Eye movements after Hemispherectomy

PESA 2026

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NACHOS
WHOLE PIES
PIZZA
CORNDOGS
LEMONADE
CHEESE STICKS
WITH TZATZIKI SAUCE
GYROS
CHICKEN PITAS
LEMONADE
Lemonade

We need eye movements all the time


144,000 x/day!

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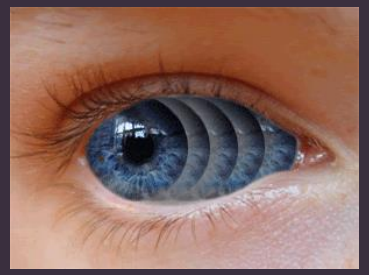
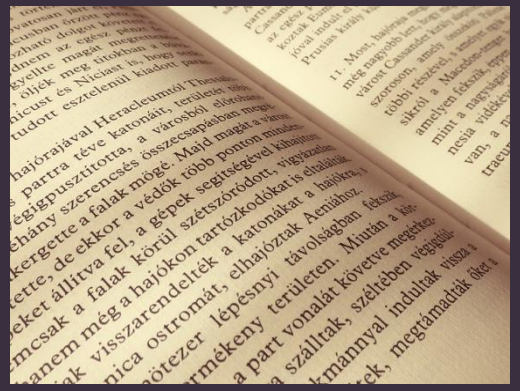


250,000x/day!


