

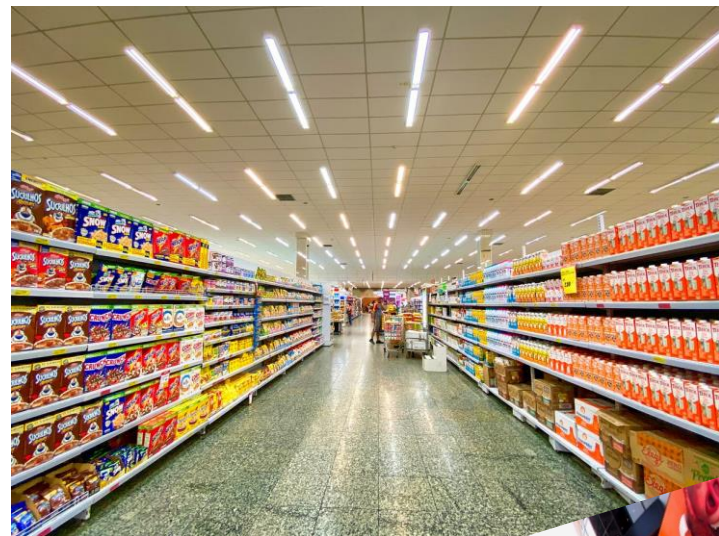


# **Vestibular rotation cancellation by vision in patients with visually induced dizziness**

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# Visual Vertigo





# Visual processing

Optic flow processing is complex

Eye movements create visual motion

Distinguishing object from self motion





# Visual dependence

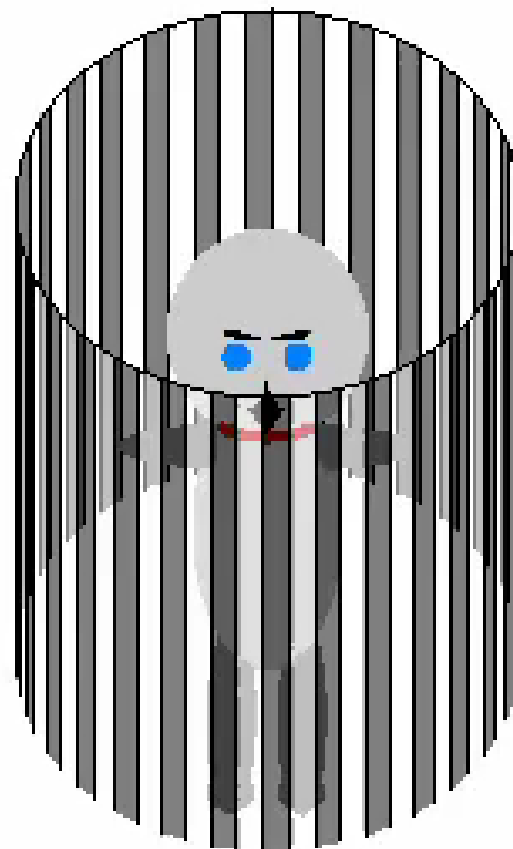
- Balance is multi-sensory  
signals weighted based on their reliability
- Many patients begin experience visual vertigo after a vestibular  
or neurological problem
- They may have learned to rely more on visual signals than  
vestibular for balance  
-- an overweighting of visual information

Cue-conflict paradigm: who wins?

