Foveal Maintenance systems

Steady Fixation

Pursuits

- **conjugate (version)**
- **disjunctive (vergence)**

Three Components of Physiological Nystagmus

Its normal if you can't see it.

High Frequency Tremor

50-100 Hz

Fixation Drifts

6 min arc/sec

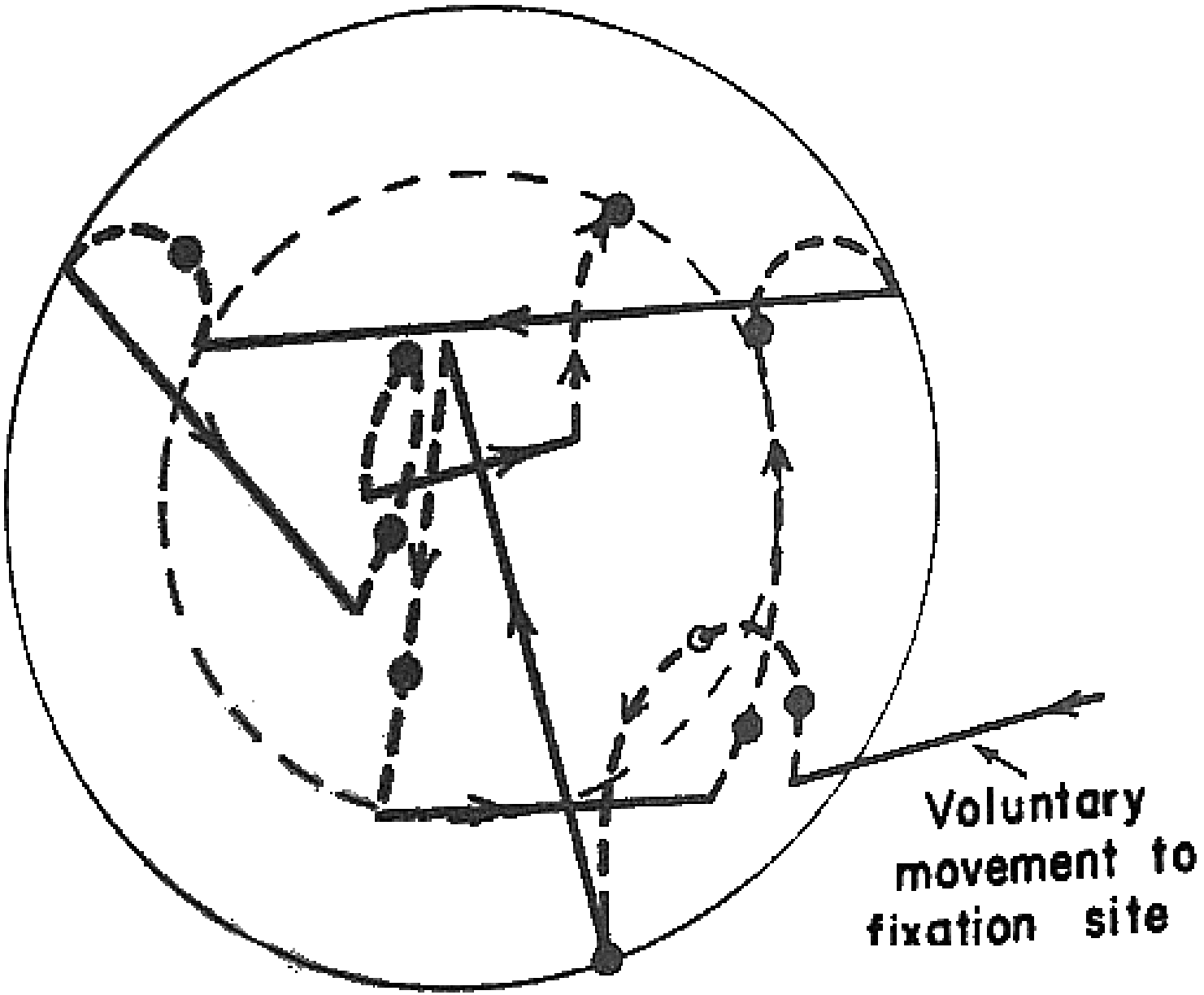
Micro Saccades

6 min arc

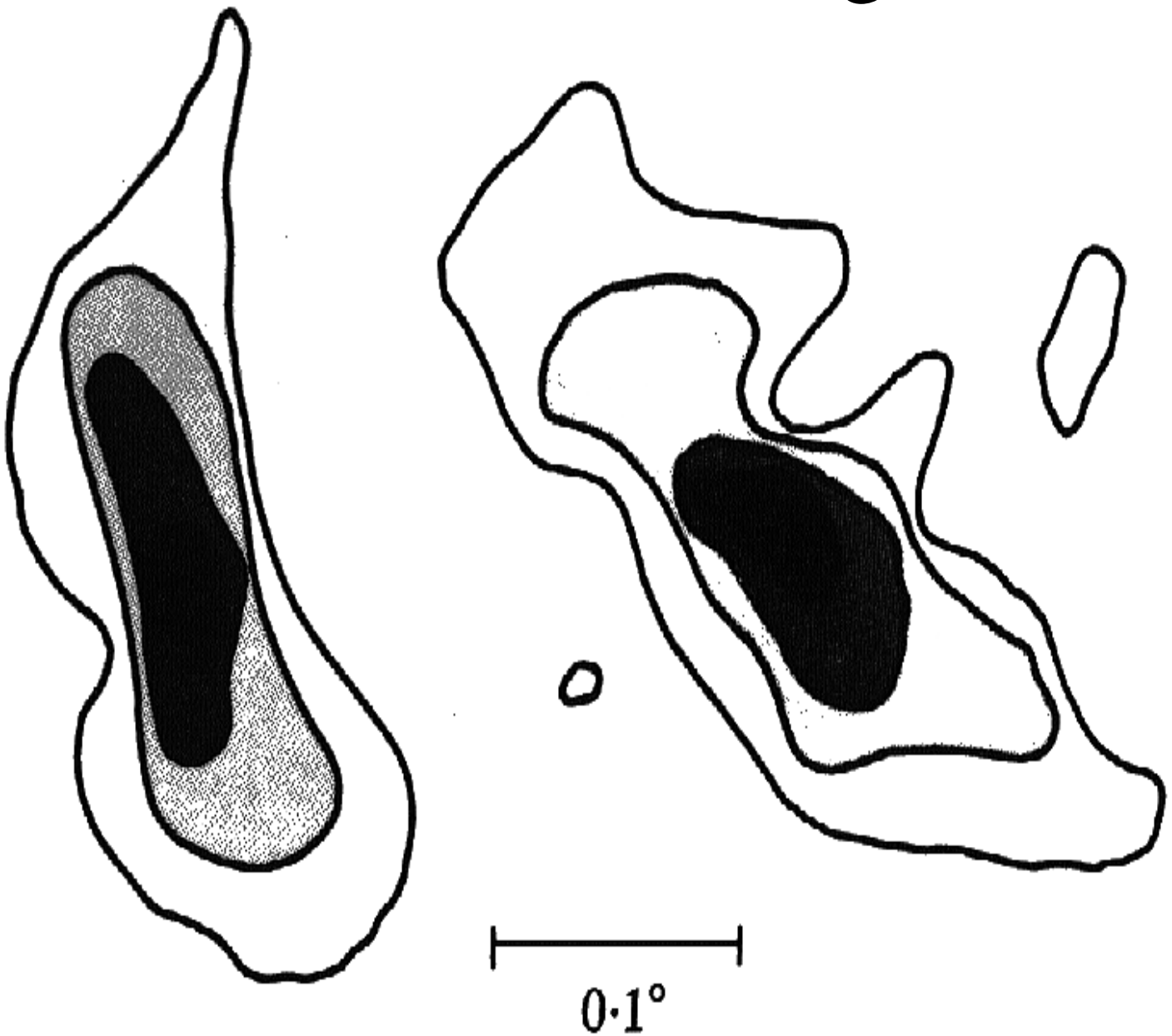
Slow fixation control without saccades.

Fixation in the dark

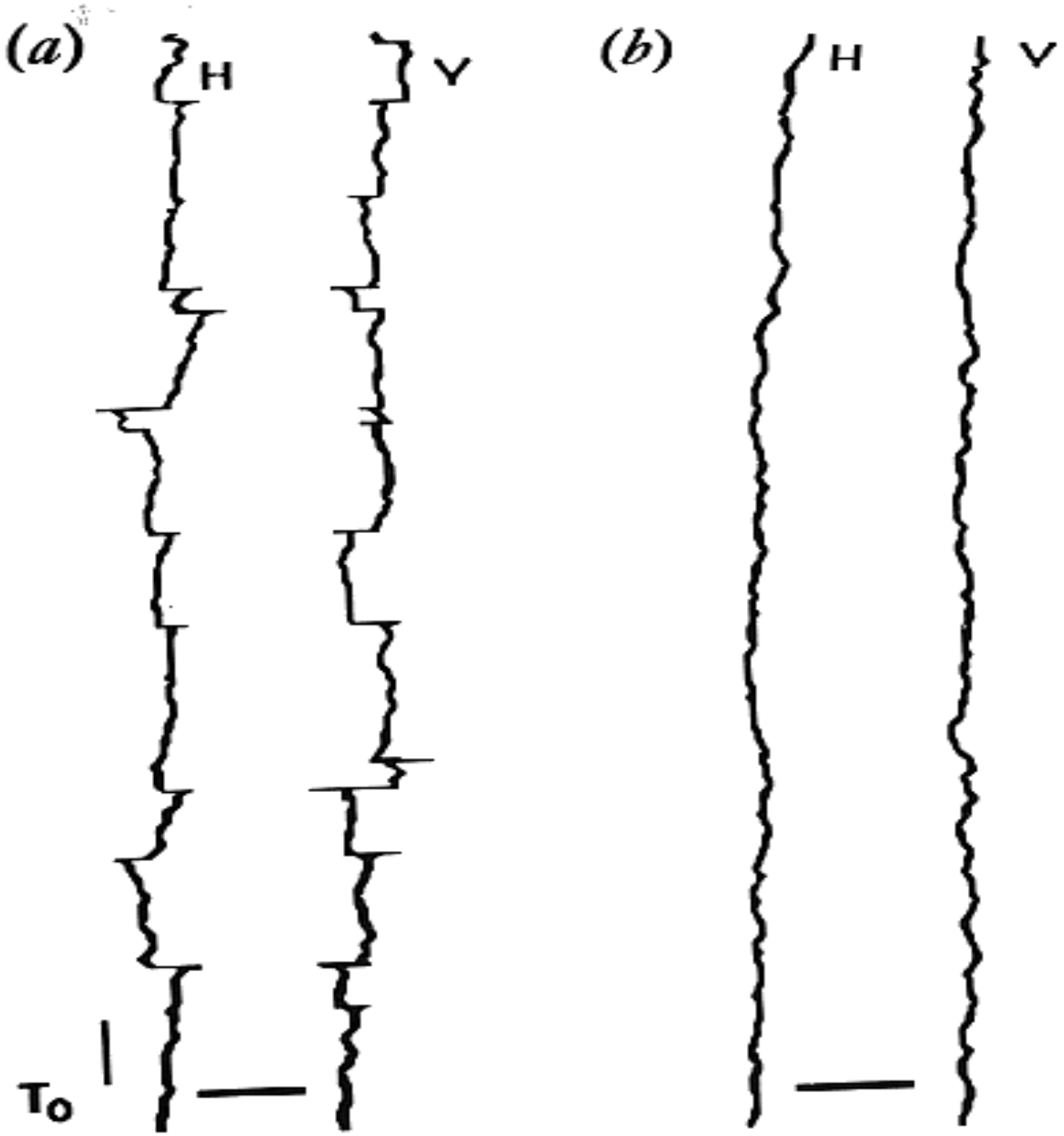
Fixation Drifts and Micro Saccades



Fixation Range



Slow Control



Abnormal Fixation

Eccentric Fixation- a constant fixation error that reduces acuity. Usually nasalward

