**Codes:**

To run everything from scratch use **run\_arrows\_task**

**Model codes**

Model (params)

**SimulateNbandits-** Bayesmodel ([Beta, epsilson])

**SimulateNbandits\_stick-** Bayes model with stickiness ([Beta, epsilson, stick])

**SimulateNbandits\_RL-** RL model ({alpha: [α-, α+], stick, (Beta and epsilon optional)})

**SimulateNbandits\_WSLS-** Win-Stay-Lose-Shift ([epsilon])

* Stay with previous bandit if reward, choose another bandit if no reward

**SimulateNbandits\_LA-** Lazy Arrow (epsilon optional)

* Choose direction most arrows are pointing towards

**get\_model\_data –**  generates simulation data for selected model by calling appropriate model function (one of the above). Calls **analyzeswitch**

**Analysis Codes**

**analyzeswitch** – summarizes data on 4 trials before switch through 9 trials after switch (14 total). Also calculates the probability of staying with bandit after no reward/reward. Outputs sw\_prob and pstay.

* **sw\_prob**: struct with all probability data
  + correct: probability of correct response
  + reward: probability of reward
  + old\_bandit: probability of previous correct bandit (prew-switch)
  + new\_bandit: new correct bandit (post-switch).
* **pstay**: double [nrew, rew]; probability of staying with bandit after no reward/reward

**Stimuli generation**

**generate\_stimuli-** gets stimuli for all sessions in each task setup as described in stim\_params input (Ndirections, Nbandits, pswitches, nSims). Calls **get\_stim**

* returns **all\_stims**: cell of size (1 x length(pswitches))
  + each cell contains session\_stim (cell size (num task setups, nSims))

**get\_stim** - generates stimuli sequence for one session

* have option to assign weights on categories of stimuli combinations
* optional visualization. (*should be used for testing only*)

**test\_stim –** in test folder, test out **get\_stim** code, shows visualization comparing stimuli distribution in session to natural weighting

**Visualization**:

**Data:**

*stim\_data*

Stimuli data for each session

cell (1 x length(pswitches))

* cell (num task setups x nSims)
  + double (Ntrials x length(stim\_data))
    - [t cb iter stim rew\_incorr rew\_corr]
      * **t**- trial
      * **cb**- correct bandit
      * **iter**- iteration of current correct bandit
      * **stim**- stimuli directions
      * **rew\_incorr**- reward if incorrect [0/1]
      * **rew\_corr**- reward if correct [0/1]

*preproc\_mod\_data*

Model reward, bandit probability, and probability of staying data

struct (1 x length(pswitches))

* **reward**- probability of reward in trials surrounding a rule switch
* **prob\_old**- probability of selecting old bandit in trials surrounding a rule switch
* **prob\_new**- probability of selecting new bandit in trials surrounding a rule switch
* **pstay\_nrew**: - probability of staying with previous bandit on trial after no reward
* **pstay\_rew**: - probability of staying with previous bandit on trial after reward
* reward, prob\_old, and prob\_new all cells of size (num models x num task setups). Each cell contains doubles of size (nSims x 14)
* pstay\_nrew and pstay\_rew are cells of size (1 x num task setups). Each cell contains doubles of size (nSims x num models)

*sum\_mod\_data*

Analyzed data that goes into figures

struct (1 x length(pswitches))

Fields: (all either cell or double of size (num models x num task setups))

Probability of reward (max & avg)

**max\_prew\_pre\_avg**: max p(rew) averaged over all simulations, pre-switch

* double (num models x num task setups)

**max\_prew\_post\_avg**: max p(rew) averaged over all simulations, post-switch

* double (num models x num task setups)

**prew\_pre\_ind**: max & average rewards of *individual* sessions, pre-switch

* cell (num models x num task setups)
  + double (nSims x 2)

**prew\_post\_ind**: max rewards of *individual* sessions, post-switch

* cell (num models x num task setups)
  + double (nSims x 2)

Curve fit coefficients

**rew\_coeffs**: coefficients of reward fits of individual sessions

**old\_bandit\_coeffs**: coefficients of bandit probability fits of individual sessions, old bandit

**new\_bandit\_coeffs**: coefficients of bandit probability fits of individual sessions, new bandit

Others

**time\_forget\_old**: time to forget old bandit, defined as first post-switch trial in which the probability of choosing the old bandit is below a certain threshold (1/Nbandits)

**time\_learn\_new**: time to learn new bandit, defined as first post-switch trial in which the probability of choosing the new bandit is above a certain threshold (0.50)