



Parkinson's Foundation

Seeing Clearly with PD: Vision Changes

Dan Gold, DO

Assistant Professor of Neurology, Ophthalmology,
Neurosurgery, Otolaryngology - Head and Neck
Surgery, Emergency Medicine, The Johns Hopkins
University School of Medicine

March 5, 2019

Better Lives. Together.

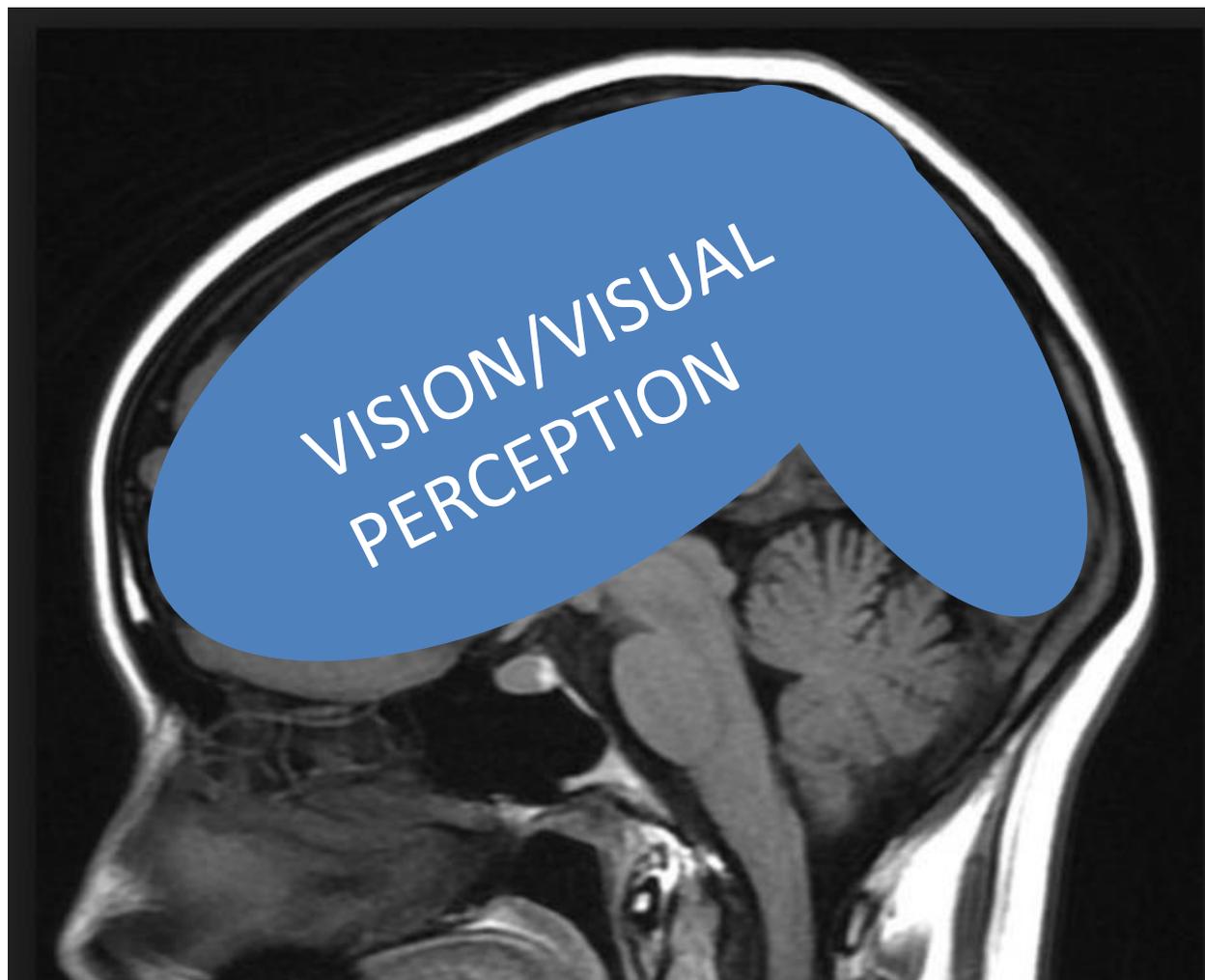
1. Why Should I Care About Vision?



