MatLab bootcamp meetings 4 & 5: Stats & Tips for dealing with inherited code

V. Müller Ewald

November 2021

I will be sending you a link to one more survey

Please take this survey!

It is for my teaching portfolio

50/50 split on people who liked when I wrote the code in real time and people who liked going over already written code

Longer instruction period

Session 5: tips for using inherited code

Reminder: you are responsible for the quality of the code that you run

Saying “I don’t know, the code just does it” is not an acceptable answer at this level of study.

1. Go in with a plan

- What do you want to accomplish?

What is the name of the specific output that you want to change?

How and where is this specific output calculated?

1. Go in with a plan

- What do you want to accomplish?

What is the name of the specific output that you want to change?

How and where is this specific output calculated?

Assignment example: line 19 crashed the code

```
Error in RatOpenField_v1 (line 19)
[~, ~, subjInfo] = xlsread('P:\Victoria\1. Parker Lab\Teaching\2021 - UIowa - Fall MatLab boot camp\Meeting 4 & 5\Rat Project 2 (Homework)\Rat open field
project IDs.xlsx','Sheet1');   % Excel sheet with info about data to be loaded
```

Go to line 19.
What is supposed to happen at line 19?
Run line by line up to line 19 to make sure that's where the error actually is.

2. Use break-points

- You can use break-points when troubleshooting a function too!

```
26 -    lpLatencyTab = []; % this is where the results save
27 -    nSubjects = size(subjInfo,1);
28
29      %% Analyze
30 -    for subjectLoop = 1:nSubjects
31 -        subjIDStr = subjInfo{subjectLoop, 1}; % subject ID as a string
32 -        subjIDNum = str2num(extractAfter(subjIDStr,"Rat")); % subject ID as a number
33
34          % Import
35          load([dataLocation, subjIDStr, '_data.mat']);
36 -        thisData = latencyData; % these are the data. The unit is seconds.
37 -        nTrials = size(thisData,1);
```