Prediction: patients give more weight to vision



# Cue-conflict paradigm

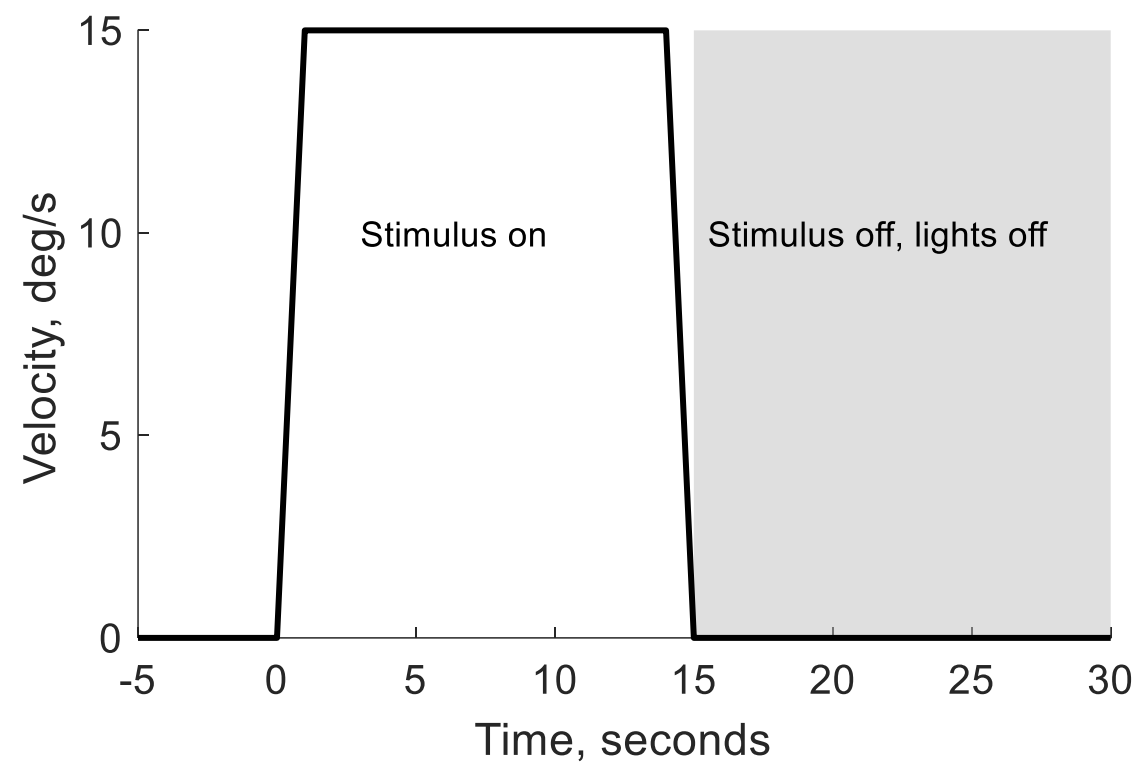


Chair 15°/s

Drum 30°/s

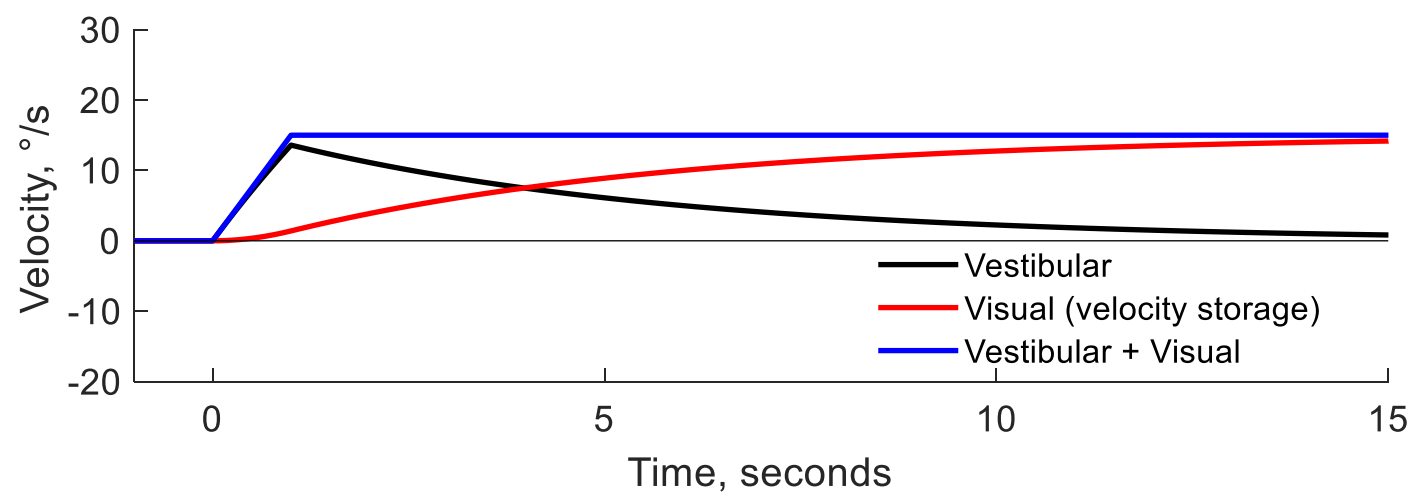
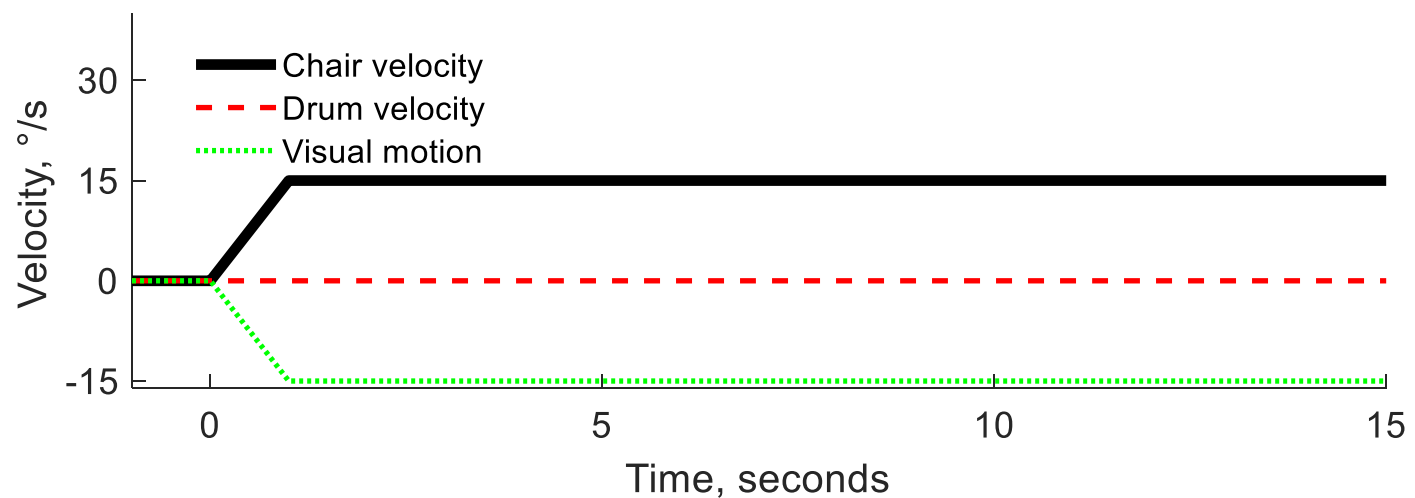
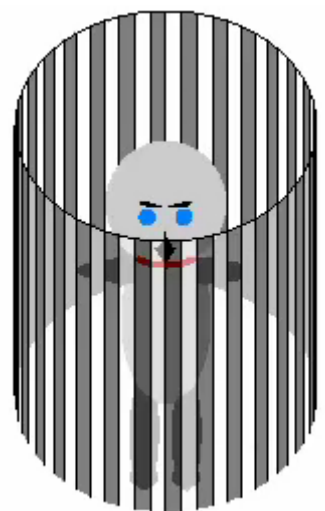
Vestibular system senses *rightward* rotation