- **Amblyopia**
- **Strabismus**

Nystagmus- Unsteady fixation (next lecture)

Pursuit Stimuli:

Retinal image motion (velocity)

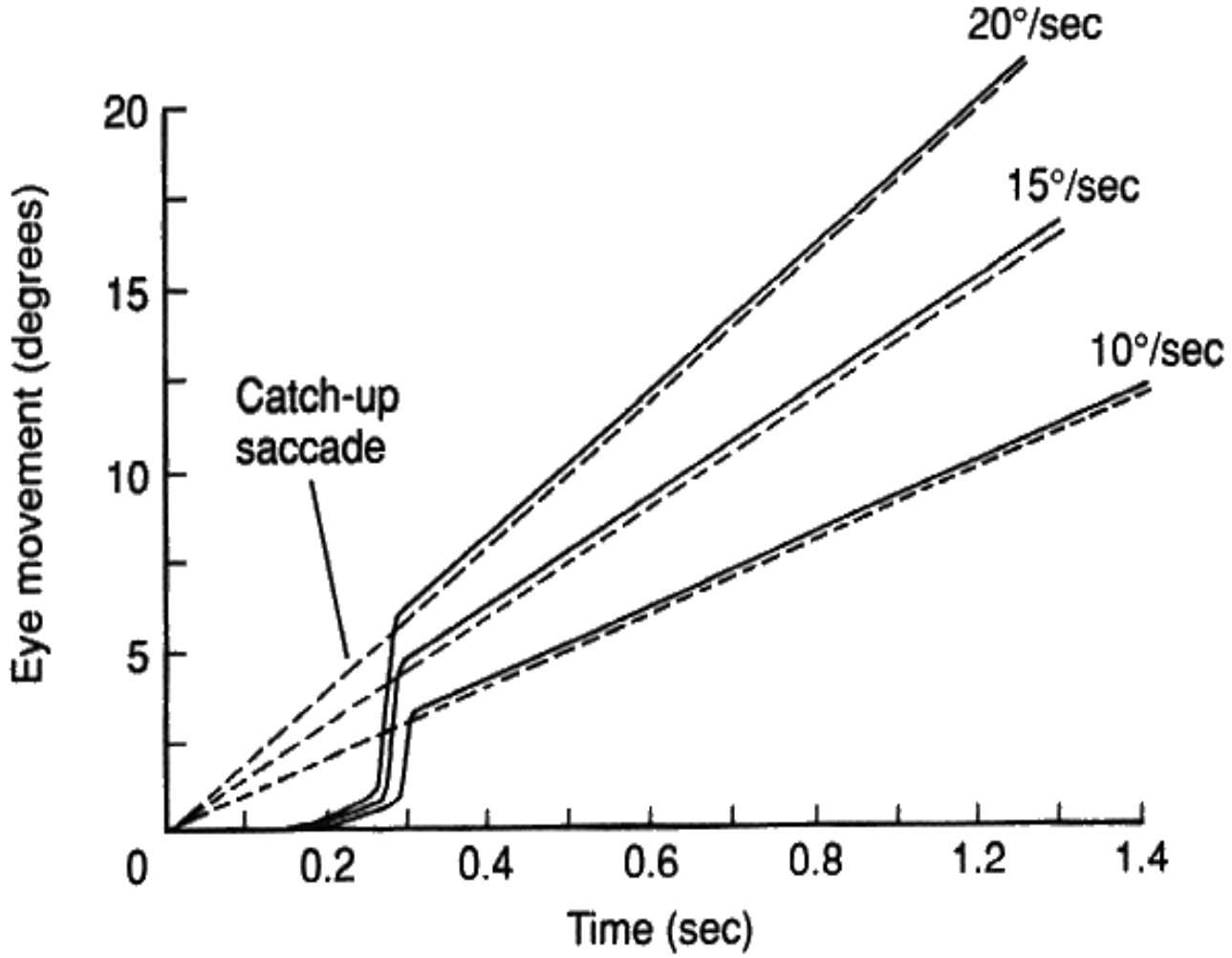
Retinal image position (foveal eccentricity)

Head centric motion (eye motion signals)

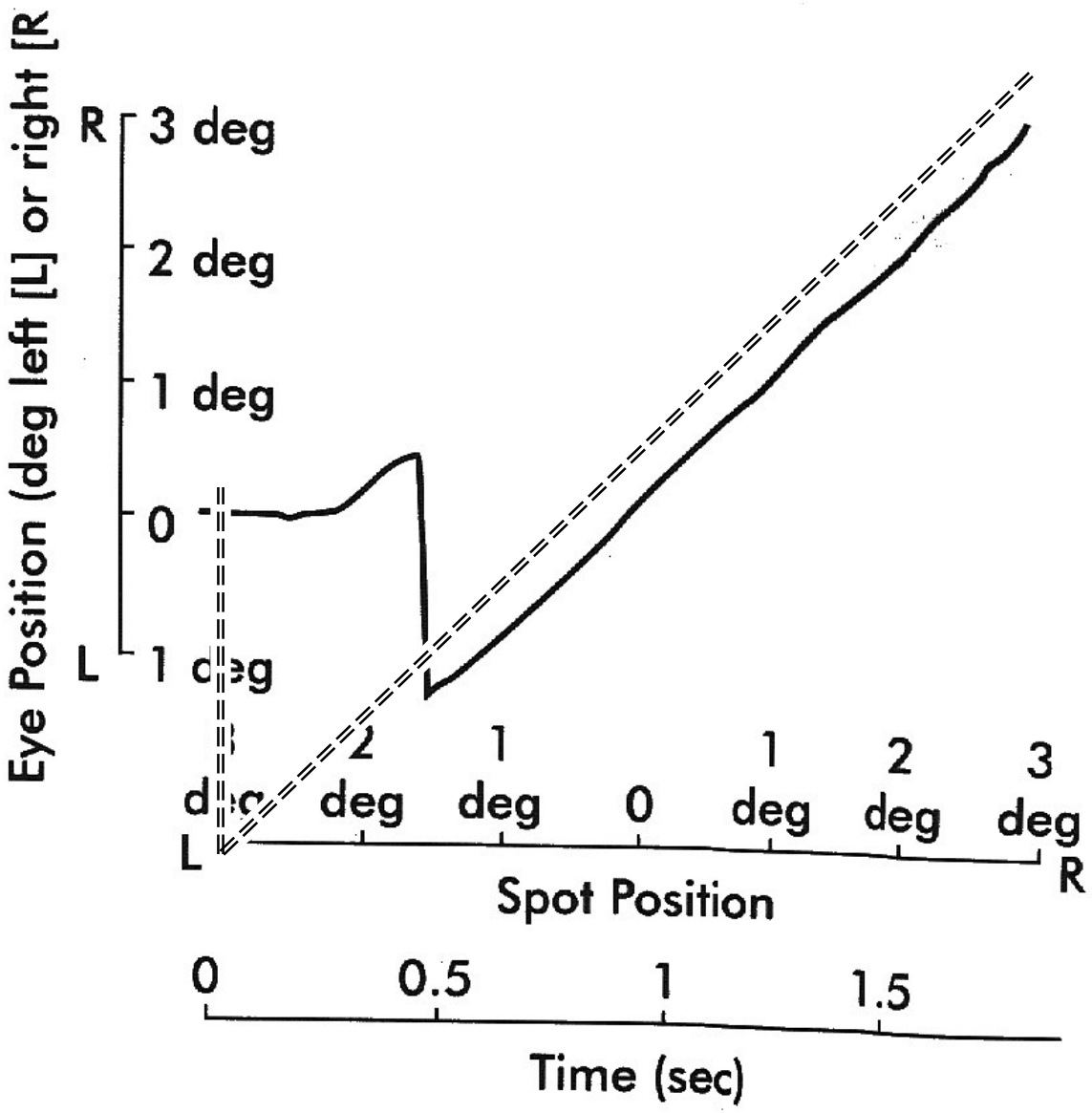
Inferred motion (stroboscopic motion)