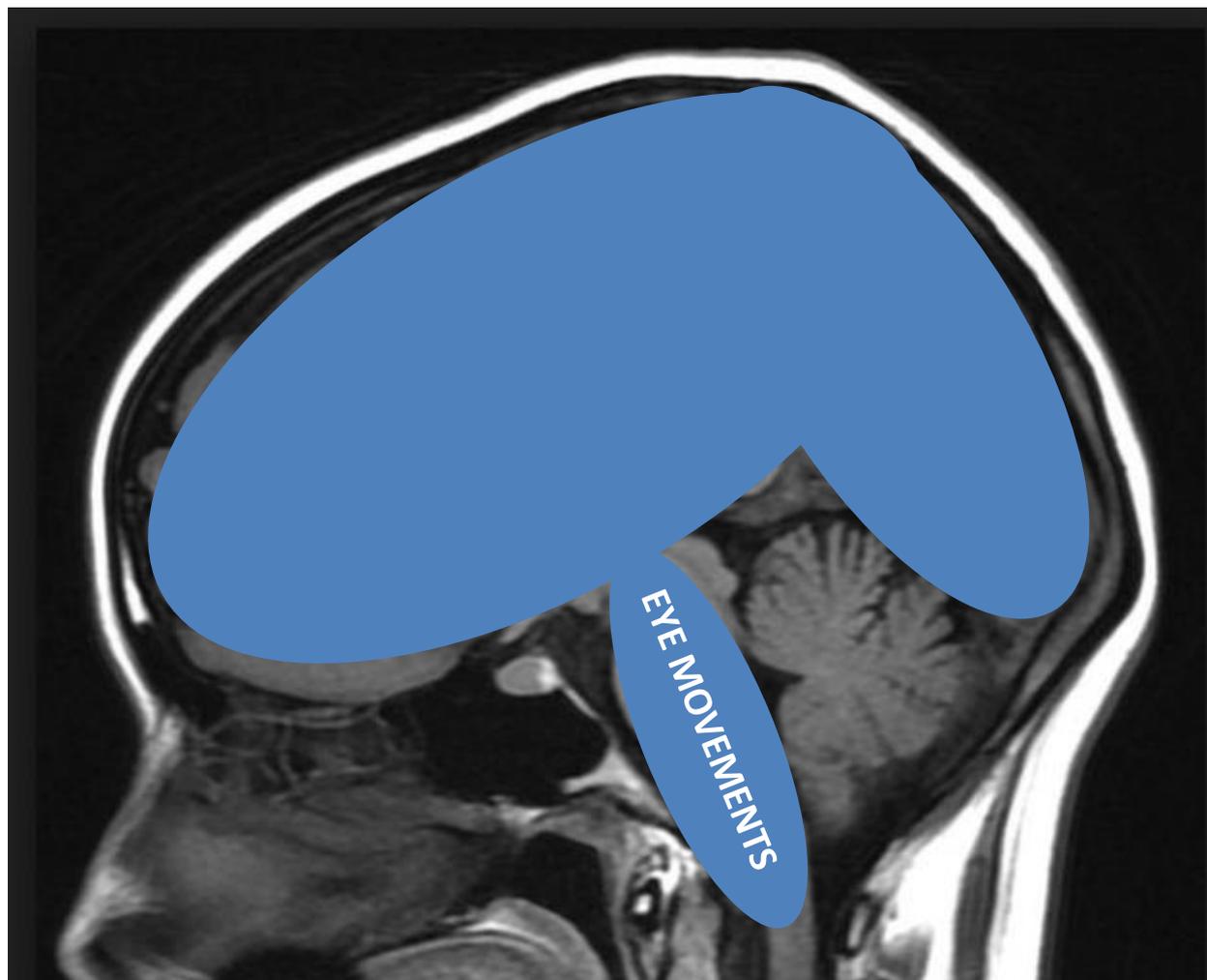
Vision Is an Important Sense



