

Stereo Vision in Nature

Shree K. Nayar
Columbia University

Topic: Uncalibrated Stereo, Module: Reconstruction II
First Principles of Computer Vision

Stereopsis



Predator eyes are configured
for depth estimation



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Prey eyes are configured for
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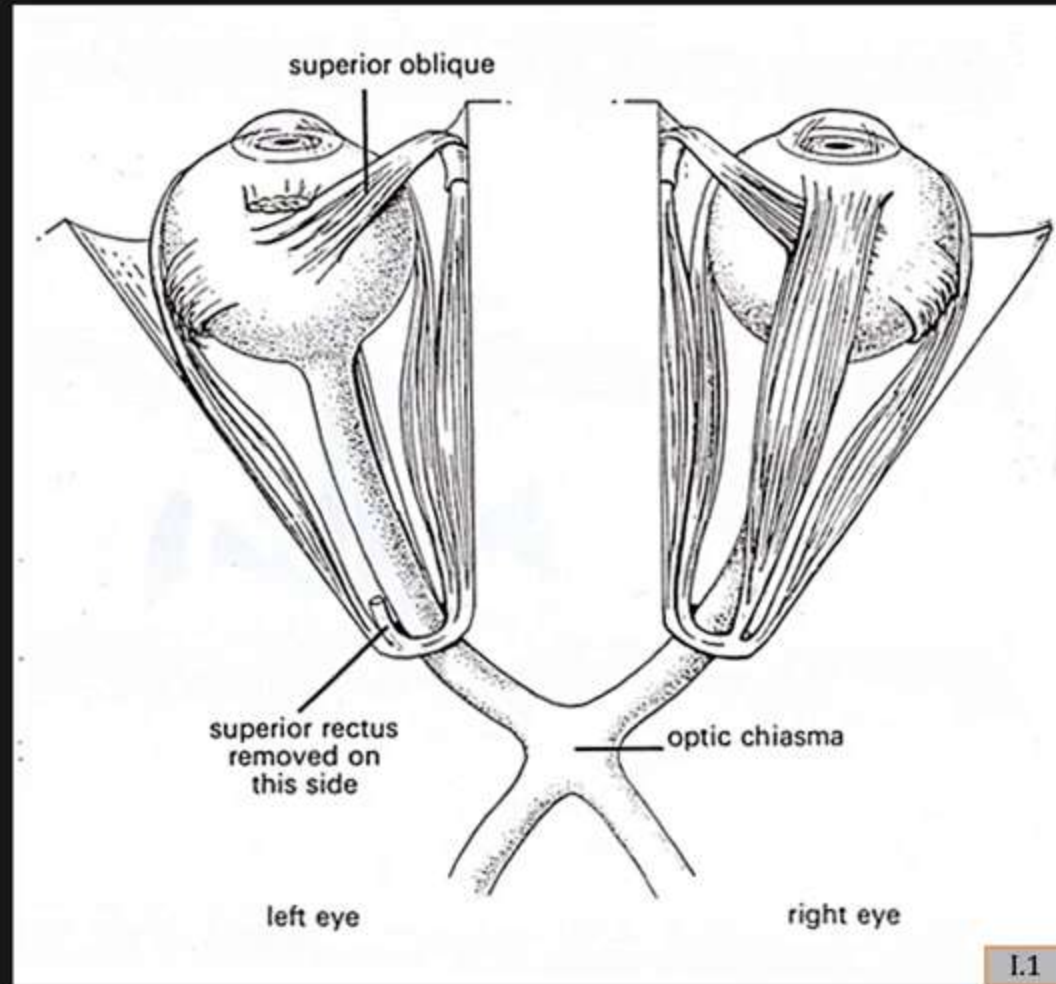


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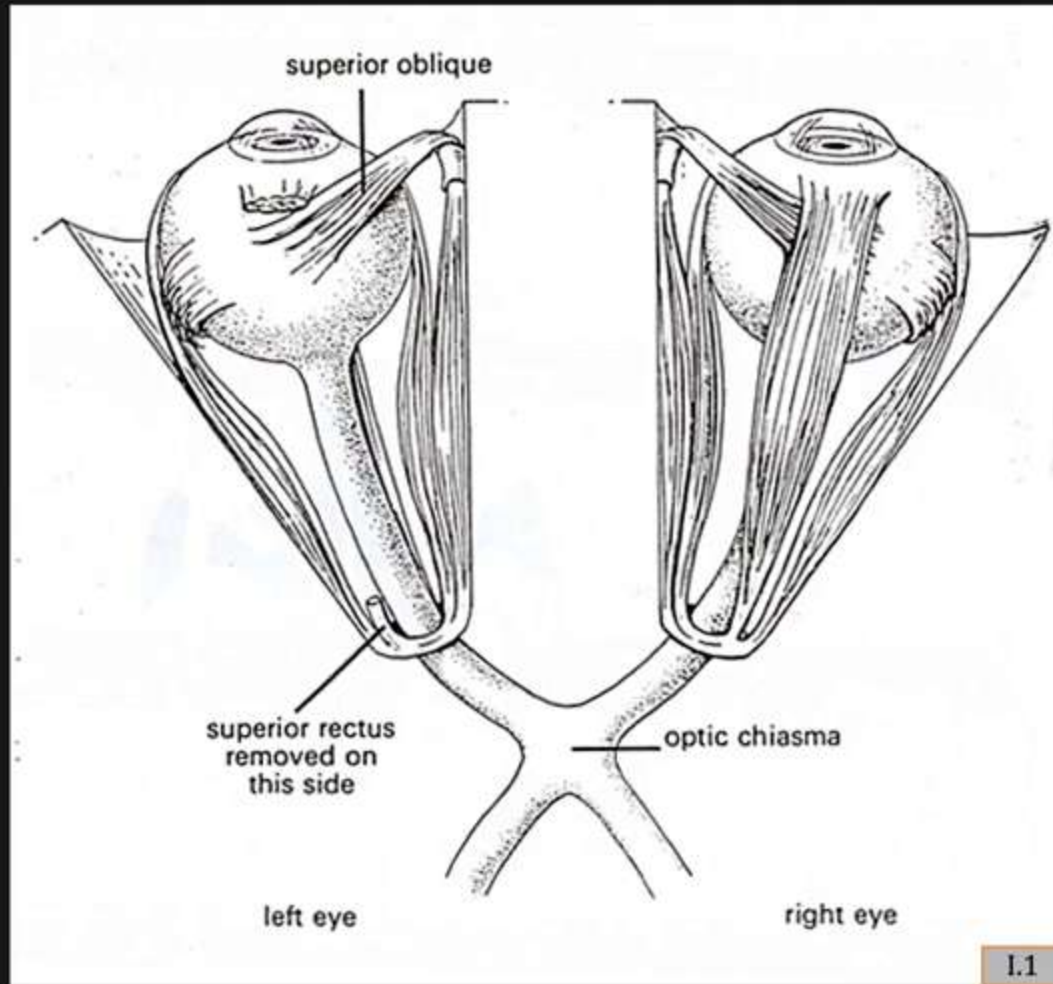
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The Human Stereo System



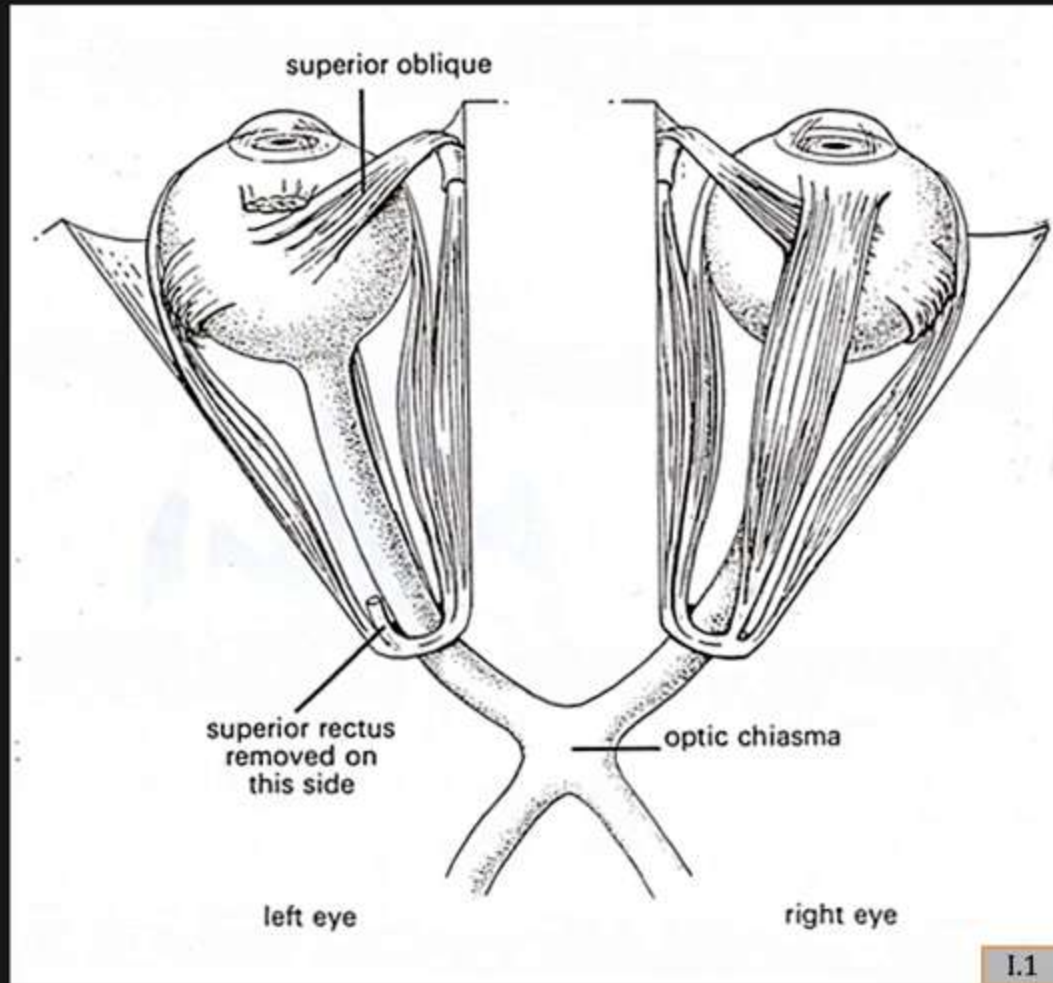
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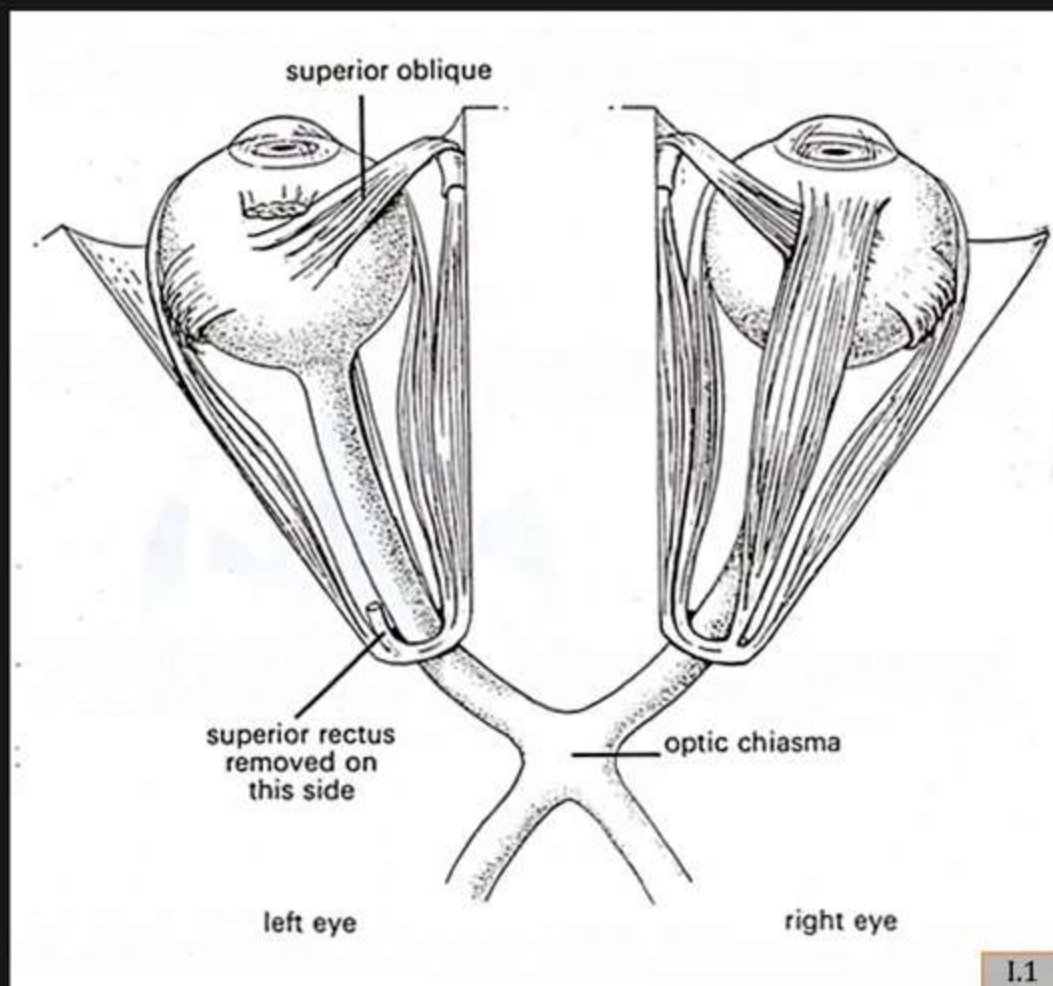
I.1



