- hidden states: 0.000e+00
- initial conditions: -2.455e+02
- evolution parameters: -1.419e+00
- observation parameters: -2.838e+00