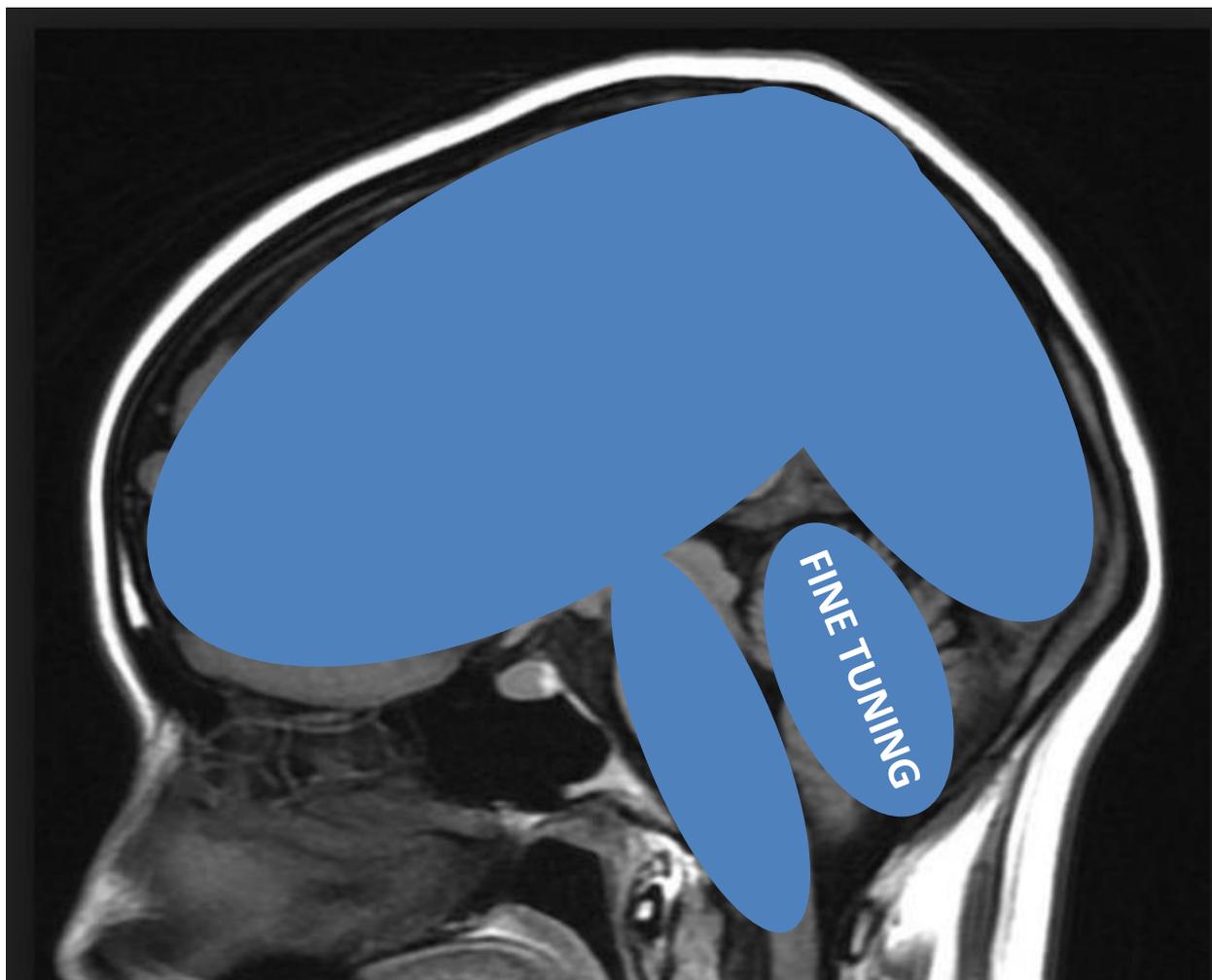
Vision Is an Important Sense



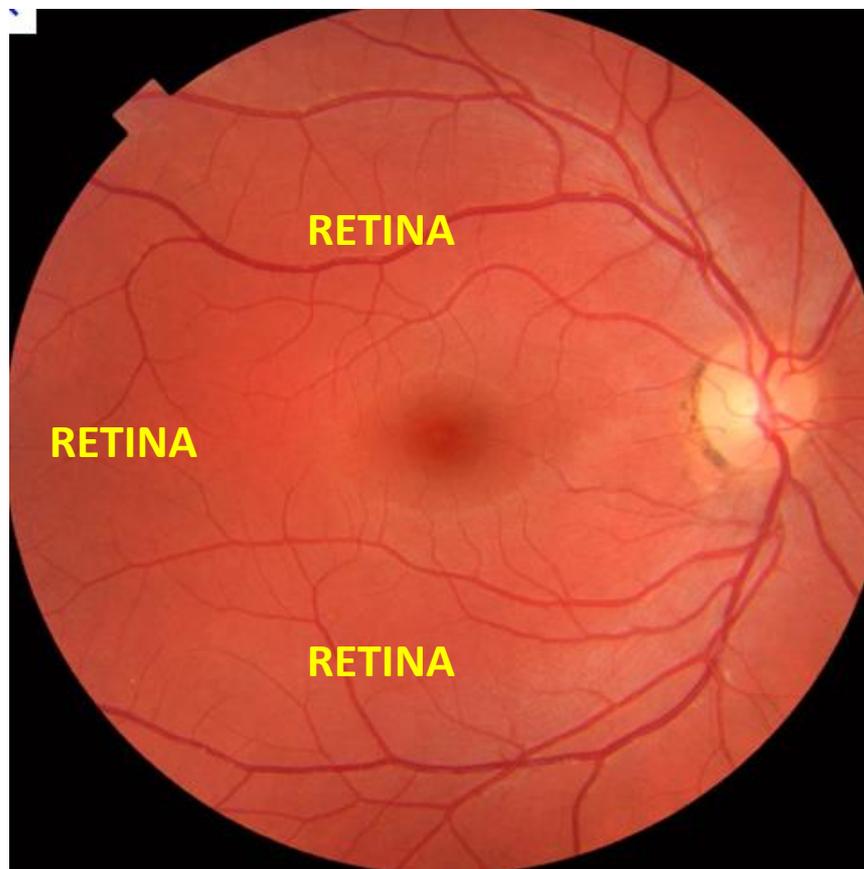
