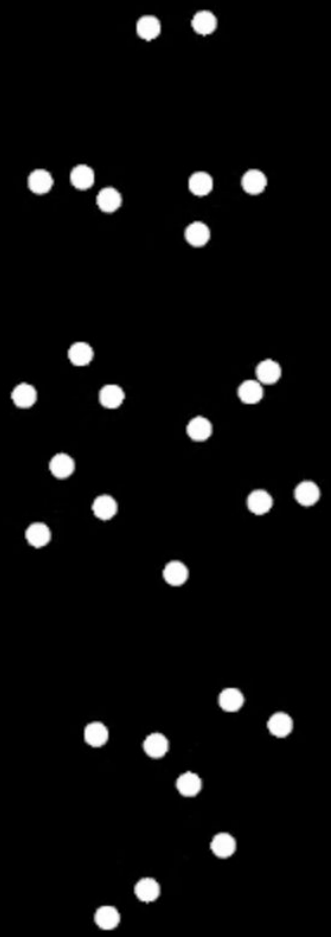


Final Year Project 2022 Conference Presentation

Perception of Biological Motion (POBM)

Joseph Byrne and Alan Chen

Supervisor: Dr. Luke Hallum

The Background

- The perception of biological motion is the ability to recognise motion from primary joints in physiology

