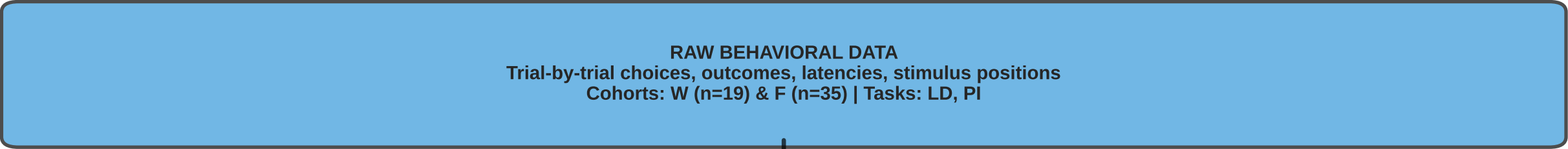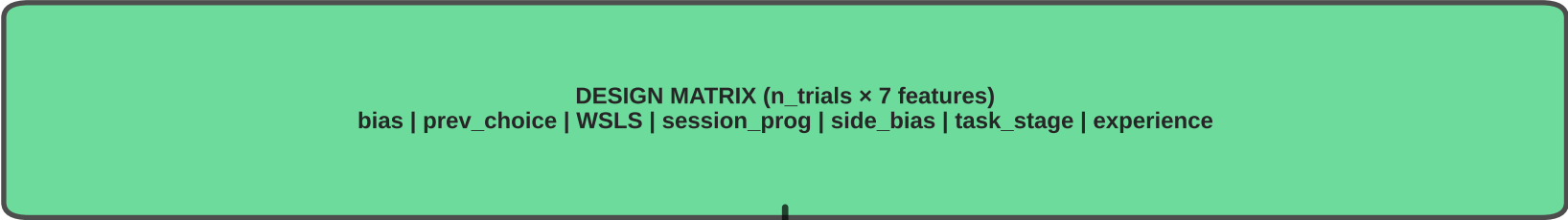# GLM-HMM ANALYSIS PIPELINE
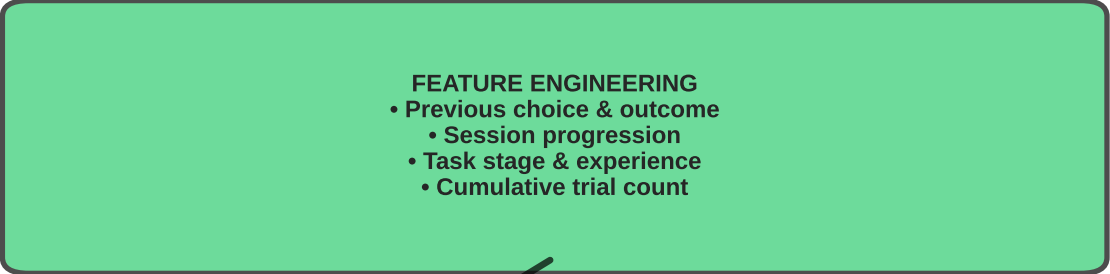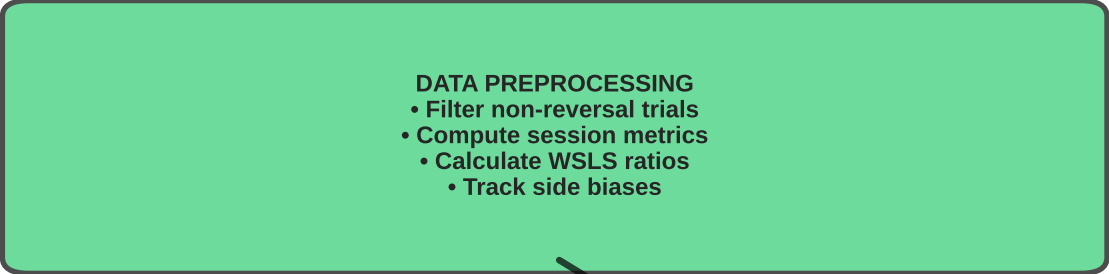
①

RAW BEHAVIORAL DATA
Trial-by-trial choices, outcomes, latencies, stimulus positions
Cohorts: W (n=19) & F (n=35) | Tasks: LD, PI

②

DATA PREPROCESSING
• Filter non-reversal trials
• Compute session metrics
• Calculate WSLS ratios
• Track side biases

FEATURE ENGINEERING
• Previous choice & outcome
• Session progression
• Task stage & experience
• Cumulative trial count

DESIGN MATRIX (n_trials × 7 features)
bias | prev_choice | WSLS | session_prog | side_bias | task_stage | experience