Vision Is an Important Sense



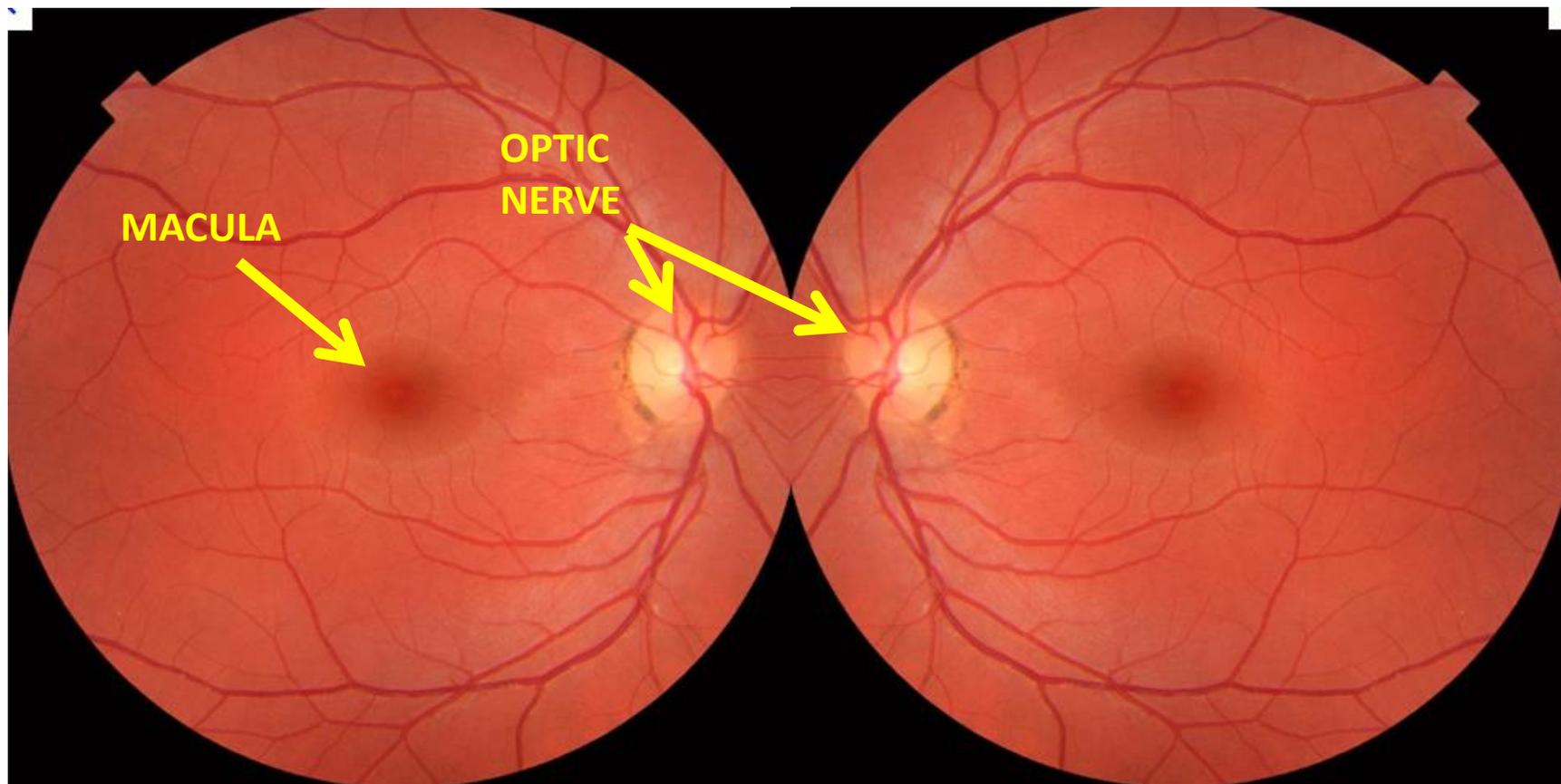
