How do we perceive motion?

**COMMON CODING THEORY**

- **Action Representations**
  - Grasping
  - Throwing

- **Perceptual Representations**

Mirror Neurons are the neural basis of the common coding theory, as they fire both when a particular action is seen and when it is performed.

**HYPOTHESIS**

If indeed our motor system is involved in ‘simulating’ perceived actions in order to make predictions, then we should be better at predicting outcomes of our own actions compared to actions of others.

**METHOD**

I followed the methodology of the experiment conducted in [1], in which subjects performed a two-alternative choice task as follows:

- 30 subjects were asked to throw darts at a dartboard which had been divided into two halves. They aimed either at the upper half or at the lower half. The successful trials were recorded.
- They were then shown edited clippings of the videos, in which the trajectory of the dart was cut off (see sample video).
- For each clipping, the viewer predicted which half of the board was aimed.
- Participants were divided into pairs. Each participant viewed their own video and their partner’s video, in the same order.

Some changes were made from the protocol followed in [1]:
- A sample video was shown before the actual experimental trials. This is because a significant improvement in accuracy was seen from the first set of videos to the second.
- It was explicitly stated that the order of videos was completely random and they could even be all up/all down. This is because the first few participants started counting the number of ups/downs that ‘should’ be there.

**RESULTS**

Sensitivity ($d'$): A standard psychophysics measure of accuracy in two-alternative choice tasks.


d' = z(u) + z(l)

$z(.)$ = Inverse Normal Distribution

- $u$ = fraction of upper Normal Distribution
- $l$ = fraction of lower half throws guessed correctly

**DISCUSSION**

- Why does the self-other difference increase with time?
  
  Prediction of action consequences using the motor system requires **integration of first- and third-person information**, which probably becomes easier with time for a particular kind of stimulus.

- What about subjects who are used to seeing themselves from a third person perspective, i.e. actors or sportspeople? Would the self-other difference be even more pronounced for them? Does the fact that it is unusual to see ourselves in a third person perspective make any difference?

- We often predict consequences of perceived actions, such as time people will take to cross roads, or trajectories of kicked balls. But this prediction is generally subconscious – we cannot help but predict! In my experiment, subjects are asked to consciously make a decision about the outcome of an action. I feel this might preclude the automatic recruitment of the motor system for perception.

**REFERENCES**