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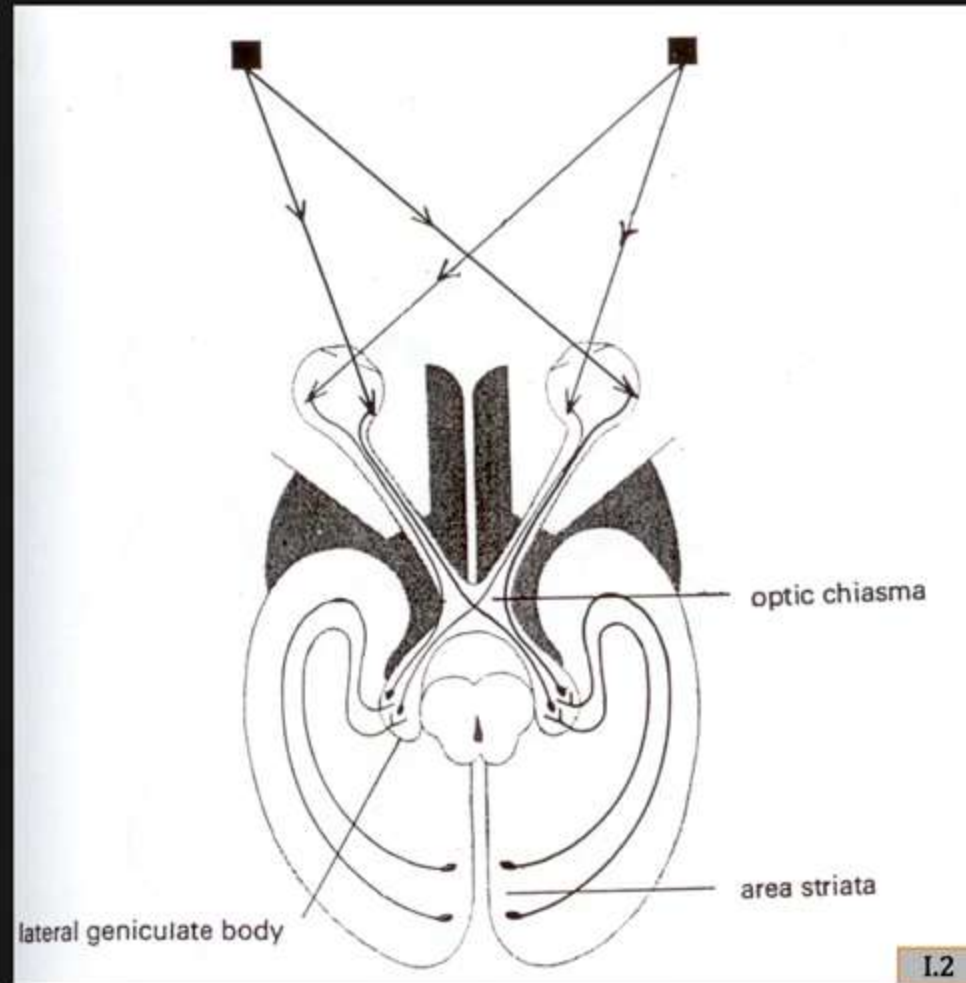
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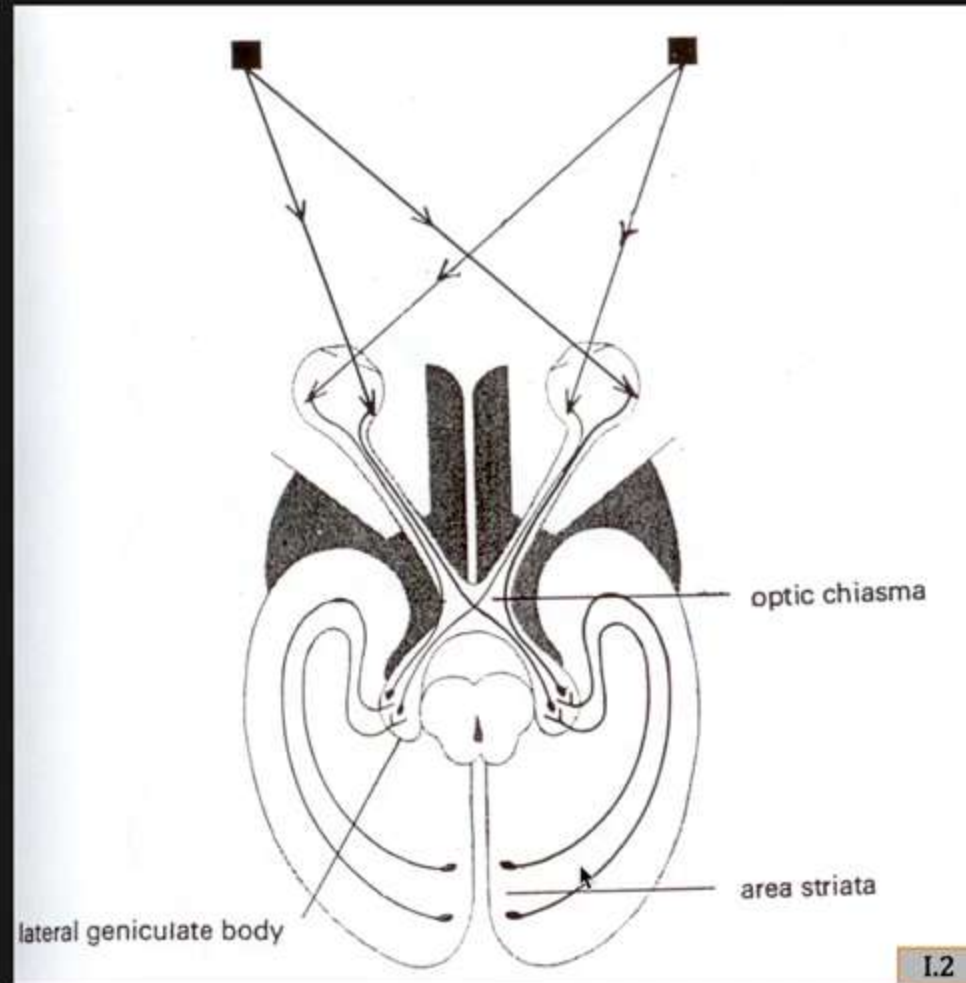
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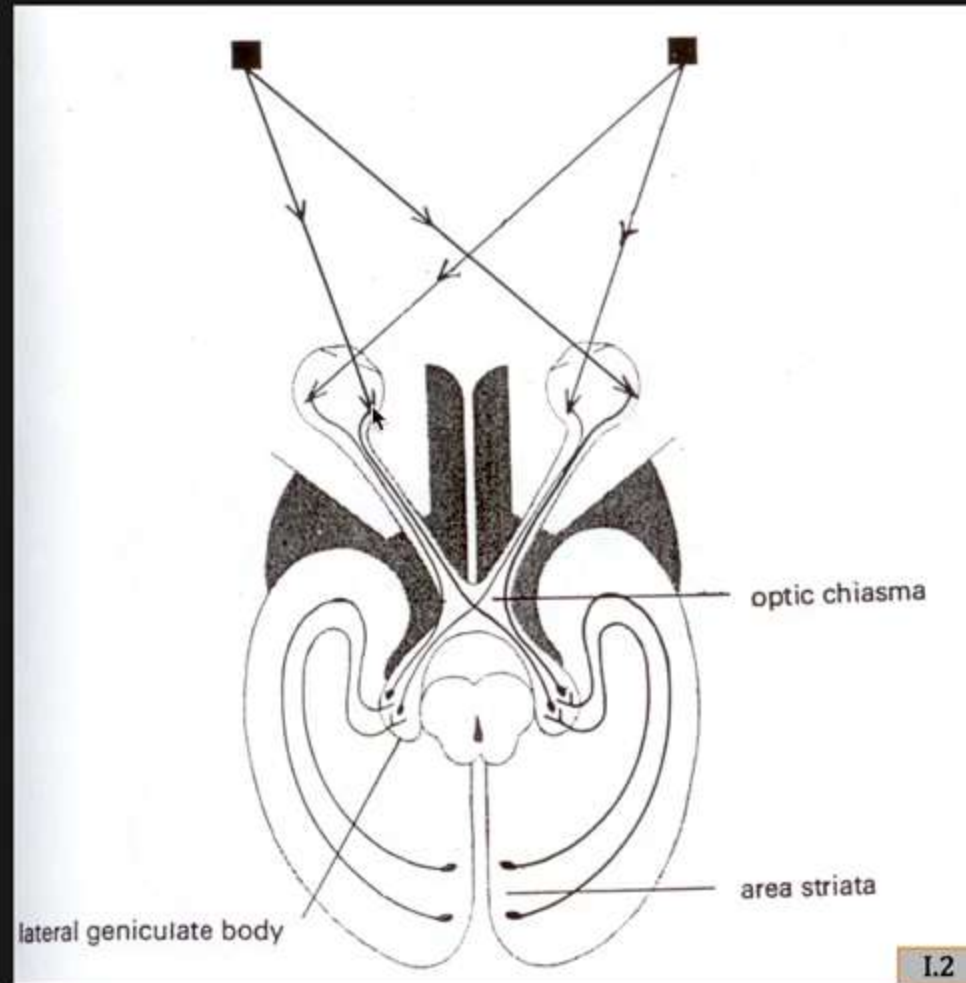
Stereopsis in Humans



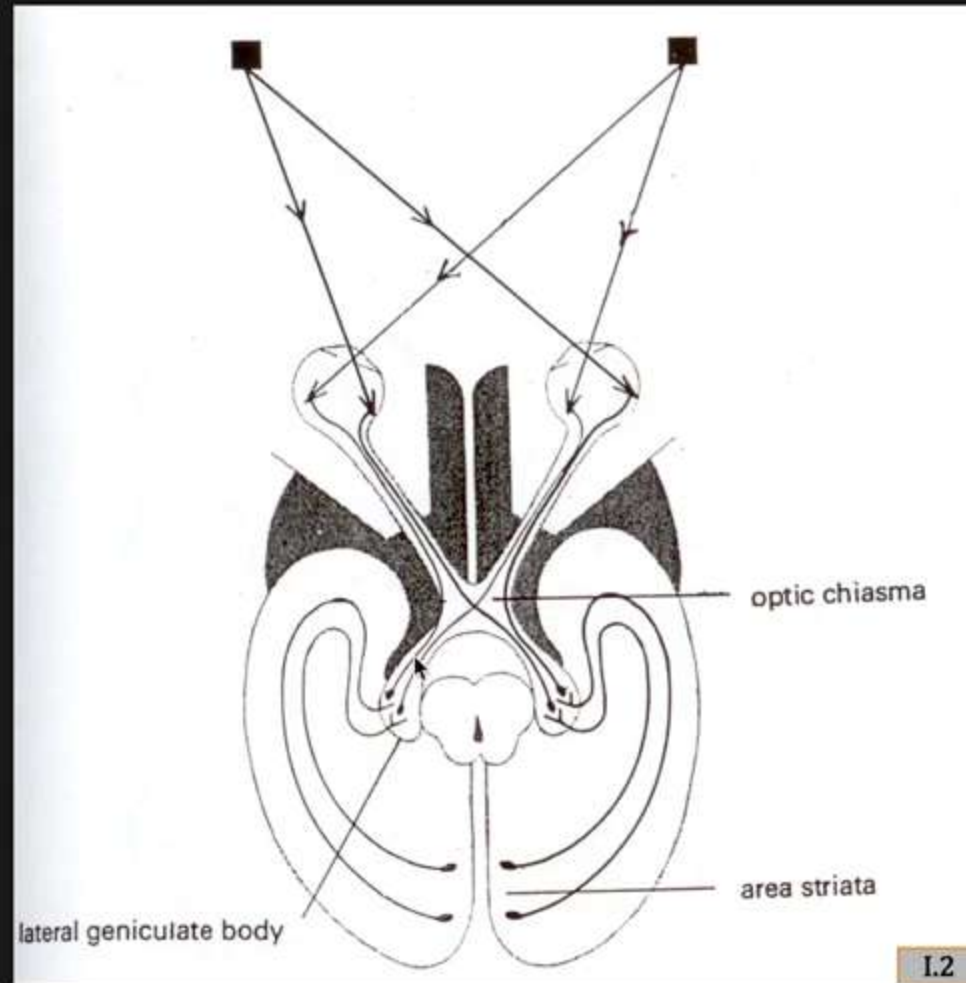
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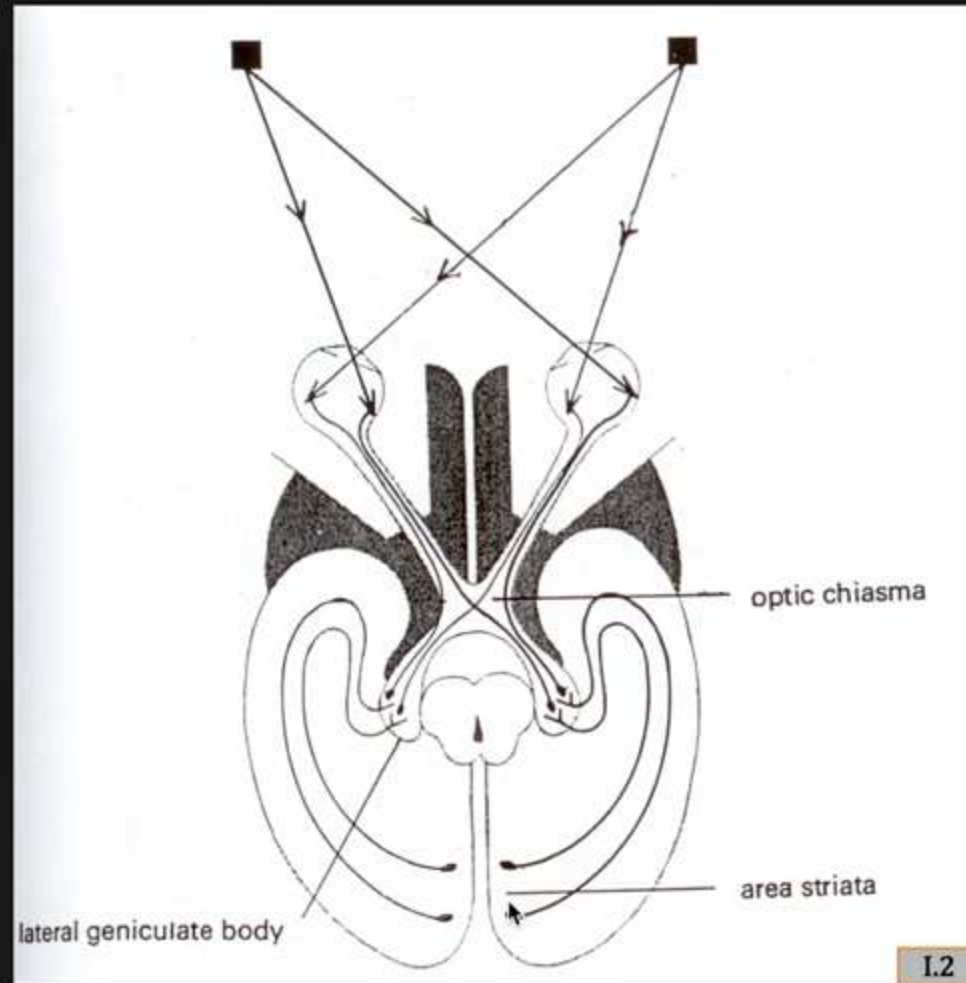
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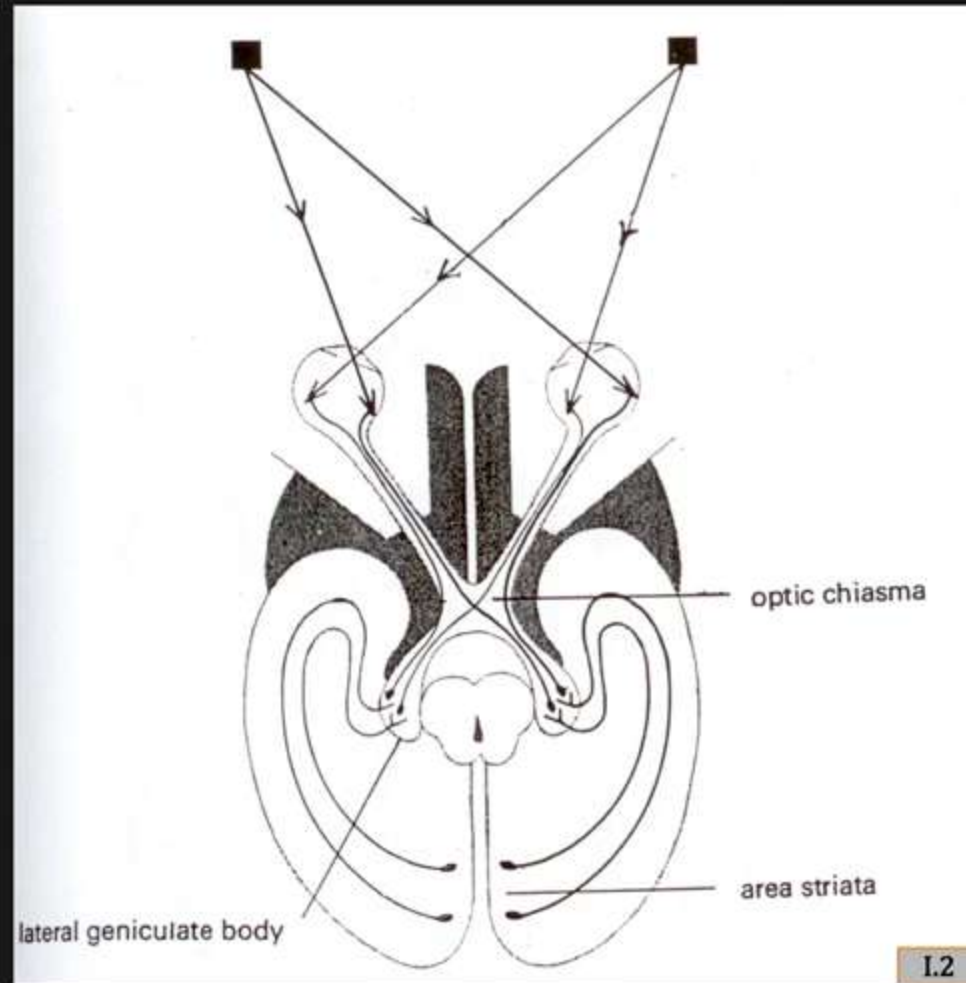
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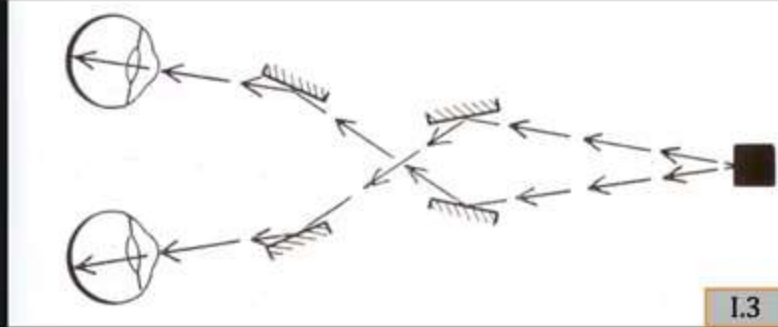