Visual system indicates *leftward* rotation



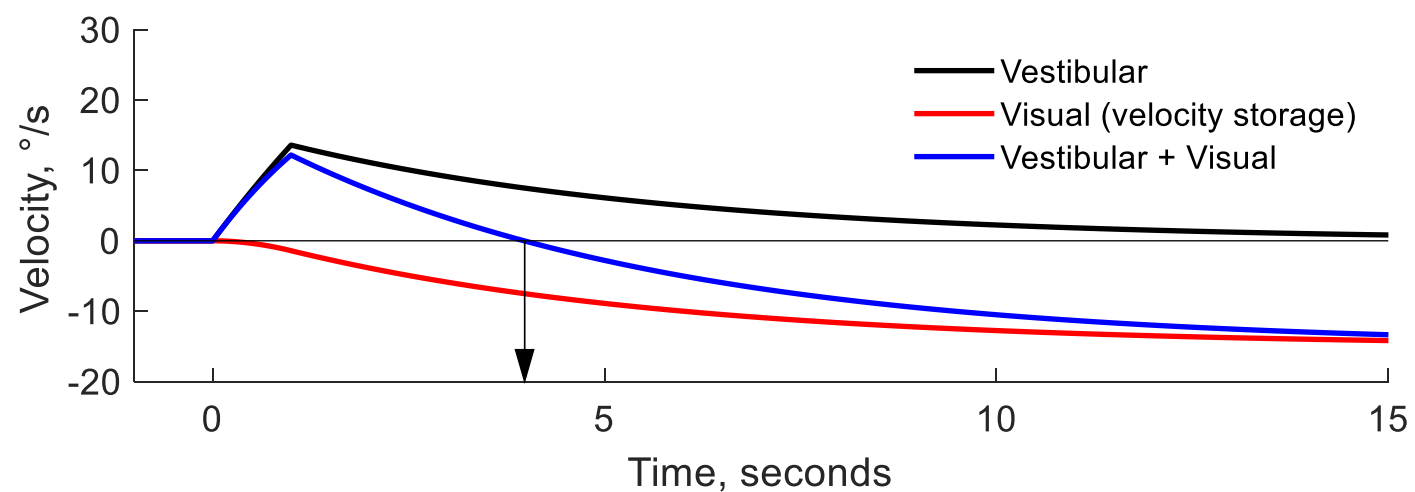
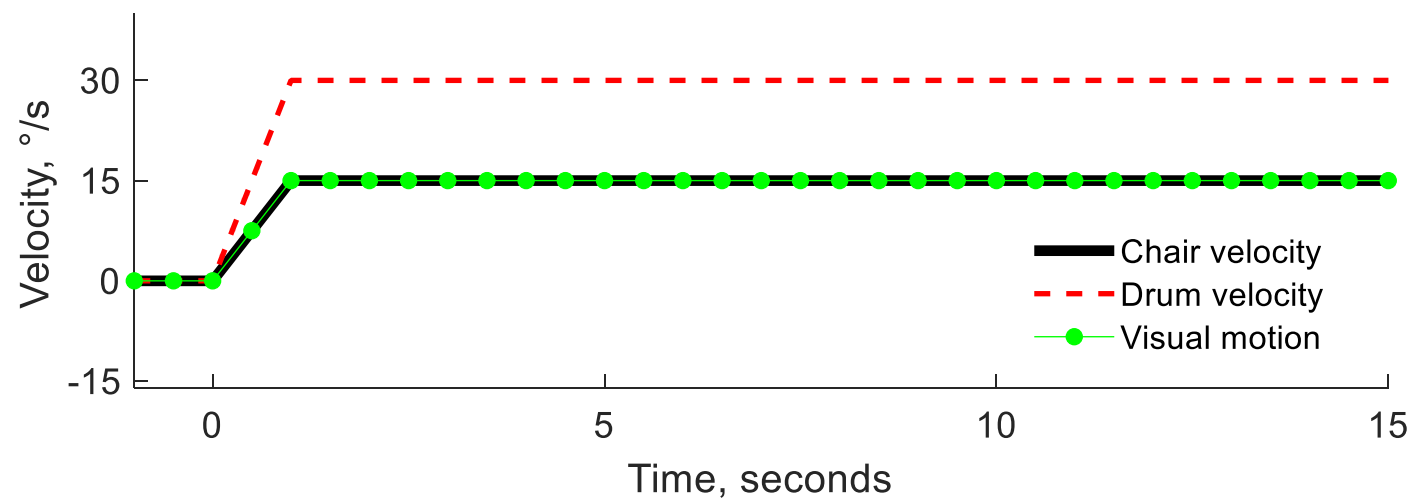
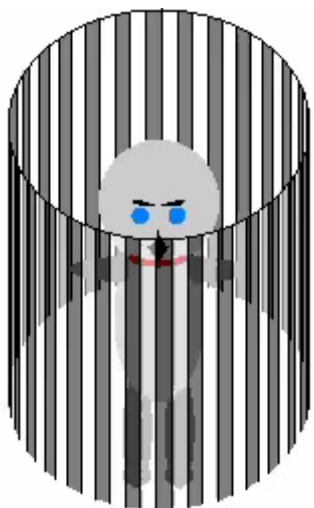