Navigating our environment

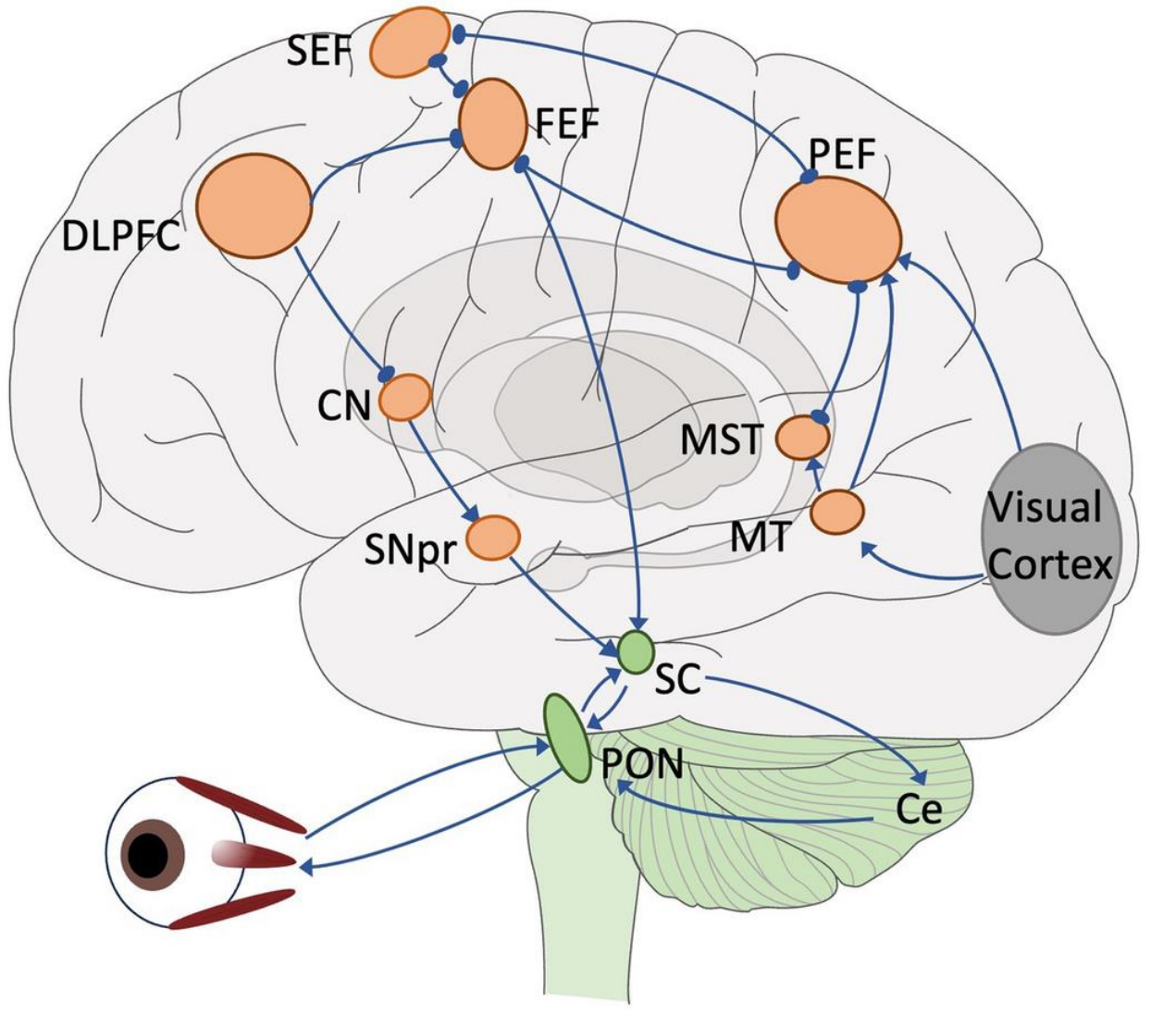

Tracking individuals

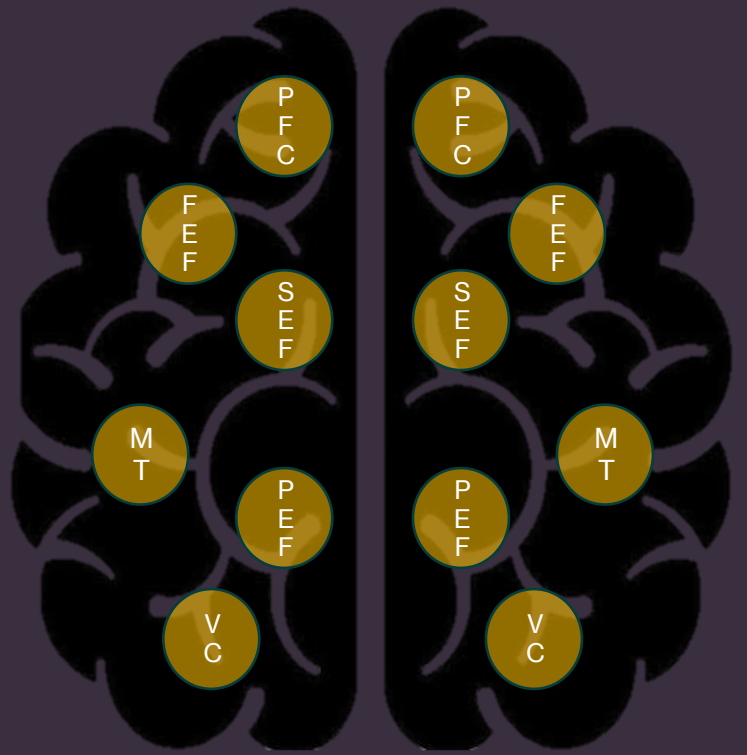


Reading

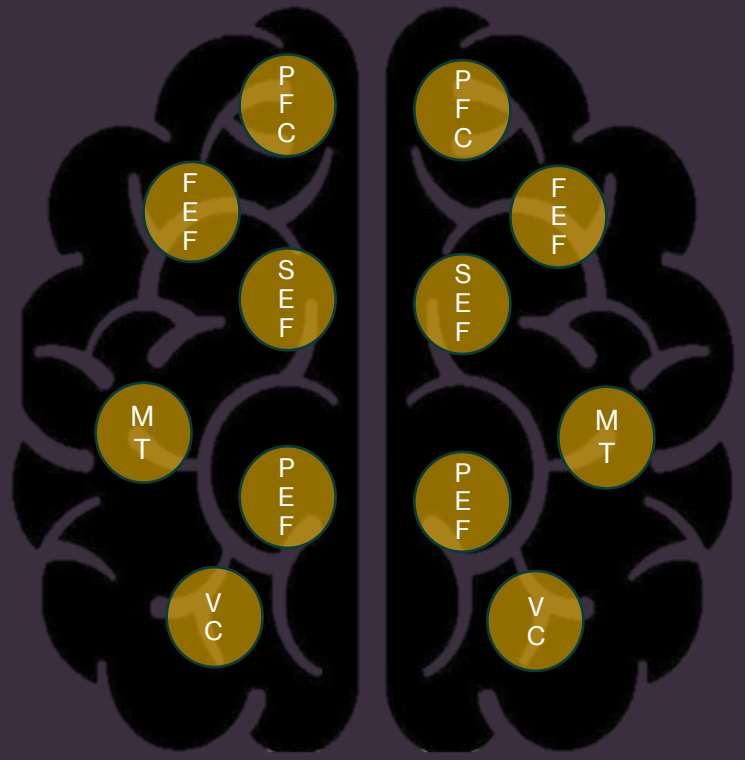
Watching or Playing Sports

Both Hemispheres help us move our eyes





Both Hemispheres help us move our eyes

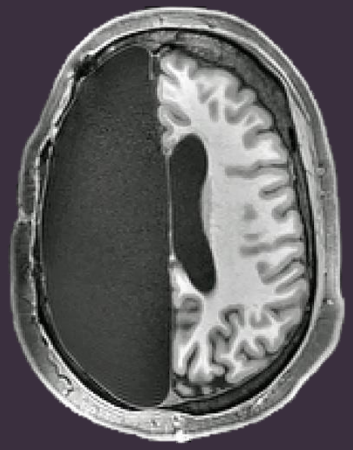


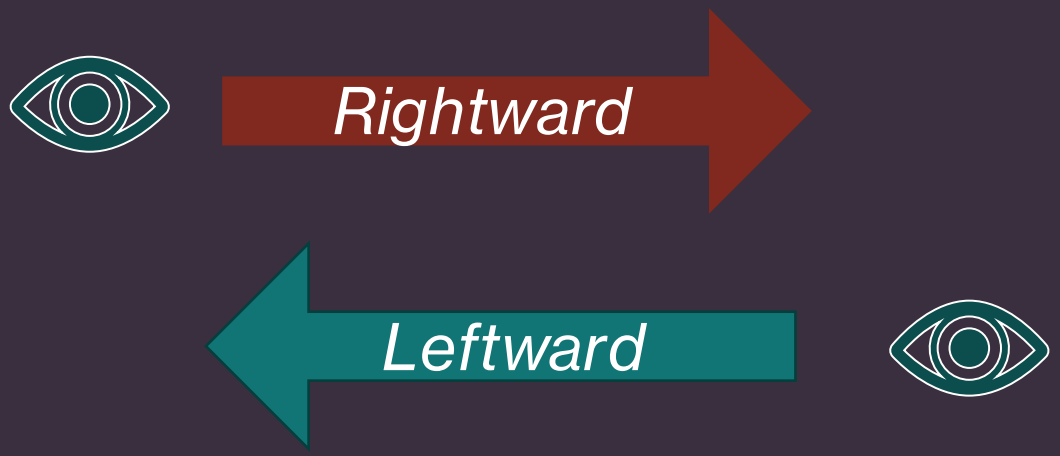
What happens if you only have one hemisphere?

"Smooth Pursuit": slow tracking

"Saccades": fast jumps

Each hemisphere may control different pursuit *directions*

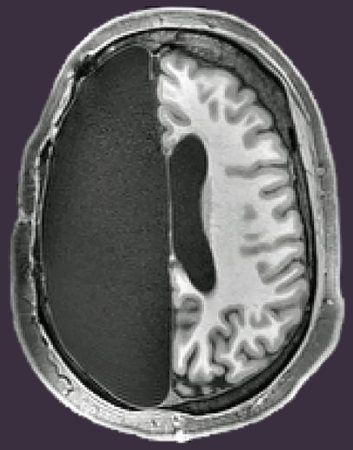




Left

Right

Each hemisphere may control different pursuit *directions*



Rightward

Leftward

Left

Right

Largest known study of pursuit after hemispherectomy

pediatricepilepsy surgeryalliance.

Utah, 2022

14 patients

10 Left Surgery

4 Right Surgery

Age: 12-32 yrs

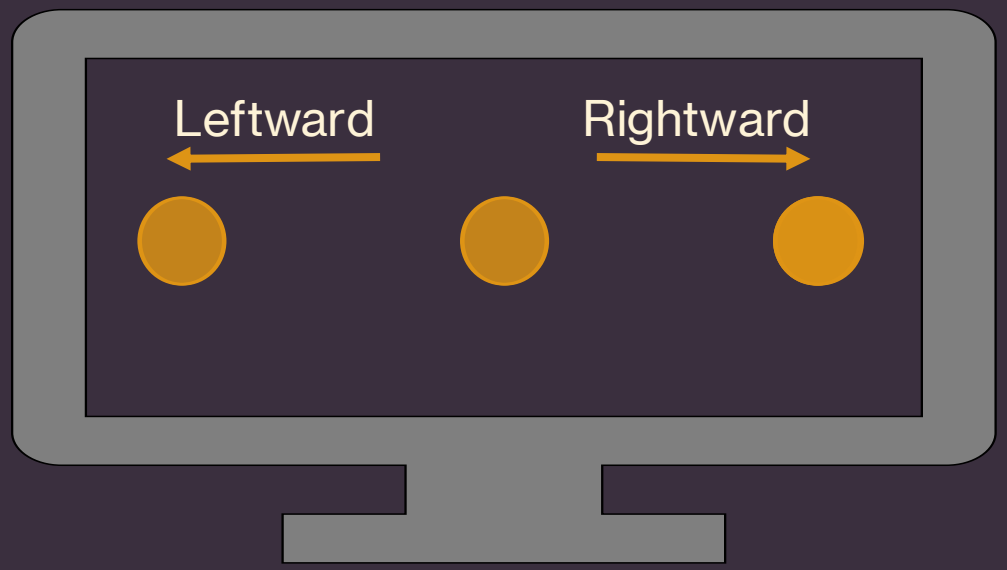
Age at Surgery: 0-12 yrs

Smooth Pursuit

1. Eye <u>position</u> in each direction

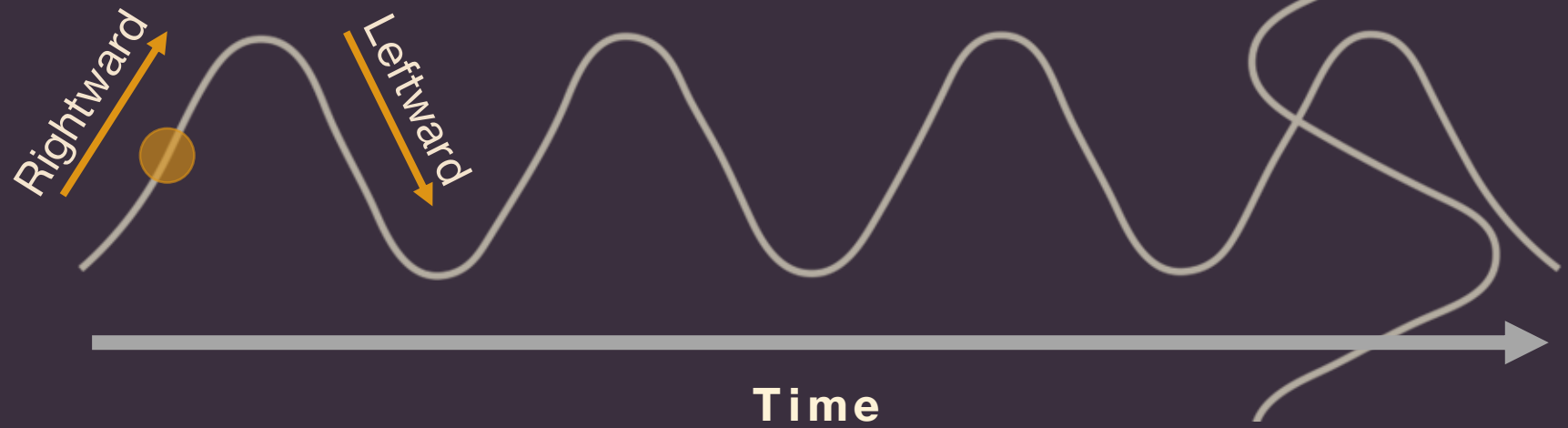
2. Eye <u>speed</u> in each direction

Eye position should be a smooth curve in both directions



Typical Pursuit

Typical Pursuit



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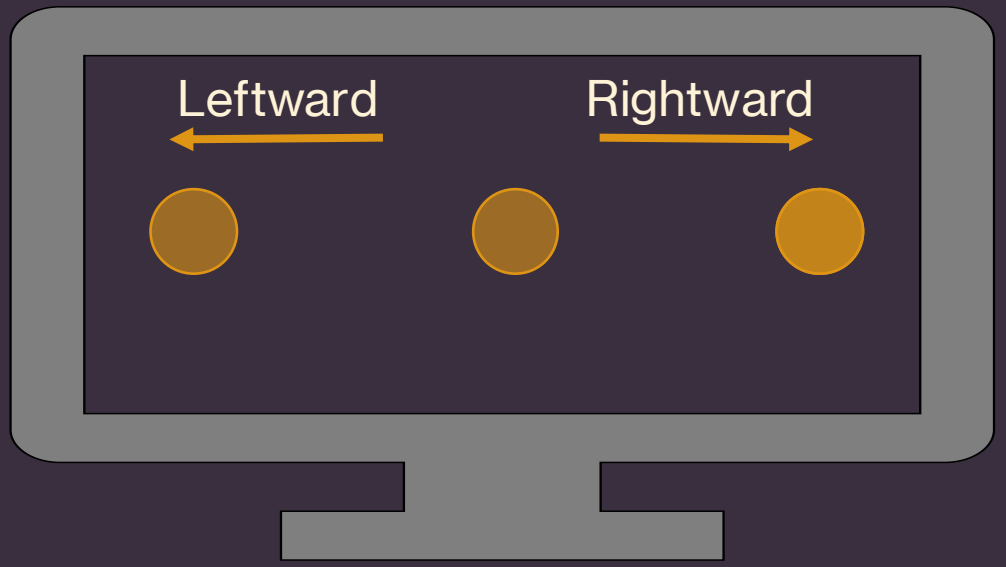
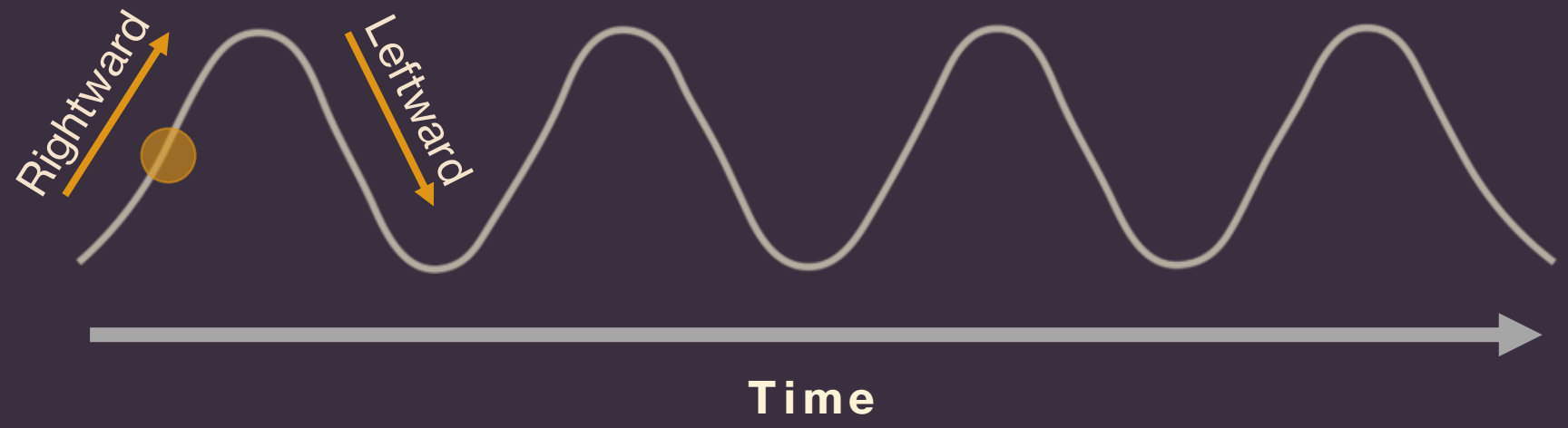