Non-visual stimuli- sound and proprioception

Pursuit response to retinal motion

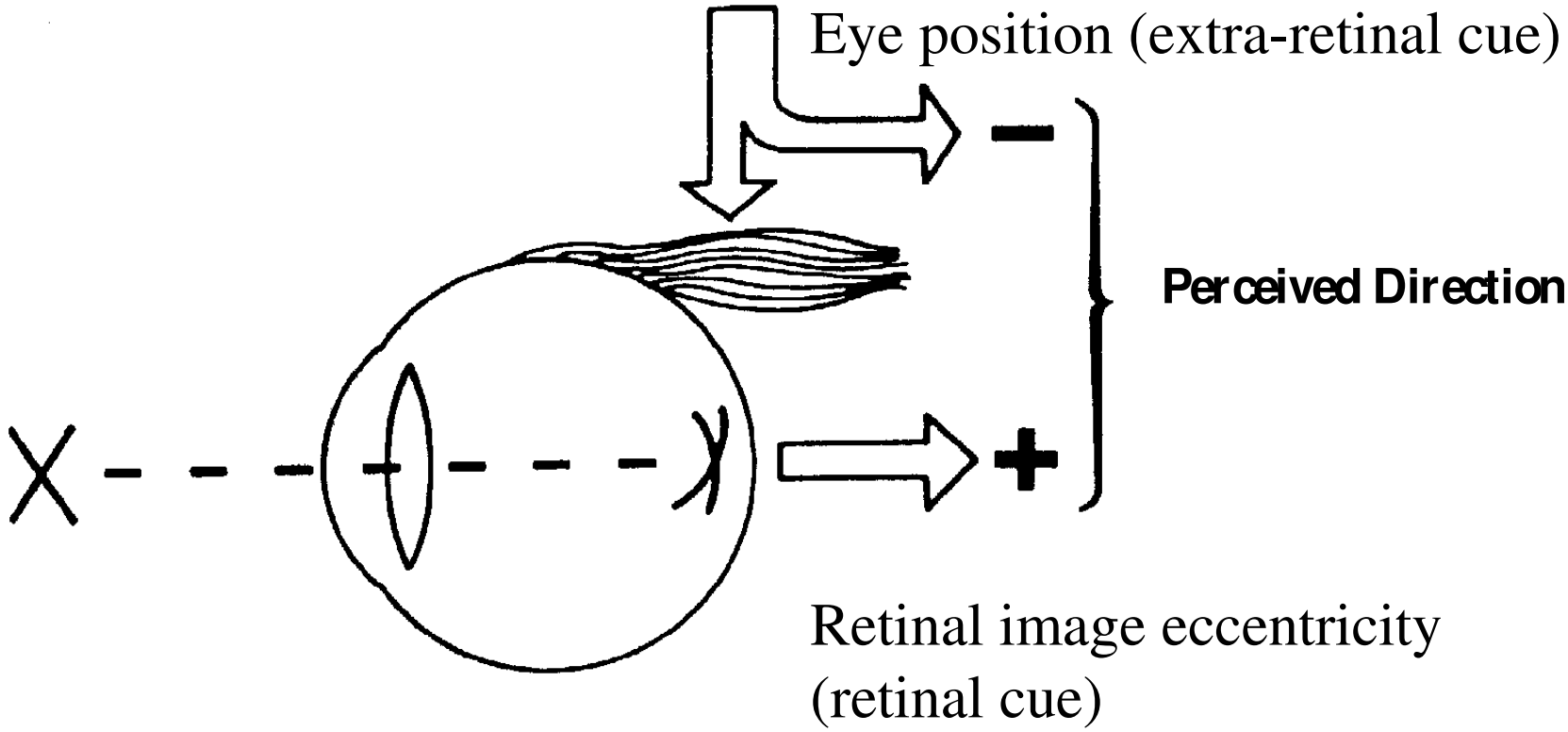


Step - ramp combination:
A conflict between position and velocity control

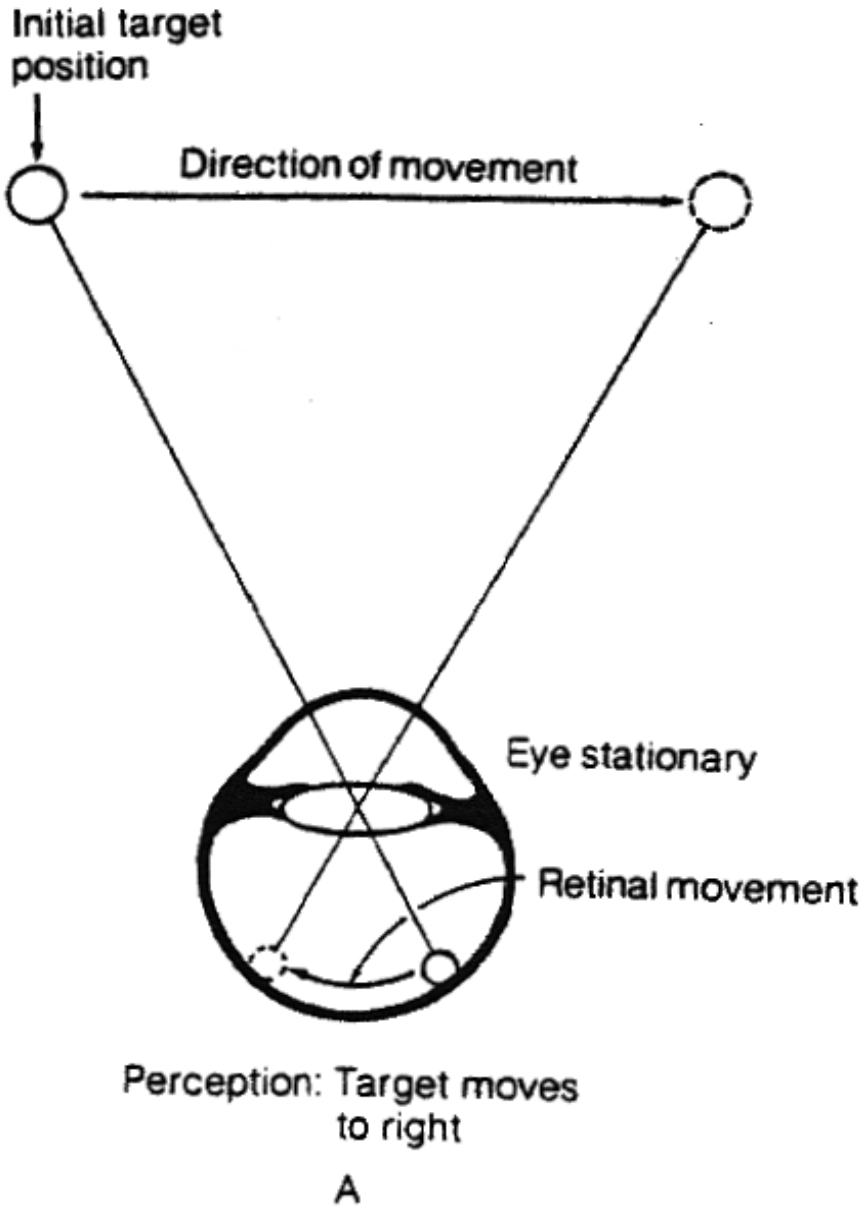


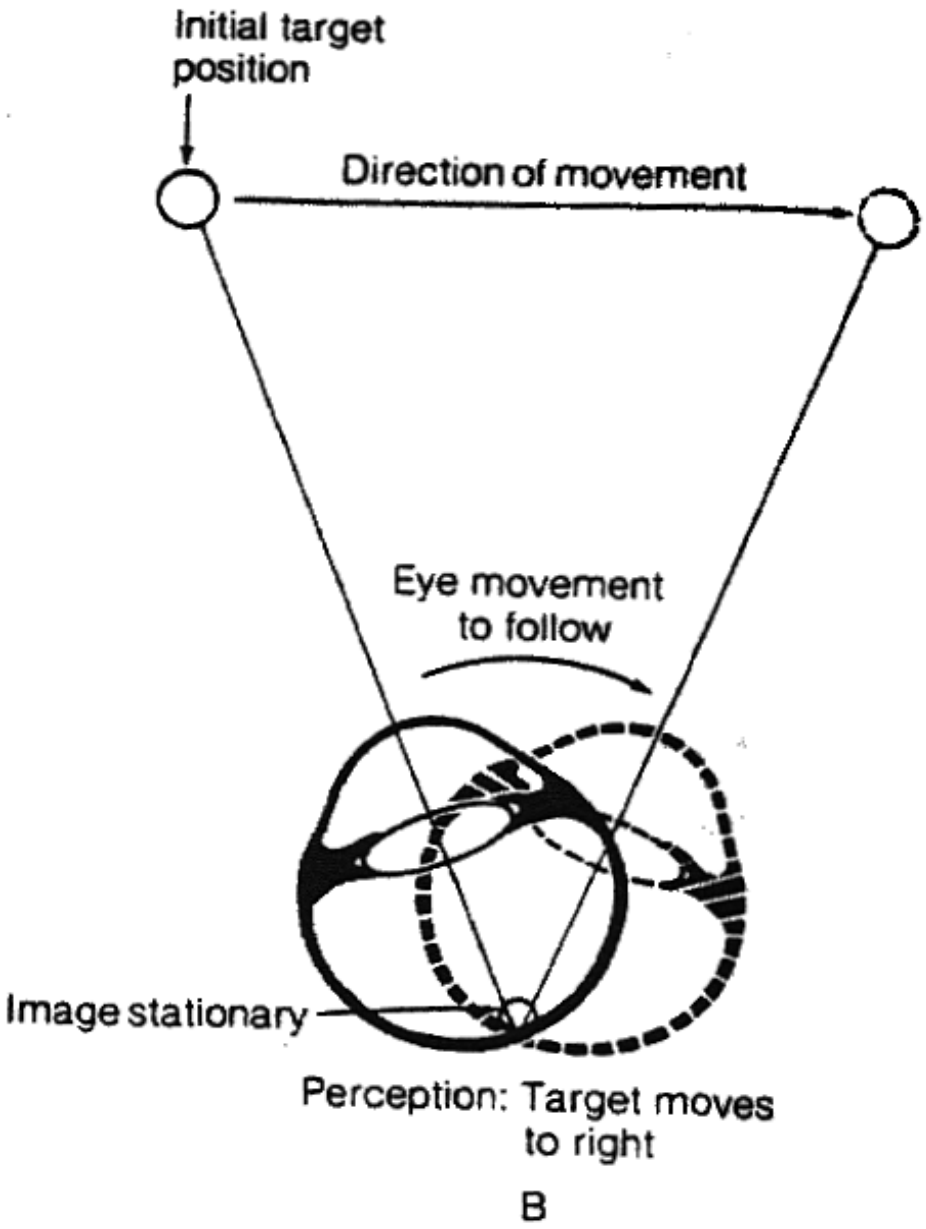
Head-centric motion

The combination of retinal position (oculocentric) and extra-retinal eye position information



