Stereo Vision and Perception

- C. H. Lo, A. Chalmers, (2003) Stereo vision for computer graphics: the effect that stereo vision has on human judgments of visual realism

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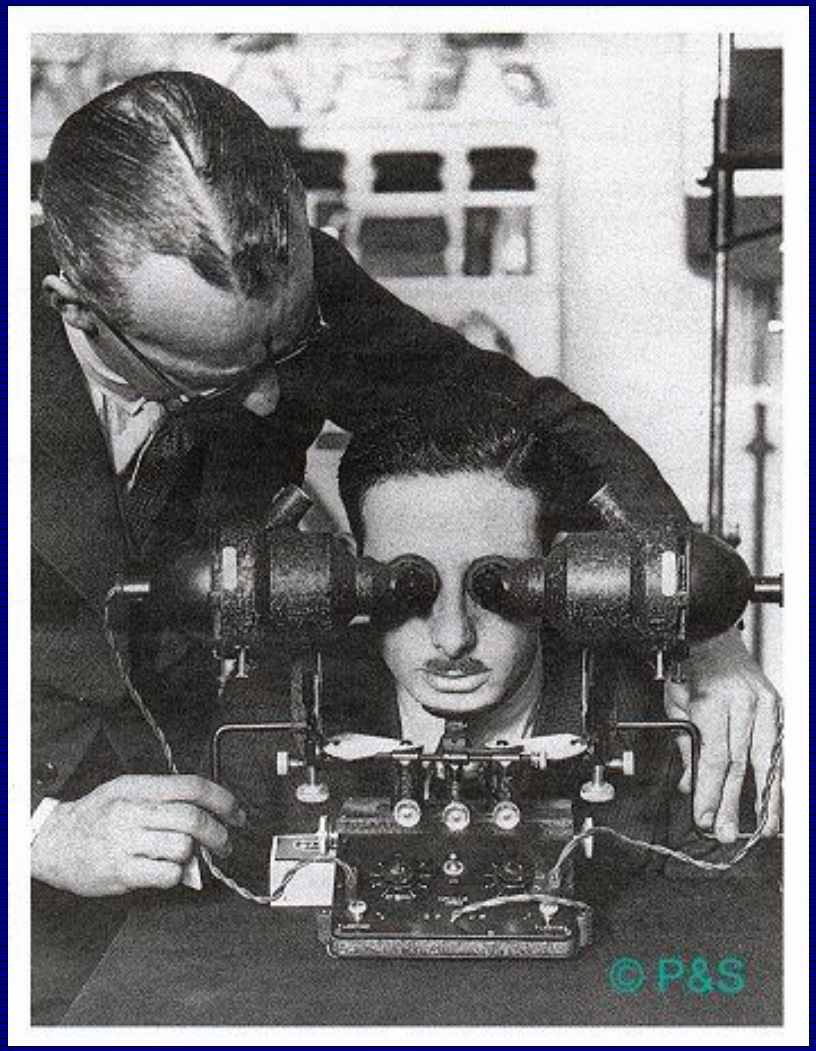
Outline

- Introduction
- Stereo vision vs mono vision
- Stereo vision and perception
- Experiments
- Conclusion

Introduction



Introduction

- Most of computer graphics work is producing 2D images
- Can stereo vision be better for producing real-like scenes?
- Purpose: the effect of stereo vision on our judgement of how real a scene looks