Typical Pursuit



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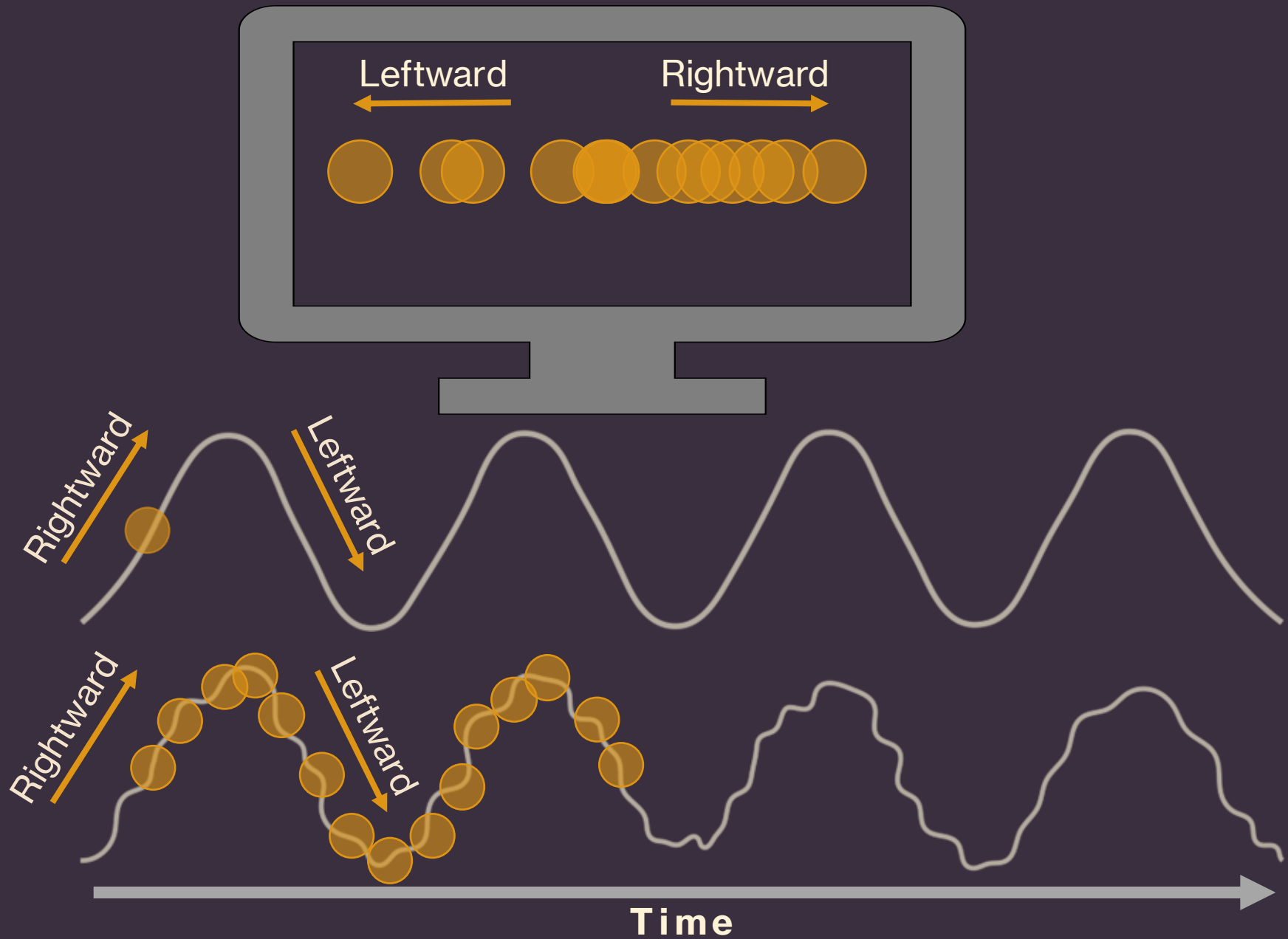
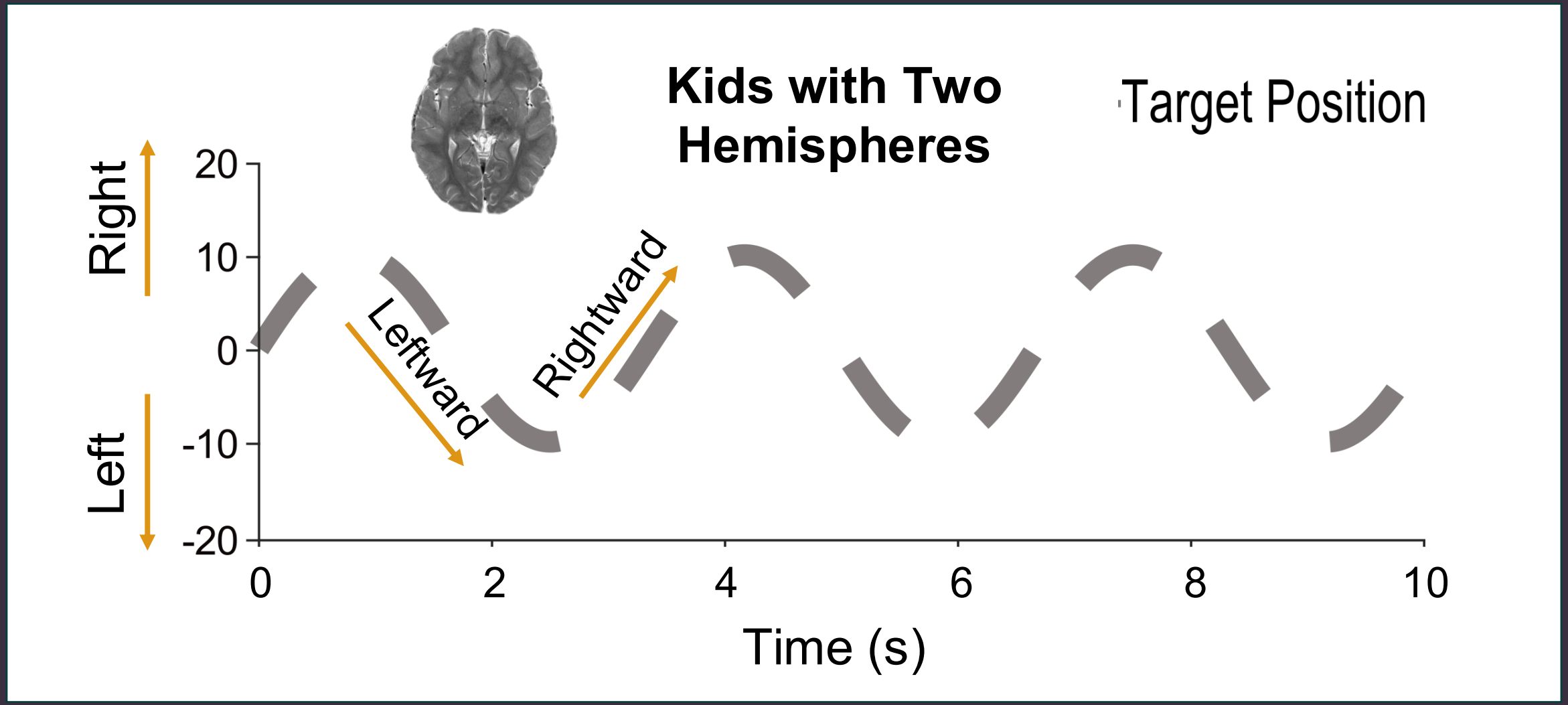