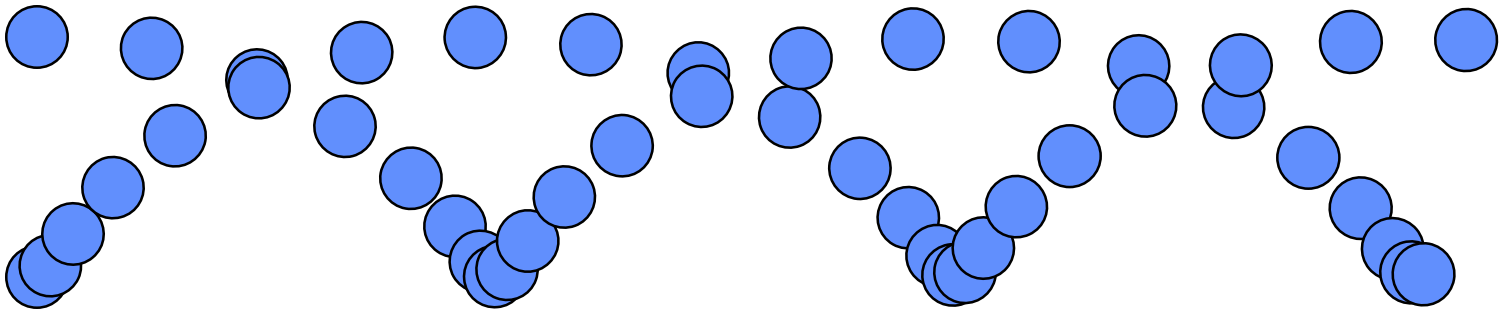
Pursuit of Head vs. Retinal Motion





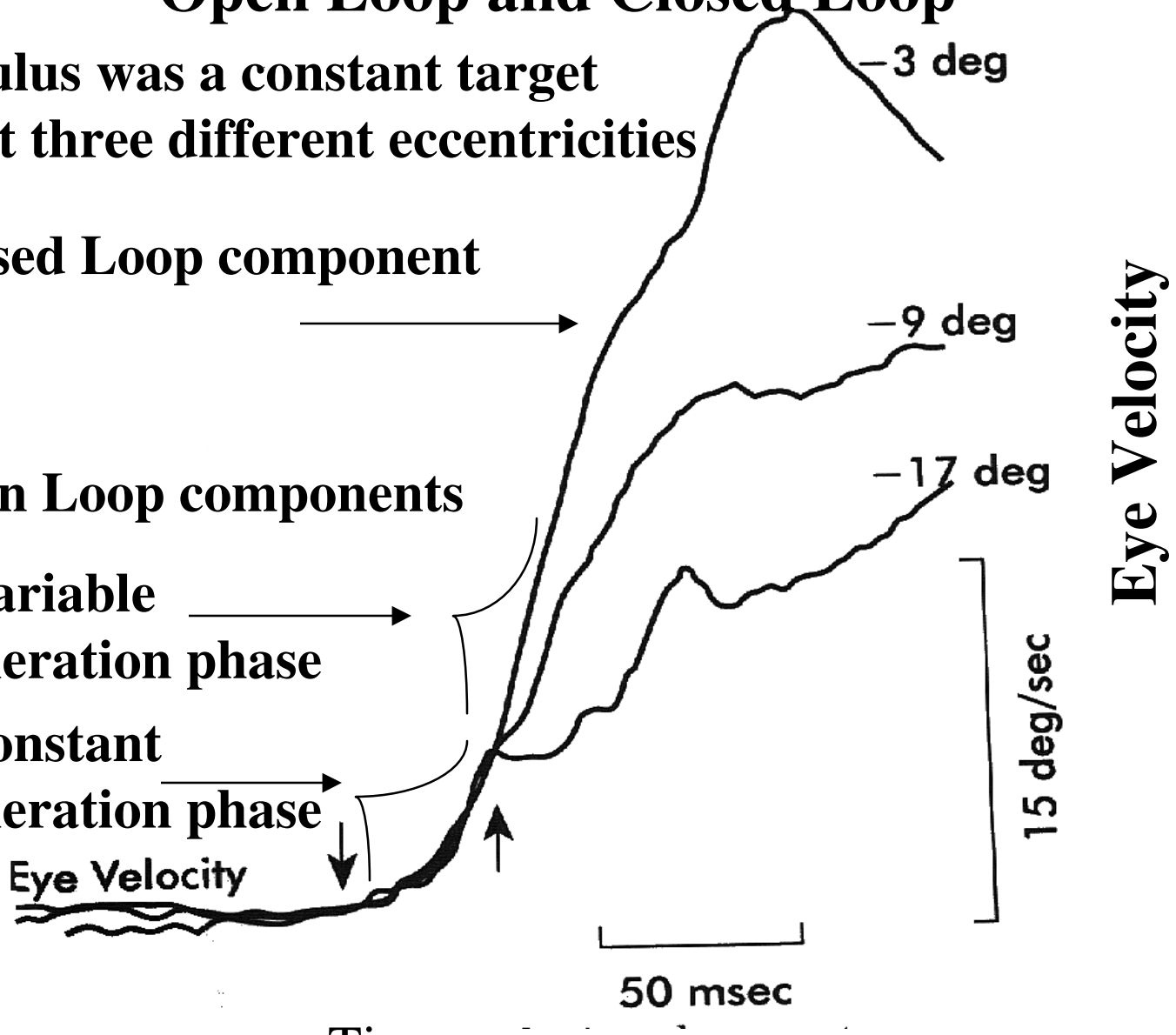
After-image gun demonstration of position driven pursuits

Hub Pursuit- run movie PP



Two phases of Pursuit Dynamics: Open Loop and Closed Loop

The stimulus was a constant target velocity at three different eccentricities



Pursuit Pathways:

Retina

LGN

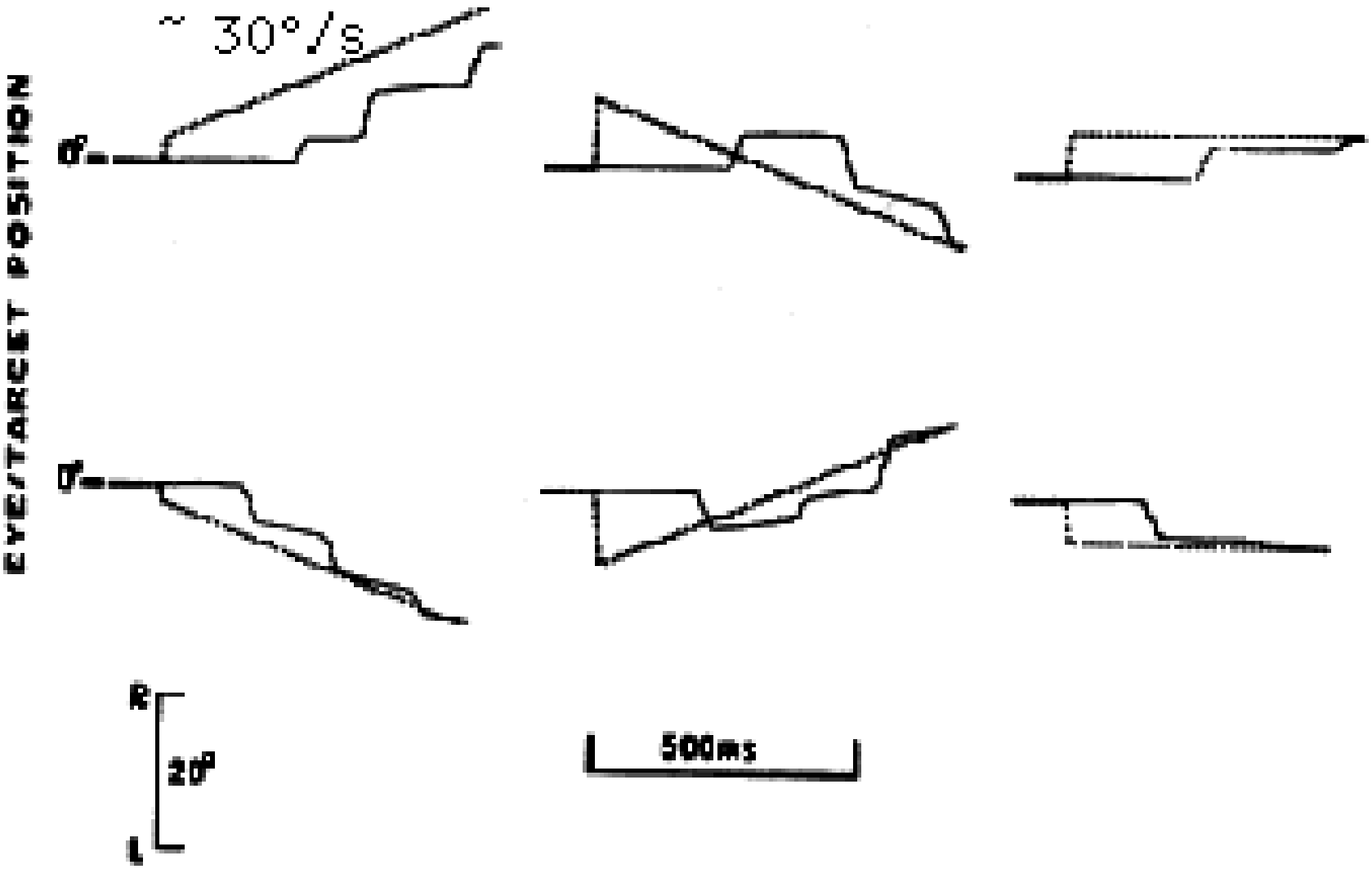
Cortex:

- **Striate Cortex (Area 17 or V1)**
- **Area MT- codes retinal motion in contralateral field**
- **Area MST- Codes head-centric motion to ipsilateral side on both halves of the visual field**

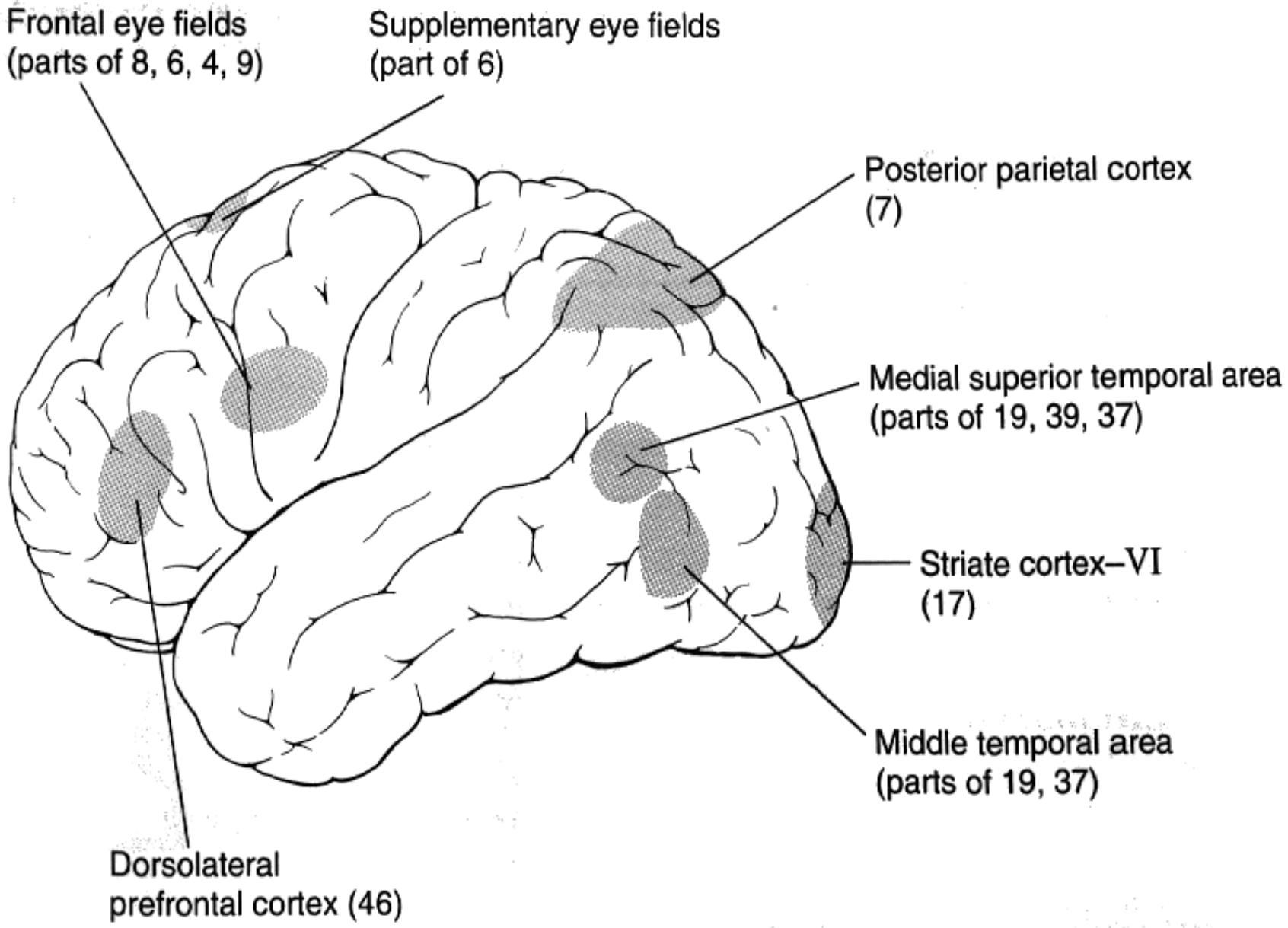
Brainstem:

- **DLPN Ipsilateral pursuit**
- **Contralateral VIII**
- **Ipsilateral Abducens and Hering's center**