- Seen in early development of infants

- Helps us walk through crowds without colliding in the dynamic environment

The Objective

- Investigate peripheral vision **effect** on PoBM

- Ascertain any **influence** from relevant factors

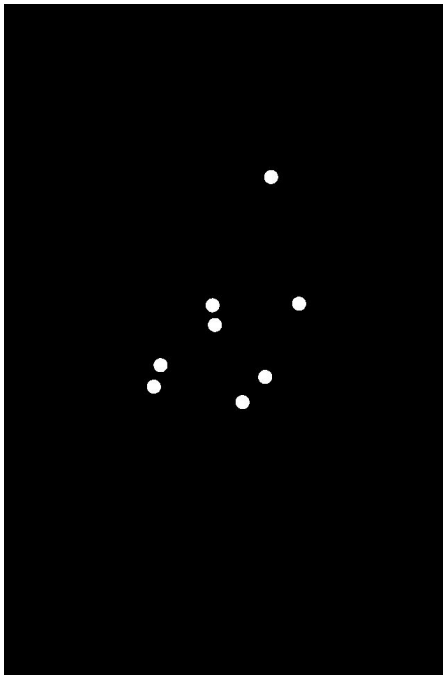


Figure 4 Point light walker

OUR HYPOTHESES

1. *Peripheral vision has a negative effect on PoBM*

2. *Worse performance with fewer nodes*

3. *Better performance in typical viewpoints*

The Methods

Capturing Human Movement

Conducting Experiments

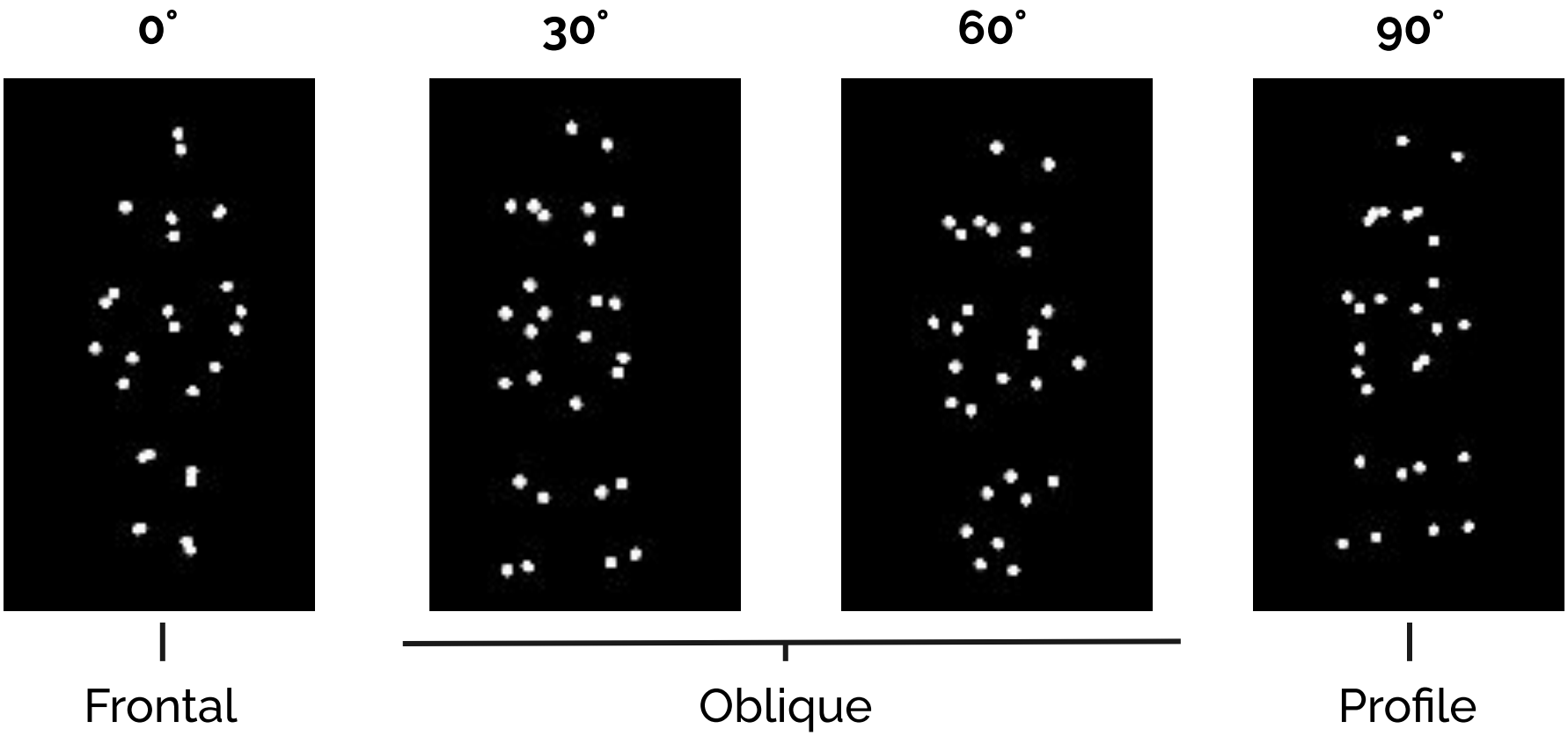
Recording Human Movement

- **28** retroreflective nodes
- 22-year-old male's gait walking 1.5 m/s on a treadmill
- Cameras track the movement of individual nodes