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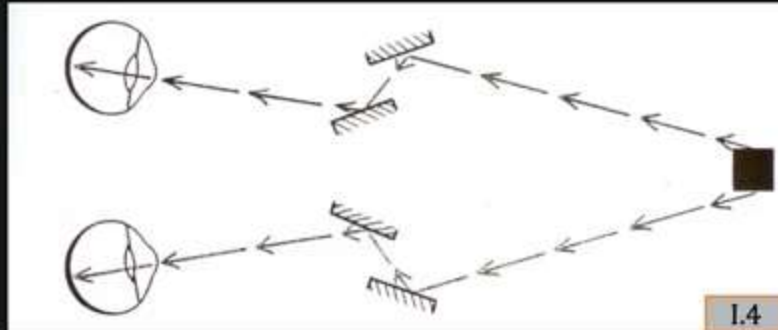


Human Stereo Experiments

A *psuedoscope* gives reversed depth

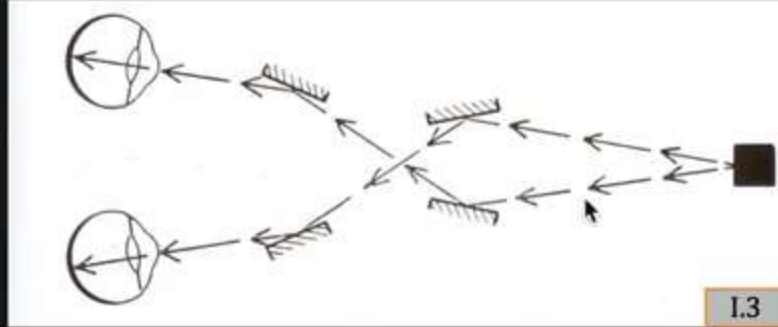


A *telestereoscope* increases separation of the eyes

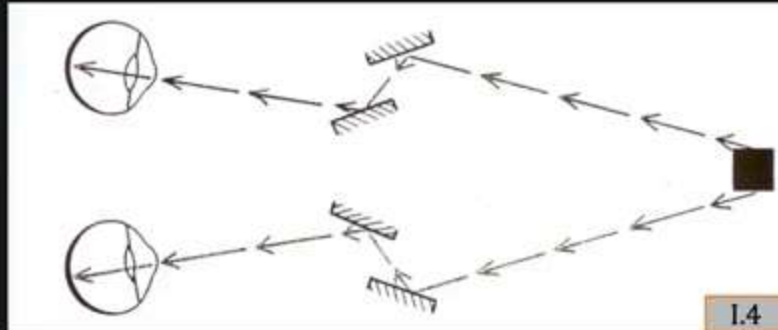


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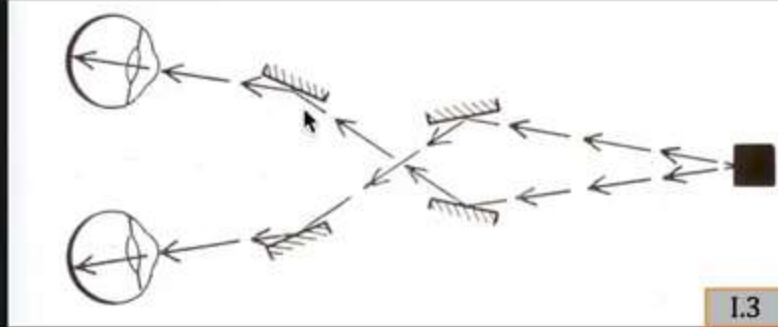


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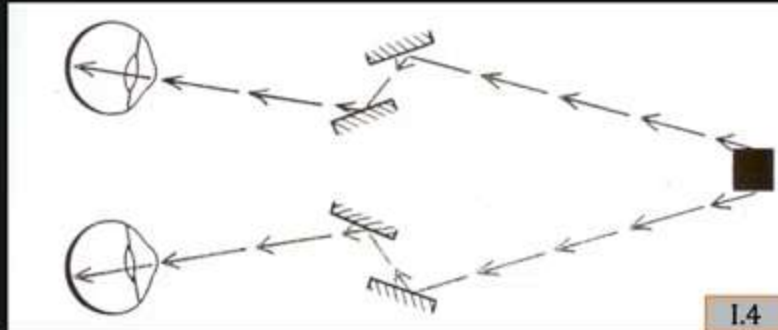


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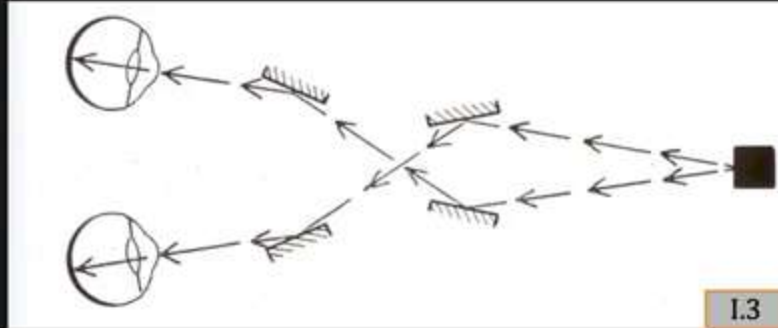


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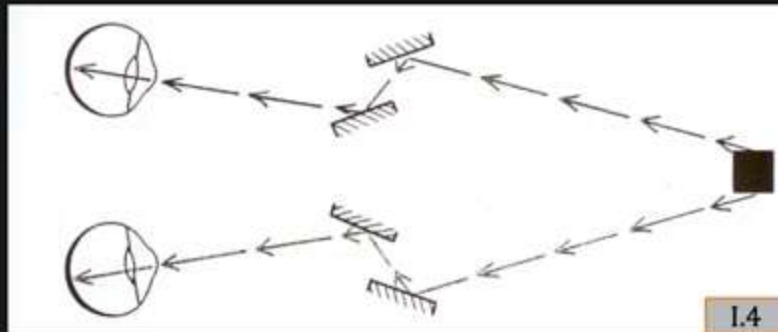


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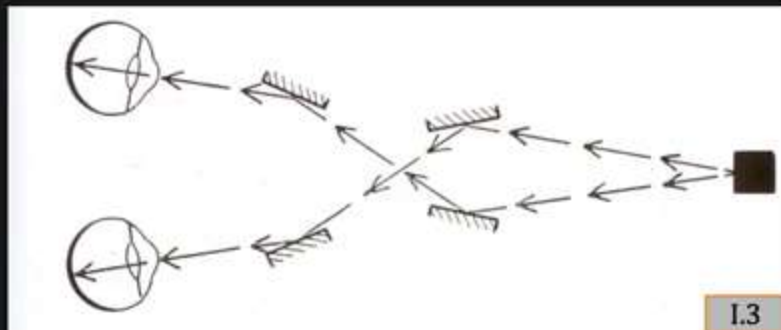


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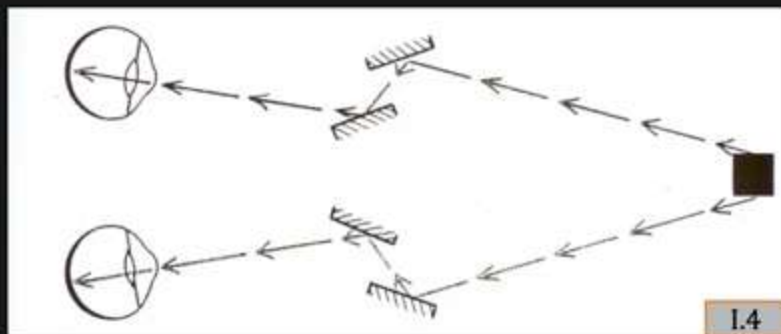


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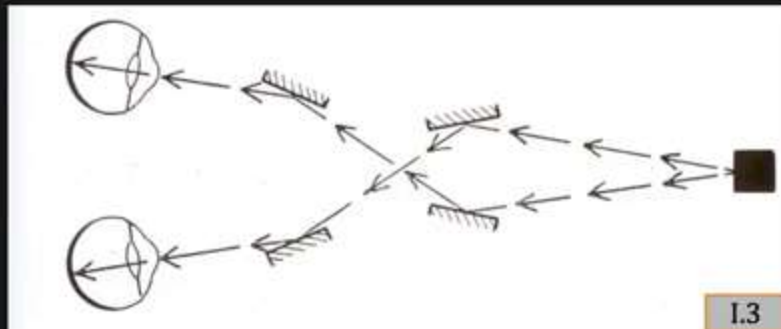


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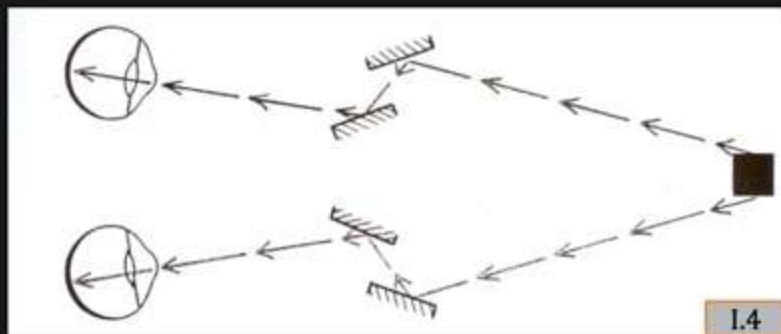