Effect of left MT Lesion on Pursuits



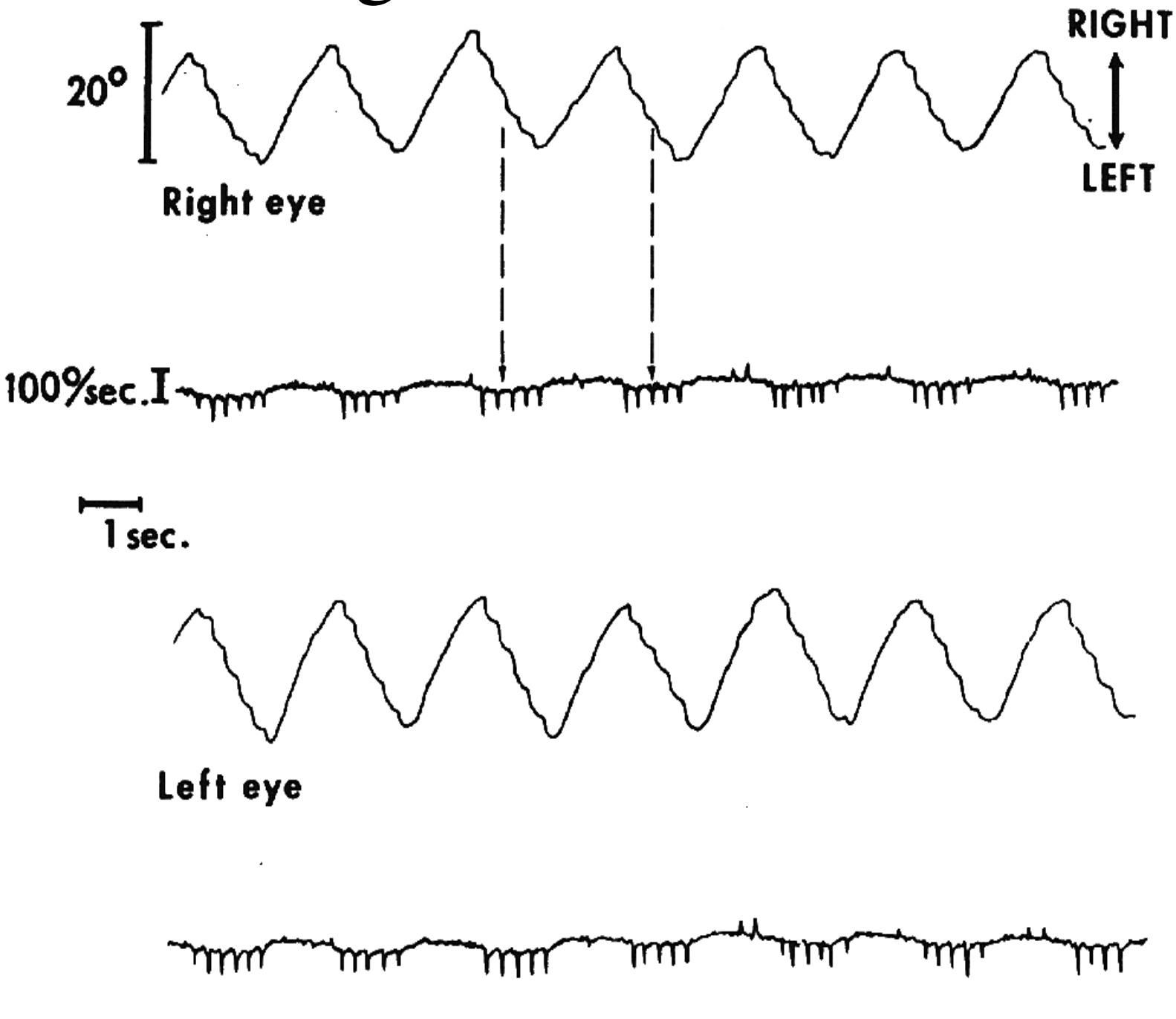
Cortical Areas



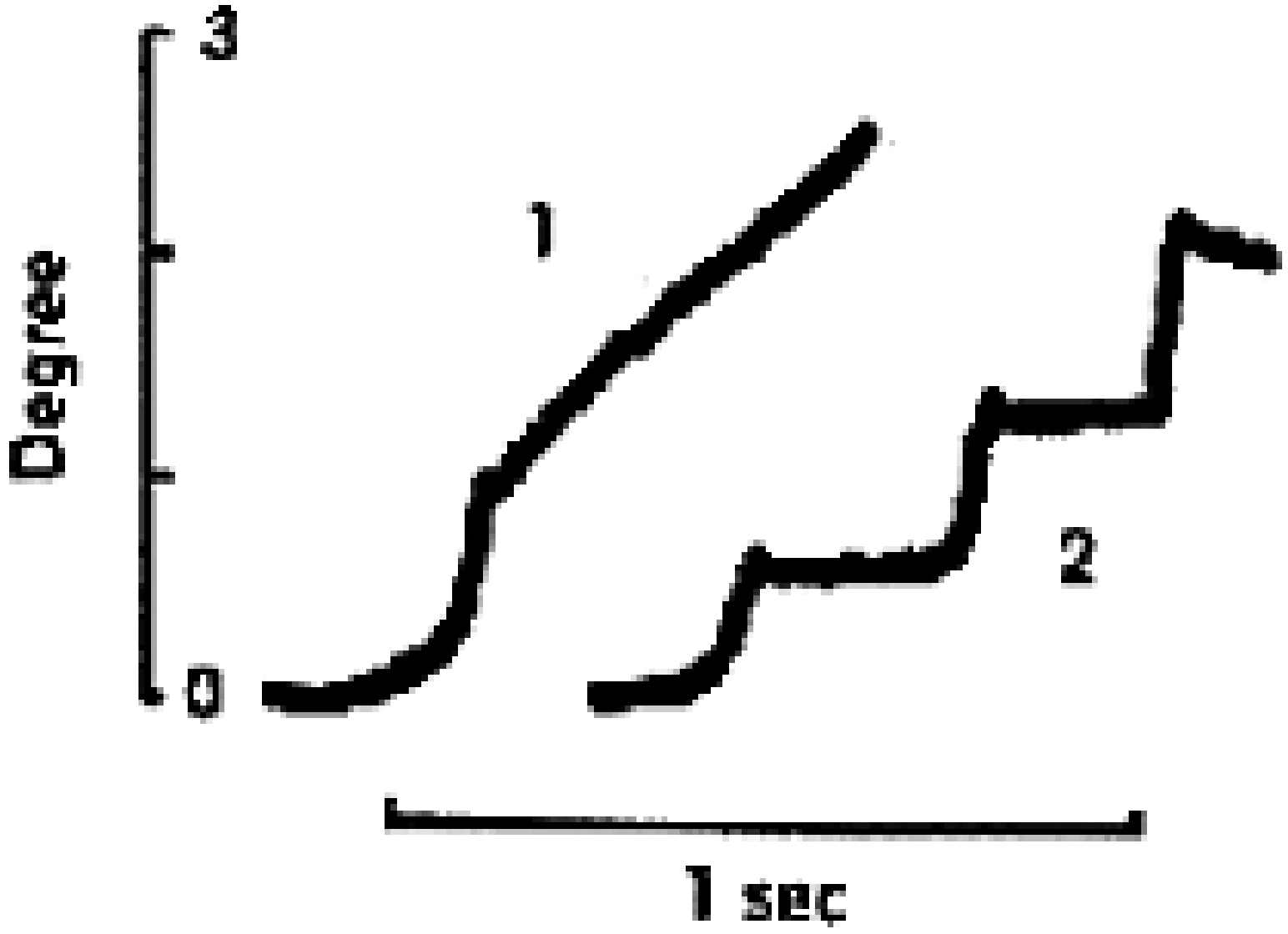
Factors influencing pursuits

Age- contrast sensitivity
Drugs-barbituates
Disease- Parkinsons,
Alzheimer's
Schizophrenia