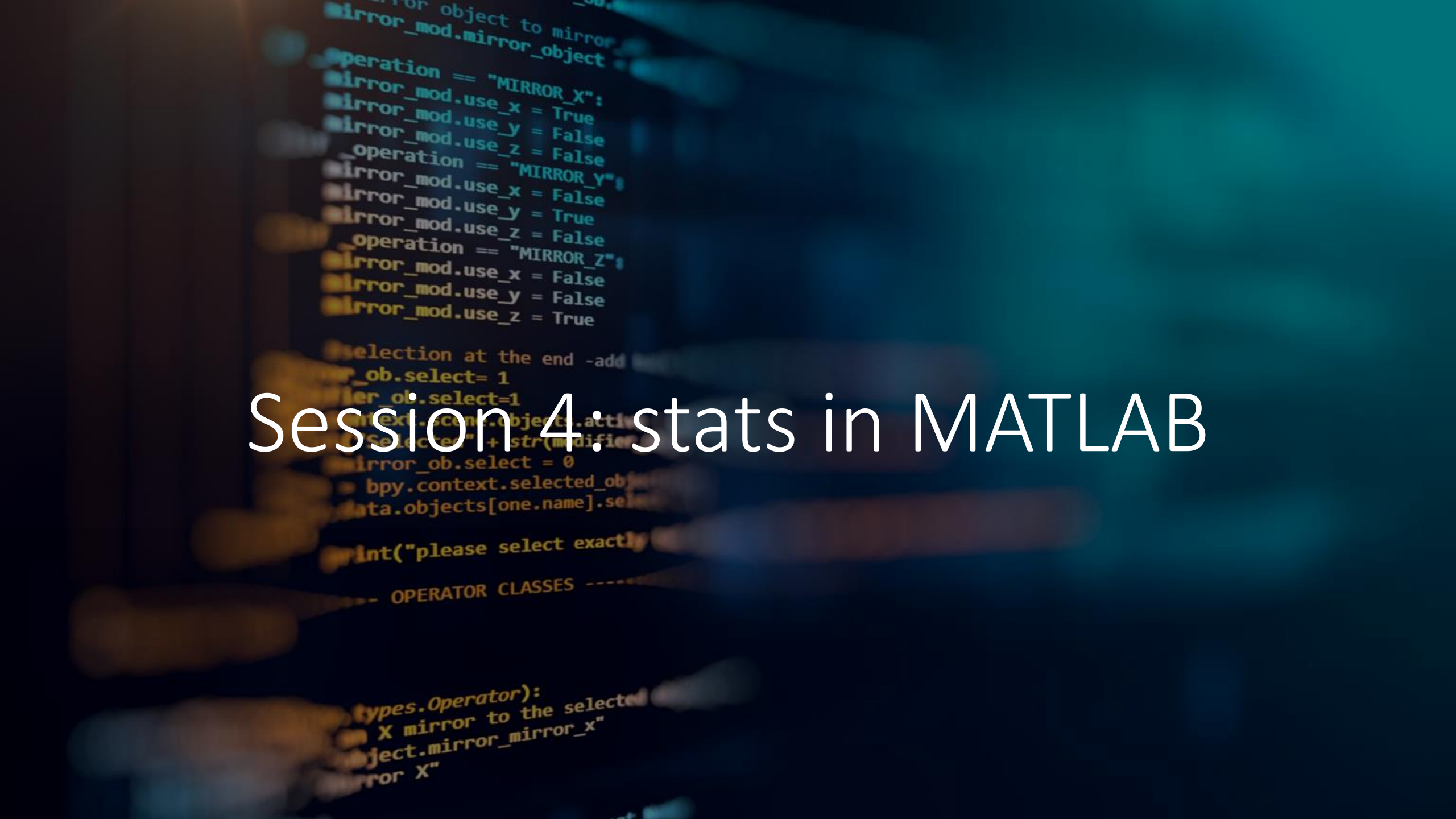
3. Run line-by-line and comment what happens to the data

- This will take 1 million years.
- That is ok, the outcome is worth it.

Note: Once you understand the code and have re-written it to your liking you should not keep this many comments.

```
% Import
load([dataLocation, subjIDStr, '_data.mat']); % Loads the data
thisData = latencyData; % these are the data. The unit is seconds.
nTrials = size(thisData,1); % calculates number of trials

% Calculate metrics for data
lp_mean = nanmean(thisData,1); % calculates mean % WHY IS THIS CALCULATED HERE?
lp_trialN = size(thisData,1); % NOT SURE WHAT THIS IS ABOUT
```



Session 4: stats in MATLAB

MatLab functions of the week:

T-test:

Paired: ttest(condition1, condition2)

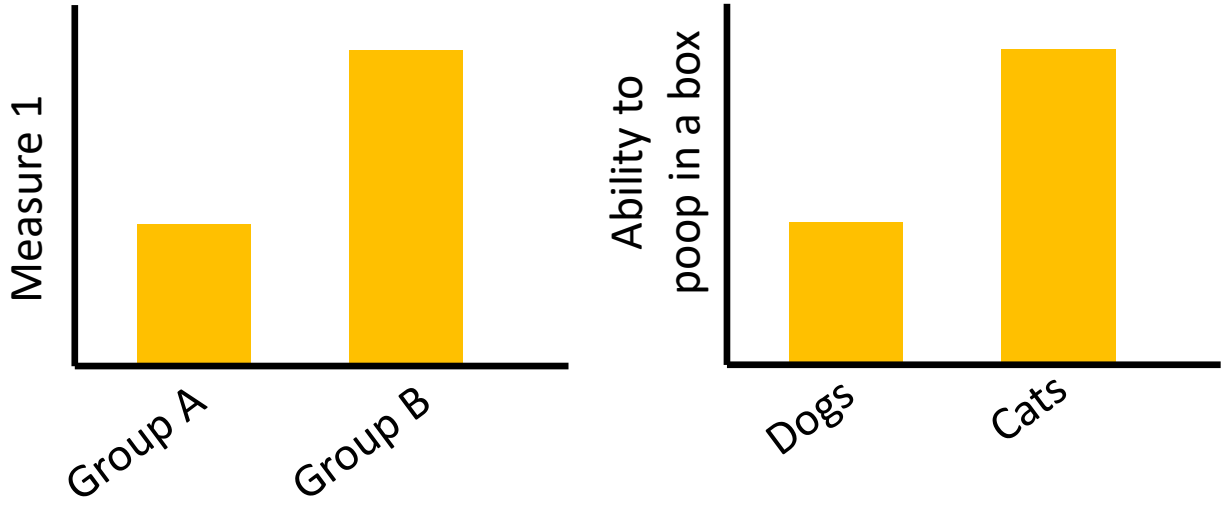
Unpaired: ttest2(condition1, condition2)