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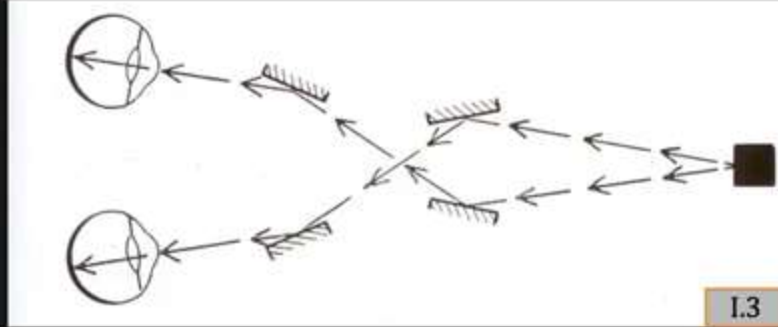


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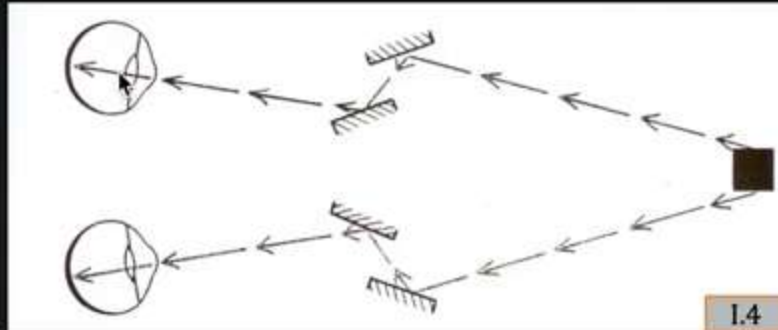


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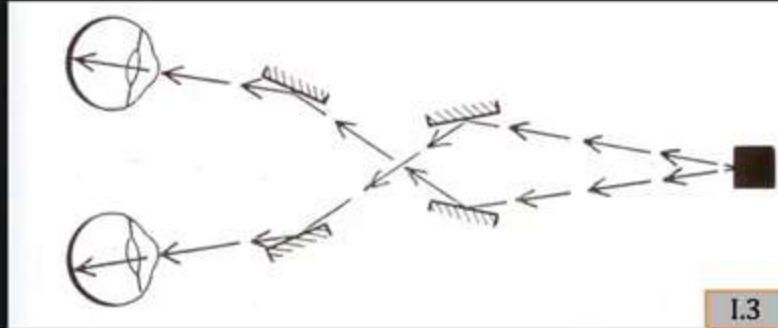


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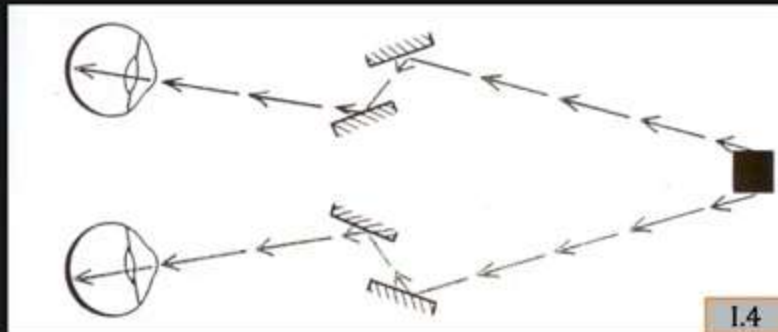


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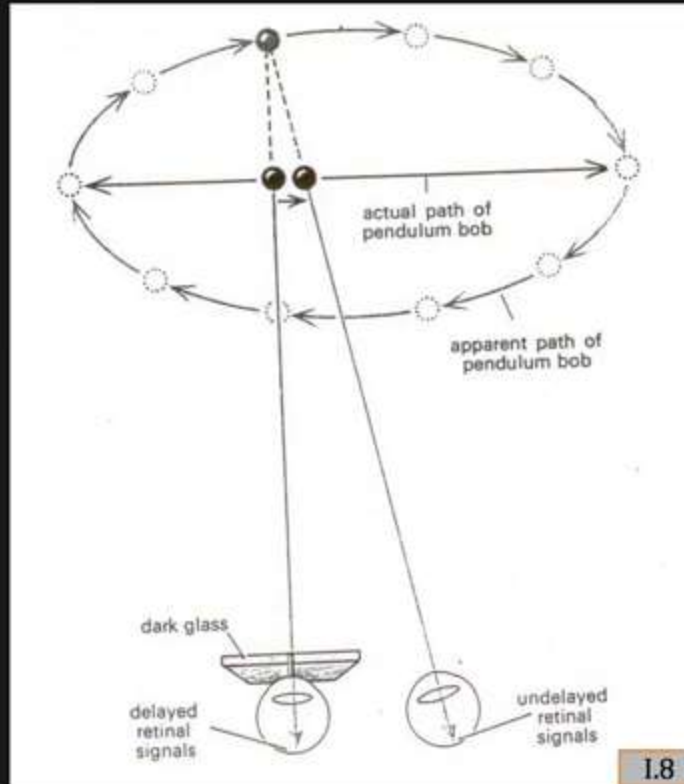
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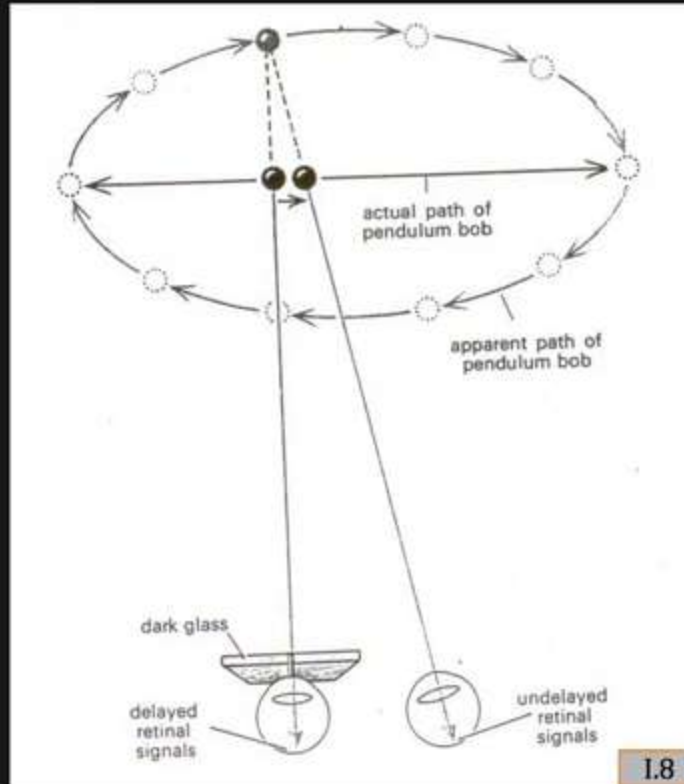
The Pulfrich Pendulum Effect



A pendulum swinging in a straight arc is viewed through dark glass in one eye. The motion appears to be elliptical.

[Arden 1954]

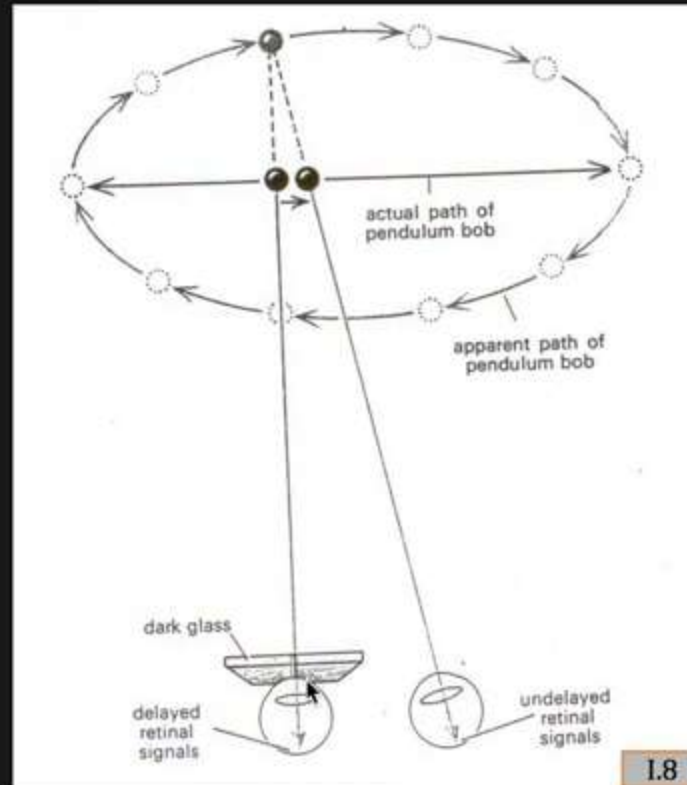
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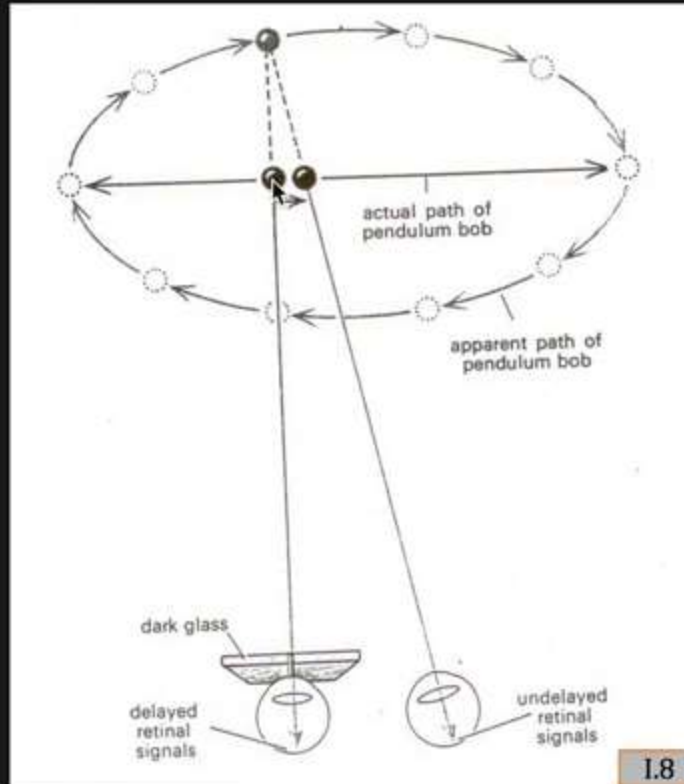
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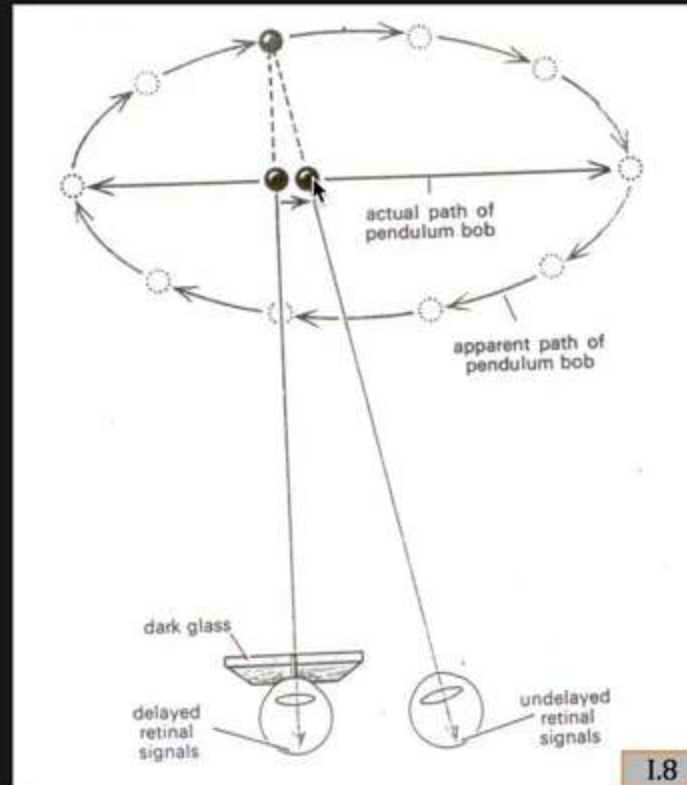
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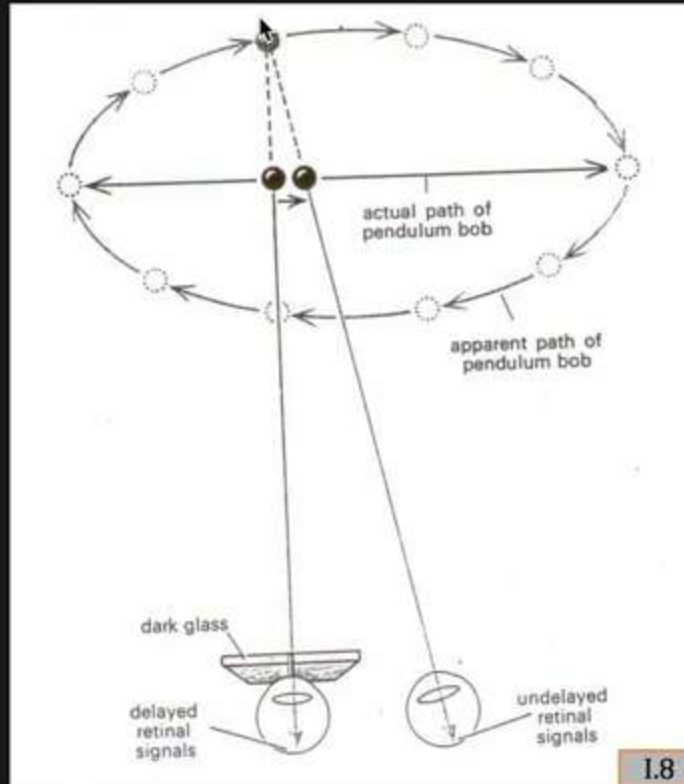
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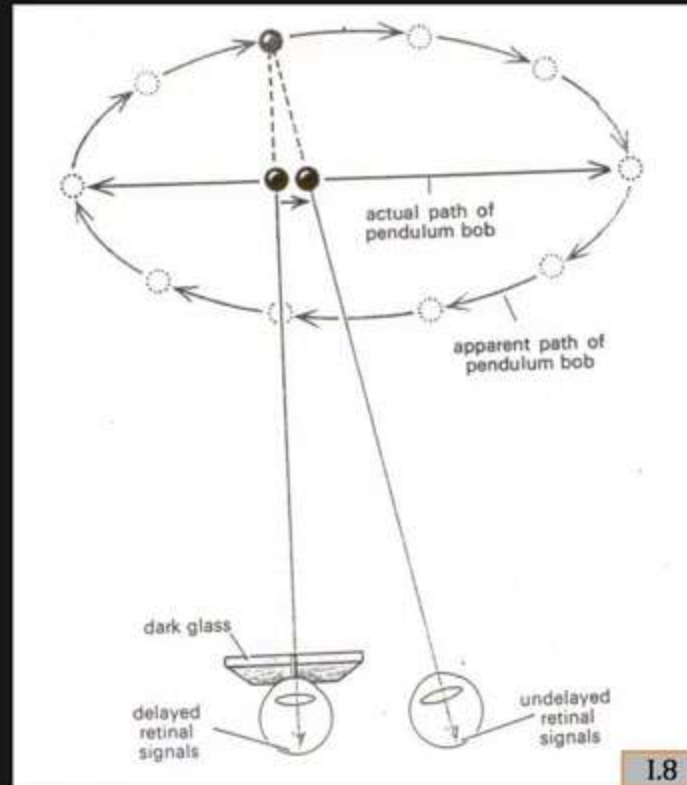
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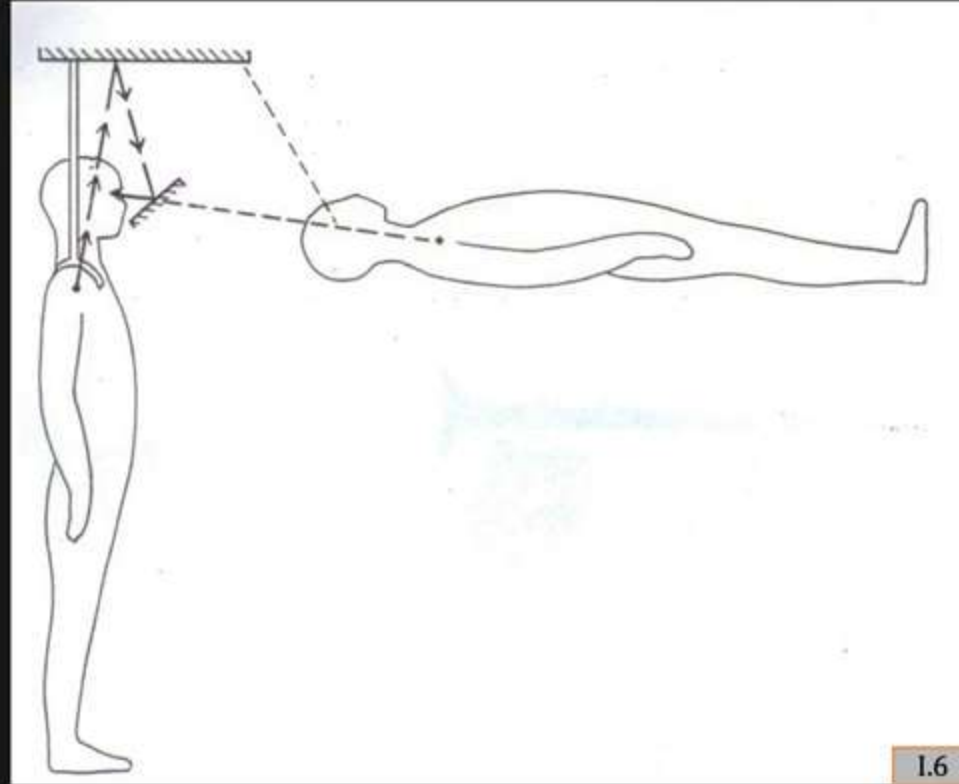
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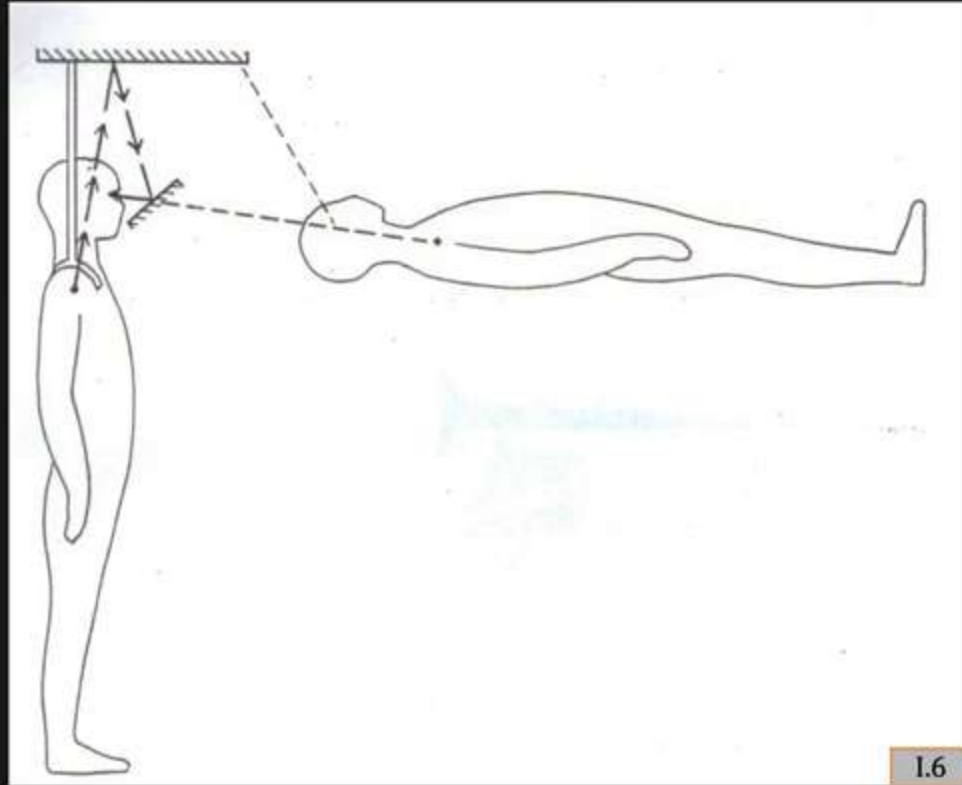
Stratton's Experiment