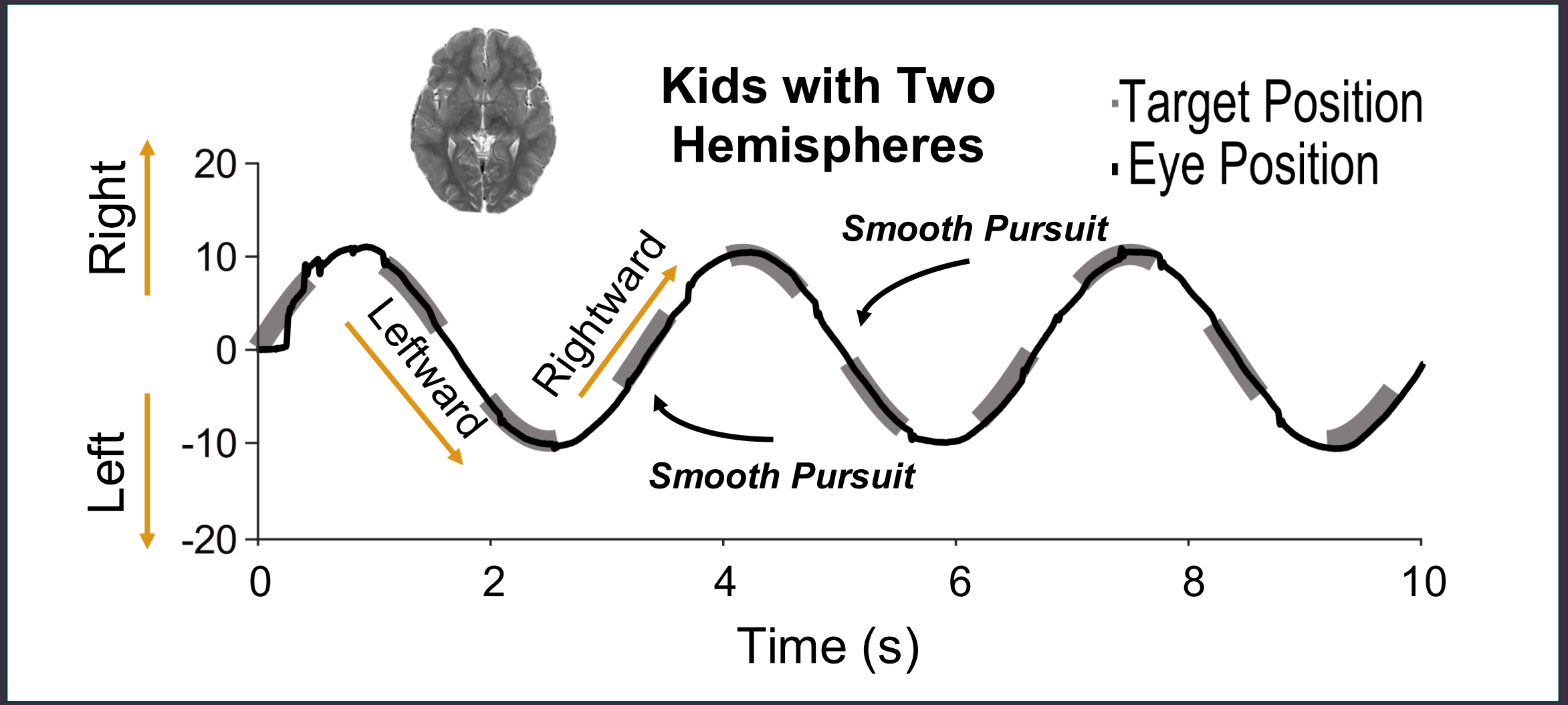
Typical Pursuit

No Pursuit (saccades)