ANOVA:

p = anova1(matrix containing data)

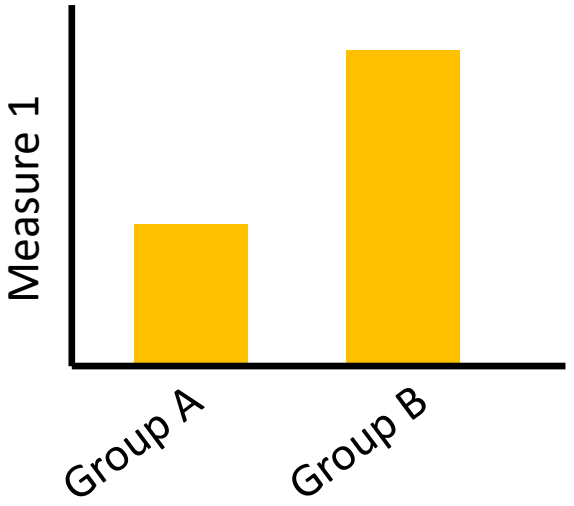
The briefest of primers for our undergraduate friends who have not taken stats yet:

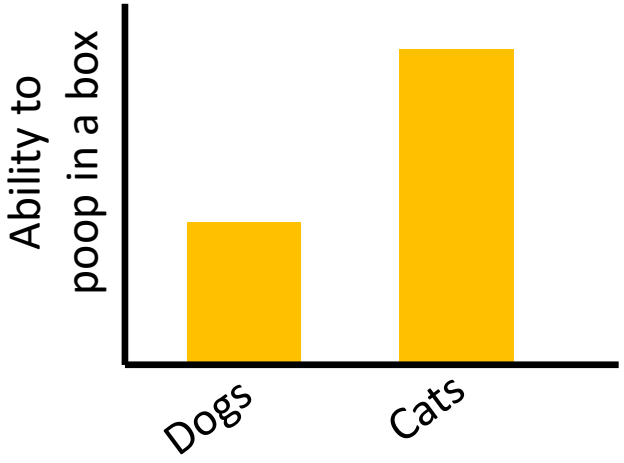
The briefest of primers for our undergraduate friends who have not taken stats yet:



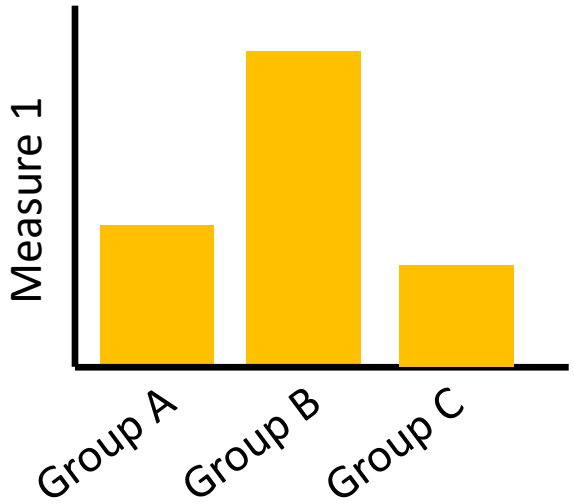
Do these groups differ in their ability to poop in a box?

