

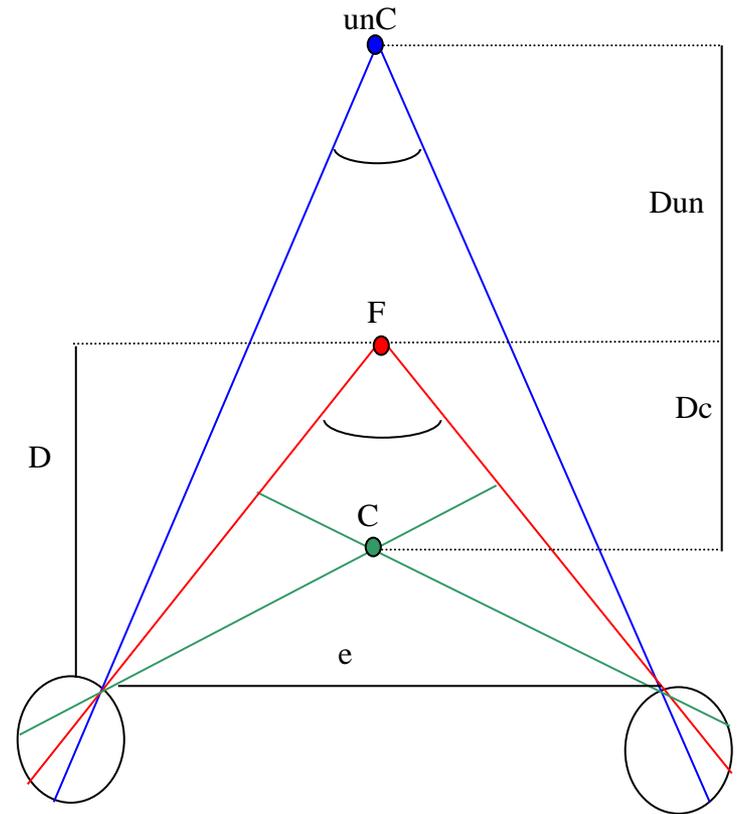
Search and Detection in Stereoscopic Vision

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Stereoscopic Vision

- Stereoscopic vision, enables us to perceive depth.
- The projections of two objects at different distances from the observer on the two retinas, are translated in the visual cortex to depth.



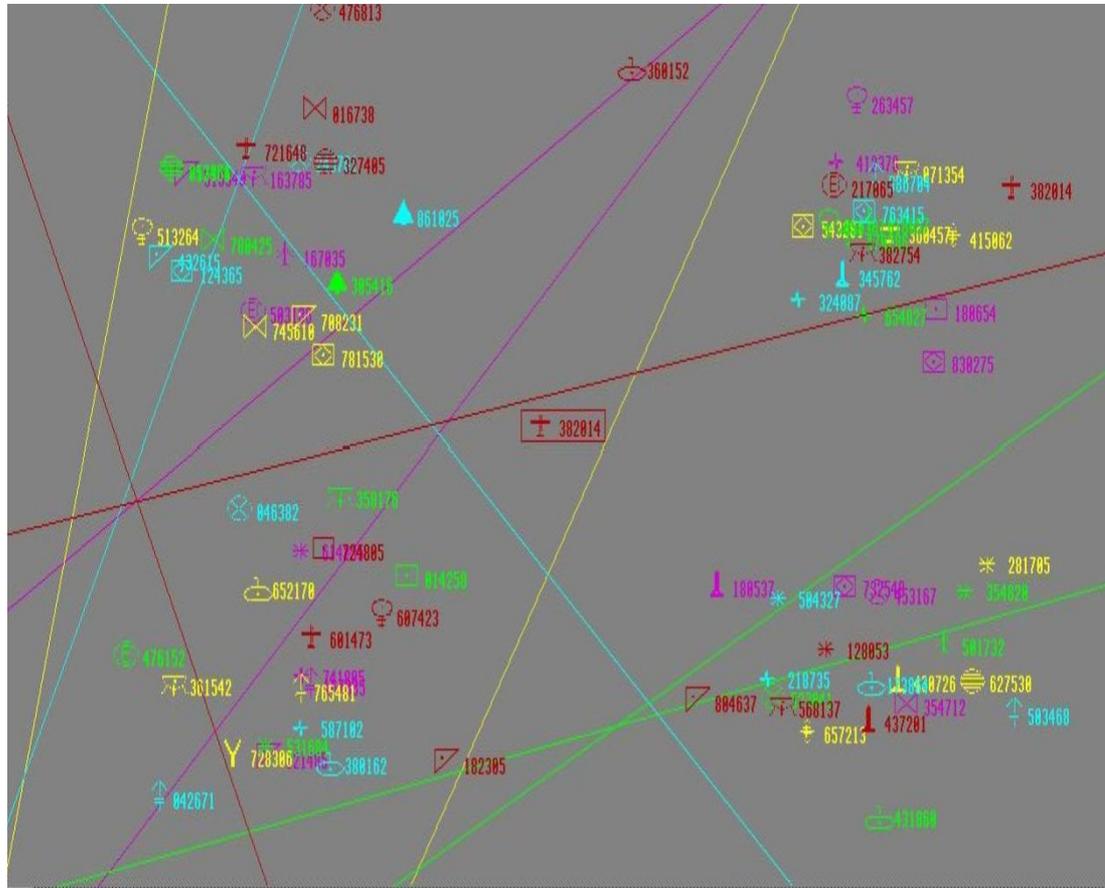
- The importance of stereopsis in short distances is doubtless.
- There are of course other cues for depth. These cues are called monocular because we can perceive them with one eye. These cues for depth are based on image content, such as perspective, overlapping or occlusion, , light and shade, and motion parallax.