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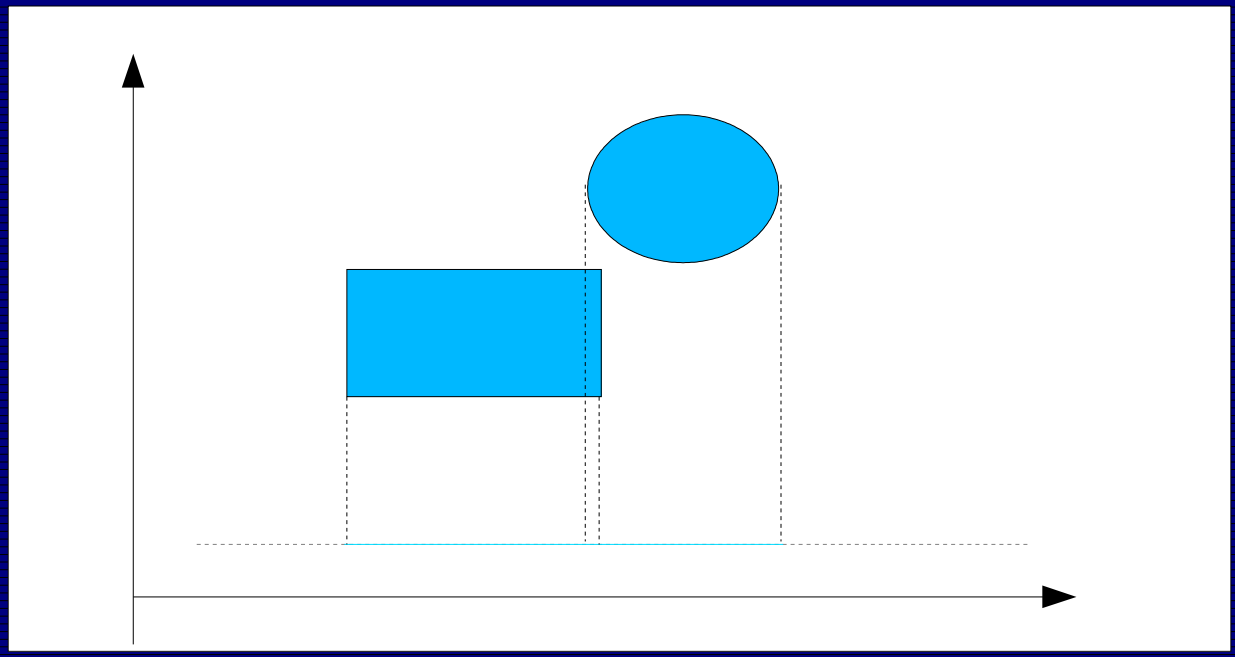
Stereo Vision

- Humans and most animals have two eyes with overlapping regions
- Stereo vision helps percieve depth in the overlapping region

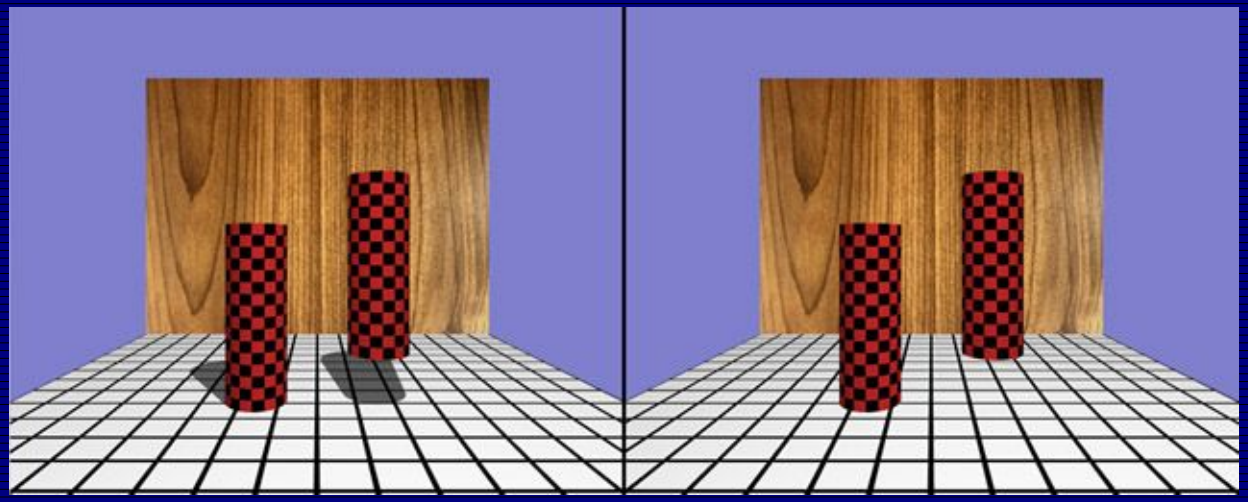
Mono Vision

- 2D images are projection of 3D objects on a 2D plane



Mono Vision

- Perception, lighting and shadows makes a 2D image look real
- Ray tracing, radiosity, texture mapping



Wanger, L.R., Ferwerda, J.A. and Greenberg, D.P., (1992) Perceiving spatial relationships in computer-generated images. IEEE Computer Graphics and Applications, 12(3), pp. 44-58.