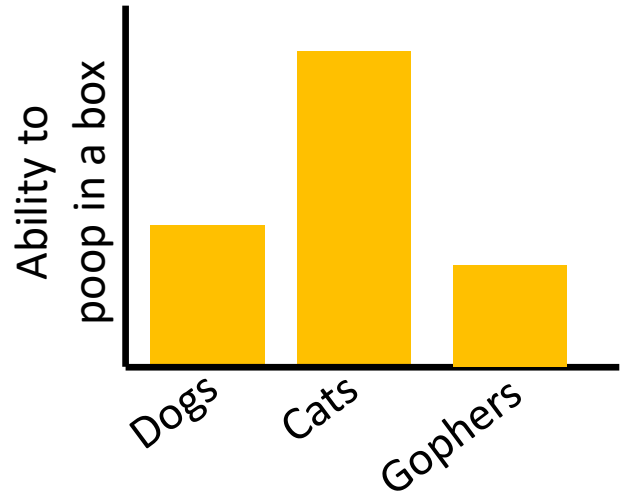
The briefest of primers for our undergraduate friends who have not taken stats yet:



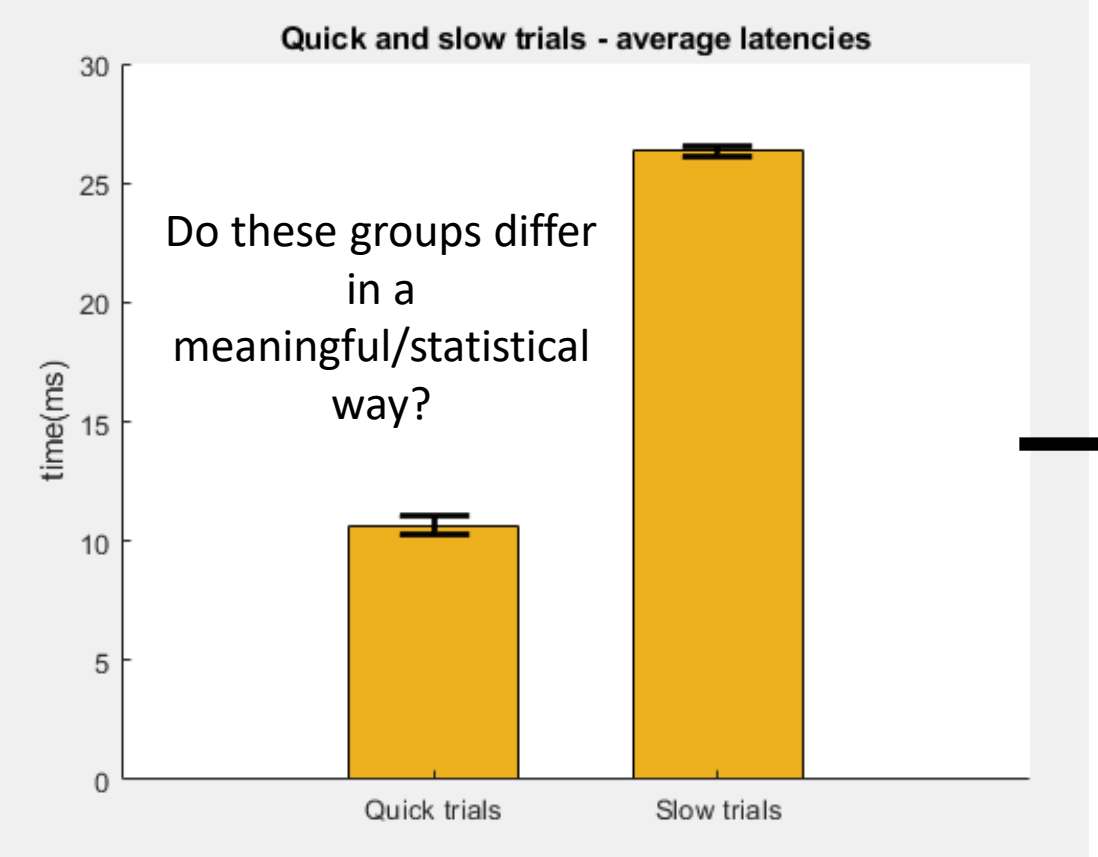