When wearing this device, Stratton saw himself suspended in space before his eyes.

[Stratton 1896]

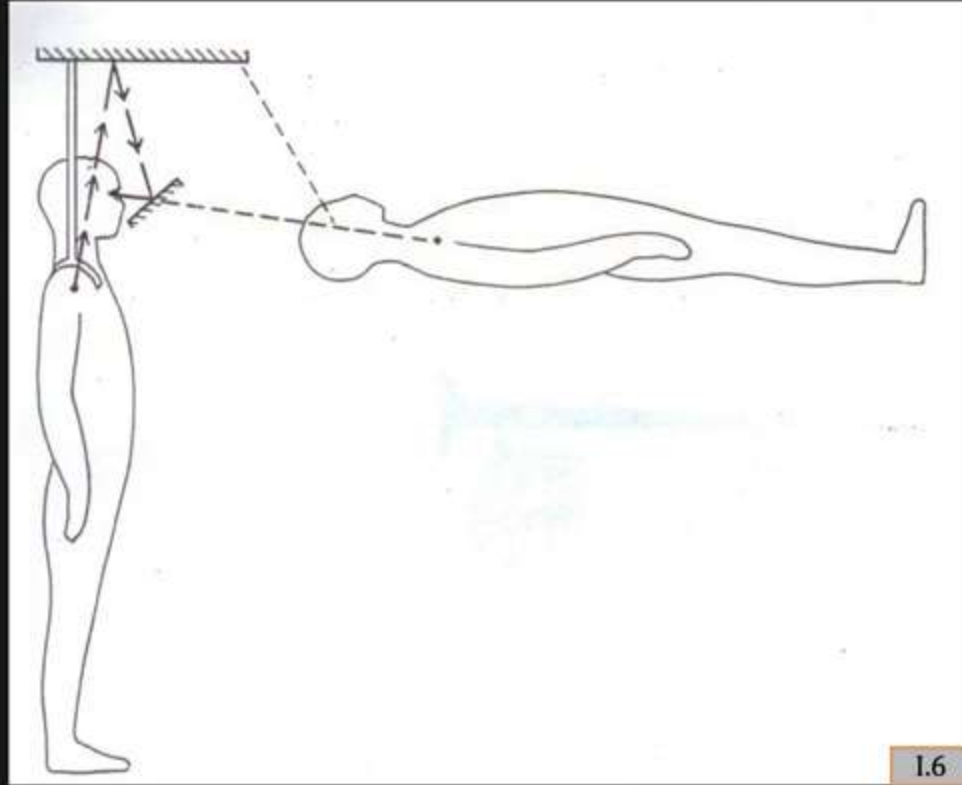
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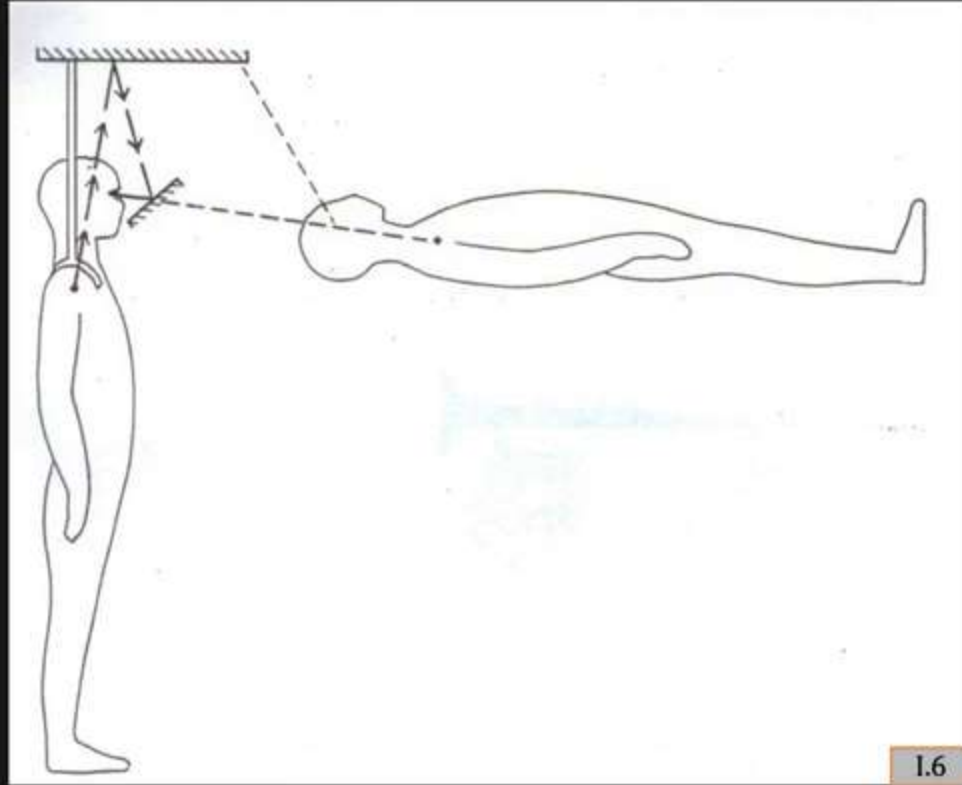
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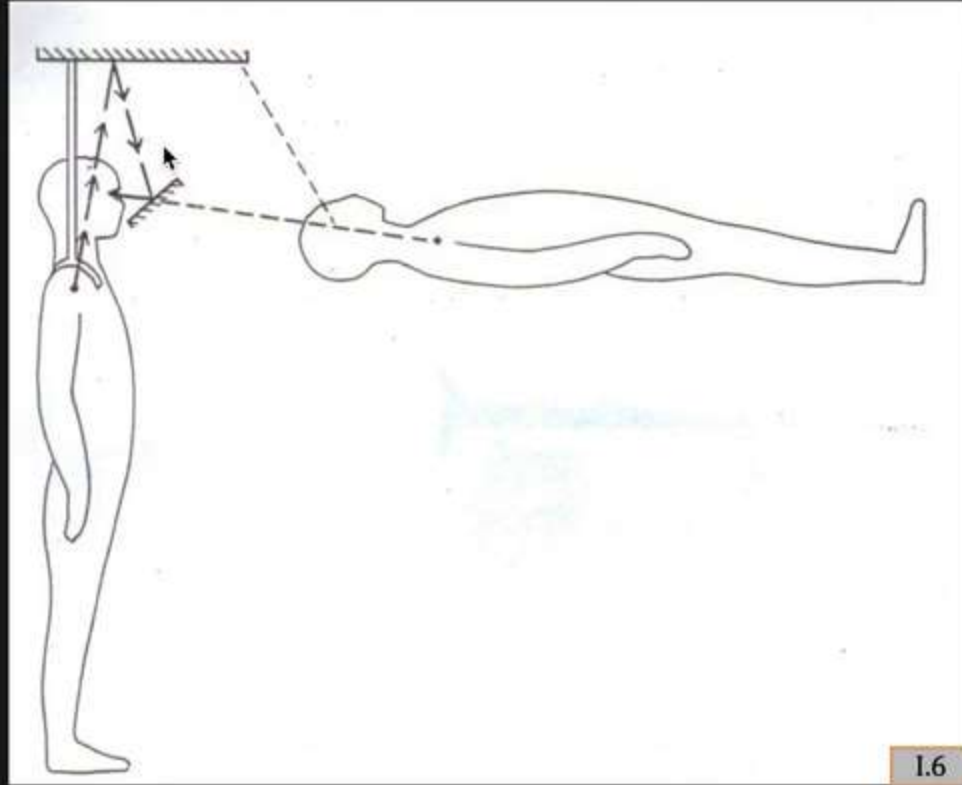
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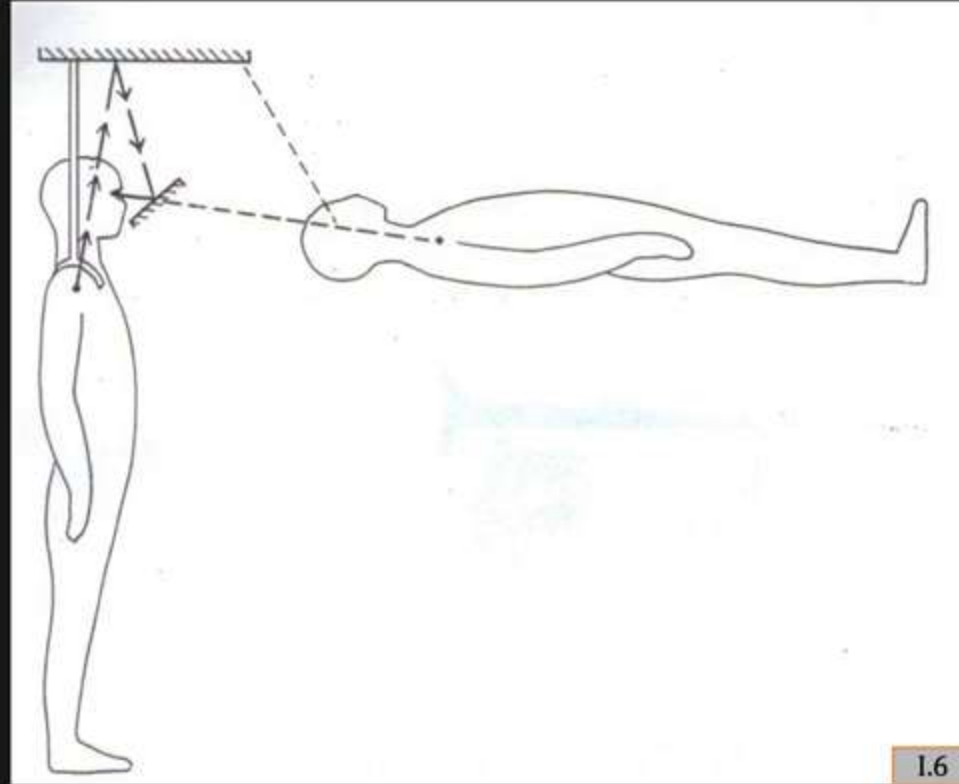
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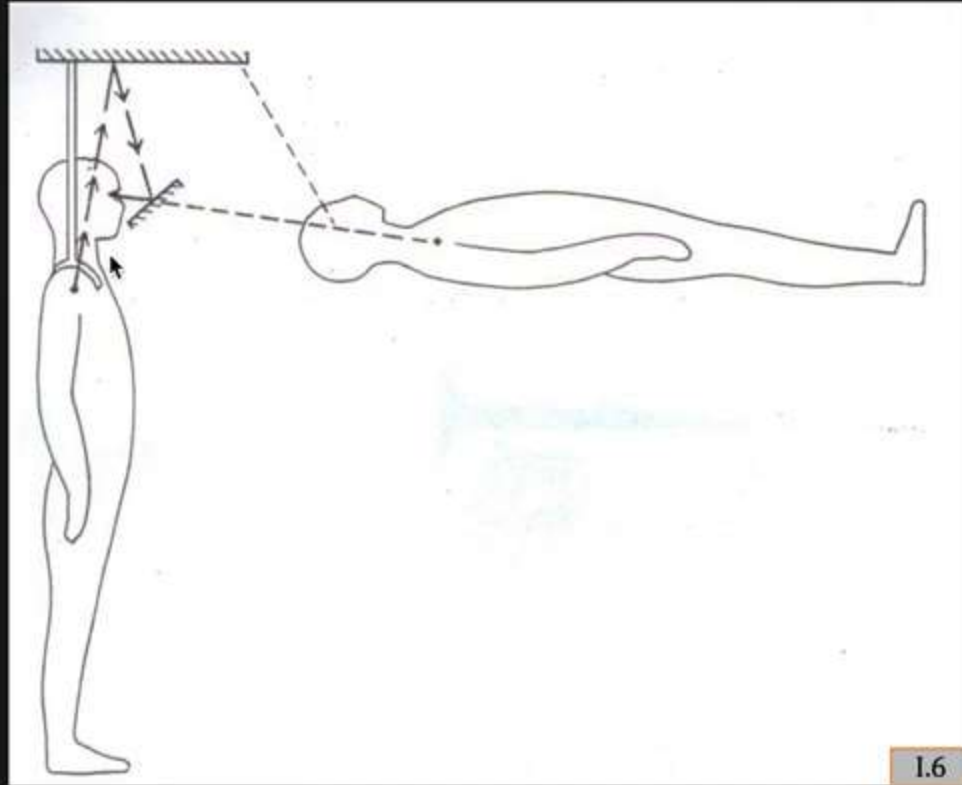
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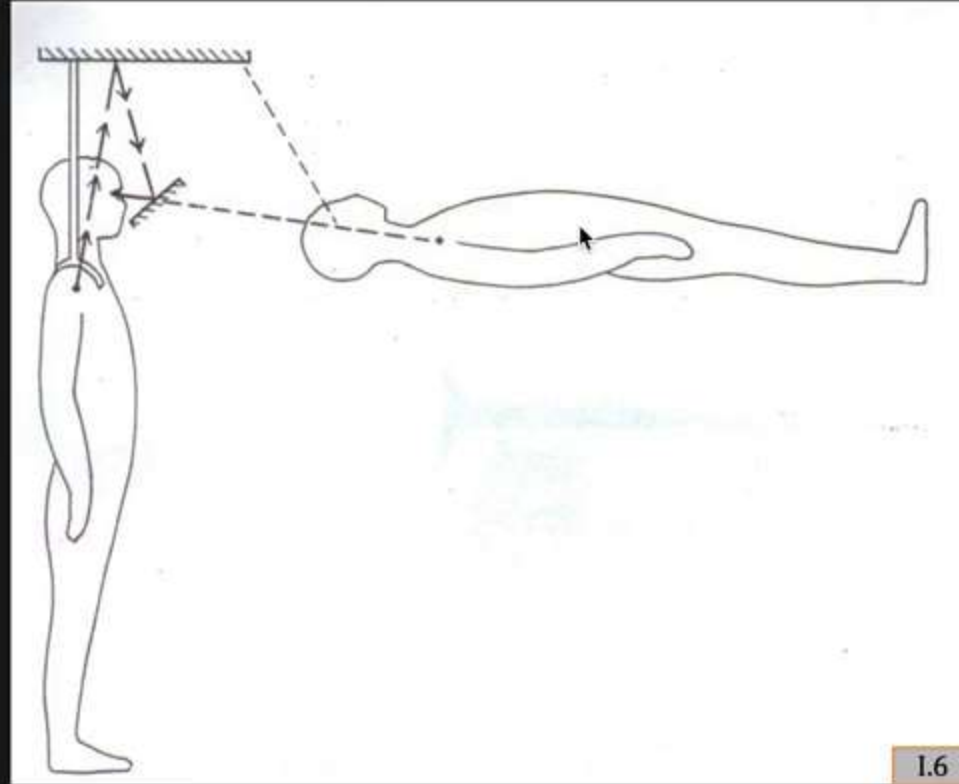