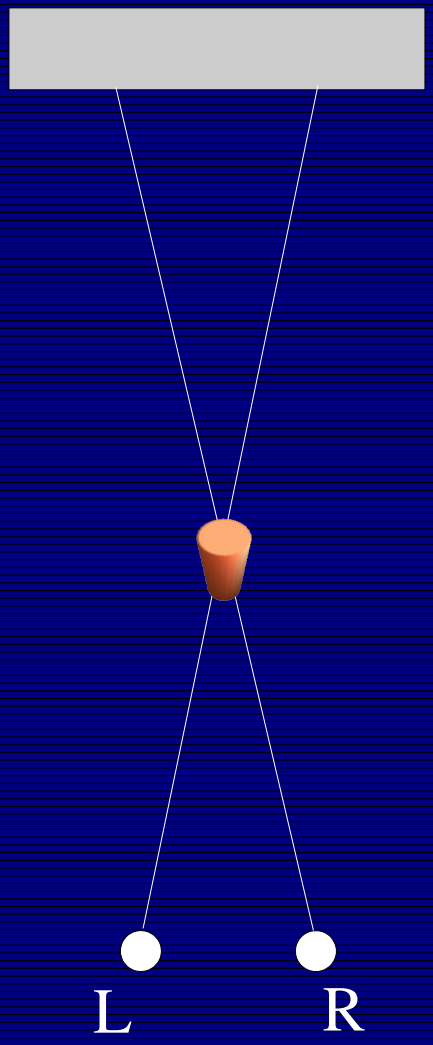
Mono Vision

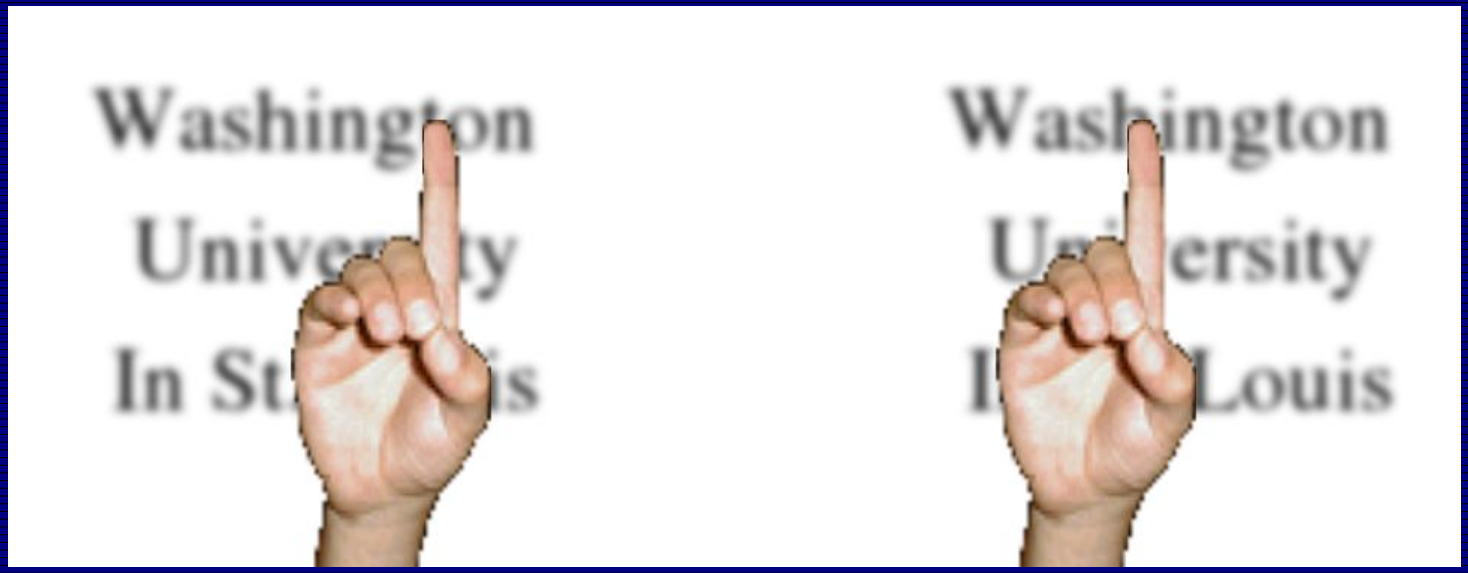
- One image is not enough
  - Try touching index fingers with one eye closed
- More than one 2D image reveals 3D information