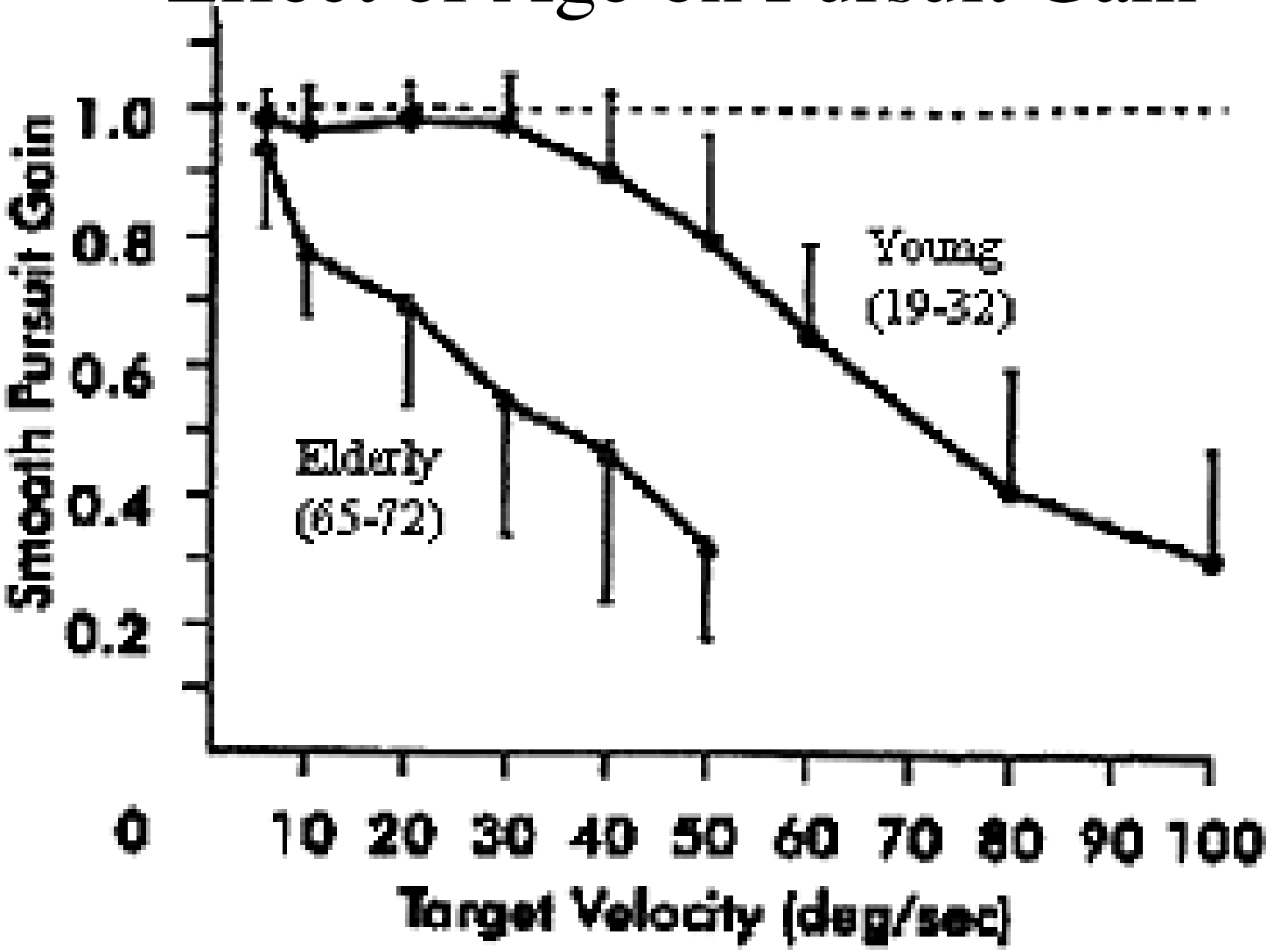
Cog-Wheel Pursuits



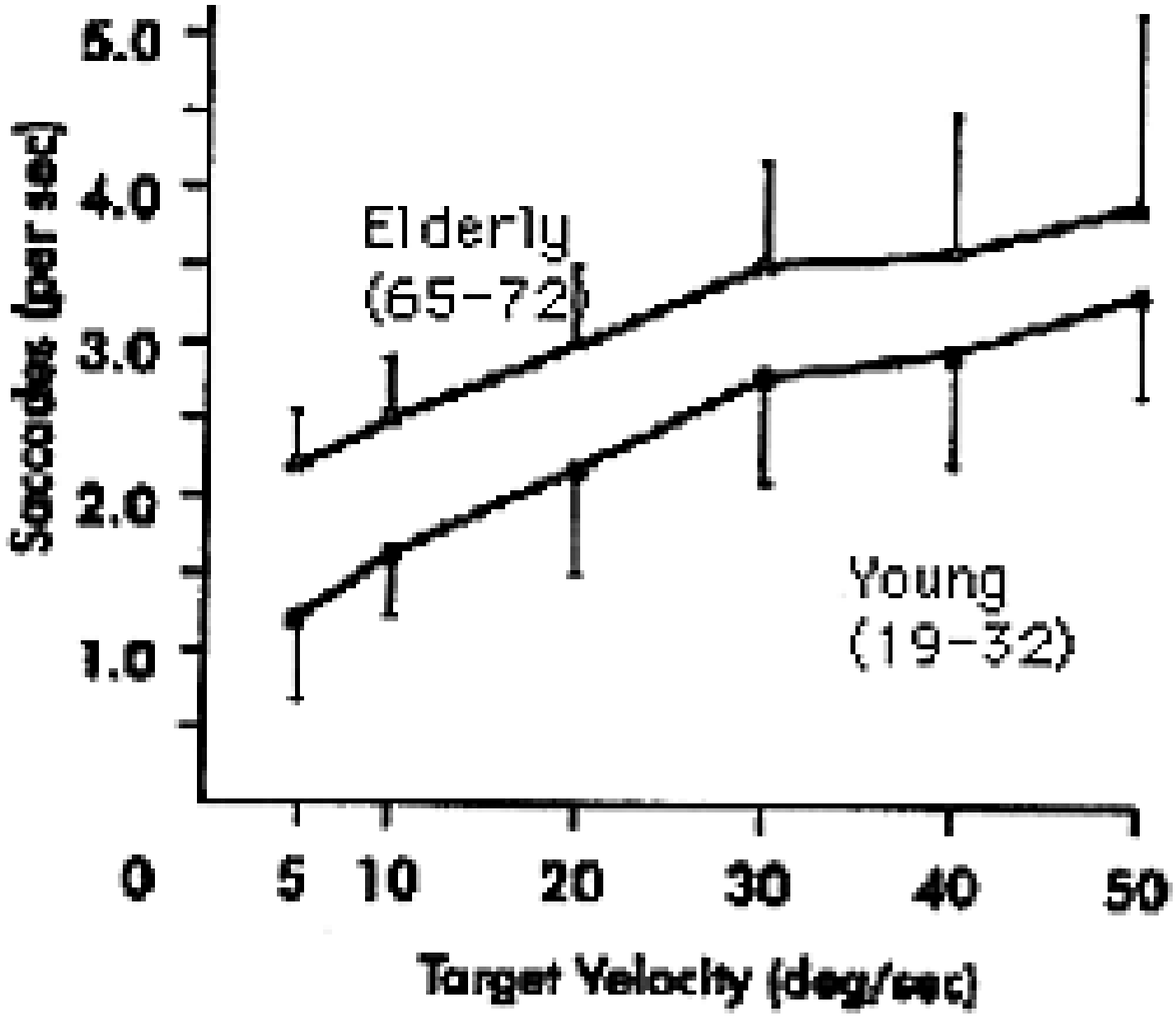
Effects of Depressants on Pursuits Alcohol and Barbiturates