Vision Is an Important Sense



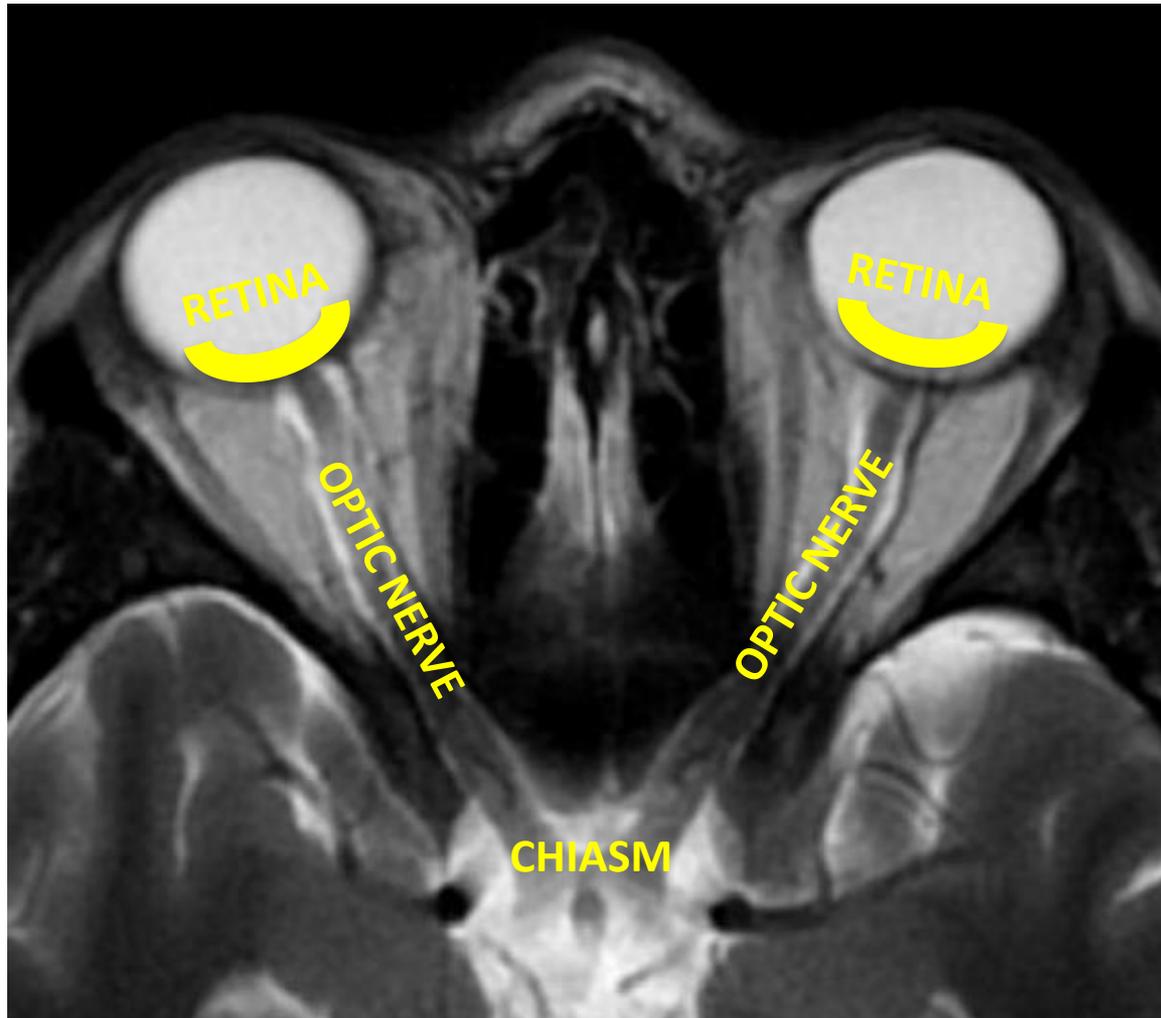