Stereo Vision

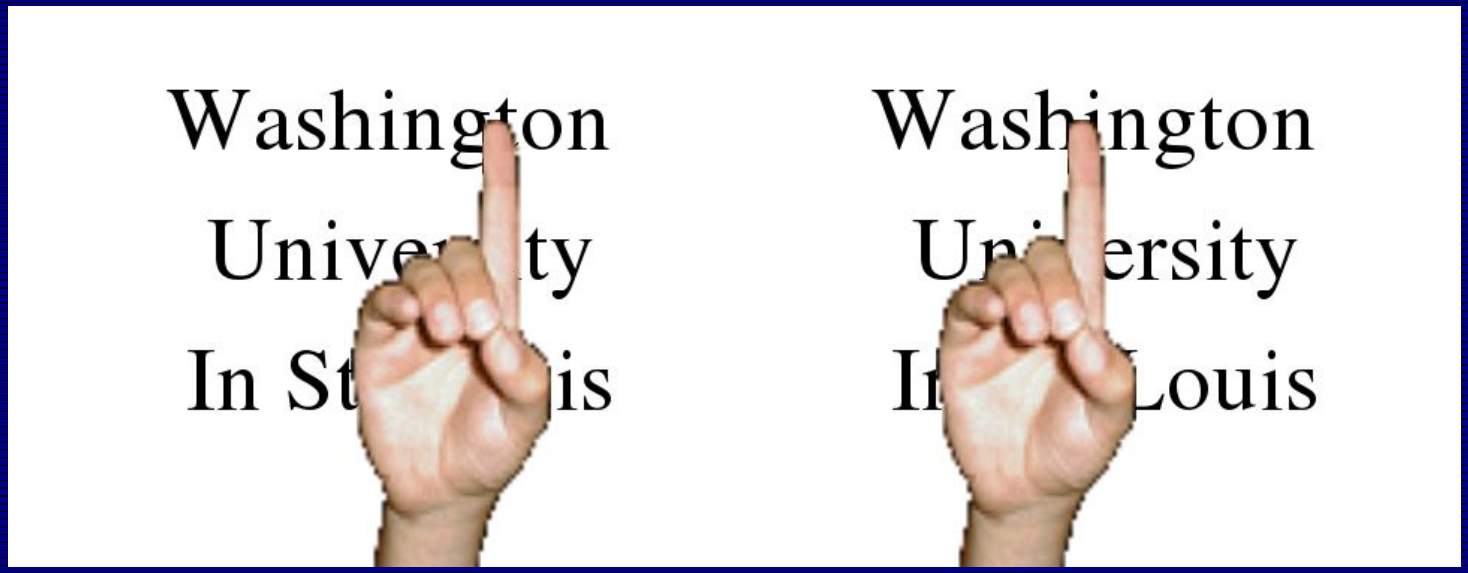
- How we see
  - Direction of eyes
  - Focus distance of eyes
- Two images
  - Brain processes them and percieves the relative depths