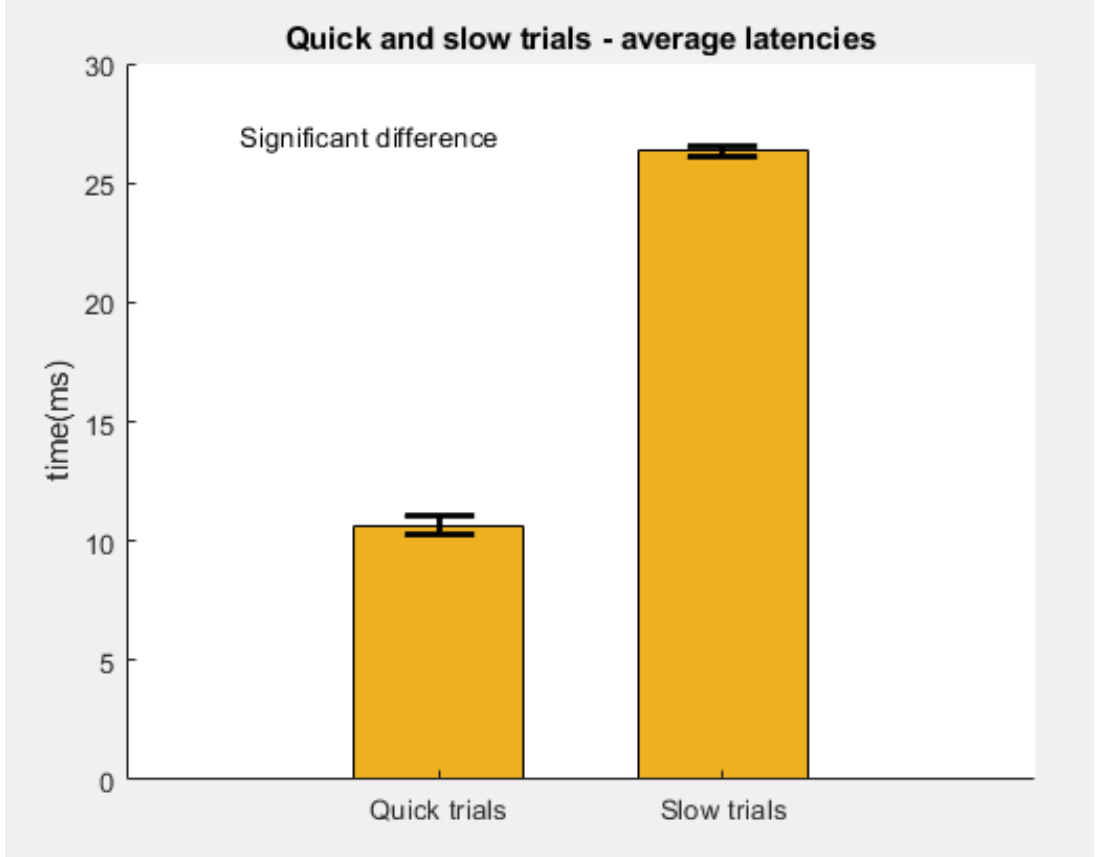
T-tests: used to assess differences between two groups





ANOVA: used to assess differences between three or more groups.