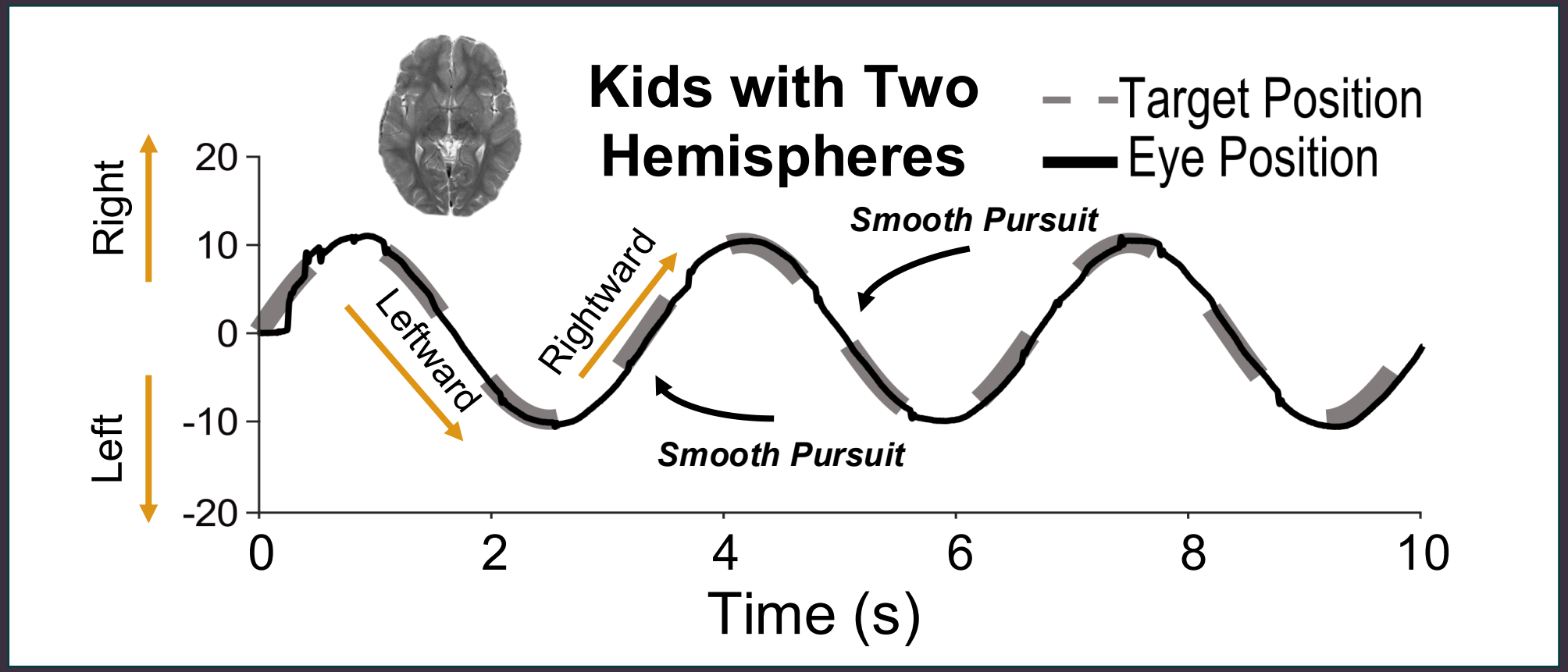
Kids with two hemispheres



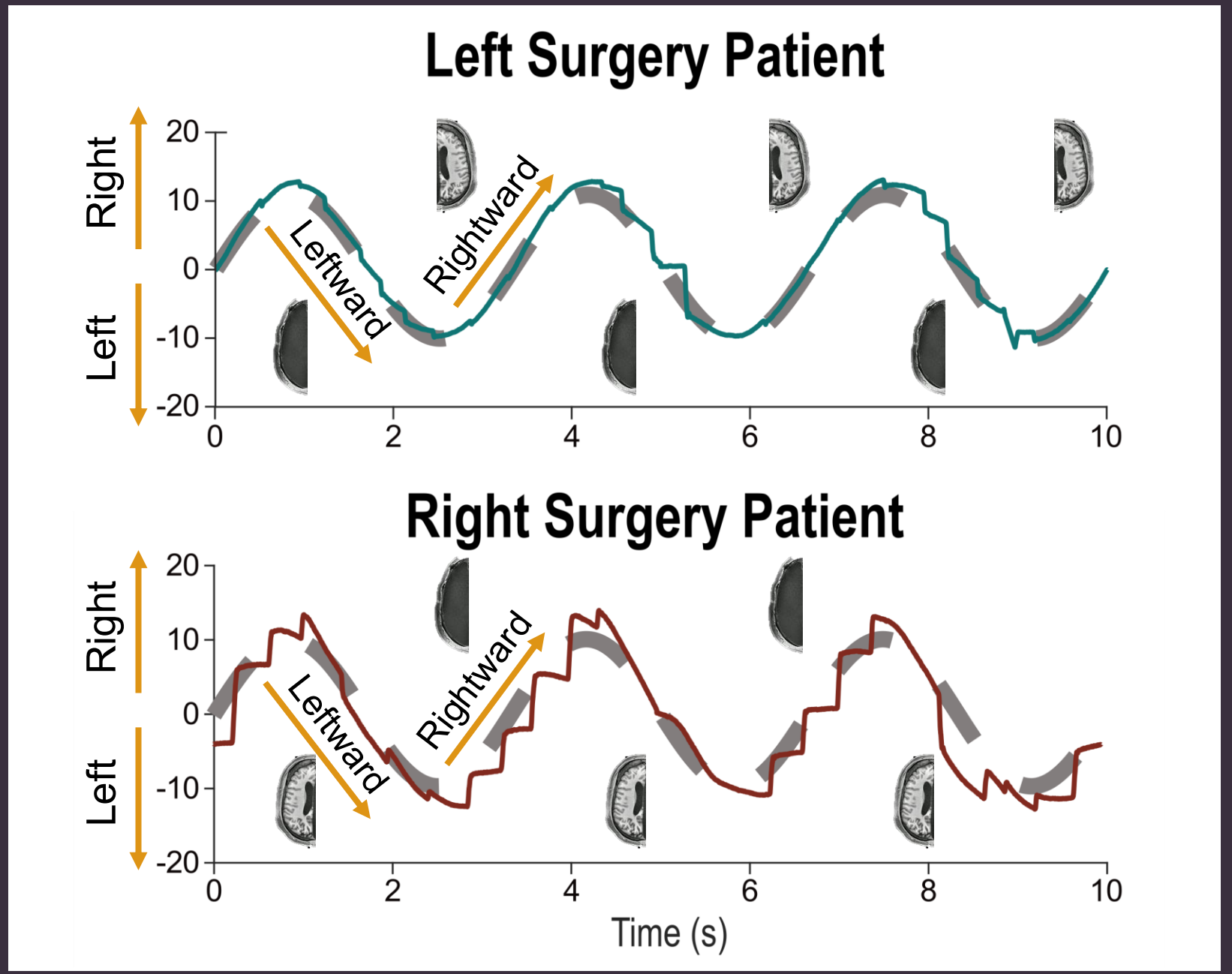
Kids with two hemispheres



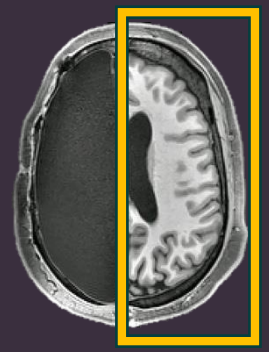
Kids with two hemispheres

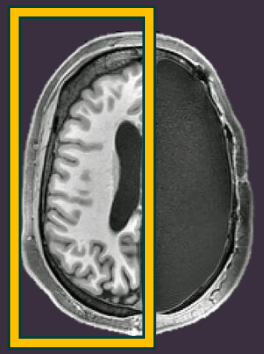


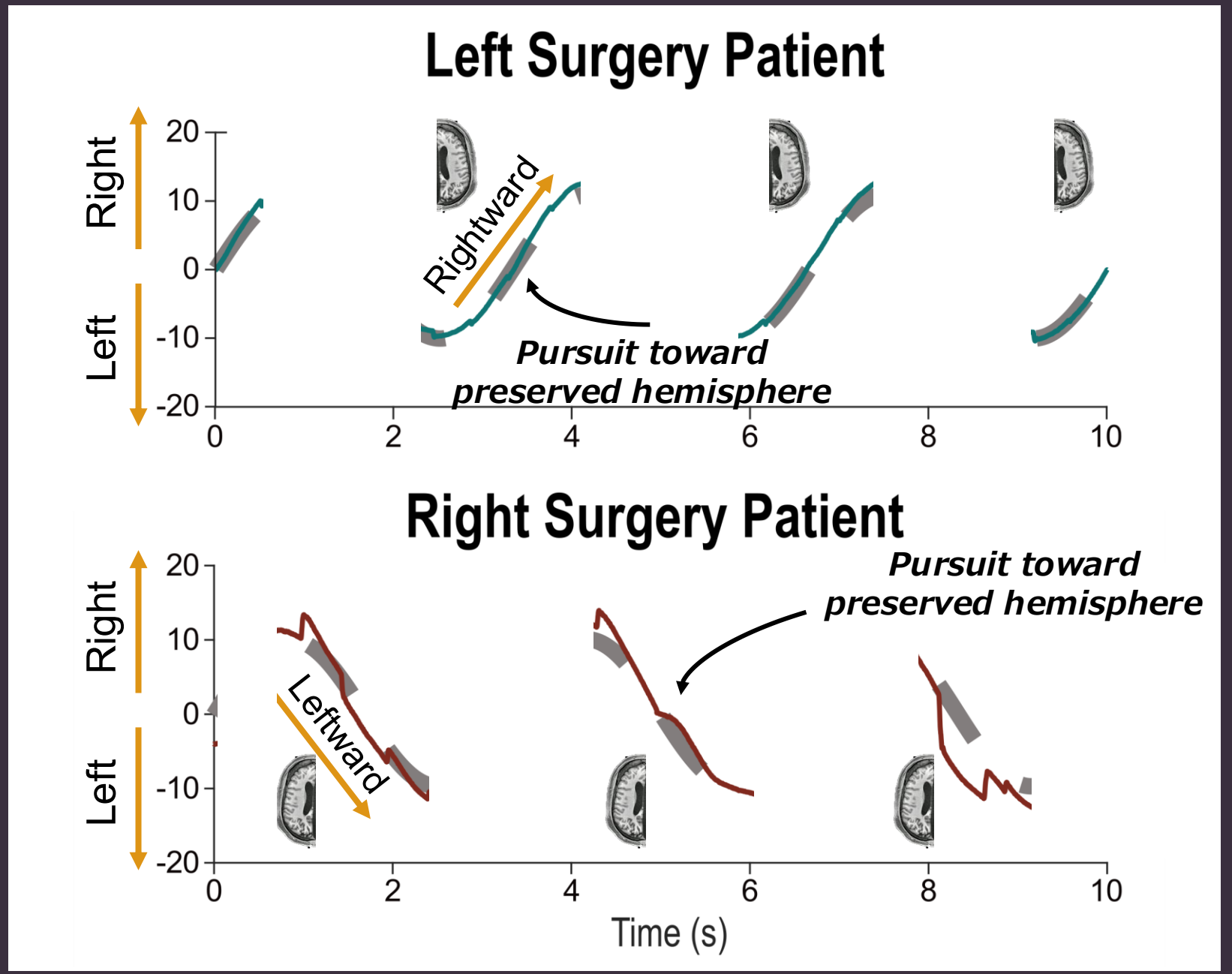
Left and Right Hemispherectomy



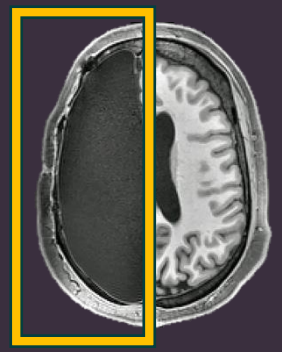
Left and Right Hemispherectomy