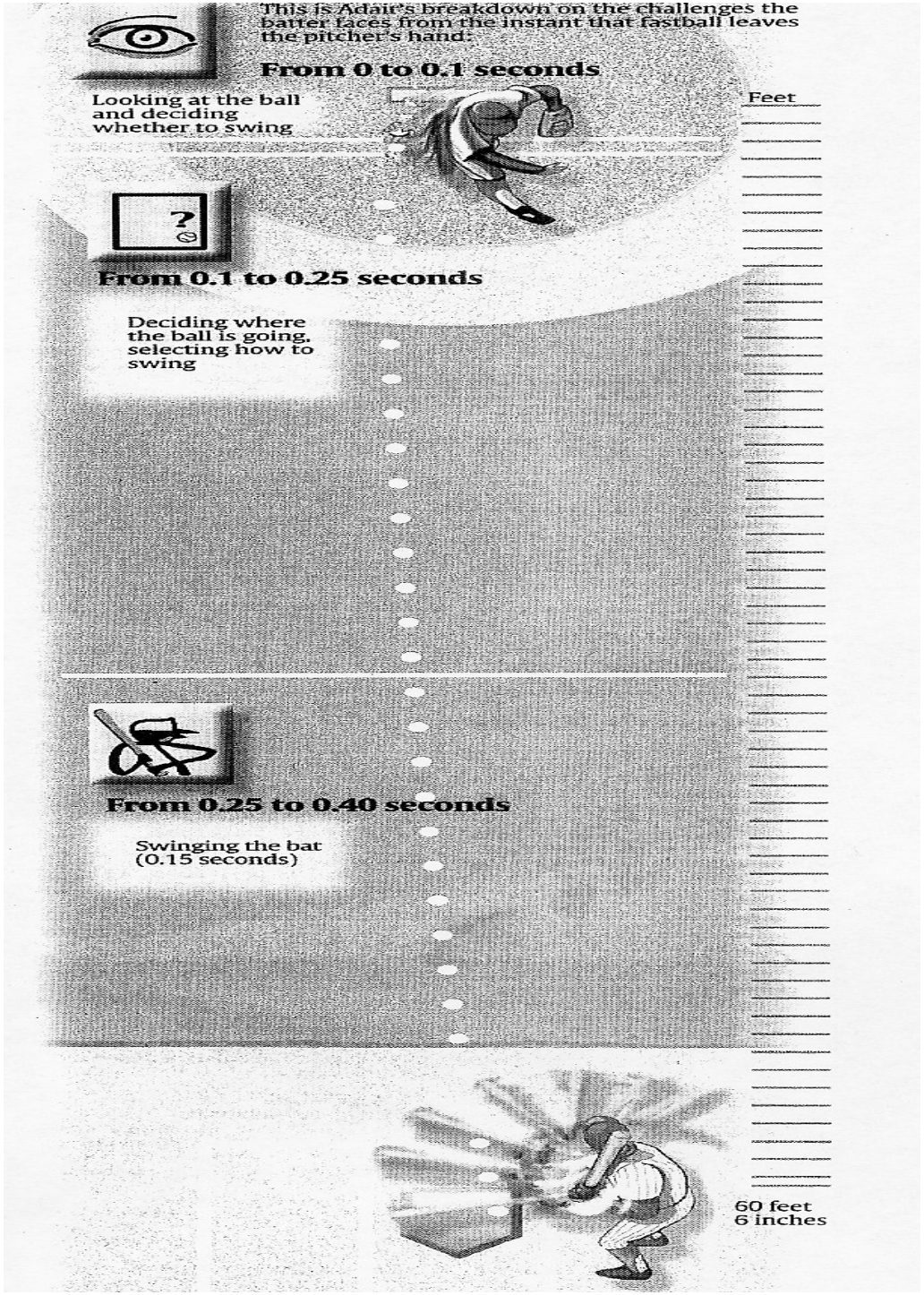


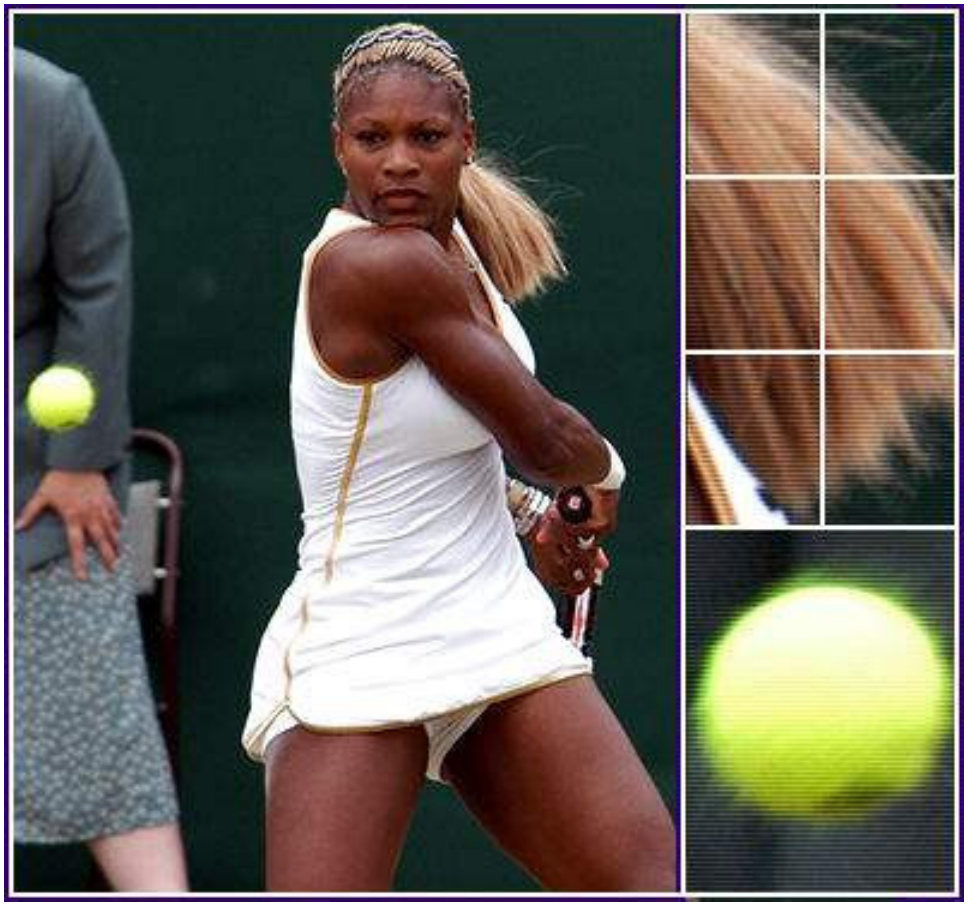
Effect of Age on Pursuit Gain

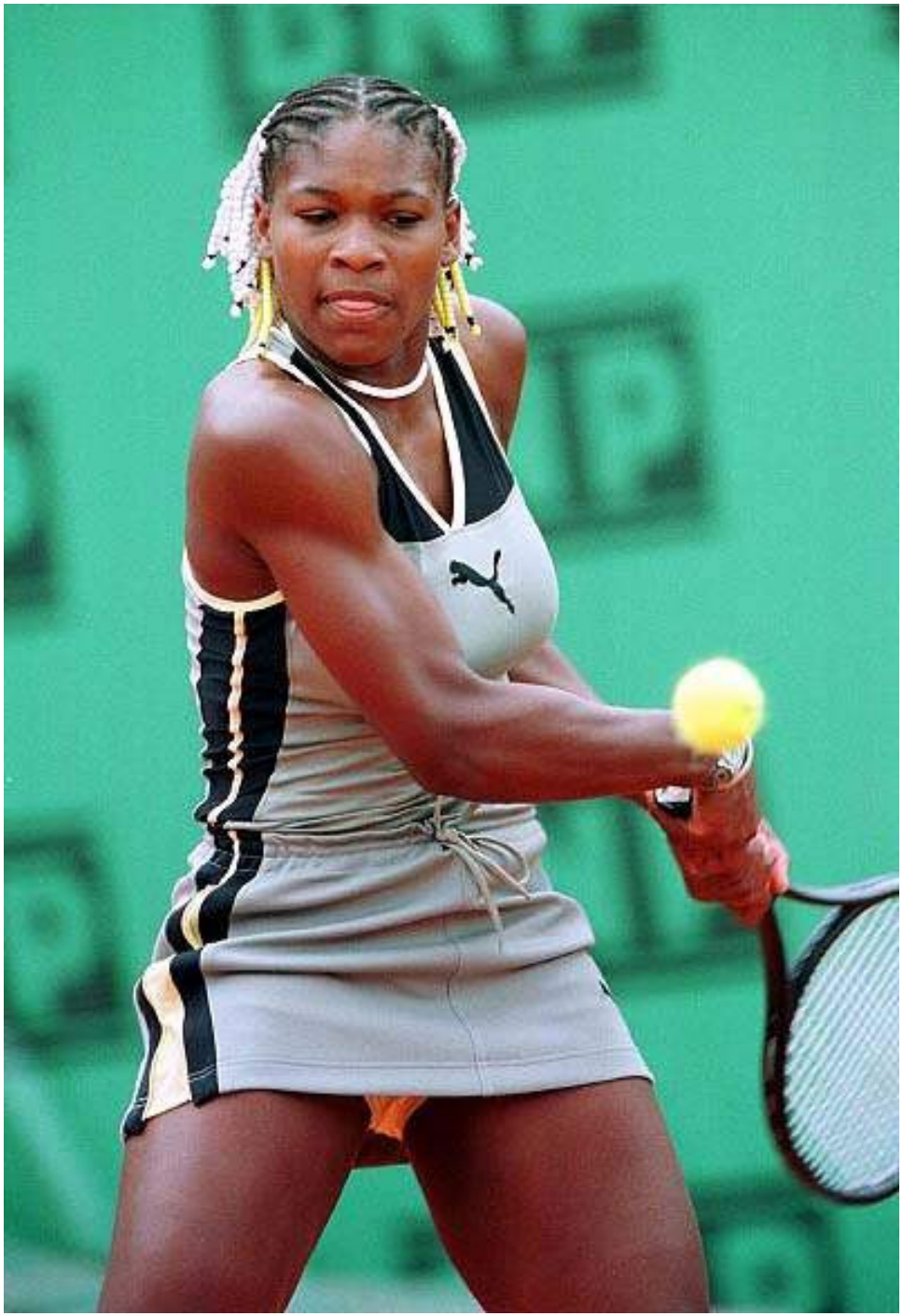


Effect of Age on Pursuit: Catch-up Saccades




This is Adair's breakdown on the challenges the batter faces from the instant that fastball leaves the pitcher's hand:
From 0 to 0.1 seconds
Looking at the ball and deciding whether to swing
Feet
From 0.1 to 0.25 seconds
Deciding where the ball is going, selecting how to swing
From 0.25 to 0.40 seconds
Swinging the bat (0.15 seconds)
60 feet 6 inches