# Constant velocity rotation in the light





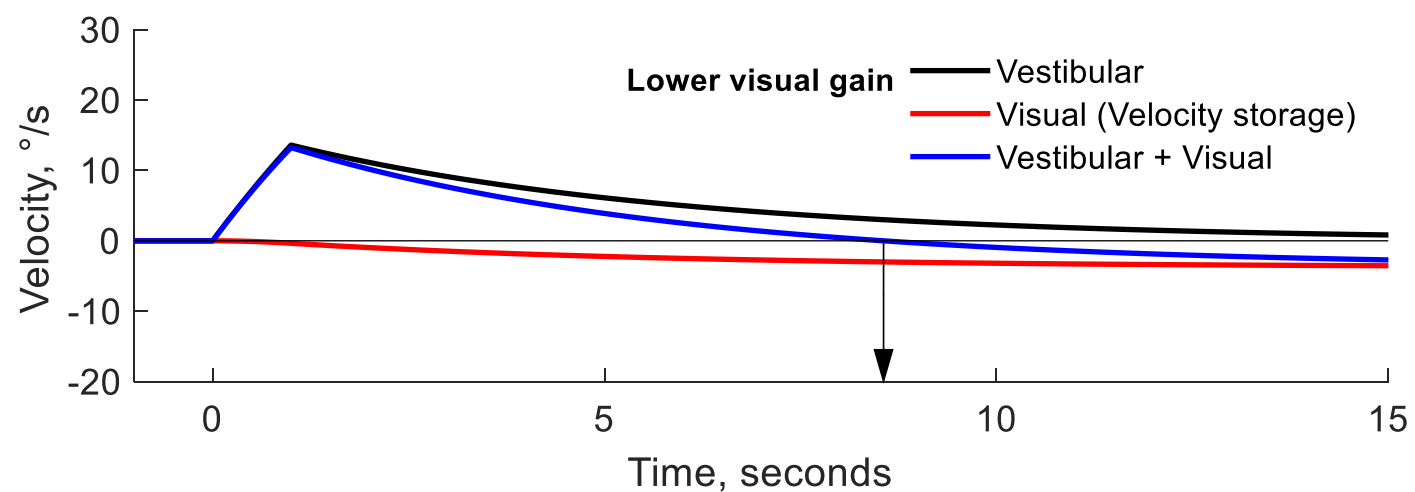
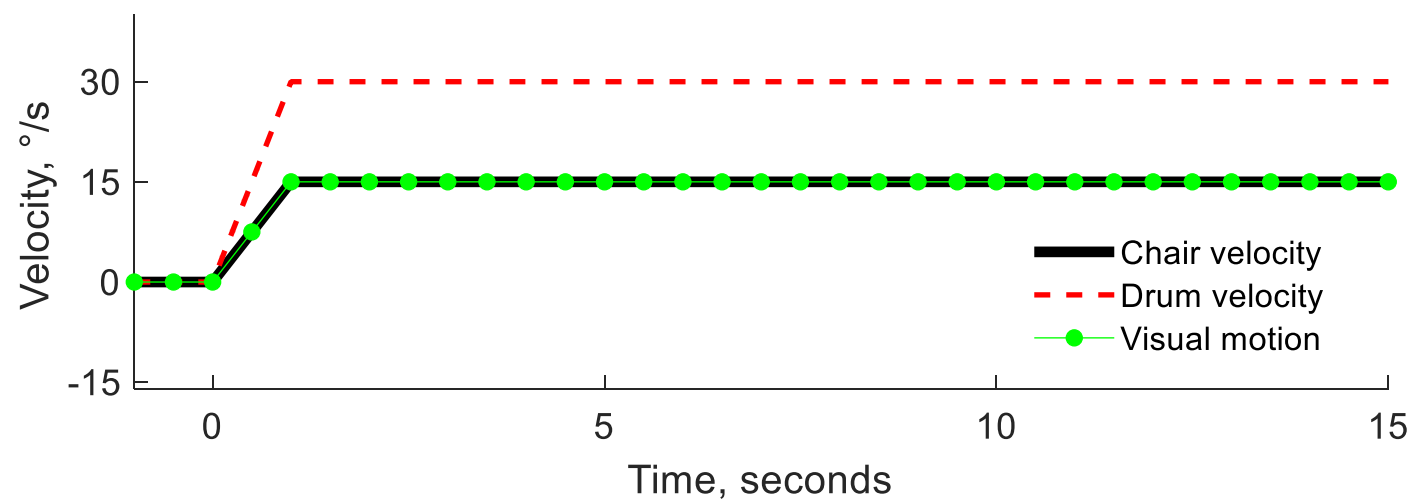
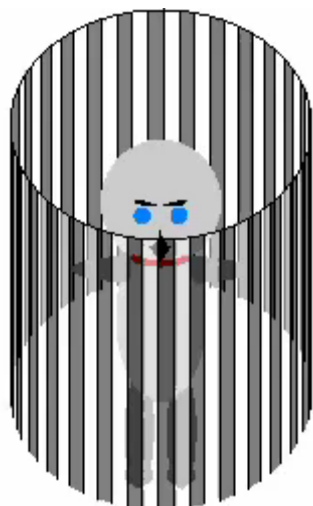
# Cue conflict trial





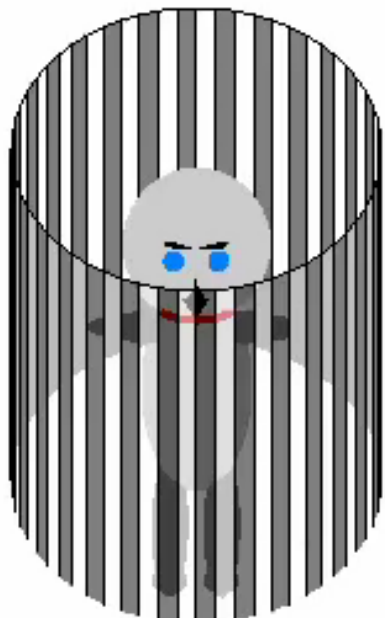


# Cue conflict trial

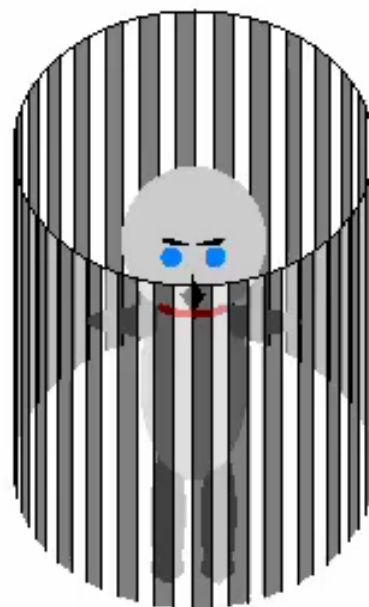




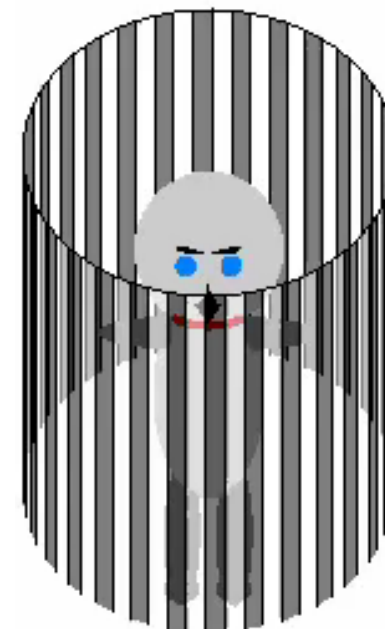
# Conditions



Chair 15°/s  
Drum 0 °/s  
(no conflict)