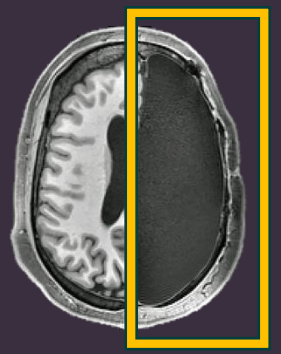


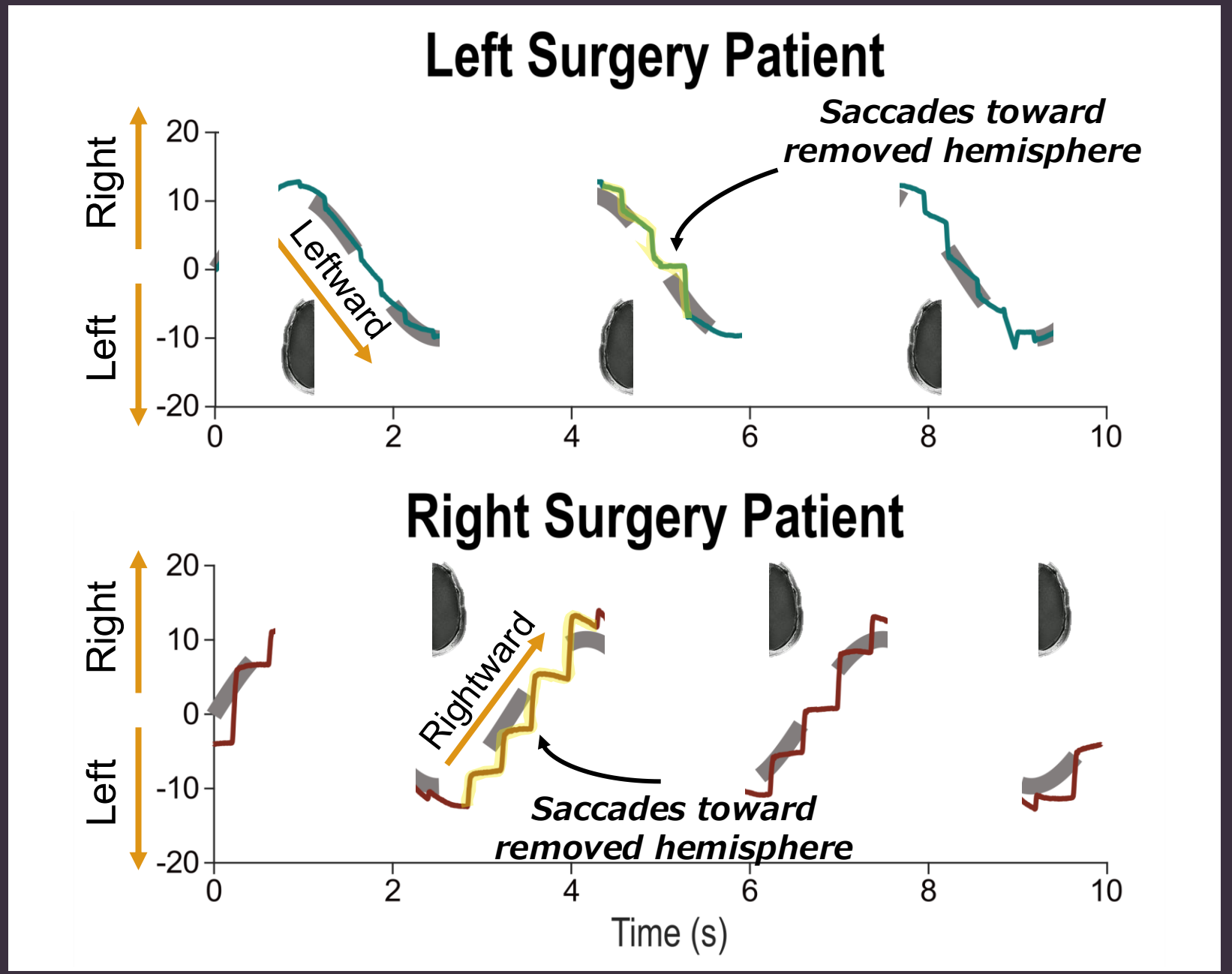




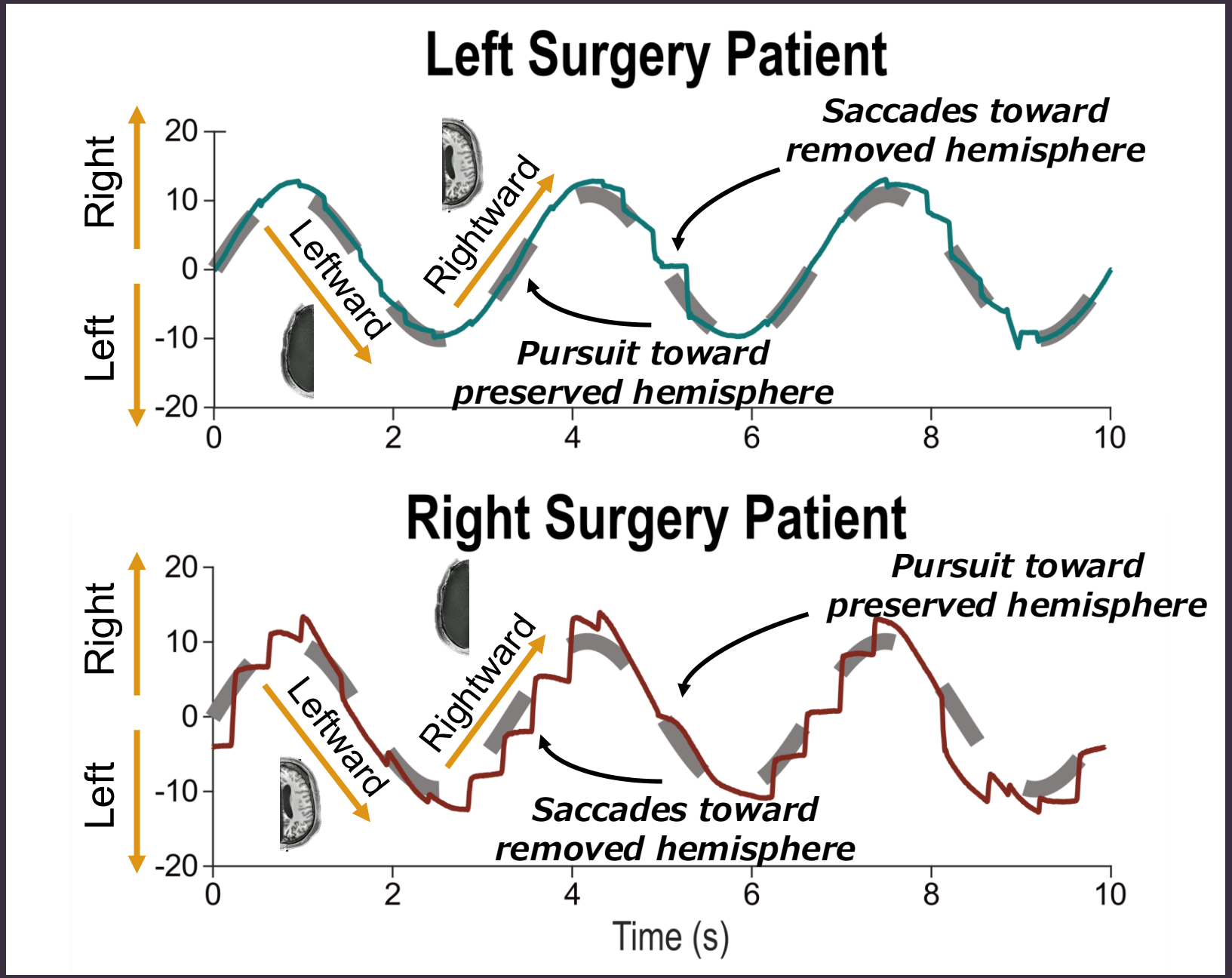
Left and Right Hemispherectomy







Summary: smooth pursuit is impaired after surgery



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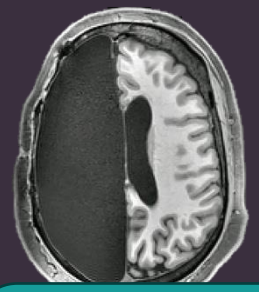
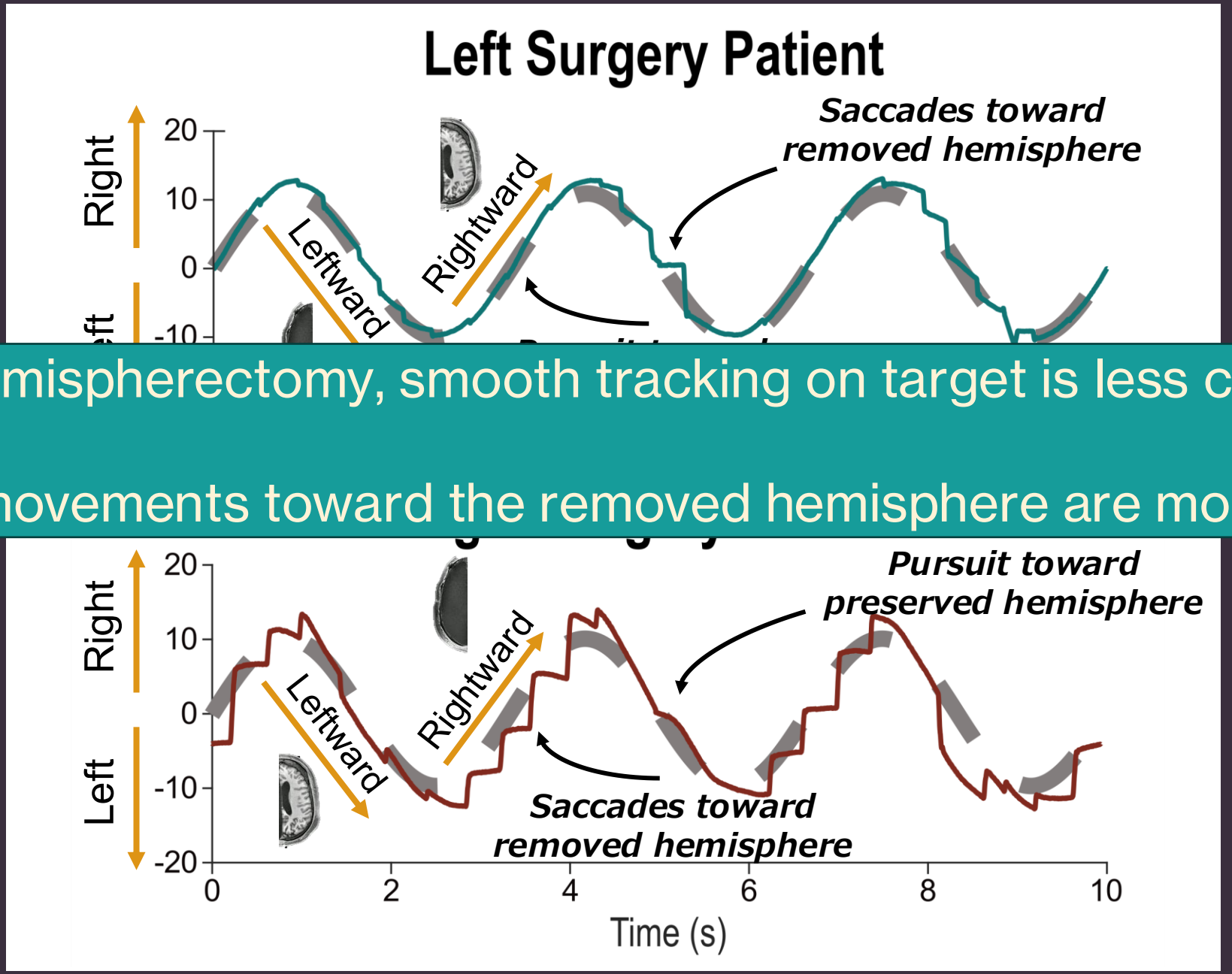
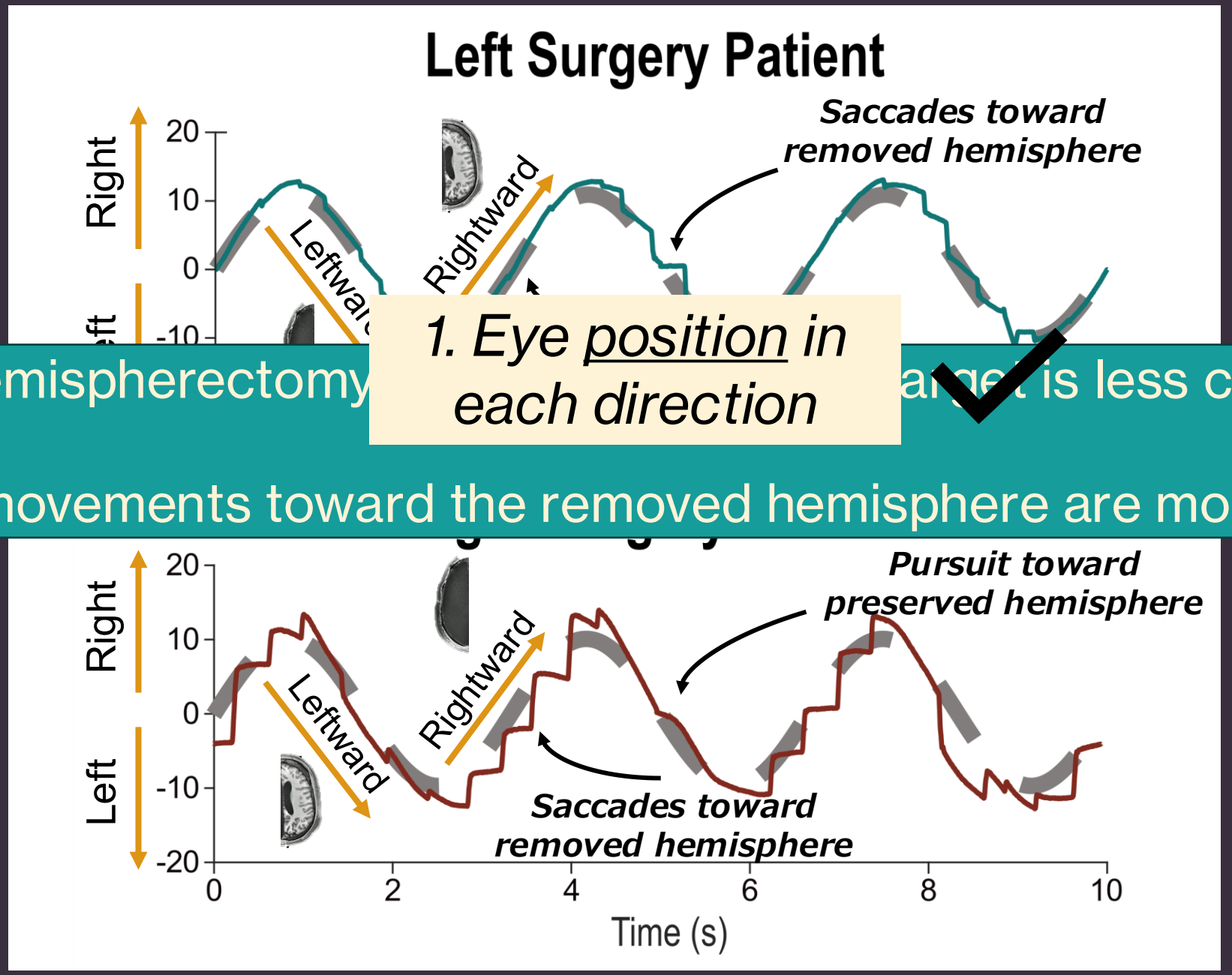