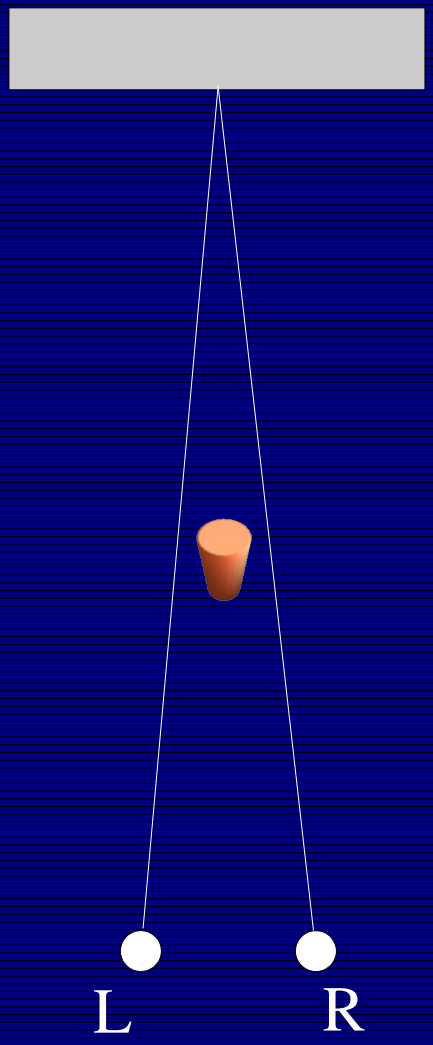
Stereo Vision





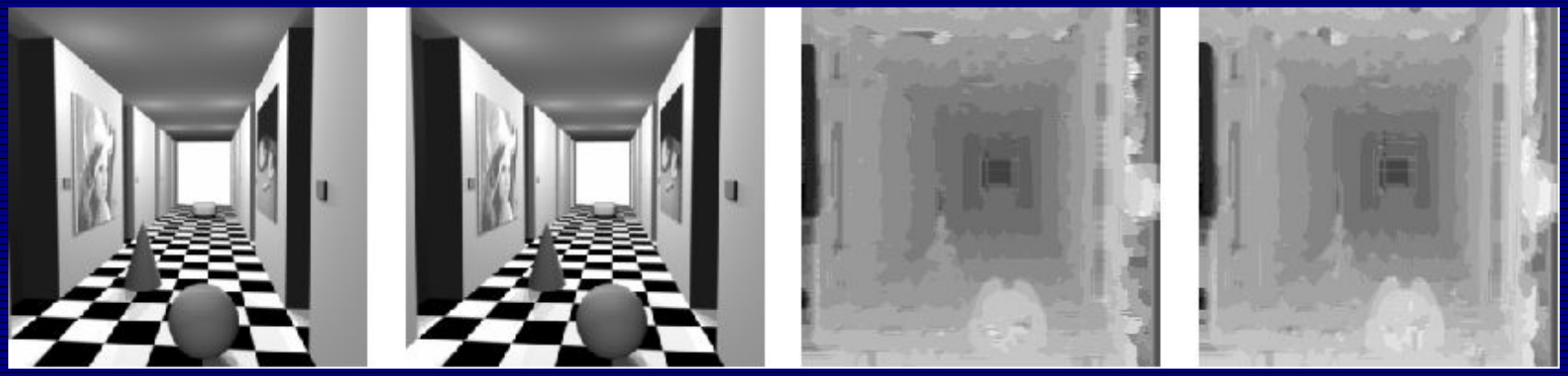
Stereo Vision





Stereo Vision

- Applications that exploit this
  - Stereo displays
  - Autostereograms
- Applications that are inspired by this



Changming Sun, (2002) Fast Stereo Matching Using Rectangular Subregioning and 3D Maximum-Surface Techniques

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Stereo Vision and Perception

- Does stereovision affects our judgement on realism?
- Hypothesis: Viewing in stereo will affect our judgement of the visual realism of the computer-generated images.

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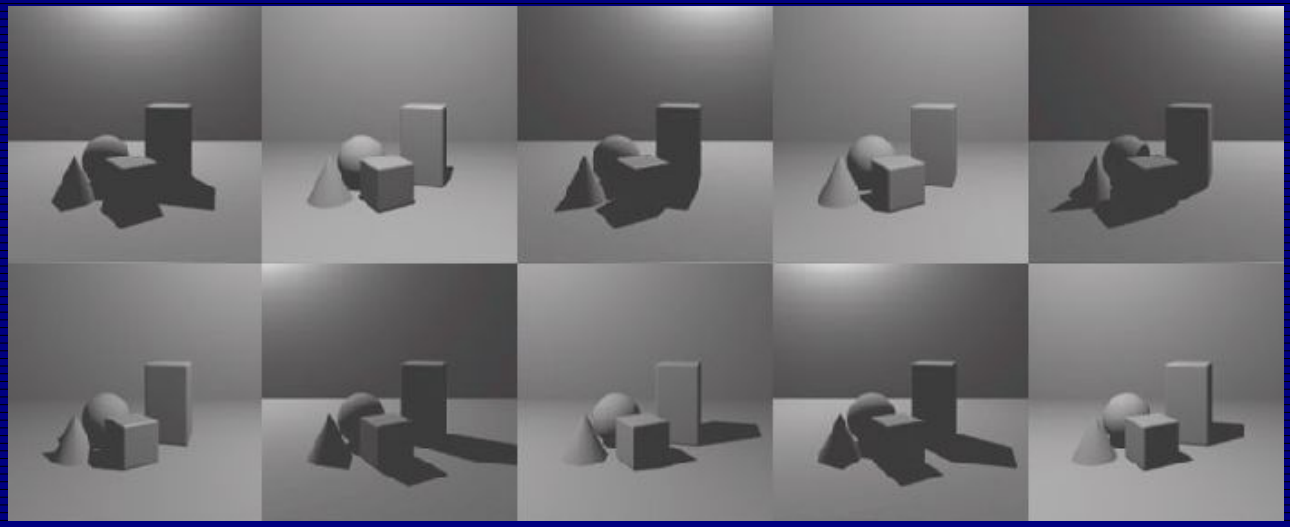
Experiments

