Skilled Reaching Analysis Workflow

Box Calibration

1. Run script\_detect\_calibration\_points to run one month at a time. This will detect as many checkerboard corners as it can and save them to a folder YYYYMM\_auto\_marked. It will save an “\_auto.mat” file that contains the point coordinates and a .png file with the calibration image with points marked on it.
2. Scan through the saved “marked” .png images. If any points aren’t marked or points are mismarked, load into Fiji. Mark the checkerboard points that need to be added and save as a “marked.tif”. Get the coordinates (“measure” or command-M), and save the .csv file as “GridCalibration\_*YYYYMMDD*\_*img#*.csv”. Save these files into a new folder YYYYMM\_manually\_marked.
3. Run script\_add\_manual\_marks. This will match the .csv files with the images and determine which points match up in each view. It will save “\_all.mat” files with all of the point markings and an “\_all\_marked.png” file. These are saved to a newly created folder YYYYMM\_all\_marked. Circles are automatically found points, squares are marked by the users in Fiji.
4. Run script\_calibrateBoxes. This takes all the matched points and calculates transformation matrices for 3D reconstructions. It stores them in a newly created folder YYYYMM\_calibration\_files in a file called “SR\_boxCalibration\_box*##*\_YYYMMDD.mat”.
5. Run script\_checkDLCBoxCalibration.m to check that the calibration worked.
   1. For each date, the script will generate graphs plotting the marked points. Check that the graphs have 3 normal looking rectangular planes and then continue the script to move to the next date.
      1. If the graphs do not look normal, go back and run the previous steps.

Kinematic Processing

1. Recalibrate the boxes for each session. Run script\_recalibrateBoxes. Make sure that the relevant box calibration file for that session has already been calculated; otherwise, the script will go back in time until it finds a calibration file for that box/
2. Reconstruct the 3D trajectories. Run script\_reconstruct3Dtrajectories. Make sure the repeatCalculations flag is set appropriately.
3. Run script\_calculateKinematics, which will move the origin to the initial pellet location and calculate a variety of kinematic features (velocity, aperture, etc.)
4. Interpolate the trajectories. Run script\_interp\_trajectories
5. Run script\_analyze\_interp\_trajectories. This will identify individual reaches from each trial and calculate some summary statistics for each session (average trajectories, variances, etc.). see script comments for details
6. Run script\_calculateRatSummaries.
7. Run script\_collectRatSummaries\_learning.
8. Run script\_calculateOutcomeTrajectories
9. Run script\_collectOutcomeDistributions
10. Run script\_collectAverageKinematicsByOutcome