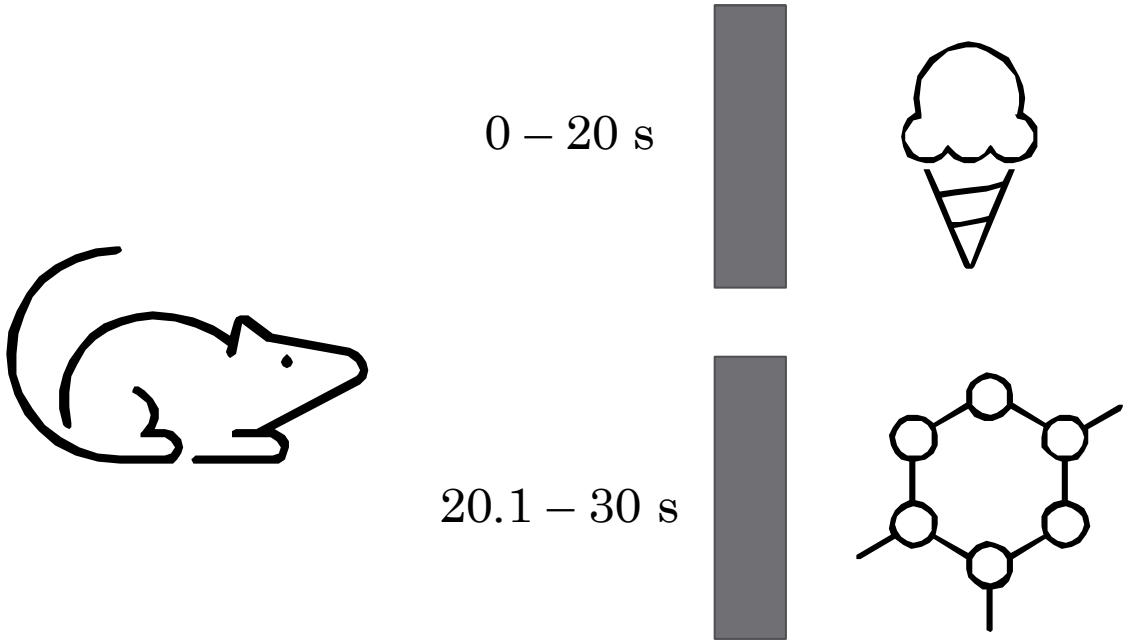

Quick and slow trials - average latencies
Do these groups differ in a meaningful/statistical way?
time(ms)
30
25
20
15
10
5
0
Quick trials
Slow trials


Quick and slow trials - average latencies
Significant difference
time(ms)
30
25
20
15
10
5
0
Quick trials
Slow trials

Objective:

Reminder about the data-set we are working with:

Rat data set: experimental set-up



Questions of interest:

1. How many total trials were there?
2. How many ice cream (quick) trials were there?
3. How many cocaine (slow) trials were there?
4. What were the mean latencies of all the trials, quick trials only and slow trials only?

MatLab functions of the week:

T-test:

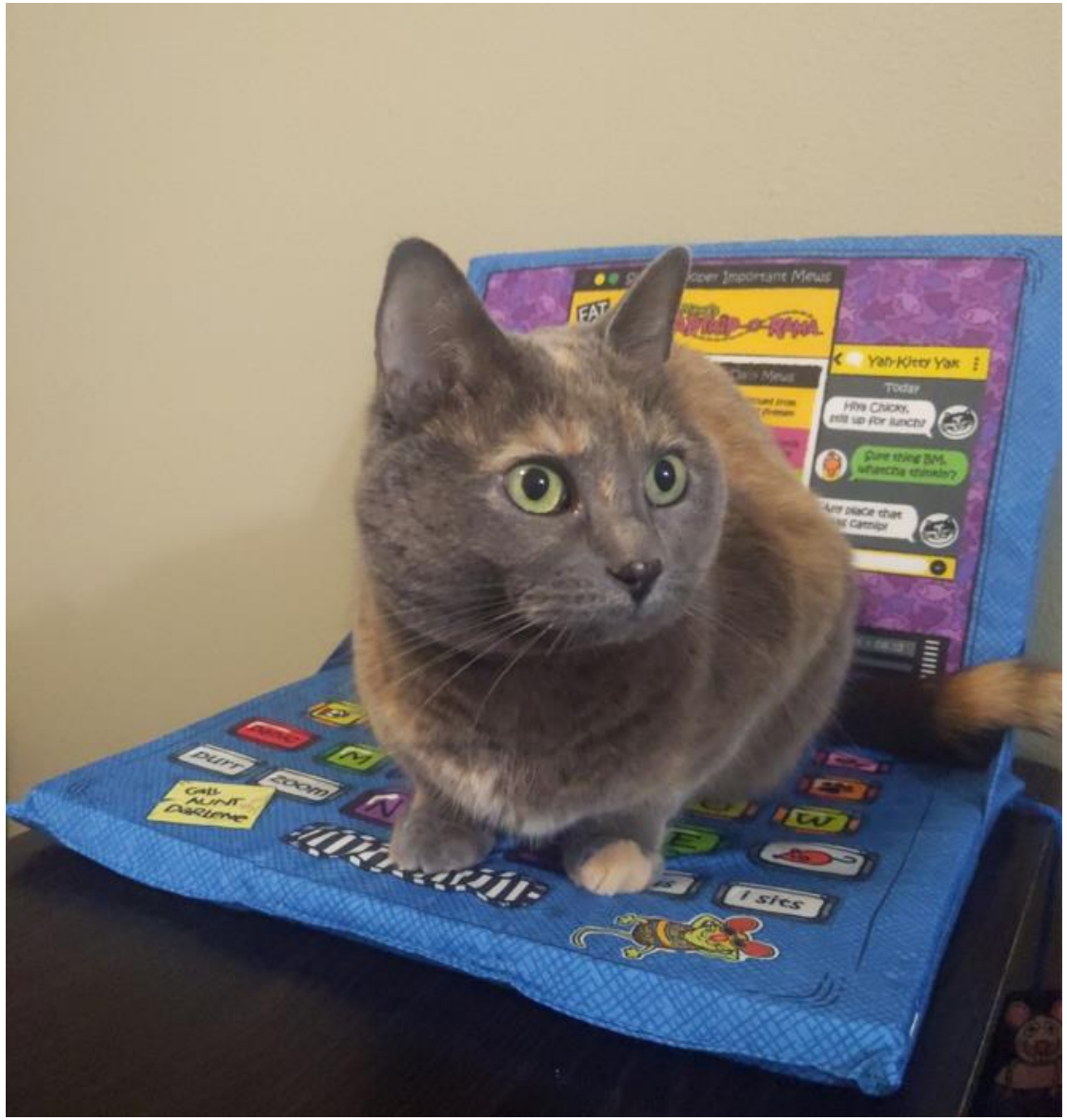
Paired: ttest(condition1, condition2)

Unpaired: ttest2(condition1, condition2)

ANOVA:

p = anova1(matrix containing data)