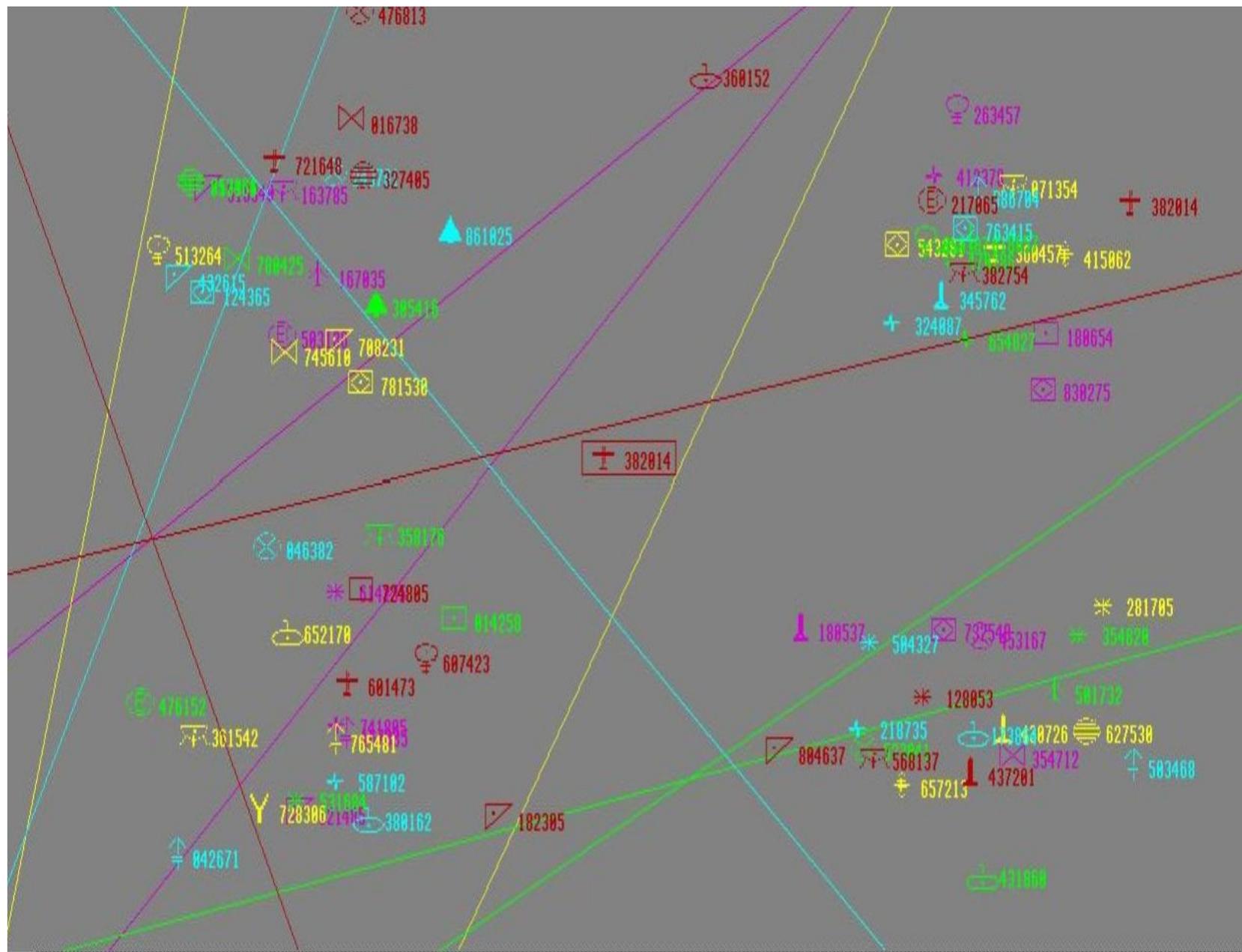
Motivation

- But it seems that for greater distances one can manage well without stereo vision.
- Yet, it is interesting to see whether vision tasks are affected when stereoscopic depth is eliminated.