How Does Vision Work?



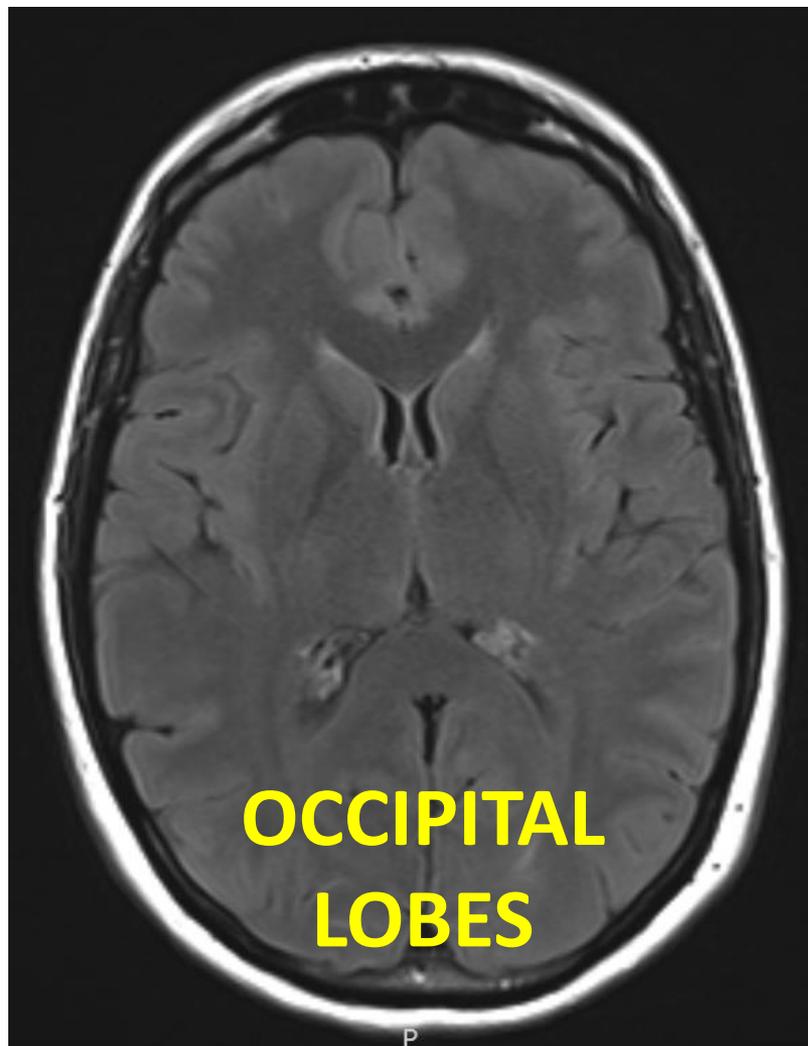
How Does Vision Work?