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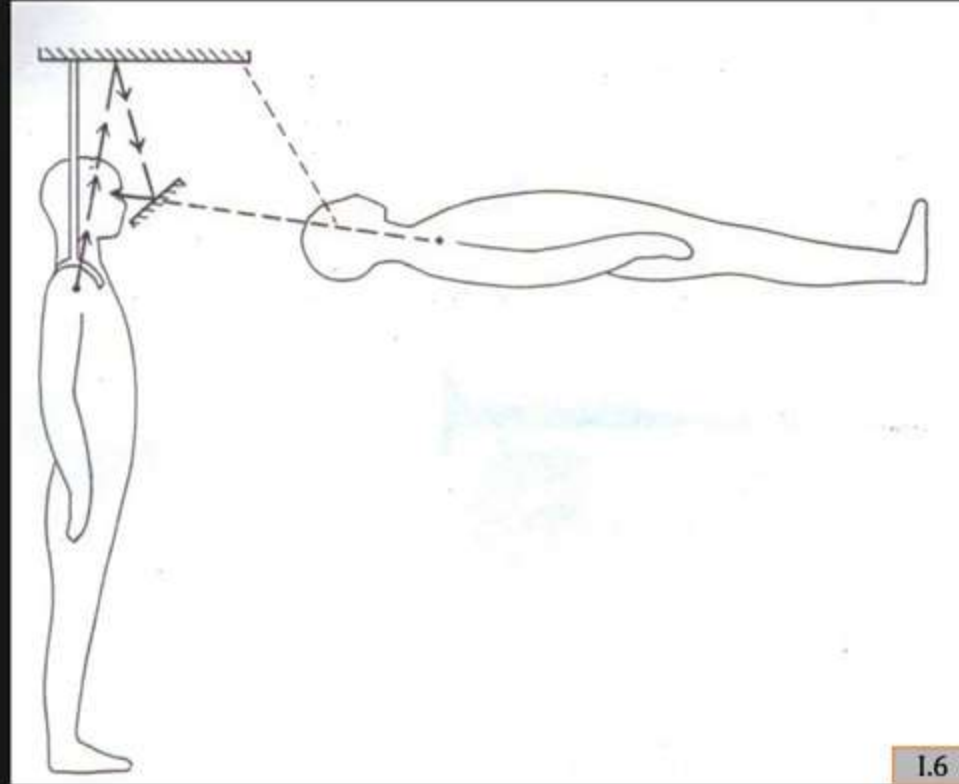
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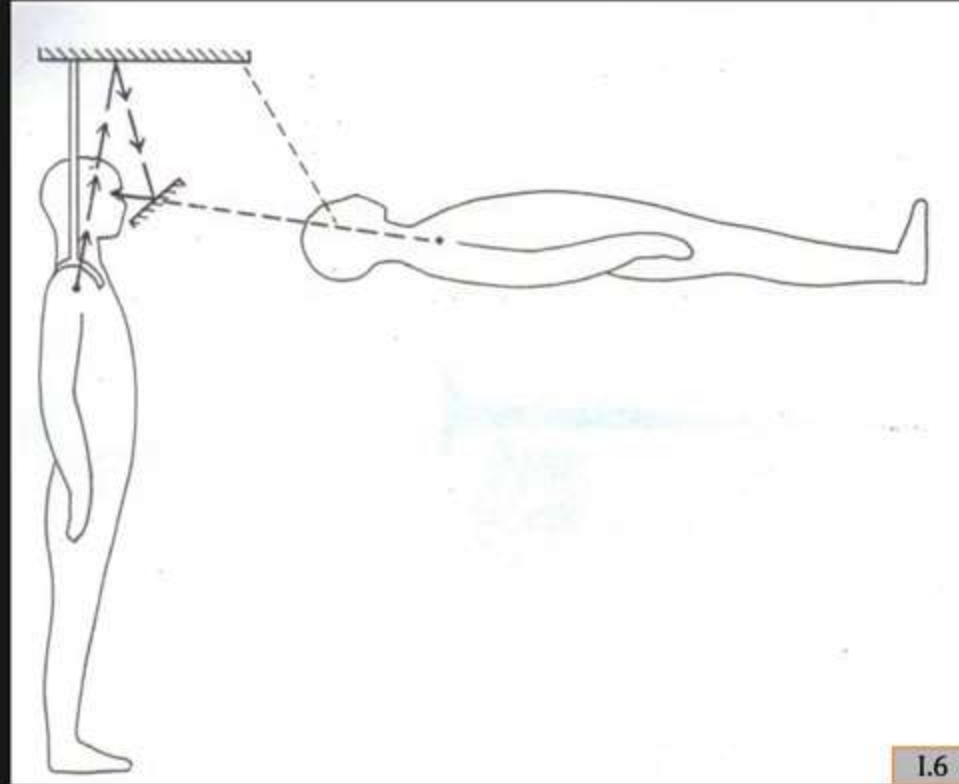
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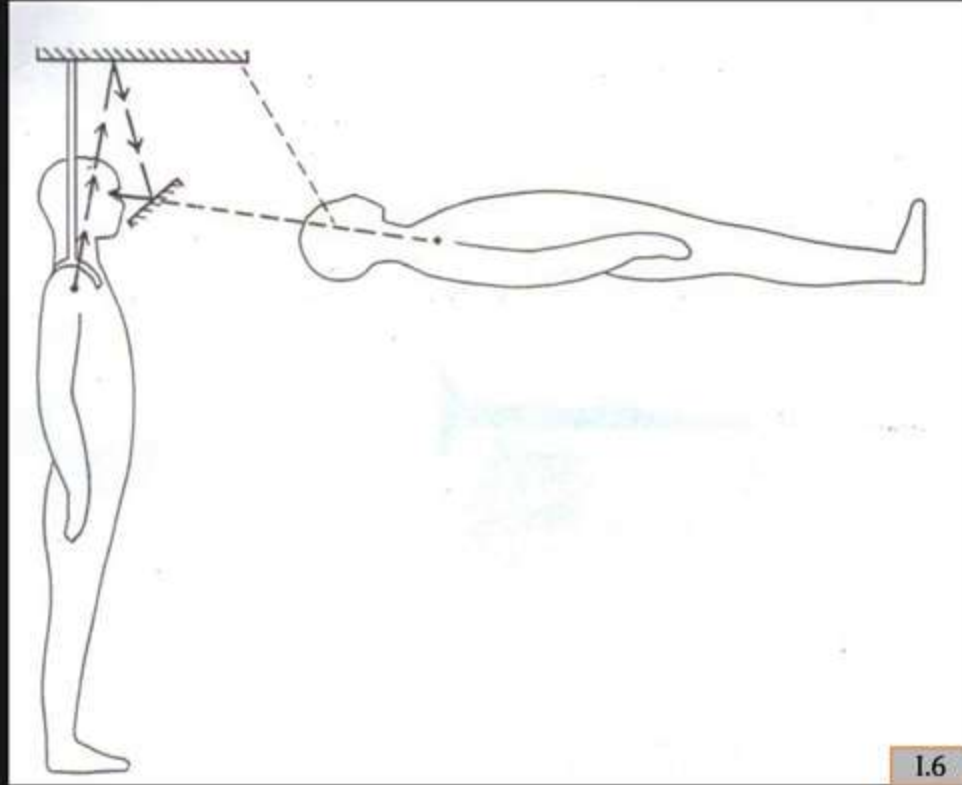
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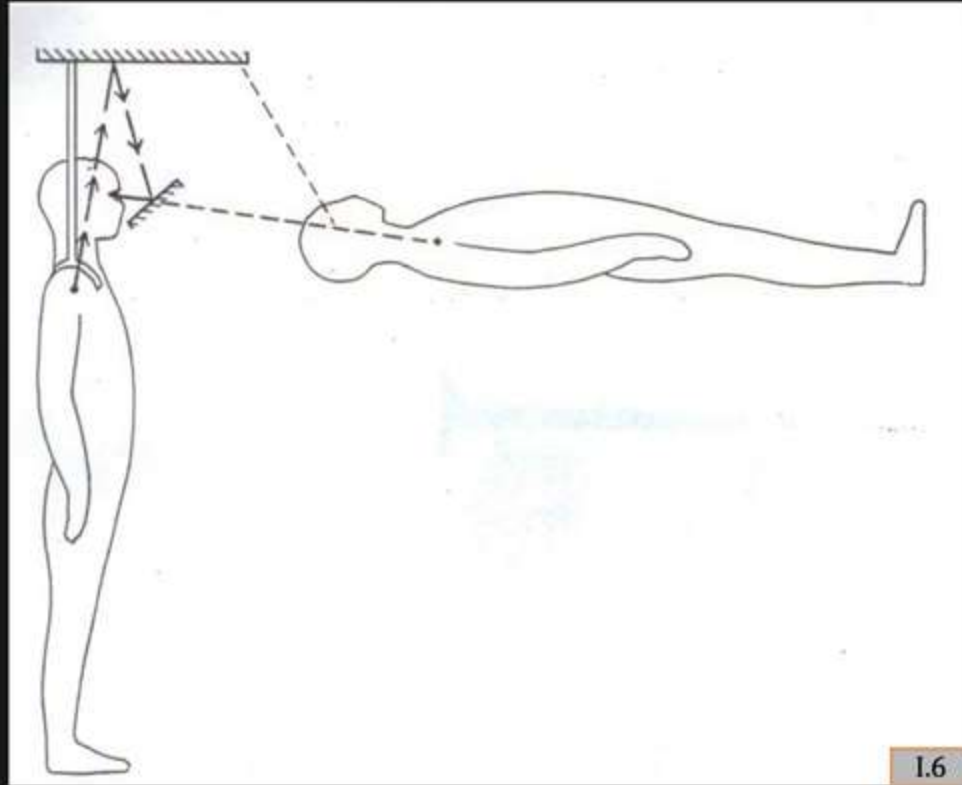
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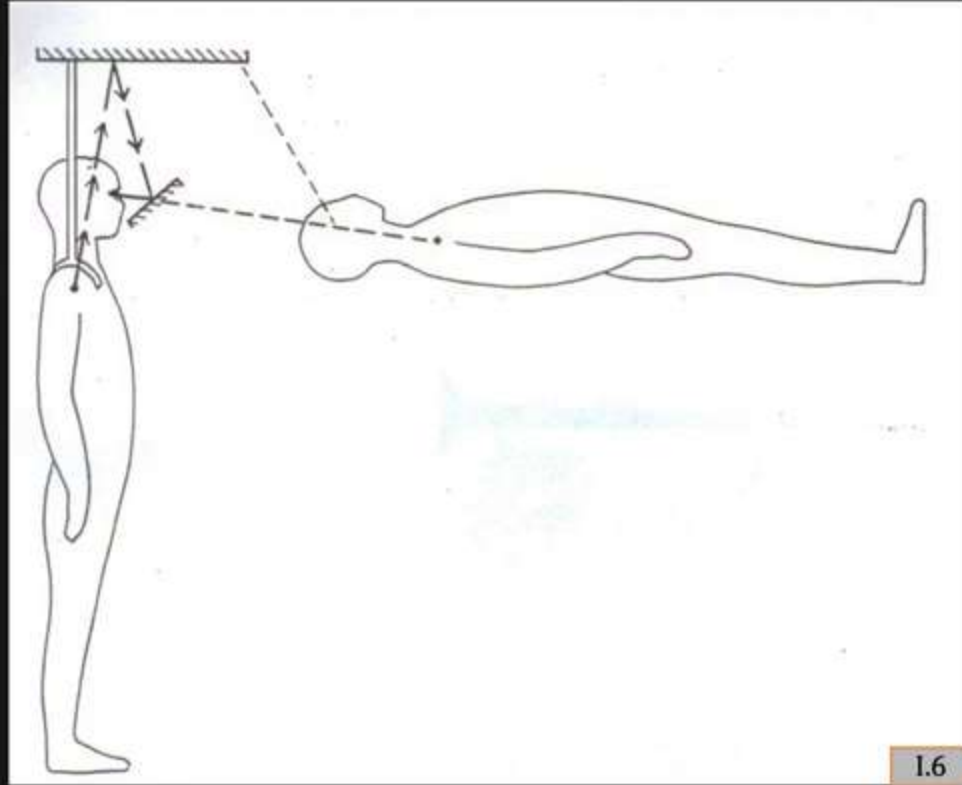
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Pfister's Hen