Figure 3 Retro-reflective node configuration

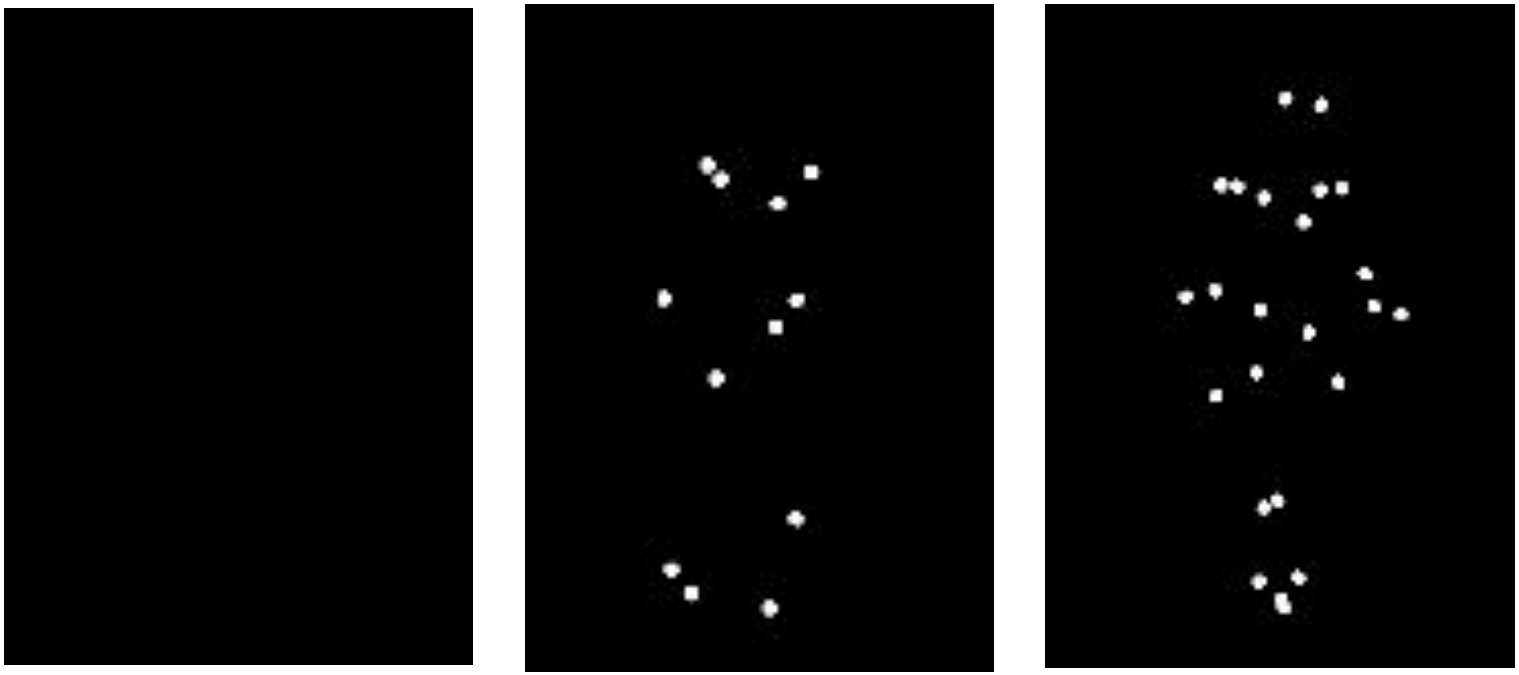
Processing & Visualisation

- MATLAB & PsychToolBox
- **Orthogonal** representation
- Coordinate transformation



Processing & Visualisation

- Visual Degradation
- Reducing the number of nodes & lifetime function



4 nodes | 12 nodes | 24 nodes

Experimental Design

Three independent variables:

Viewpoint Angle, θ_v: 30, 60, 90 (deg)

Number of Visible Dots, η_d: 2, 4, 8, 12, 16, 20, 24 (dots)

Peripheral Eccentricity, ε_p: 0, 15, 45 (deg)