How Does Vision Work?



How Does Vision Work?



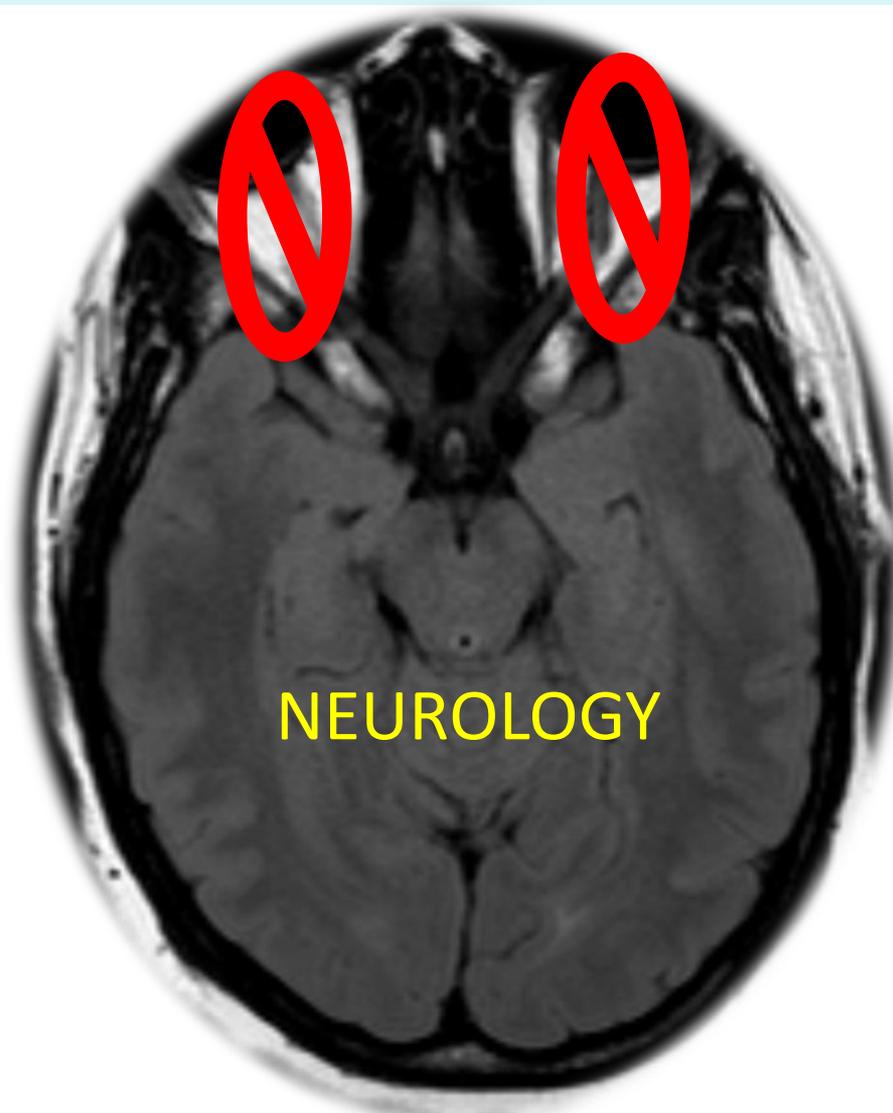
2. What is a Neuro-ophthalmologist?