Chair 15°/s  
Drum 15 °/s

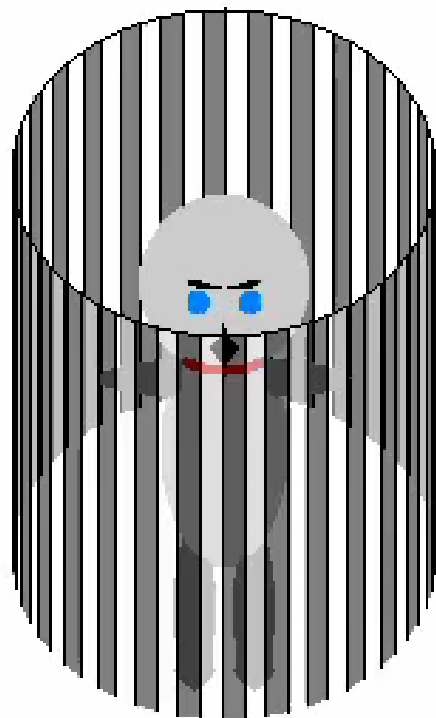


Chair 15°/s  
Drum 30 °/s

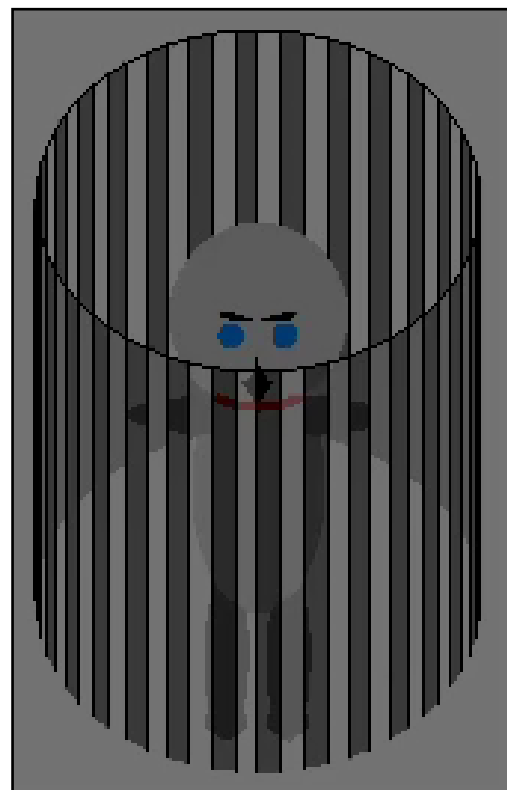
15 second duration trials



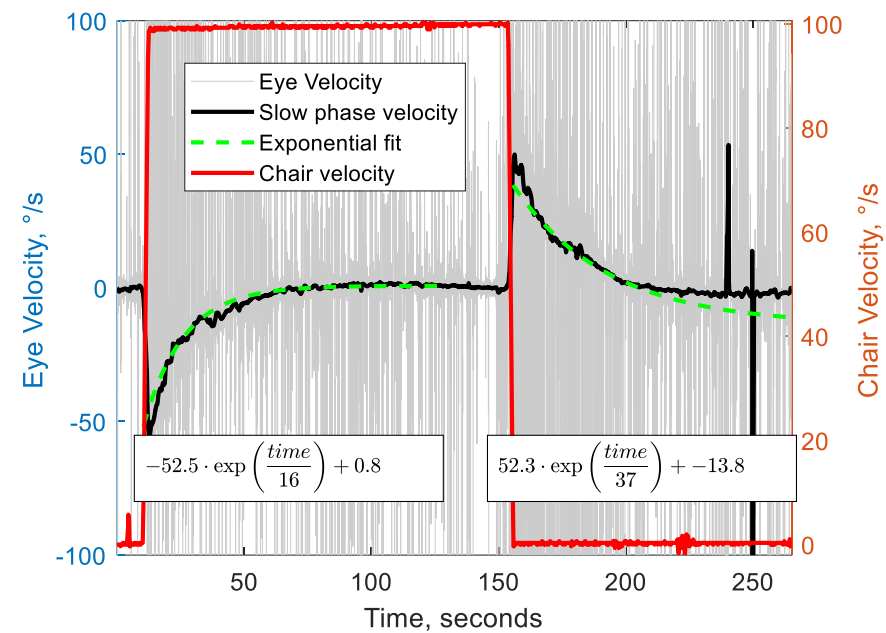
# Conditions



Chair 0°/s  
Drum 15 °/s  
(Vection trials)