After hemispherectomy, smooth tracking on target is less consistent.

Visually, movements toward the removed hemisphere are more affected.

Summary: smooth pursuit is impaired after surgery

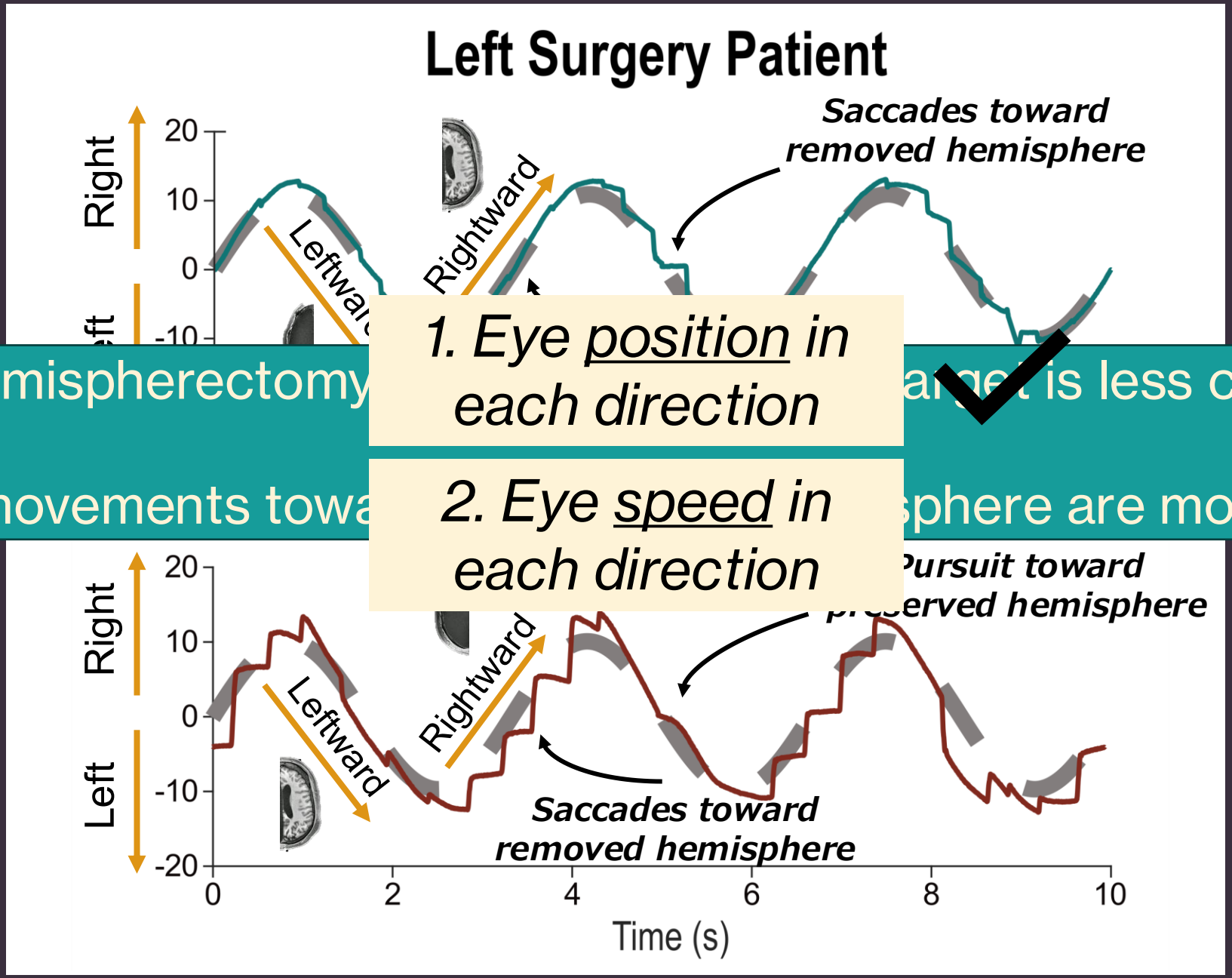


1. Eye position in each direction

After hemispherectomy [illegible] is less consistent.

Visually, movements toward the removed hemisphere are more affected.

Summary: smooth pursuit is impaired after surgery



After hemispherectomy … is less consistent.

Visually, movements towa… sphere are more affected.