Prisms are placed in front of each eye to rotate the field of view, effecting the efficiency of depth perception



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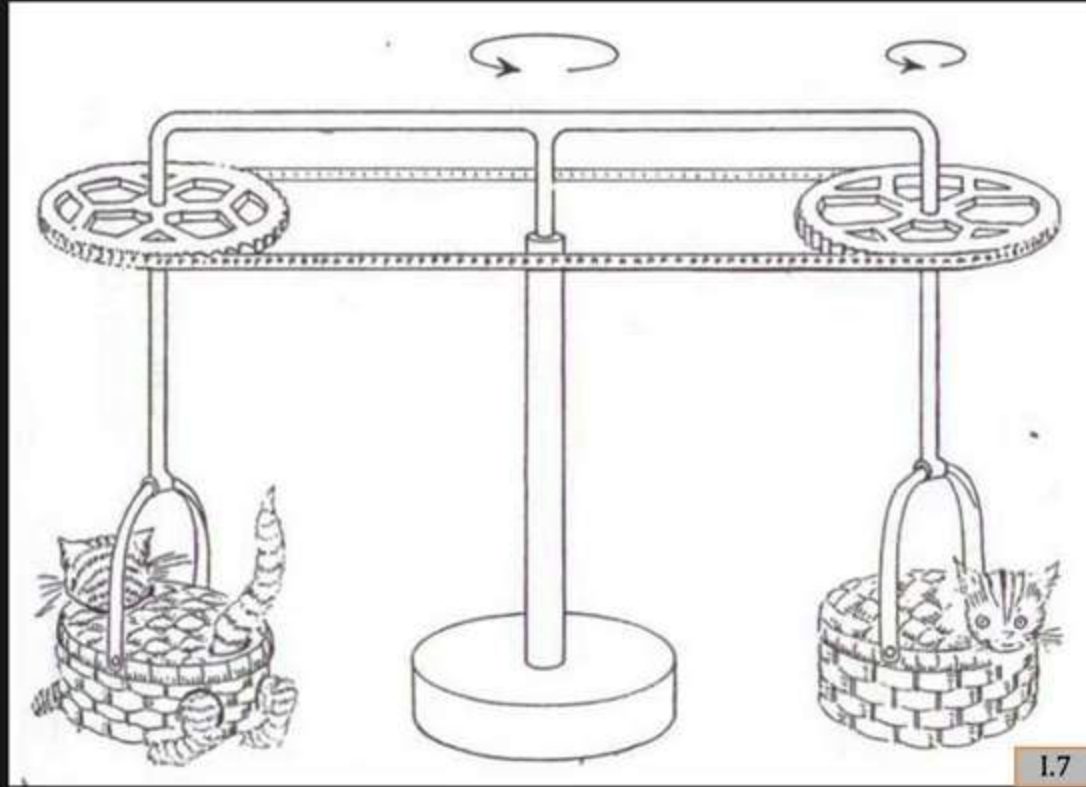
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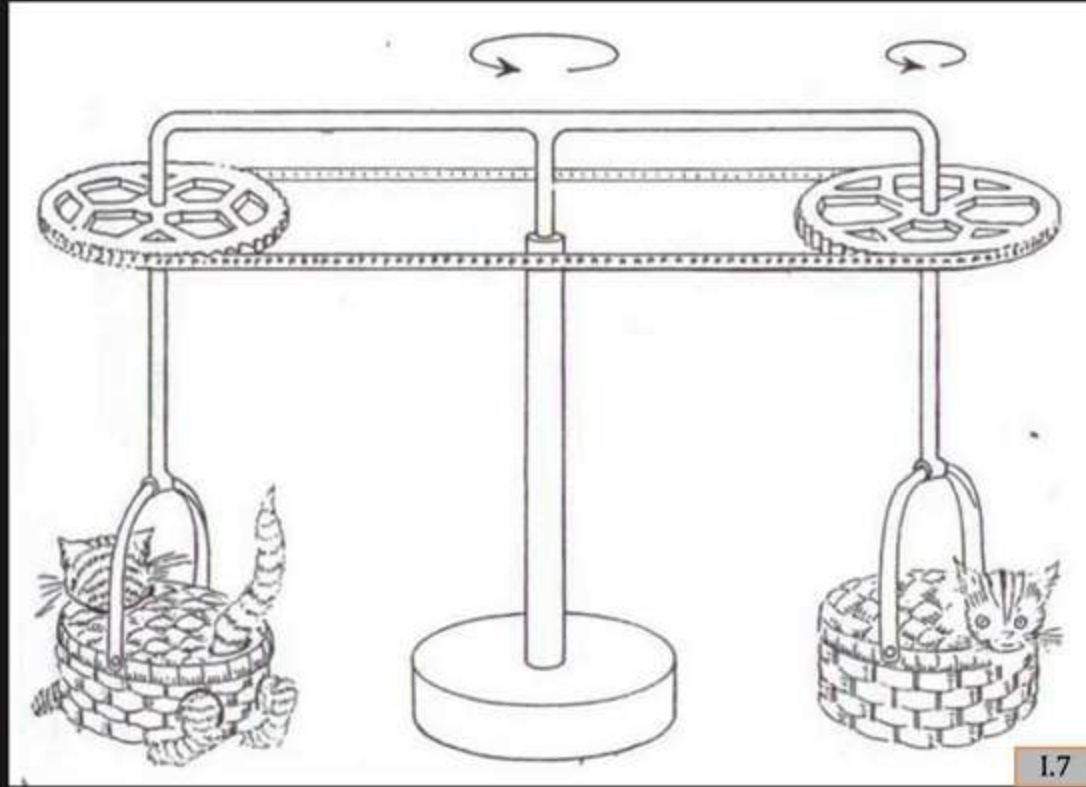
Perceptual Learning and Vision



Apparatus designed by Held and Hein to discover whether learning takes place in a passive animal.

[Held 1963]