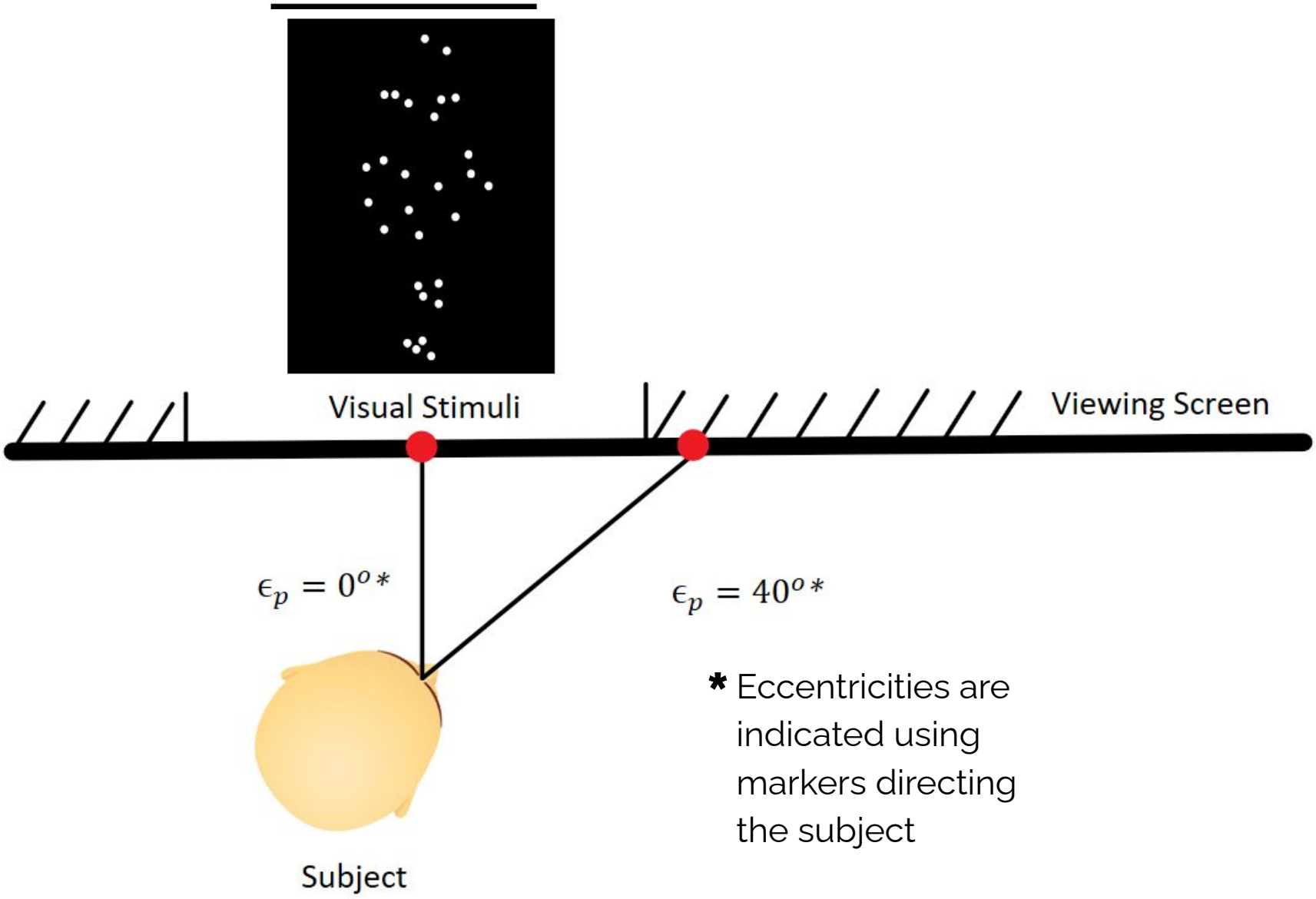
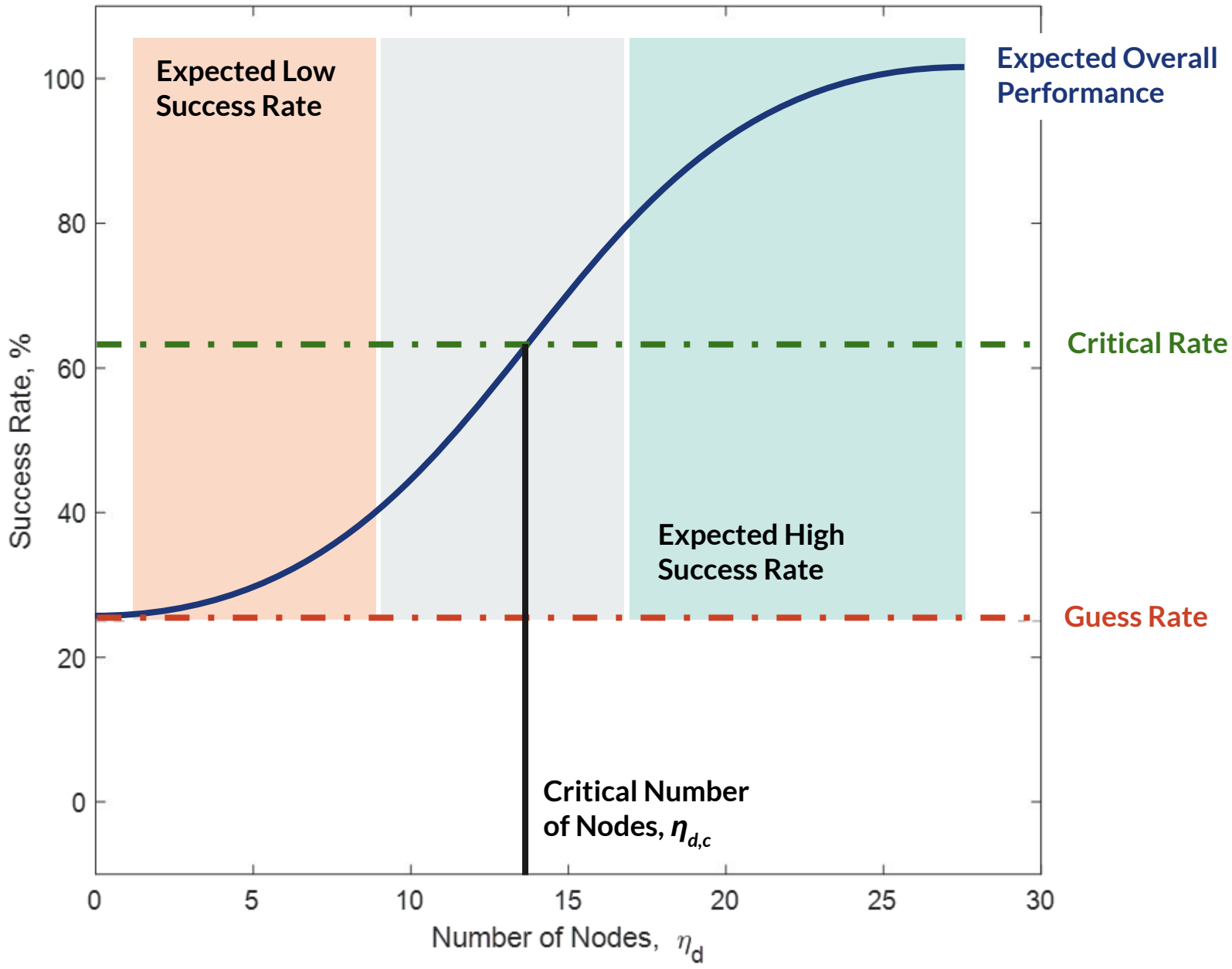
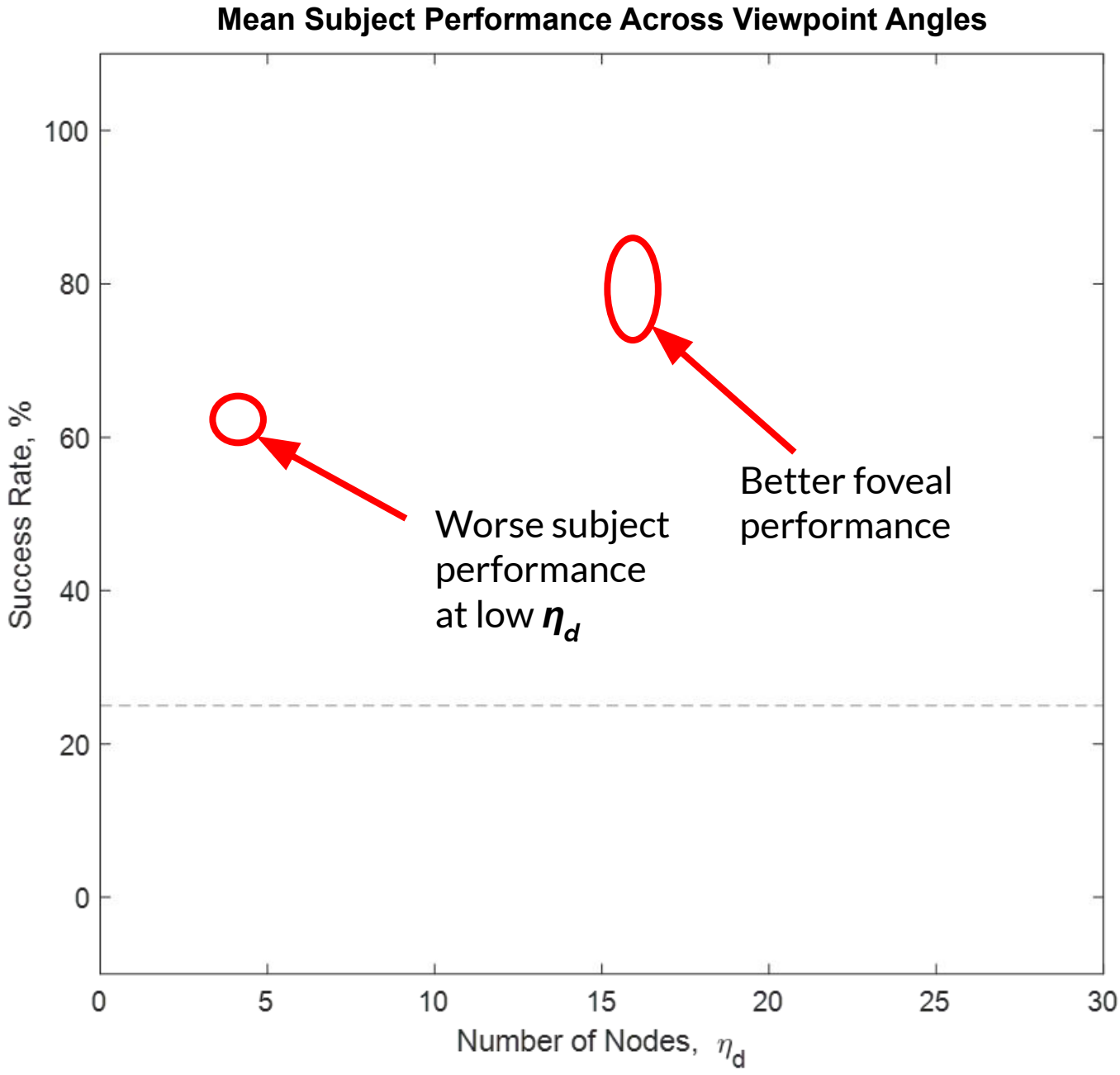


Figure 8 Overhead view of viewing screen and subject positioning

40


Expected Low
Success Rate
Expected High
Success Rate
Expected Overall
Performance
Critical Rate
Guess Rate
Critical Number
of Nodes, $\eta_{d,c}$
Success Rate, %
Number of Nodes, η_d
100
80
60
40
20
0
0
5
10
15
20
25
30


Mean Subject Performance Across Viewpoint Angles
Success Rate, %
100
80
60
40
20
0
0
5
10
15
20
25
30
Number of Nodes, η_d
Worse subject performance at low η_d
Better foveal performance

The Conclusions & Discussion

As observed...

More successful performance **in foveal** vision than in peripheral

Worst performance at lower number of dots

Moving Forward

Gather more data for stronger evidence of meaningful interaction

Identify differences in PoBM with varied viewpoint angles

Develop a machine learning agent to classify viewpoint angles

We thank you for your time and attention…

Questions?