- And that was the purpose of our experiments.

Experiment 1

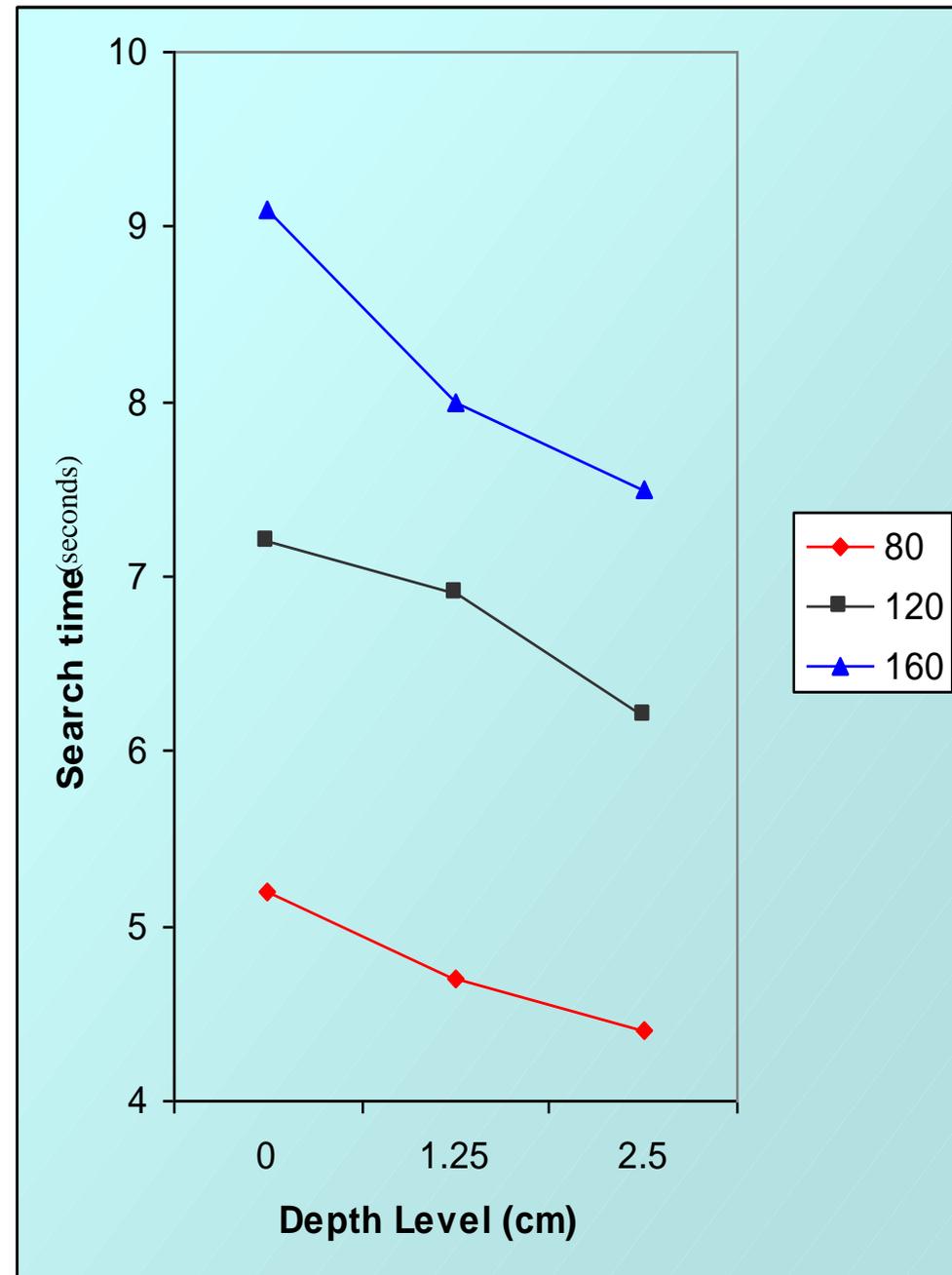
- We used artificial images.
- Subjects had to look for a symbol and six digits in one of four quarters of the screen.





