

# Systems Neuroscience

## Matlab, indexing and summarizing

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 JMH 332

### Last time in Matlab class...

- Compute rates for each 100ms window:

```
rate(1)=sum(spikes(6,1:100))/0.1;
rate(2)=sum(spikes(6,101:200))/0.1;
rate(3)=sum(spikes(6,201:300))/0.1;
rate(4)=sum(spikes(6,301:400))/0.1;
rate(5)=sum(spikes(6,401:500))/0.1;
```

*Let's practice  
generating  
number intervals!*

- Compute with for loop:

```
for i=1:5
    rate(i)=sum(spikes(6,100*(i-1)+(1:100)))/0.1;
end;
```

### New data set: object and noise perception

View objects and noise

Task: press button if pic(t) == pic(t-1)

Variables: accuracy, reaction time, object or non-object

Questions:

- What picture was shown?
- What button was pressed?
- How quickly was button pressed?

Results recorded in: ExptRecord

### ExptRecord columns

- `ExptRecord(:,3)` – 0 is noise, 1 is object
- `ExptRecord(:,10)` – 1 should press button, -1 should not press button
- `ExptRecord(:,11)` – 1 subject presses button, 0 subject not press
- `ExptRecord(:,12)` – 0-1000ms, number of ms until button press

## Exploring your data

- size – data dimensions
- plot – display data contents in figure
- max – maximum value in vector
- min – minimum value in vector
- sort – order vector from low to high values
- hist – count frequency of values in vector
  
- MatVariable(:) – convert AxB matrix into single vector

## Finding desired values

```
find(vector<number)      find(c<2)
Return indices in vector that are less than number
```

Example: `vector=[5, -1, 0, 12];`  
`smallLocations=find(vector<2);`  
`smallLocations` contains [2 3]

### Comparisons

- `d<2, d>2`            strict inequality
- `d<=2, d>=2`        semi-inequality
- `d==2`                equality

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## Combining searches

```
vector=[5, -1, 0, 12];
```

### Logic combinations

- `d>5 & d<8`            the AND operation – all conditions must be true
- `d<5 | d>8`            the OR operation – one or more conditions true

Example: `find(vector<2 & vector>-2)`

Can combine results from multiple matrices:

```
vecB=[12 3 8 0];
find(vector<2 | vecB>4)
```

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## Looking at data subsets

- Look at average Reaction Time for button press for objects vs noise

```
objTrials = find(ExptRecord(:,3)==1);
ExptRecObj=ExptRecord(objTrials,:);
objClick=find(ExptRecObj(:,11)==1);
mean(ExpRecObj(objClick,12))
```

```
noiseTrials = find(ExptRecord(:,3)==0);
ExptRecNoise=ExptRecord(noiseTrials,:);
noiseClick=find(ExptRecObj(:,11)==1);
mean(ExpRecNoise(noiseClick,12))
```

## Looking at data subsets

- Look at how often subject presses button when she should for objects and for noise:

```
length(find(ExptRecObj(:,10)==ExptRecObj(:,11)))
```

```
length(find(ExptRecNoise(:,10)==ExptRecNoise(:,11)))
```

...turns out they are equal