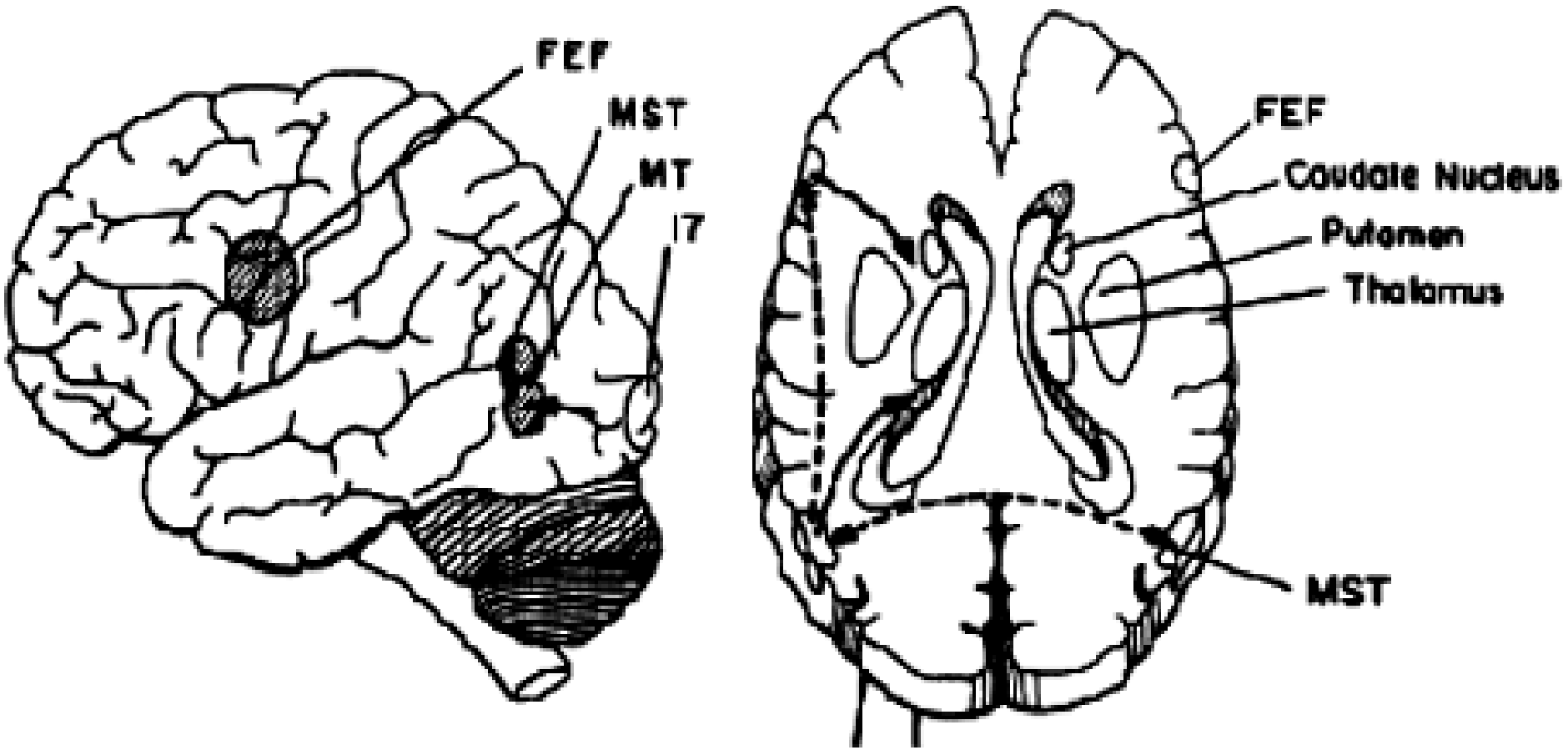




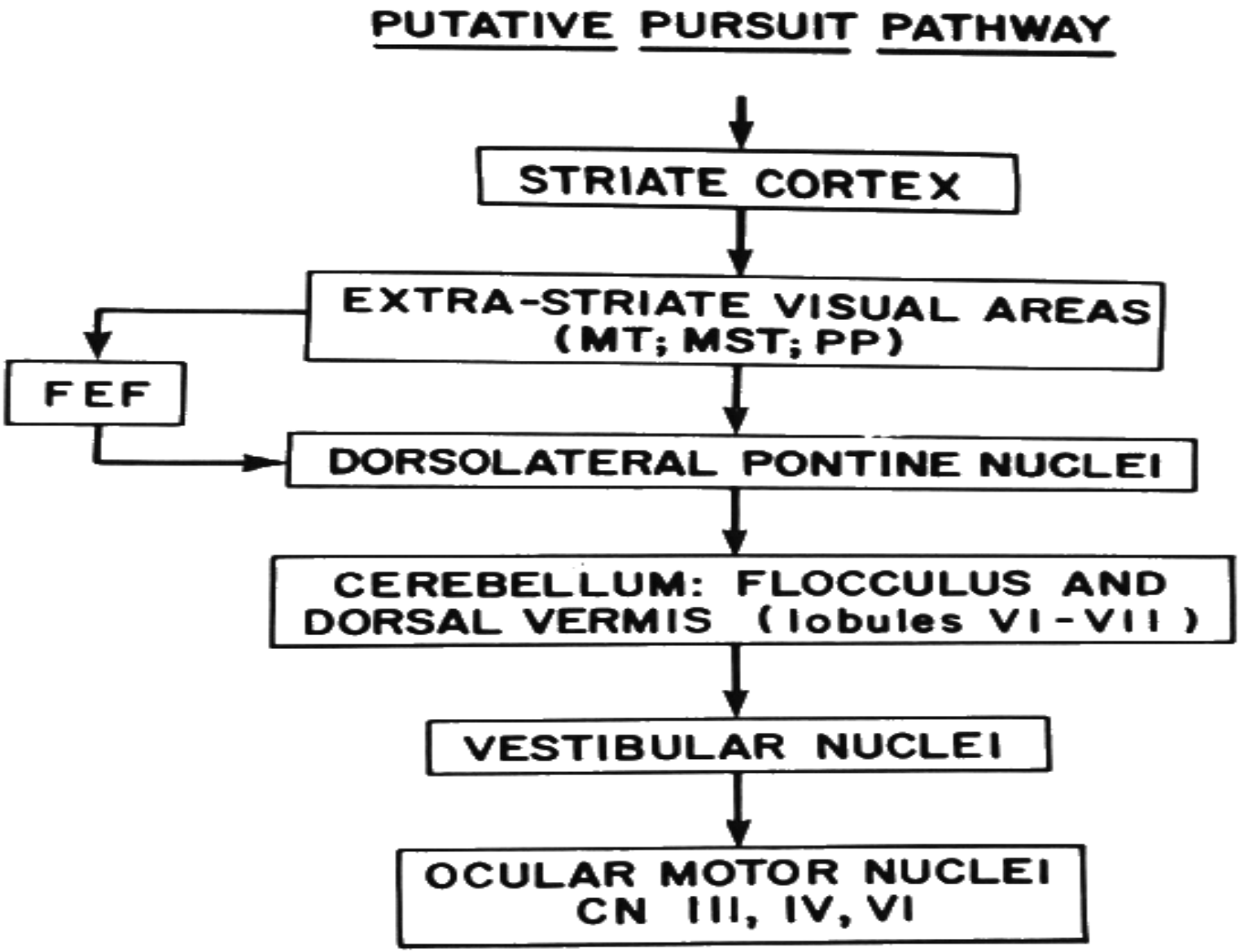

MARINERS

Run demer movie in quick time

Cortical Areas for Pursuit Control



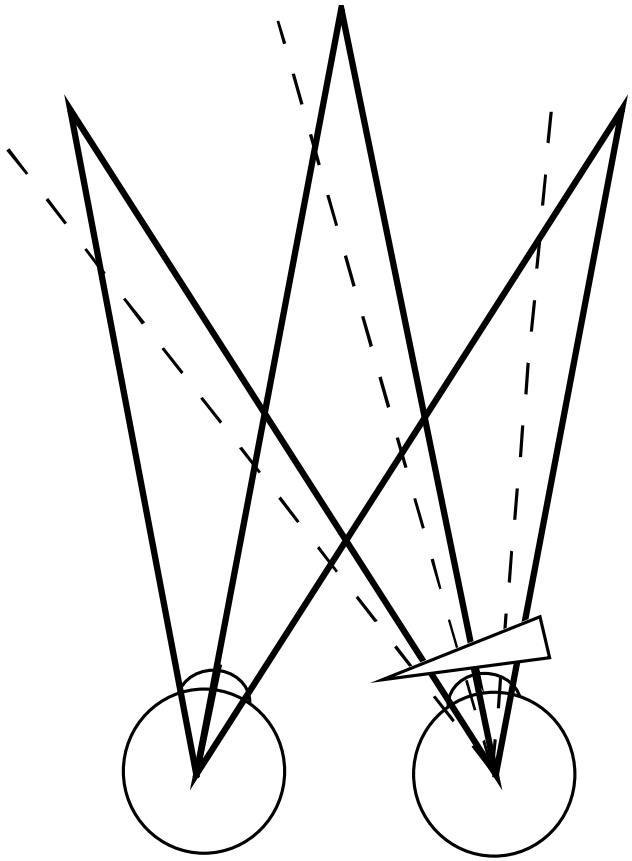
Pathway for Pursuit Control



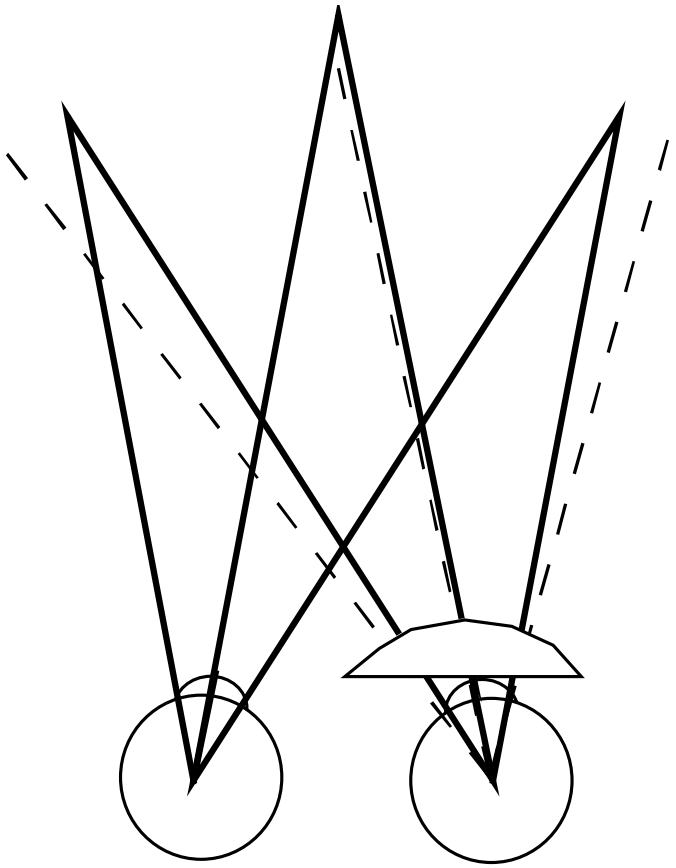
Non-concomitant Pursuit Adapatation

Solid lines show orthophoric alignment before adaptation

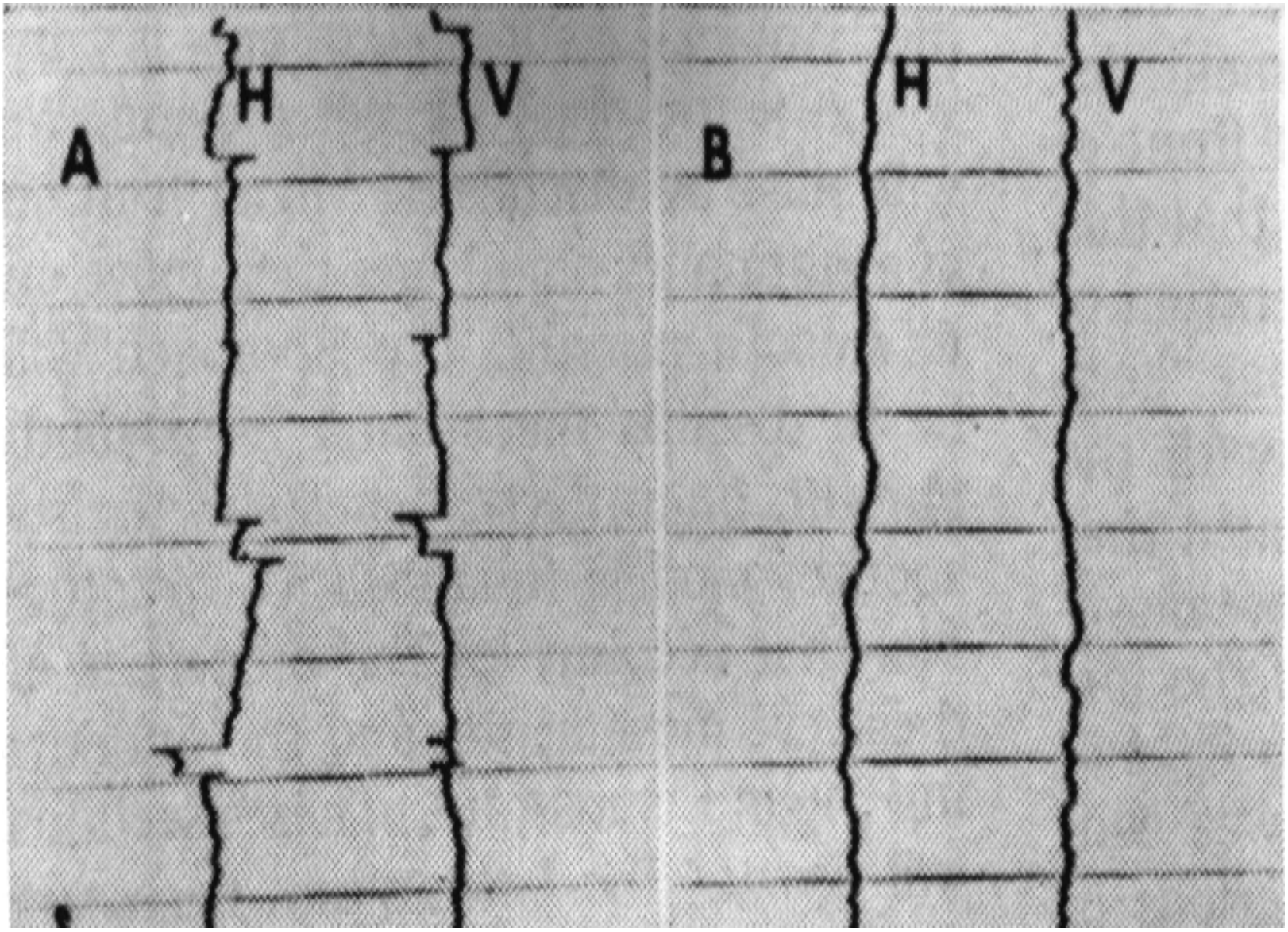
Dashed lines show how right eye will be deviated after adaptation, with left eye viewing

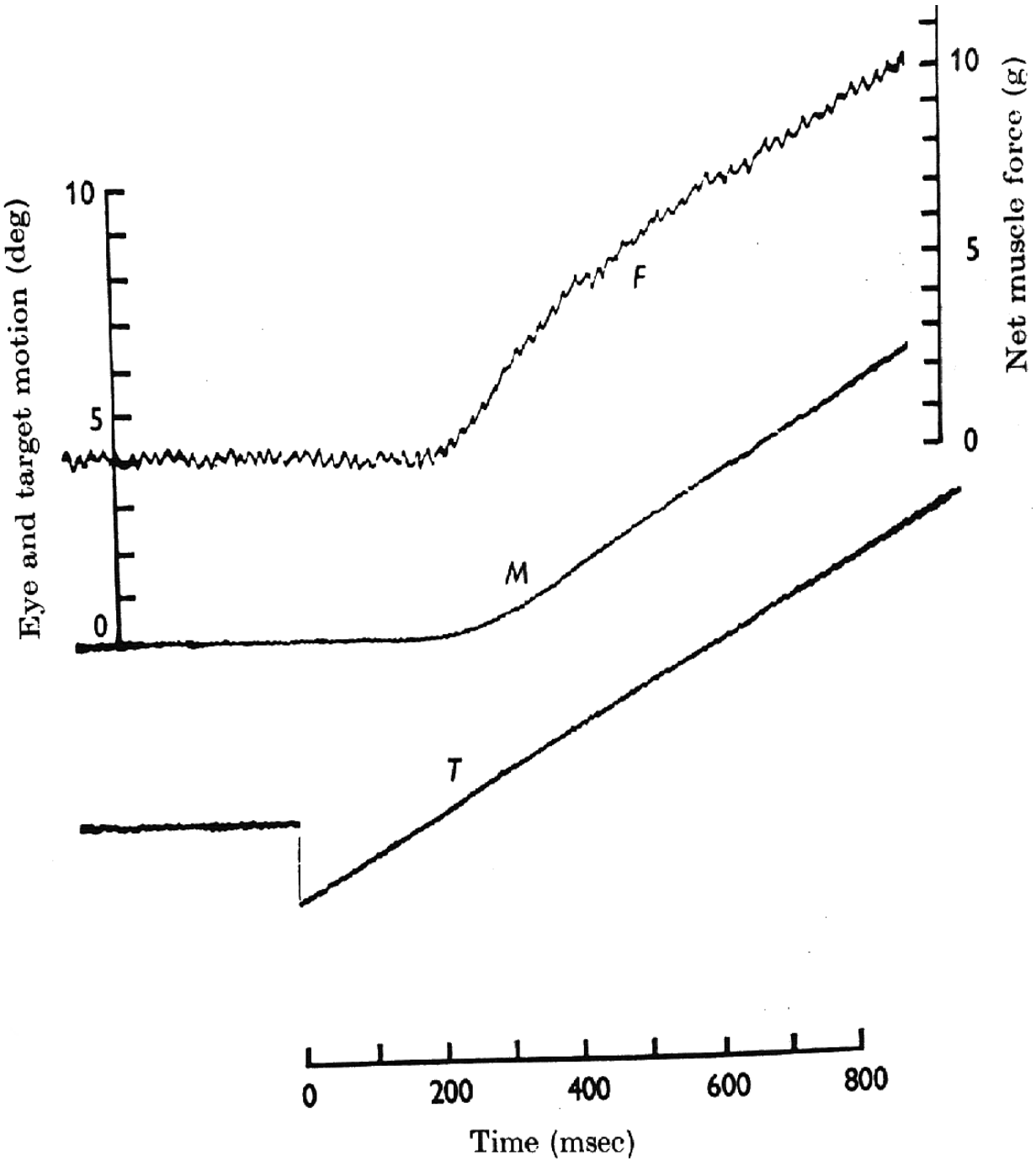


Prism adaptation produces ***concomitant*** change in phoria



Anisometropic spectacle adaptation produces ***non-concomitant*** change in phoria


A
H
V
B
H
V


Eye and target motion (deg)
10
5
0
Net muscle force (g)
10
5
0
F
M
T
0
200
400
600
800
Time (msec)

Eye movements during batting