Pet of the week



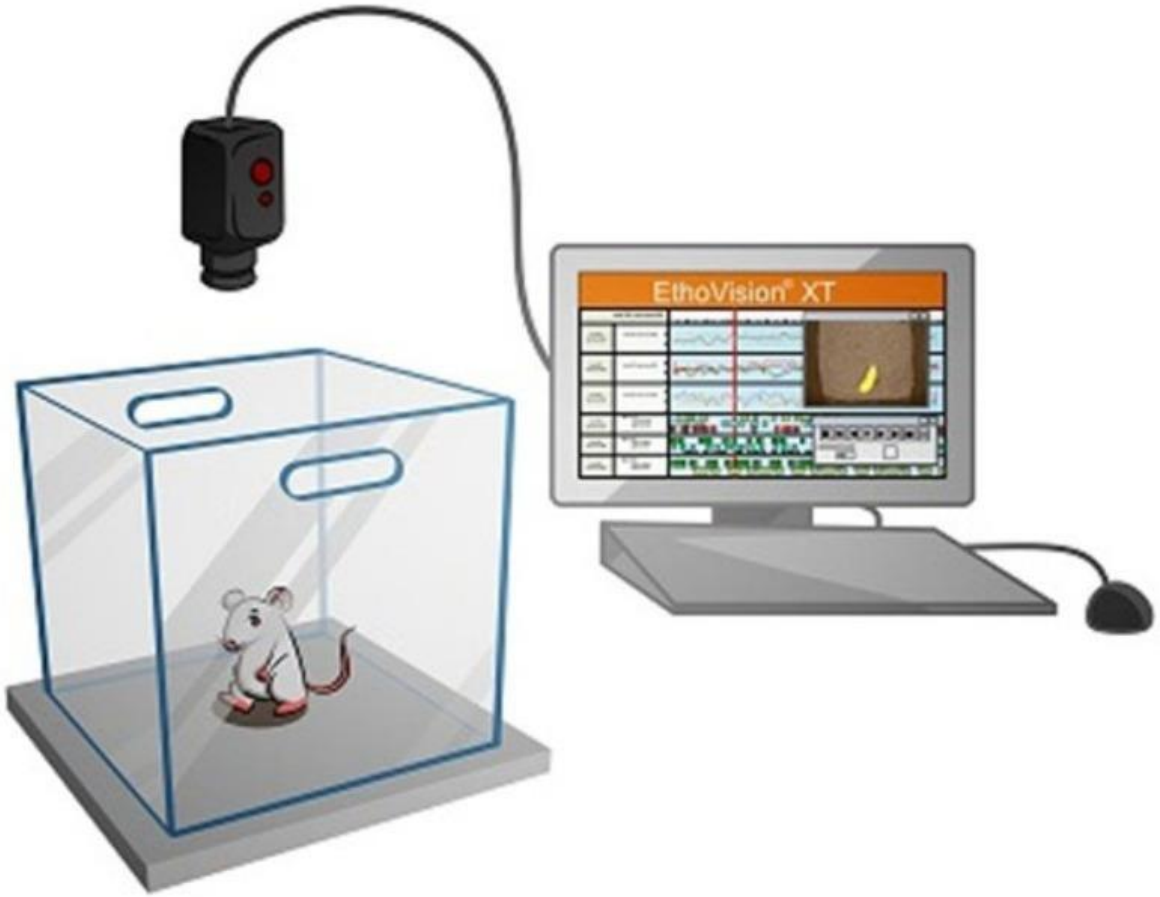
Assignment dataset

Script: RatOpenField_v2

Rat open field experiment

Open-field test:

Used to assess anxiety-like behaviors in rodents



Rat open field experiment

Whats with this lady and drugs?

I am an addiction biologist by training

Condition 1 = saline

Condition 2 = alcohol

Condition 3 = heroin

Do these drugs have anxiolytic effects on rats?

How do these different drugs affect the rats' anxiety-like behaviors?

Rat open field experiment

Condition 1 = saline
Condition 2 = alcohol
Condition 3 = heroin

	A	B	C	D
1	Condition 1	Condition 2	Condition 3	
2	75	55	12	
3	90	80	15	
4	115	56	22	
5	88	42	14	
6	82	88	55	
7	101	92	35	
8	104	81	22	
9	71	48	17	
10		90		
11		72		
12				

Objective:

1. Import the data
2. Run an ANOVA between saline, alcohol and heroin conditions
3. Plot the data

Errors:

Two errors to practice troubleshooting in MatLab

The end forever!