- 3D display hardware
- Different renderings of same objects
- Stereo and mono



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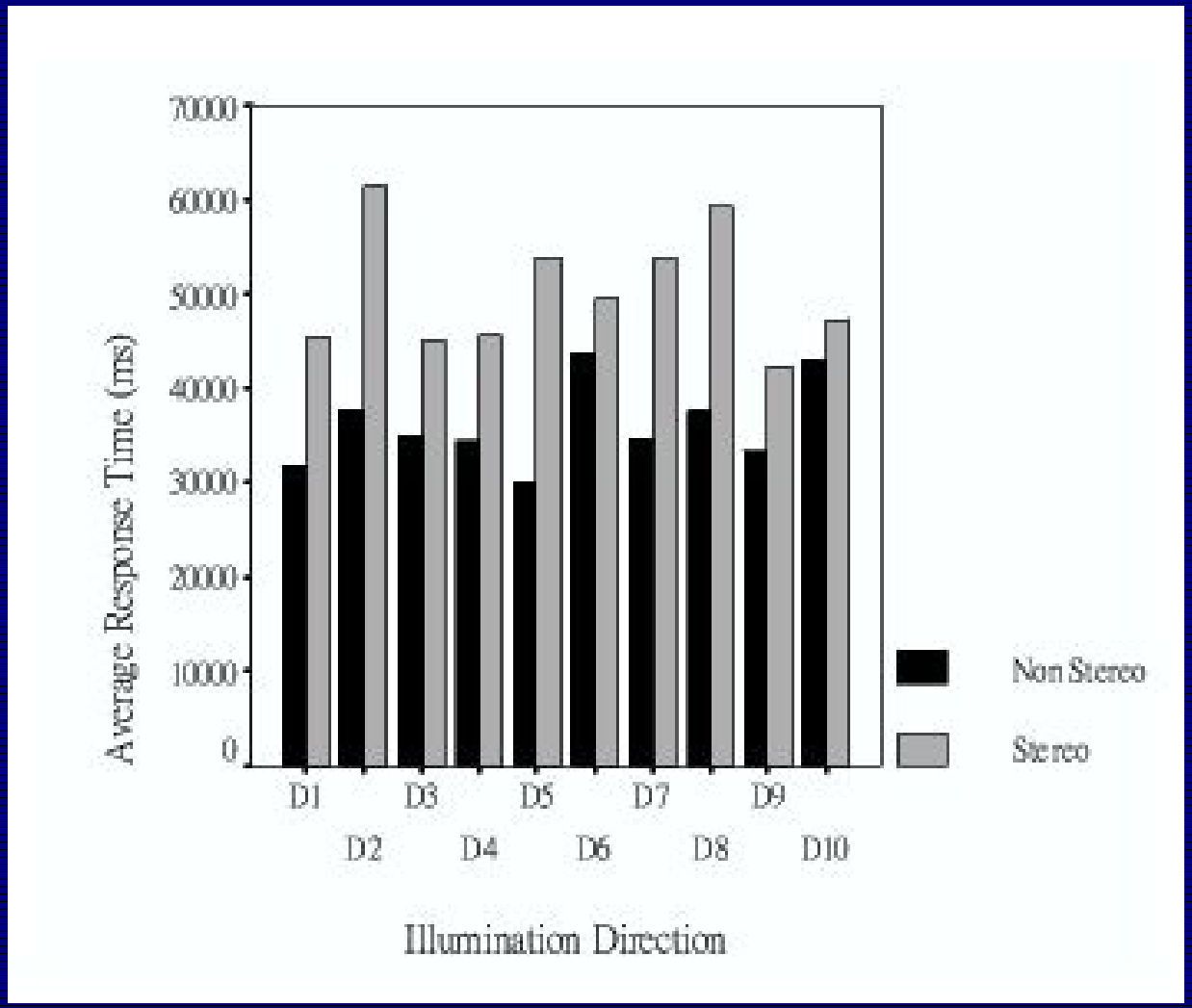
Experiments