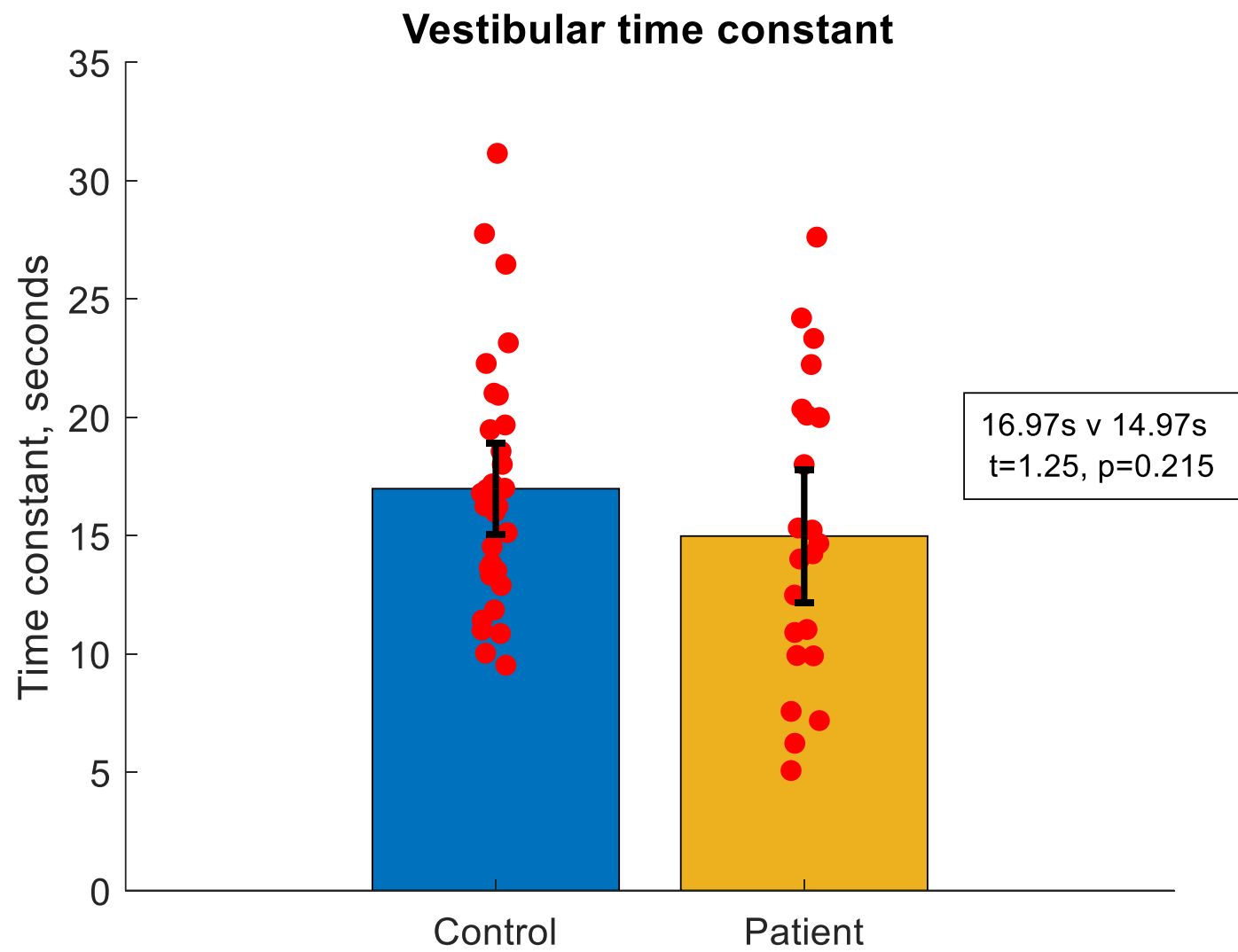
In dark

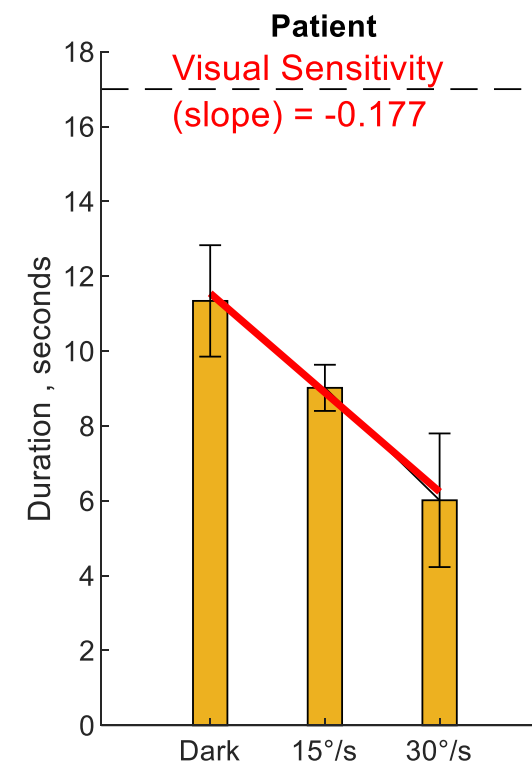
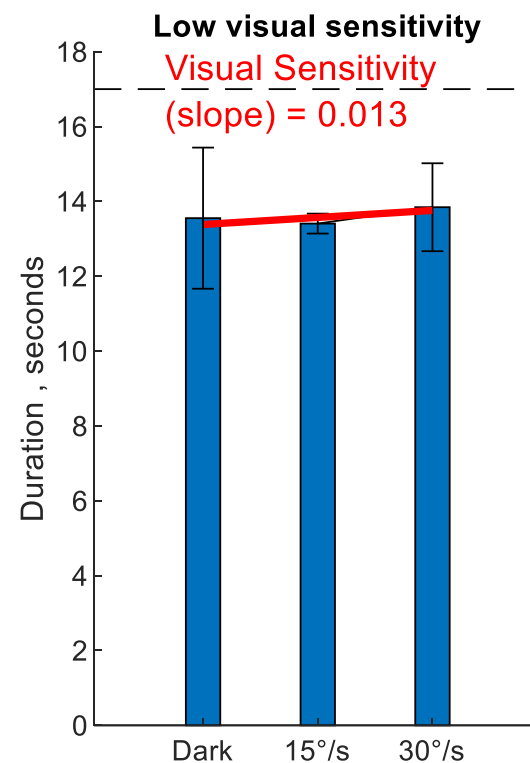
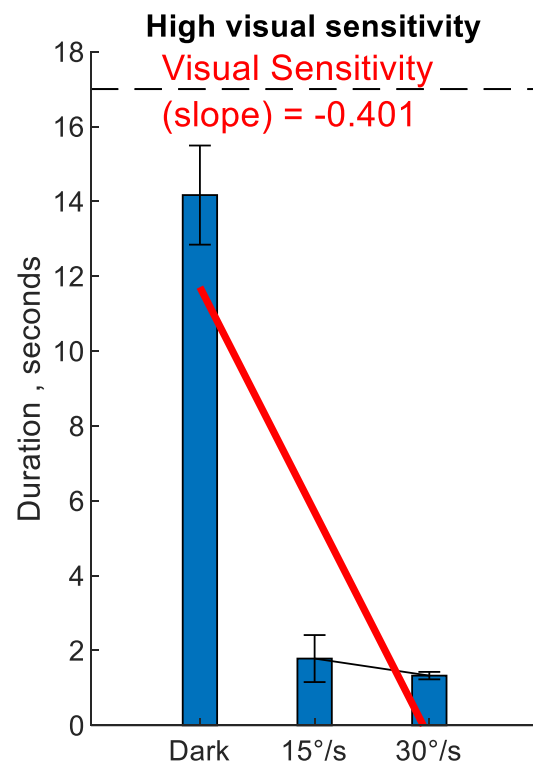
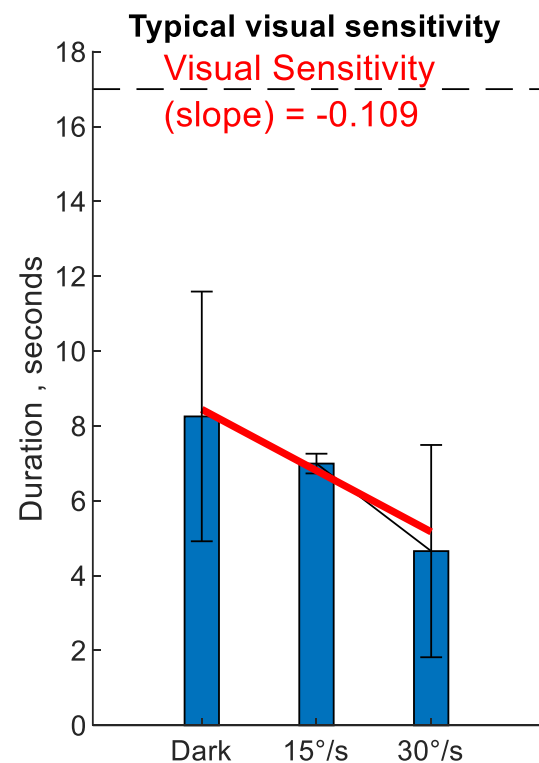