③

GLM-HMM FITTING
• EM algorithm (100 iter)
• 3 hidden states
• Bernoulli observations
• L2 regularization

MODEL COMPONENTS
• Transition matrix (3×3)
• GLM weights (3×7)
• Initial state probs (3)
• Viterbi decoding

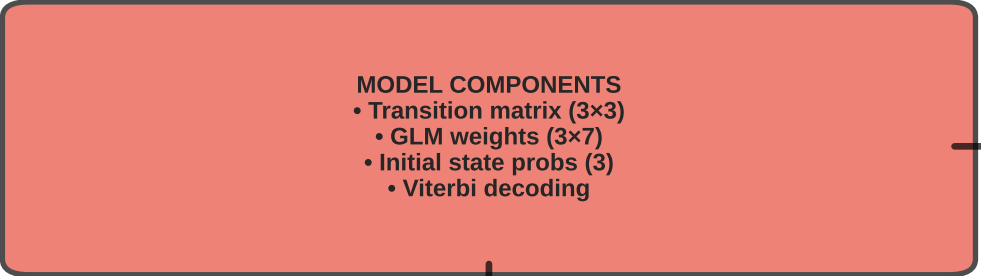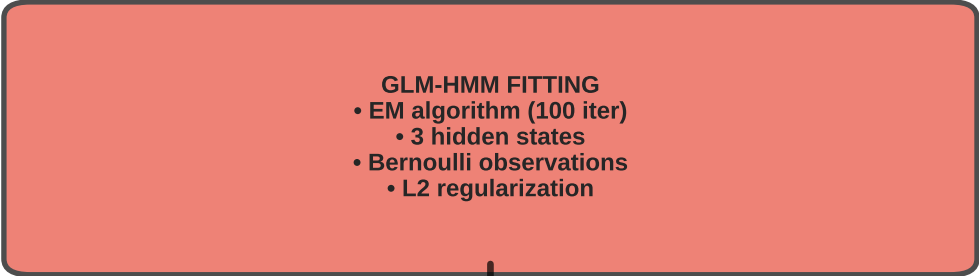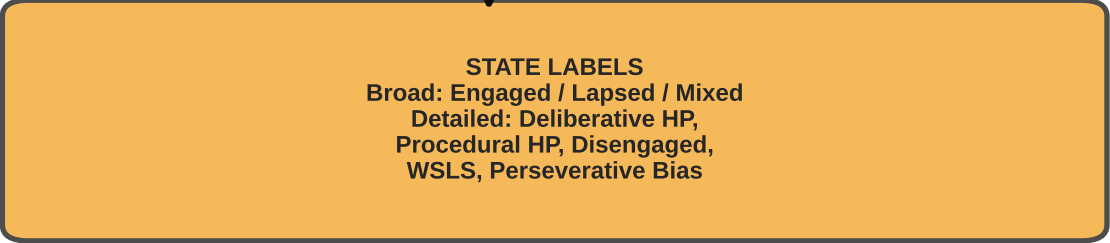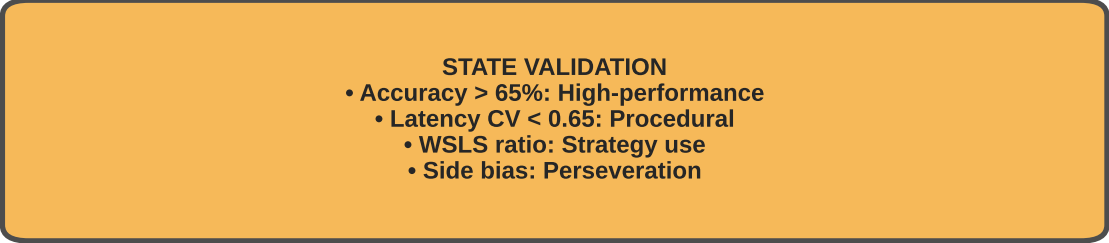**MODEL VALIDATION**

3-fold CV
2-5 states

Metrics:
• LL
• AIC
• BIC
• Accuracy

④

STATE VALIDATION
• Accuracy > 65%: High-performance
• Latency CV < 0.65: Procedural
• WSLS ratio: Strategy use
• Side bias: Perseveration

STATE LABELS
Broad: Engaged / Lapsed / Mixed
Detailed: Deliberative HP,
Procedural HP, Disengaged,
WSLS, Perseverative Bias

⑤

STATE DYNAMICS
• Occupancy by genotype
• P(state) over time
• Transition patterns

LEARNING CURVES
• Accuracy trajectories
• State overlays
• Genotype comparisons

STATISTICAL TESTS
• Batch effects
• Mixed models
• Cross-validation