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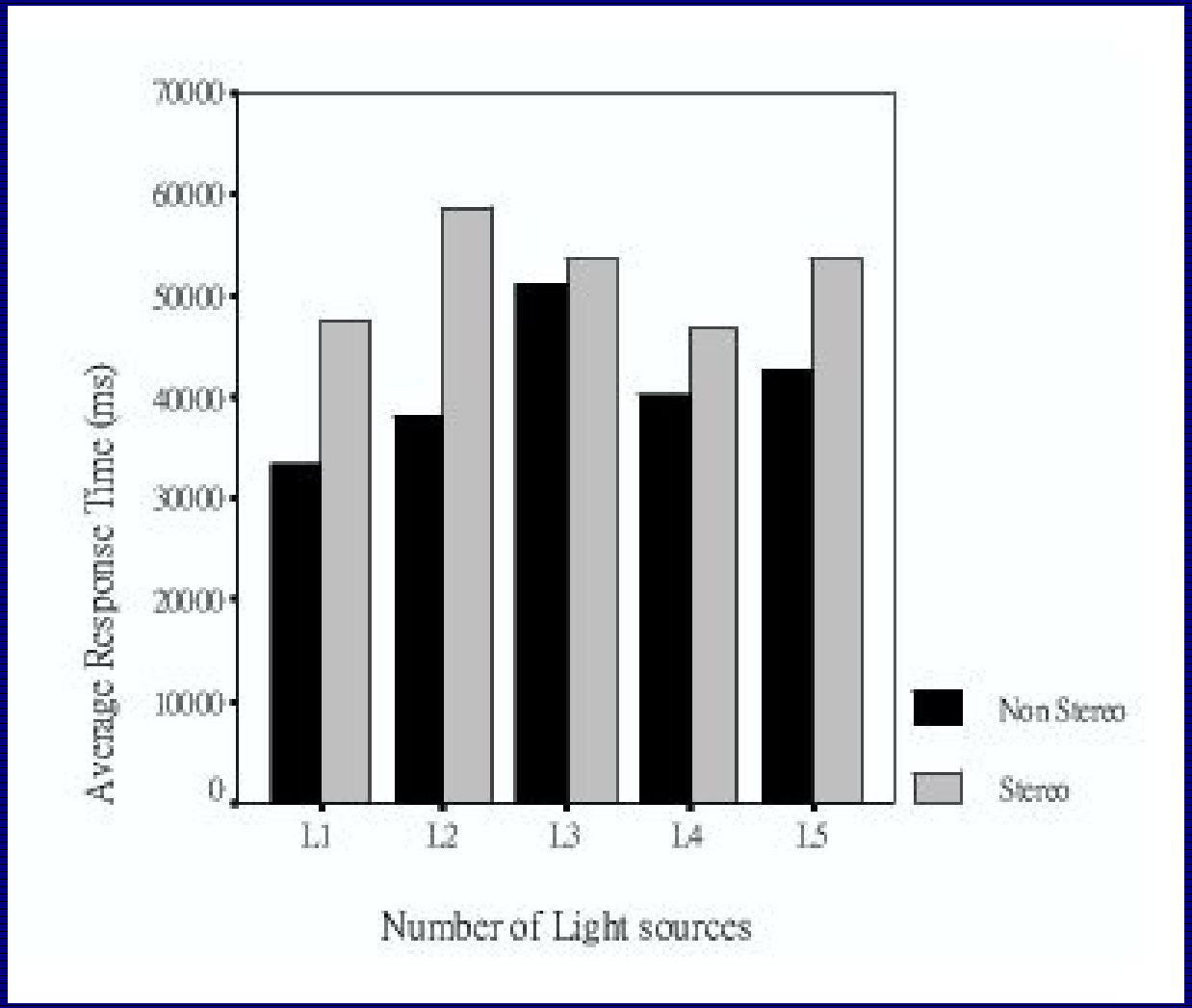
Experiments