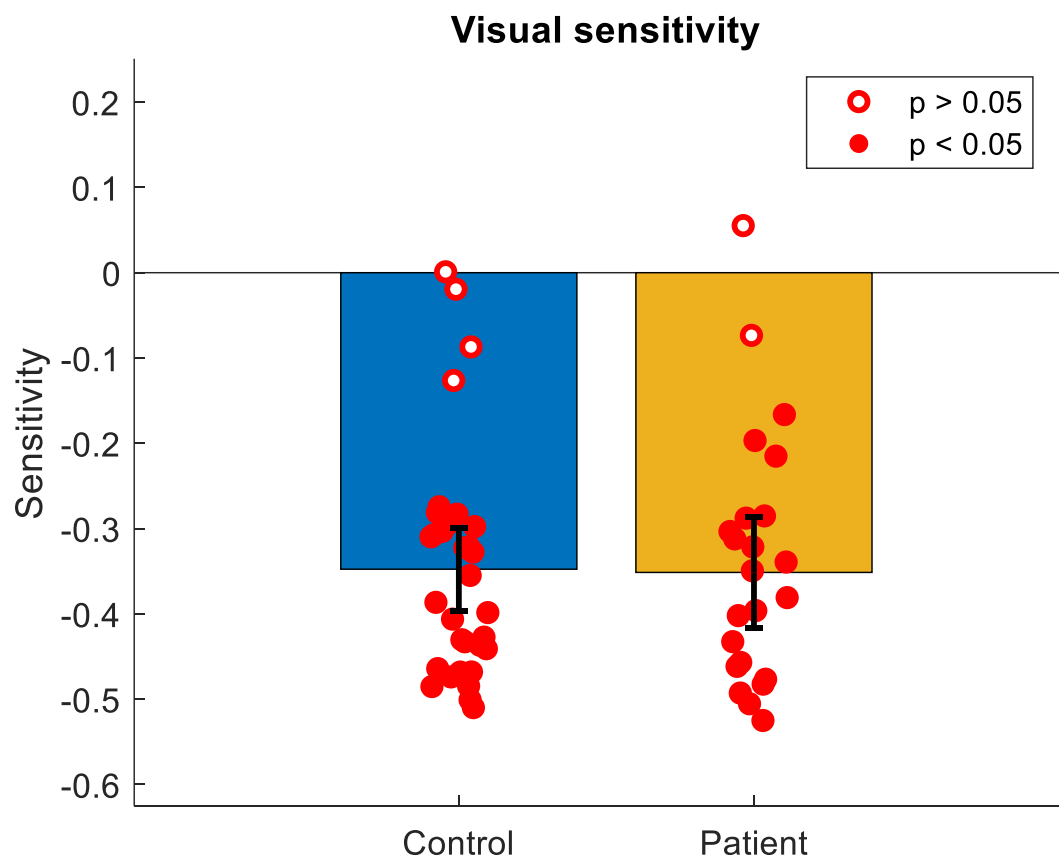
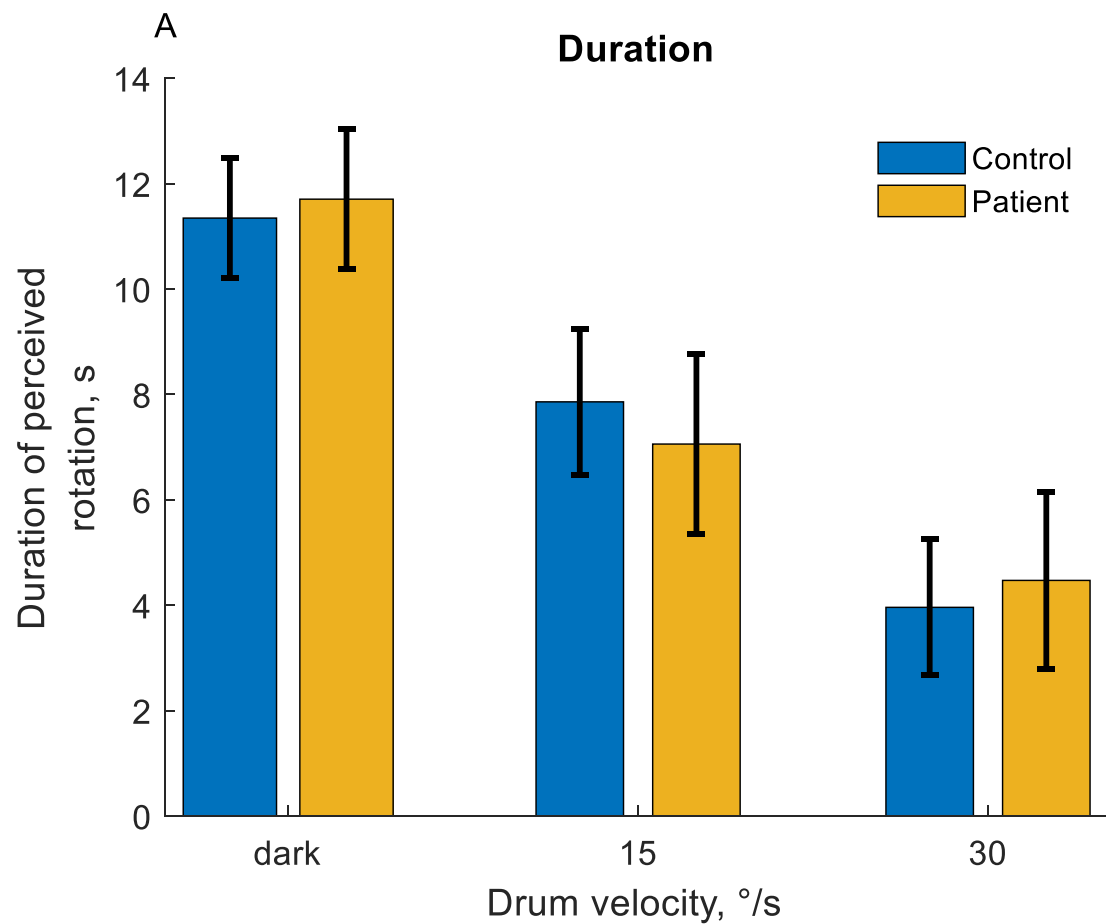
100°/s Velocity step  
Time constant