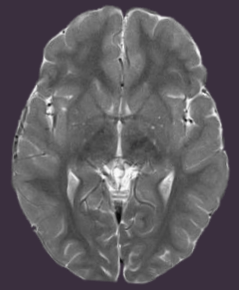
1. Eye position in each direction

2. Eye speed in each direction

Eye speed is important for staying on target

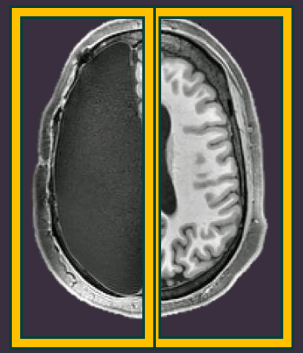
Leftward

Rightward



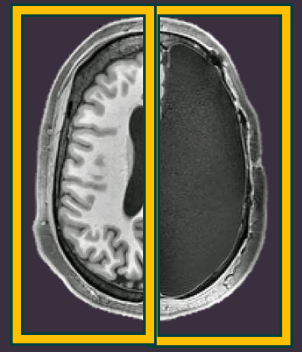
Equal

Equal



Much Slower

Faster



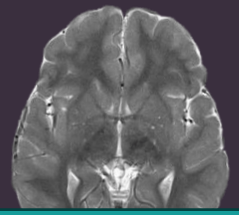
Faster

Much Slower

Eye speed is important for staying on target

Leftward

Rightward



Equal

Equal

A single hemisphere has difficulty in *both* directions

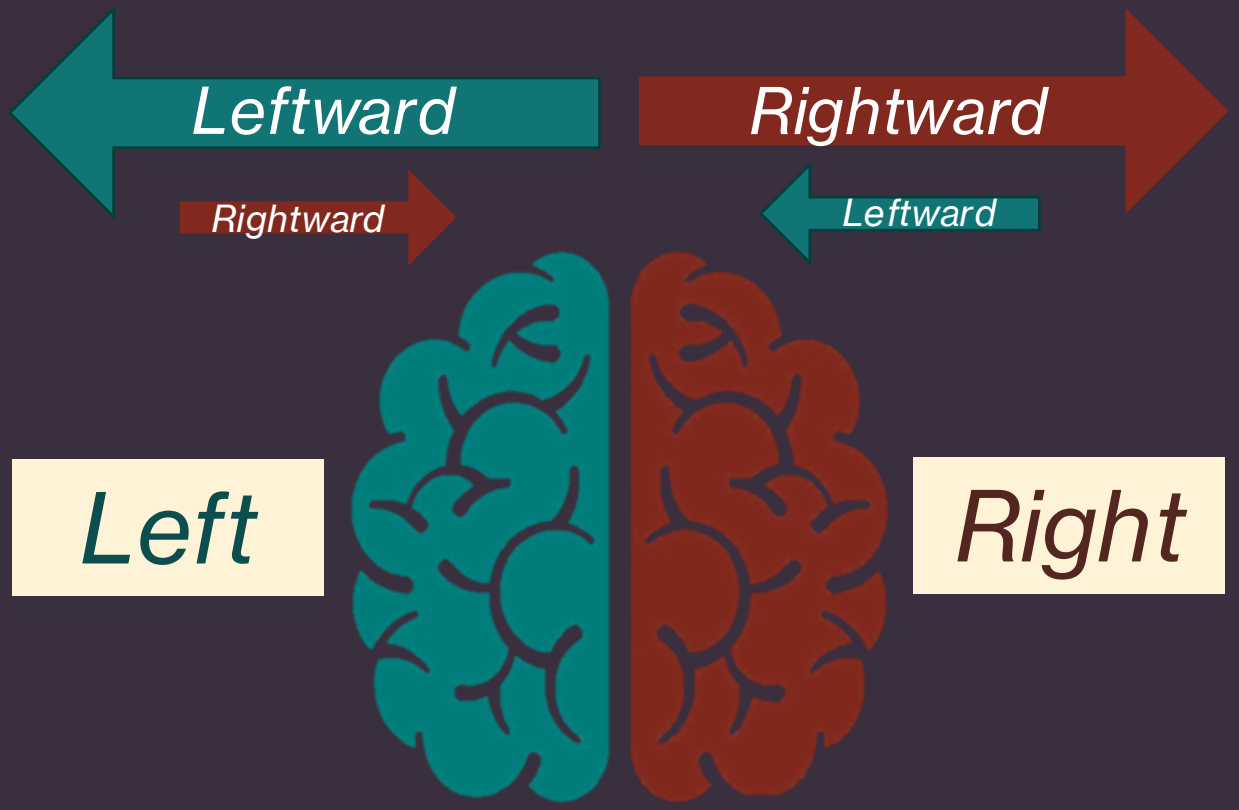
The directions are asymmetric: one is slow, one is fast

True with surgery on left or right hemisphere.

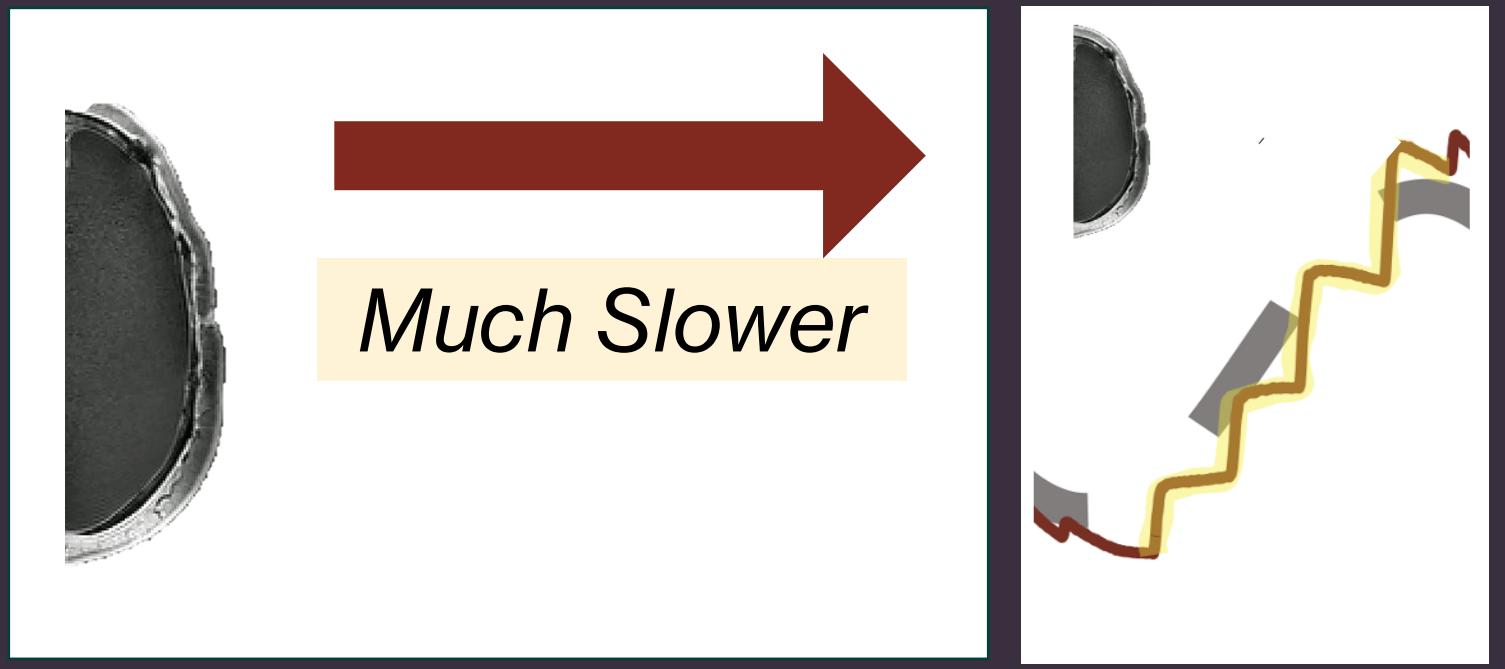
Faster

Much Slower

The hemispheres work together *asymmetrically* for movements in *both* directions



Resilience: Saccades can help compensate



When pursuit is slow, *saccades* are really fast

Key Take Home Messages

This work adds important knowledge about eye movements after resections

Even before this knowledge is integrated clinically, YOU can use it to understand your individual child's experience

This work lays the groundwork for future work and eventual eye movement interventions

What's next?

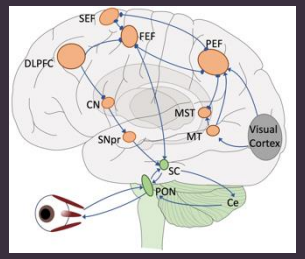
What do the deficits we found mean in more real-world situations?

Pamir, 2024

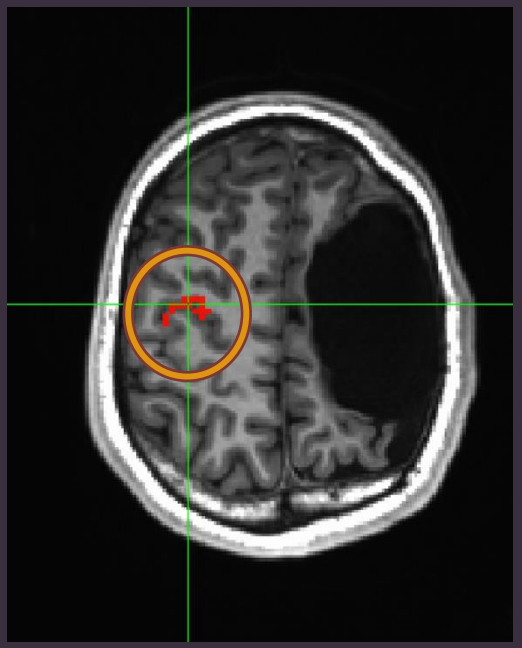
Preliminary: Patient eye movements are *less efficient*

In analysis phase to understand differences by direction– stay tuned for future publication!

What's next?



What is going on in the brain? How does one hemisphere differ from two?



Soon to be recruiting more patients – come to Pittsburgh and help us learn!

Patients show activation in eye movement regions

Thank you!

pesa.

Participants and their families

Advisors & Labs




Funding, Depts, & Orgs

National Eye Institute
NATIONAL INSTITUTES OF HEALTH

fondazione dompé
Rita-Levi Montalcini Scholarship

100 PSYCHOLOGY 1915-2015

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CNBC

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Friends + Family

All of you for listening!

Questions?

Contact Me!
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