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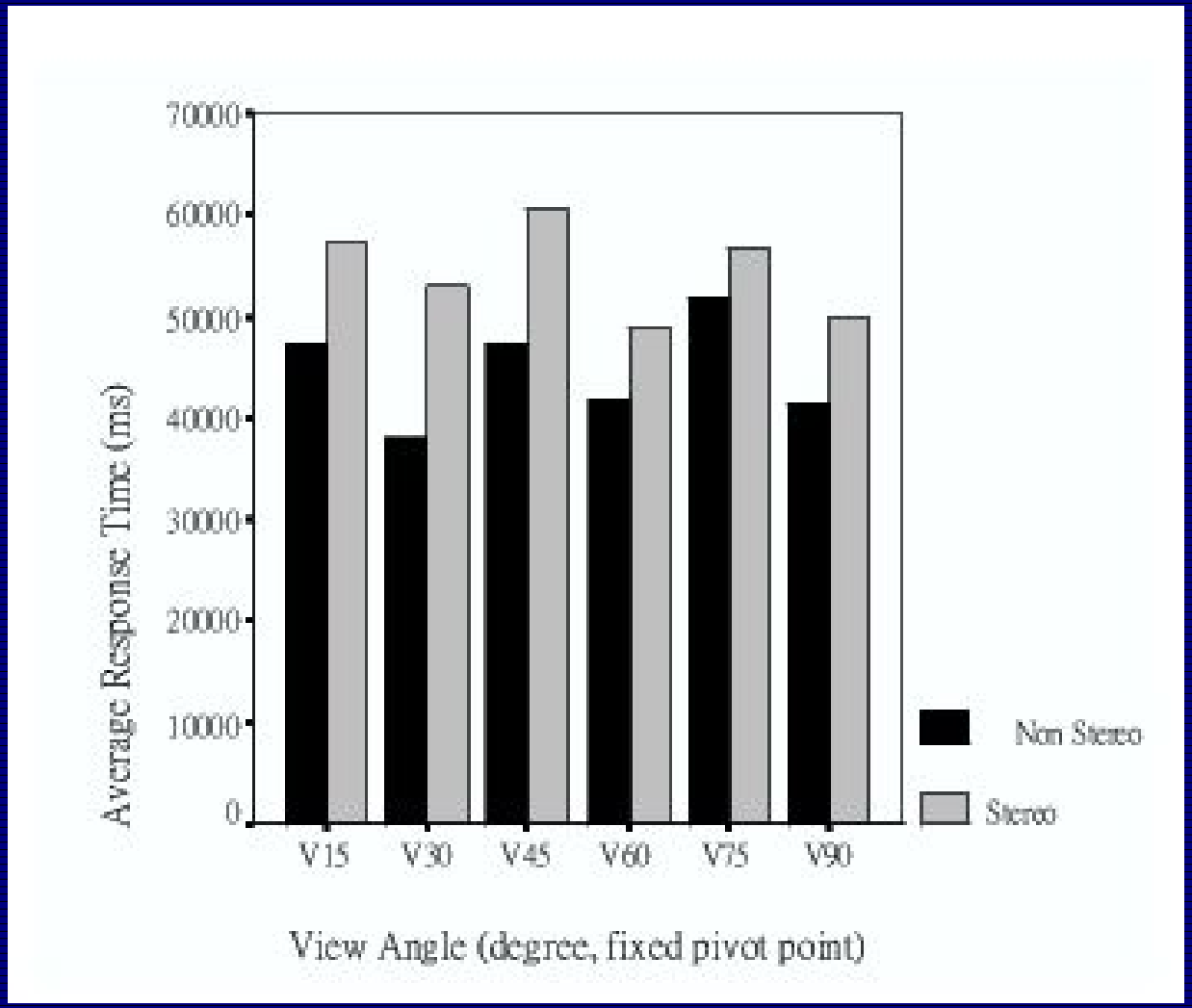
Experiments



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Conclusion

- Subjects decide later in stereo
- Stereo vision affects the perception of realism

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