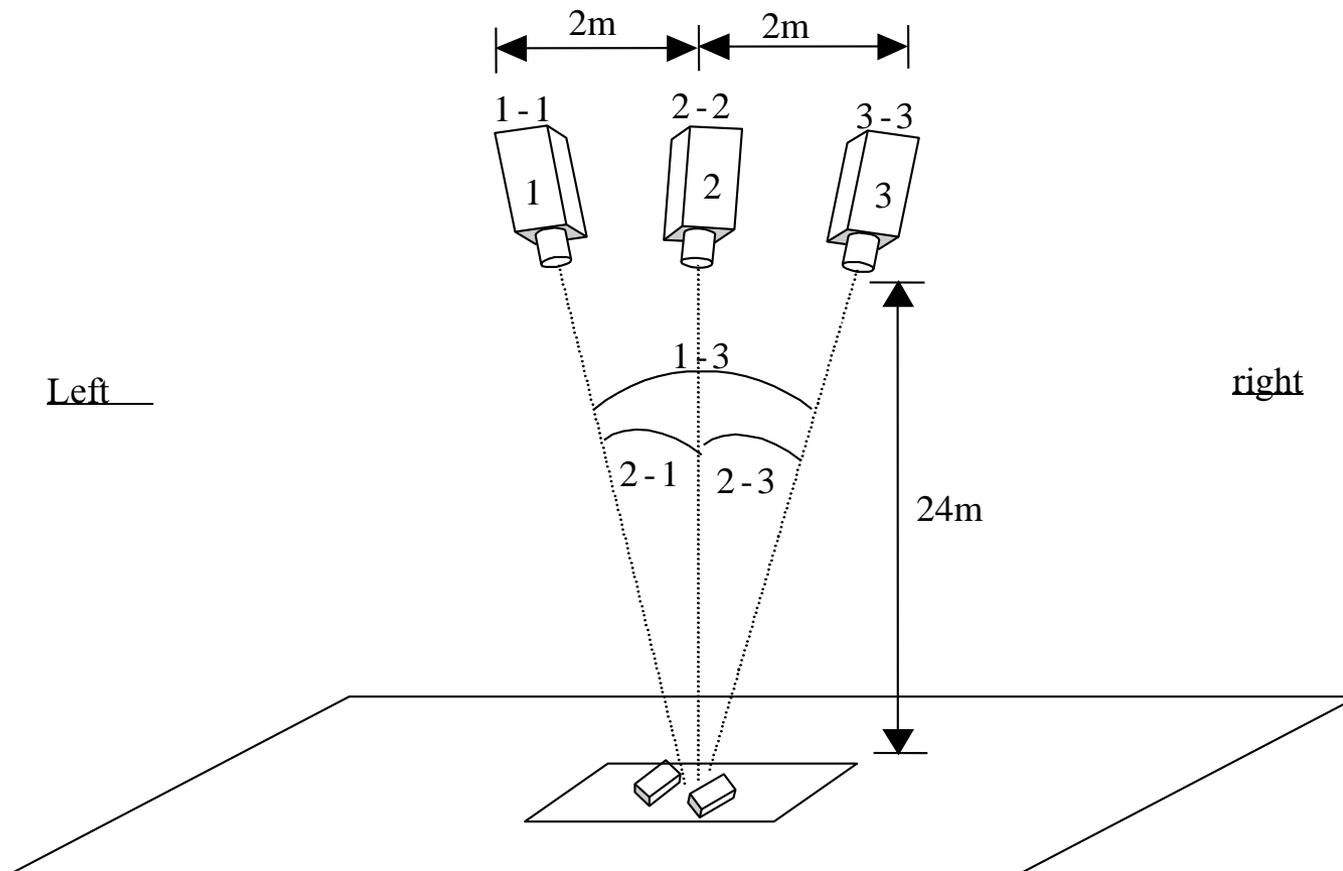
- The display consisted of five different stereoscopic depth levels.
- There were three kinds of displays:
 1. There was no distance between the levels – all five levels were in the plane of the screen.
 2. The distance between the neighboring levels was 1.25 cm.
 3. The distance was 2.5 cm.