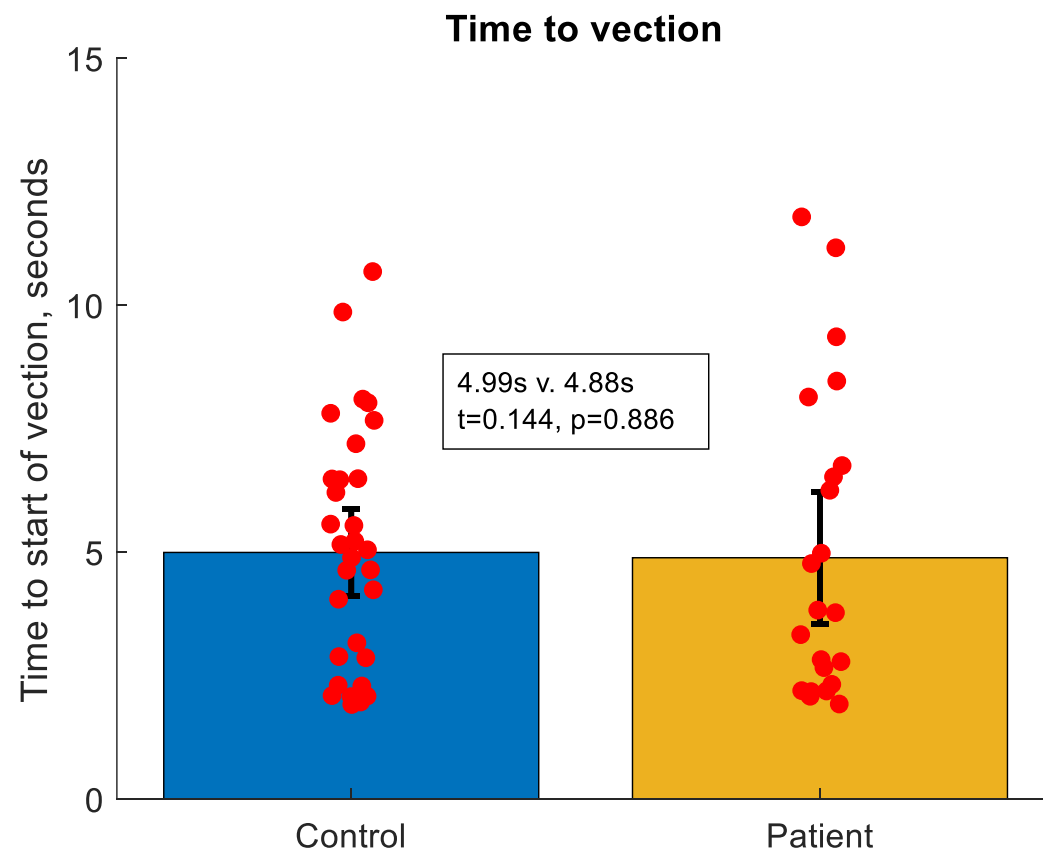
- 24 patients  
(Mean age = 50 yrs (range = 25 - 69, SD = 12; 13 female))
- 31 controls subjects  
(Mean age 36 yrs (range = 24 -63, SD= 12; 17 females)
- (an additional 4 patients and 1 control could not complete the experiment due to motion sickness)







Error bars are 95% confidence intervals







# Summary

- No support for the hypothesis that patients have enhanced sensitivity to visual self motion cues compared to vestibular cues
  - No difference on cue conflict trials
  - No difference on vection trials



# Summary

- No support for the hypothesis that patients have enhanced sensitivity to visual self motion cues compared to vestibular cues
  - No difference on cue conflict trials
  - No difference on vection trials
- Caveats
  - Subjective method: perceived duration perhaps too variable or sensitive to bias
  - Visual stimulus was overwhelming?



Thank you