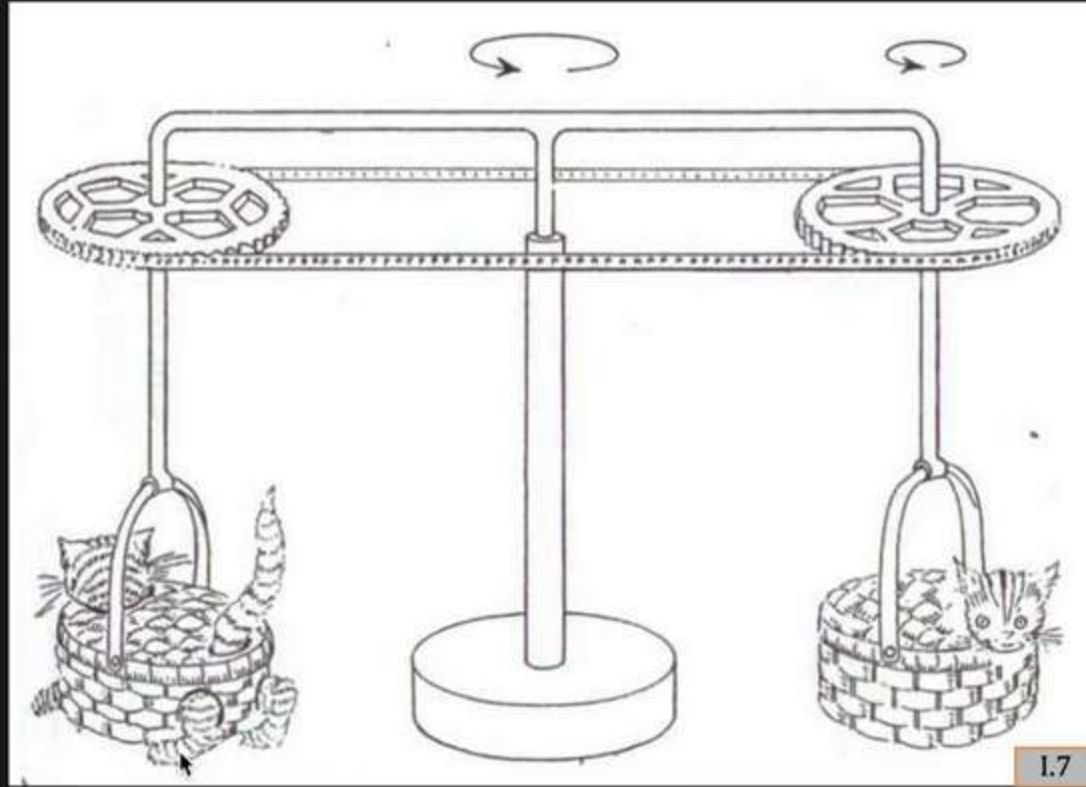
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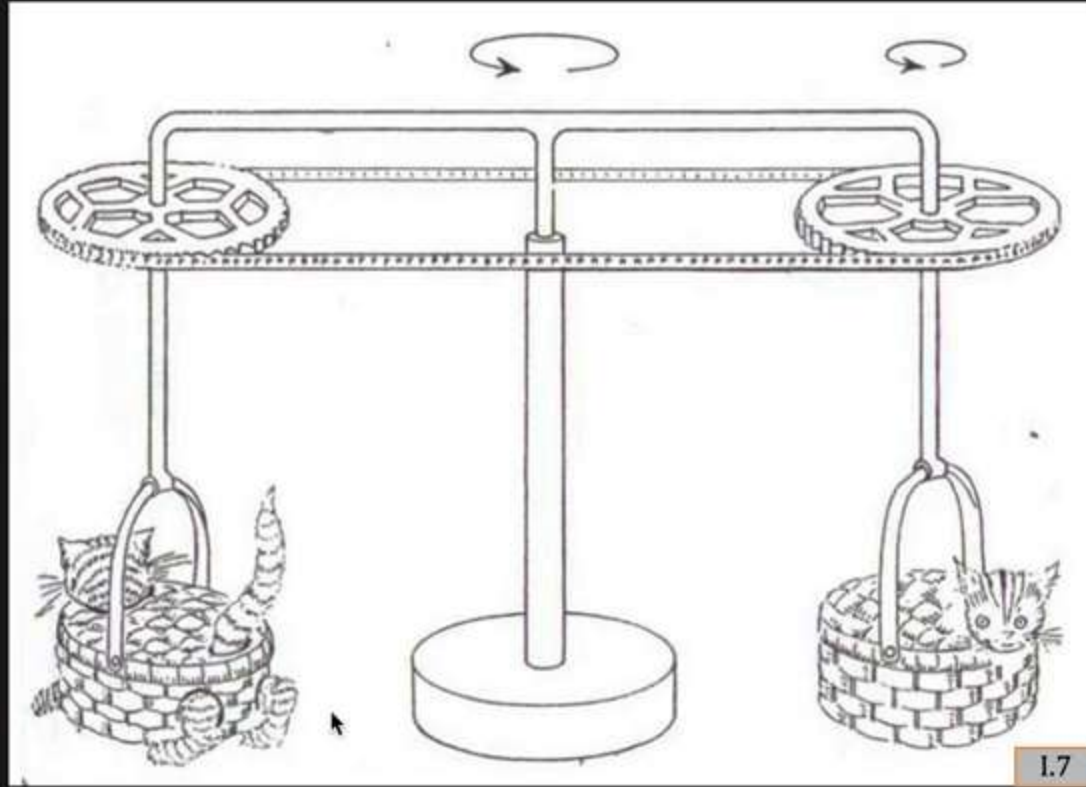
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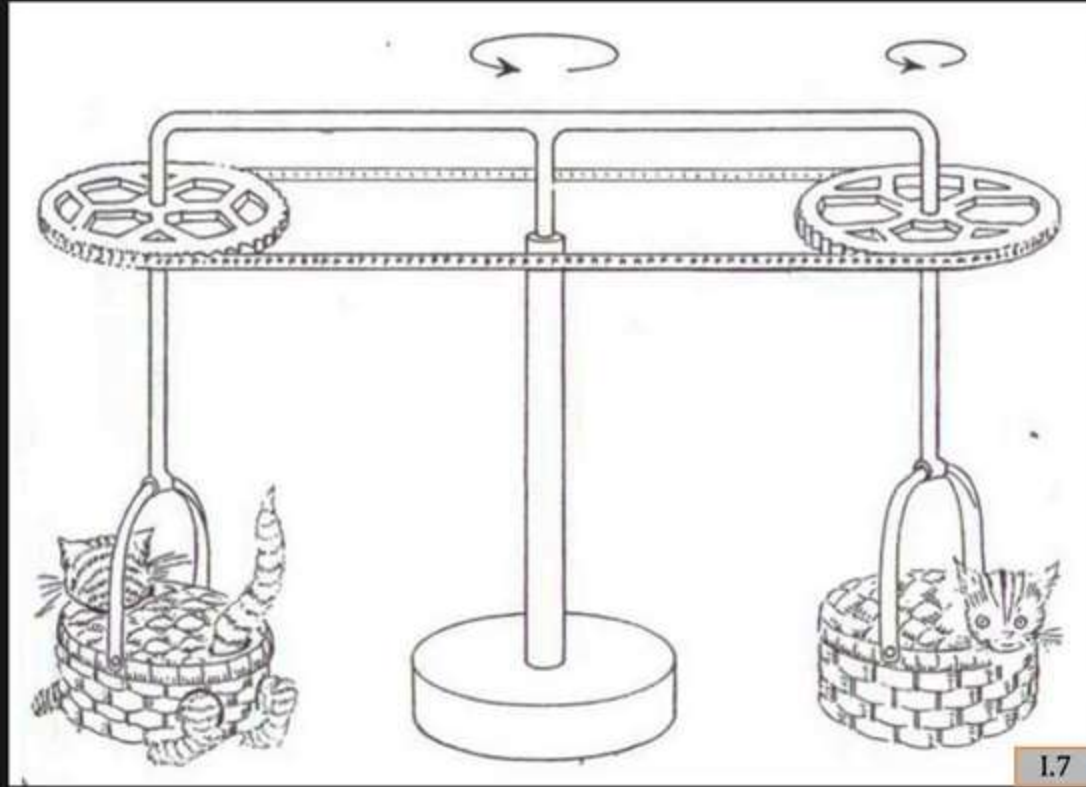
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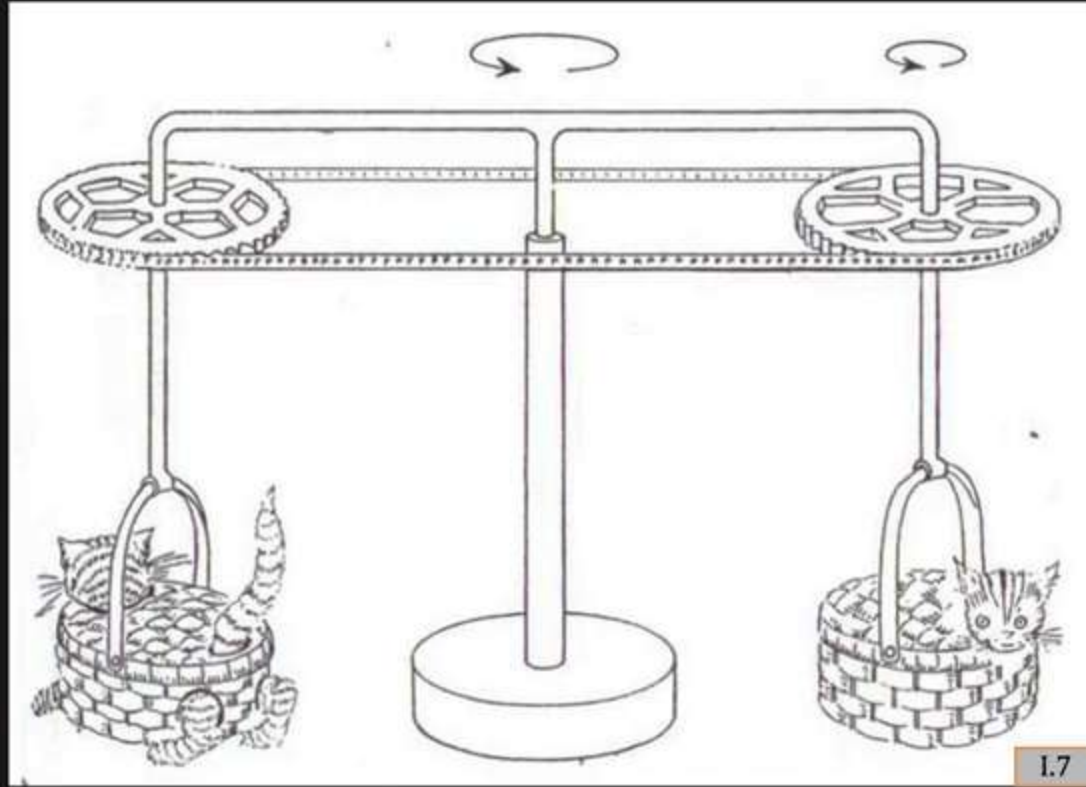
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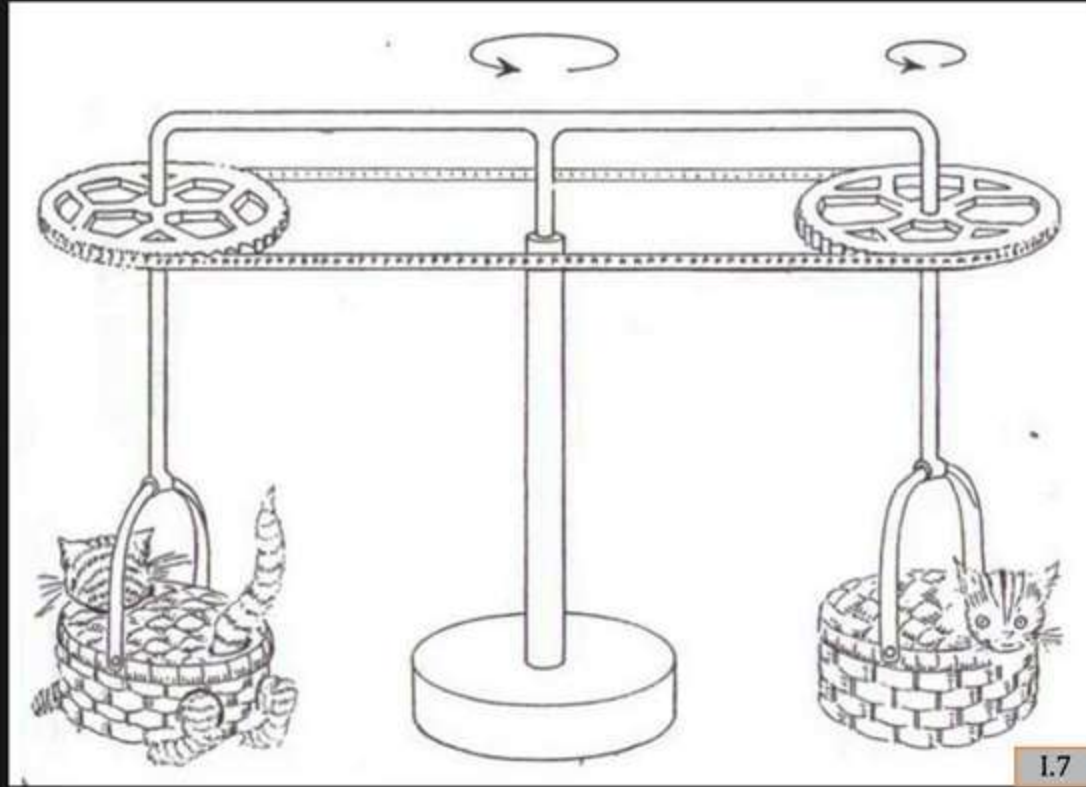
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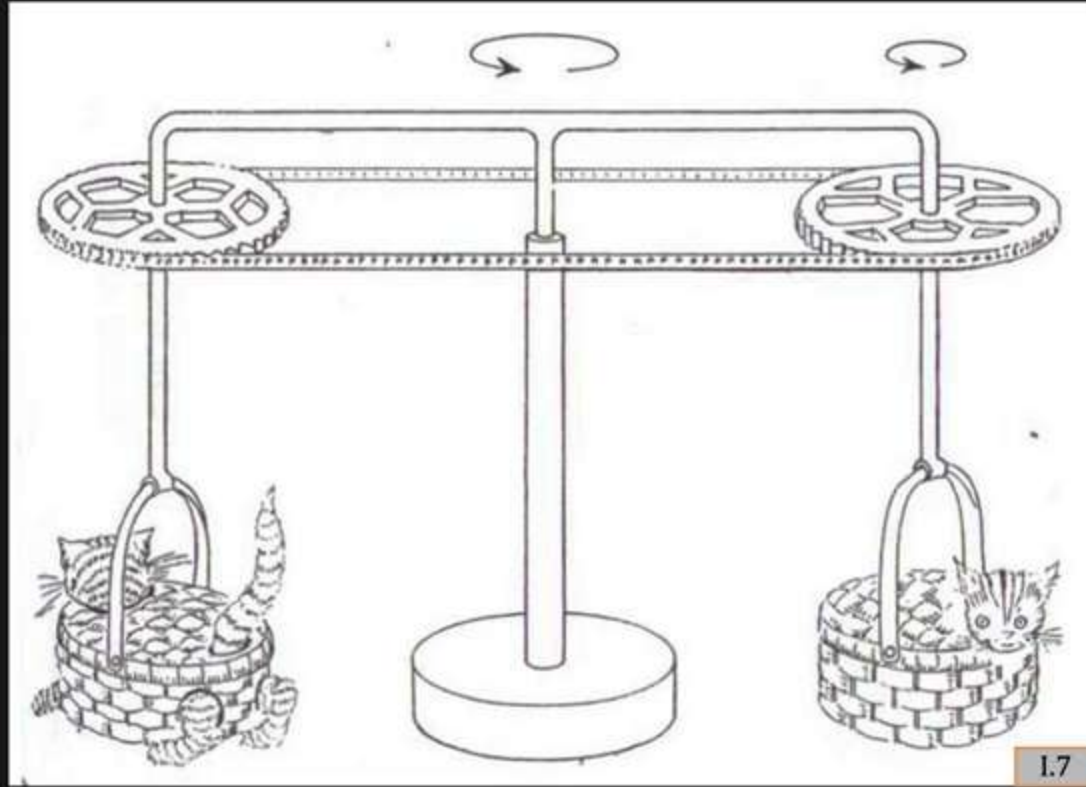
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