- The graph shows three levels of density 80, 120 and 160 symbol sets.
- The results show that search time decreased significantly when the depth between the levels increased.

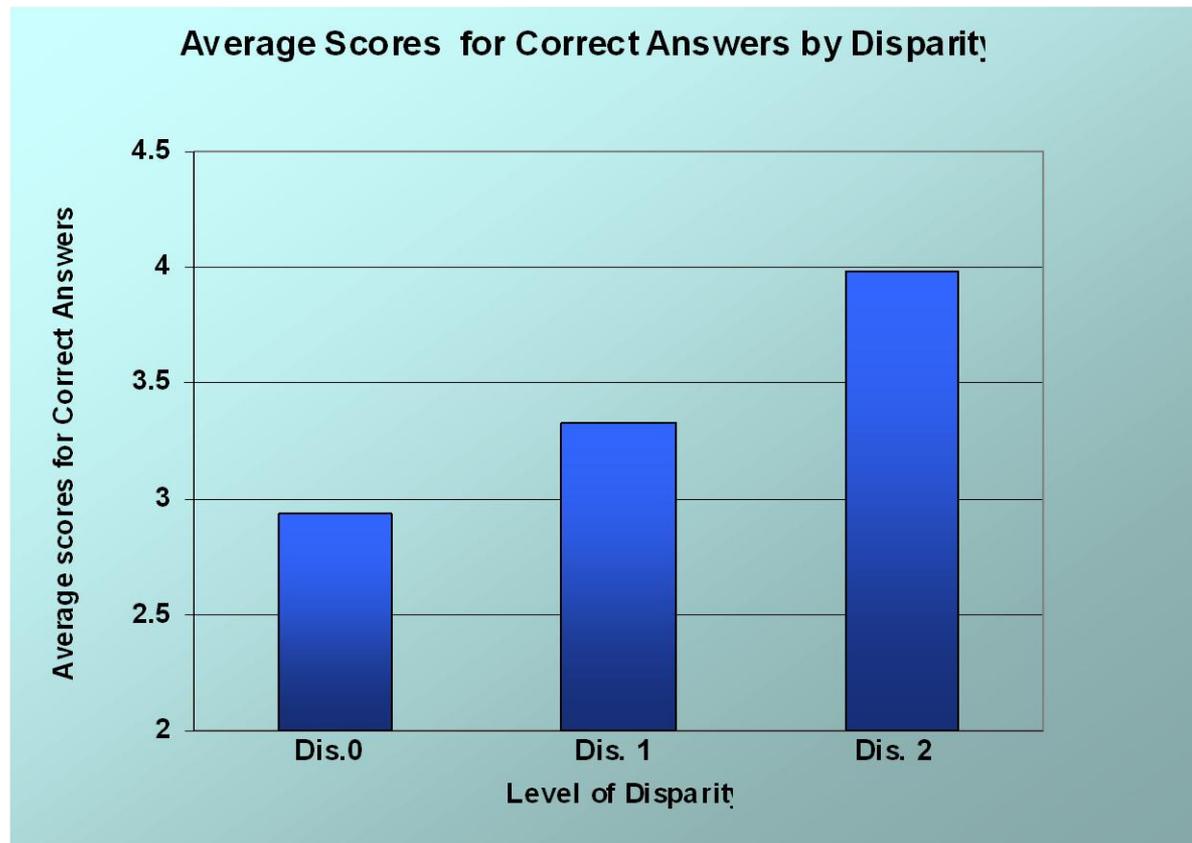


Experiment 2

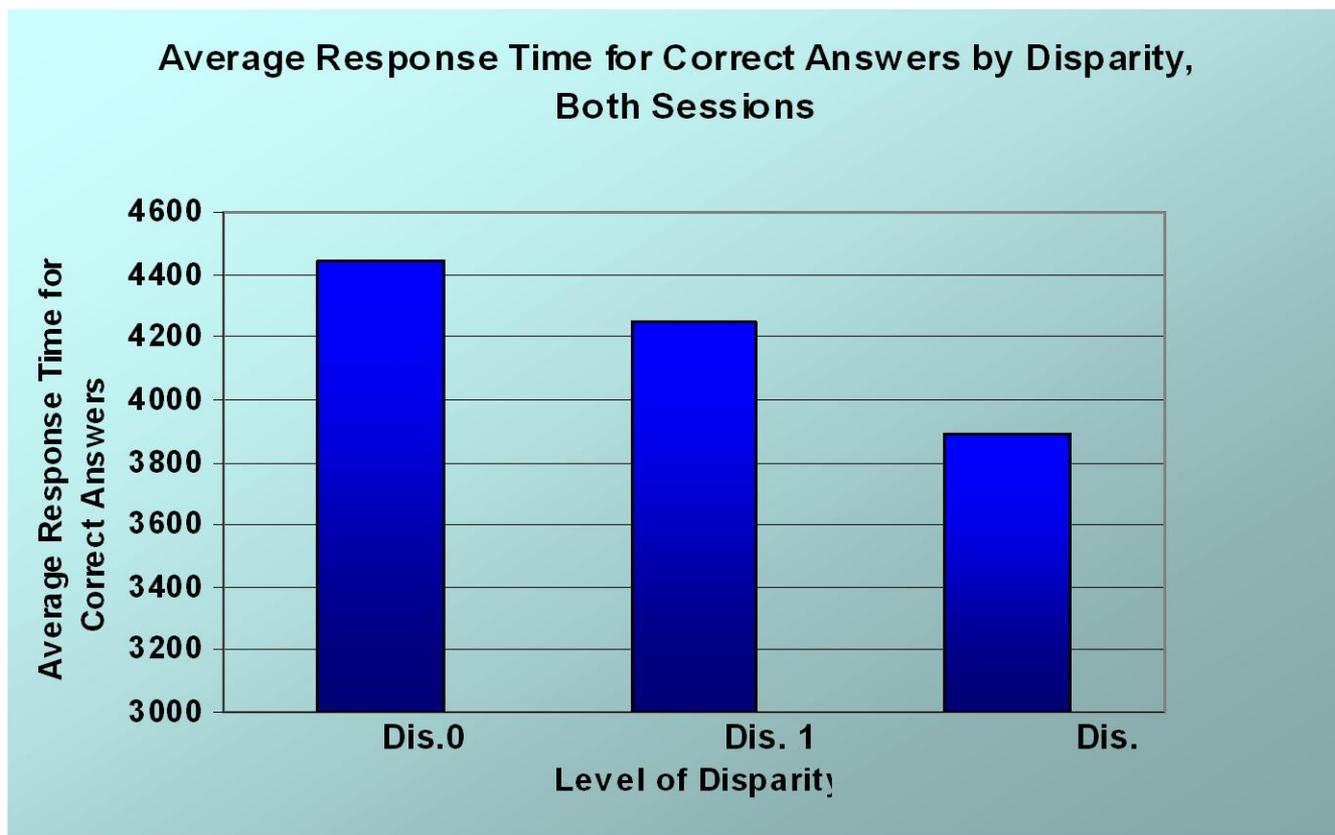
- we took black and white pictures of a sand box with model cars from three different positions:



- Performance was assessed by correct answers and response times.
- The results showed that the scores for correct answers were significantly higher for larger camera disparities.



But we were surprised that the response times of greater disparities were faster, as we hypothesized that for greater disparities response times would be slower due the necessity for processing.



Conclusion

- Task performance improved with greater disparity and there was no sign of a speed-accuracy trade off.
- Although it is thought that stereoscopic vision is unnecessary for search and detection tasks we find that it improves performance on such tasks all the same.