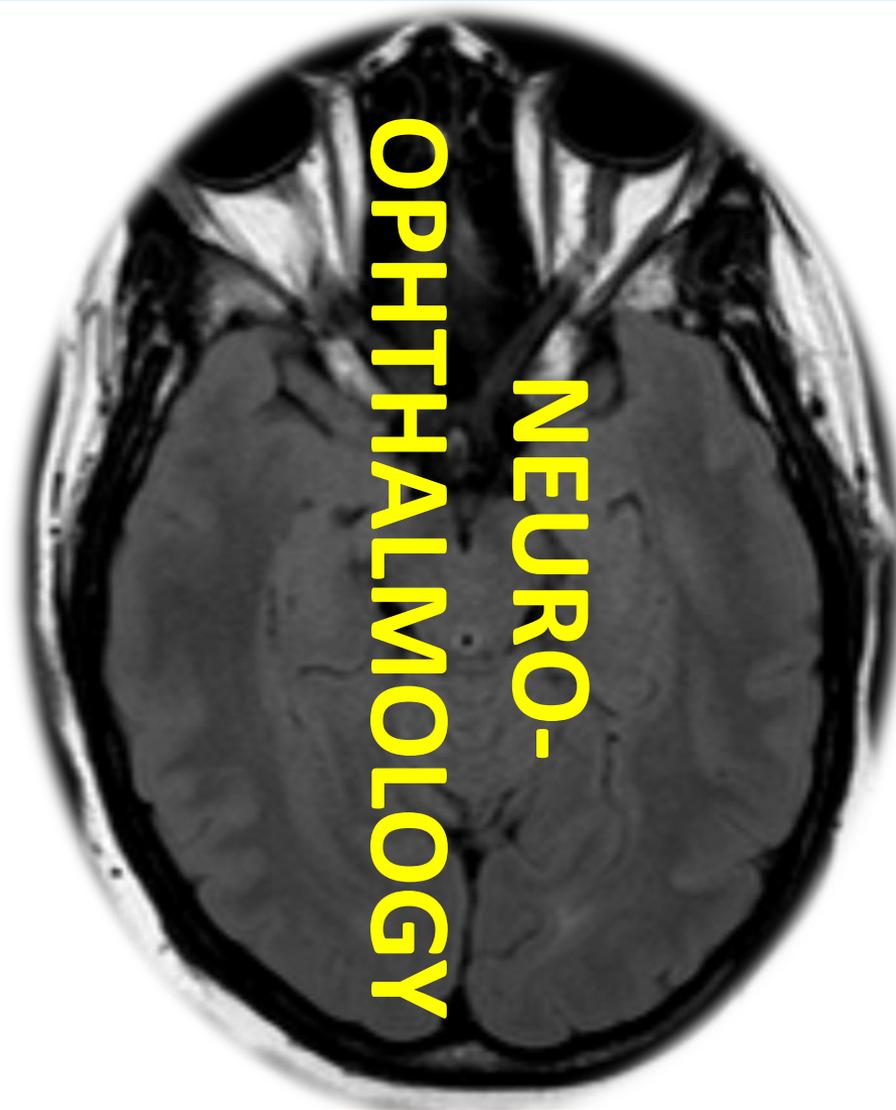
What is Neuro-Ophthalmology?



What is Neuro-Ophthalmology?



What is Neuro-Ophthalmology?



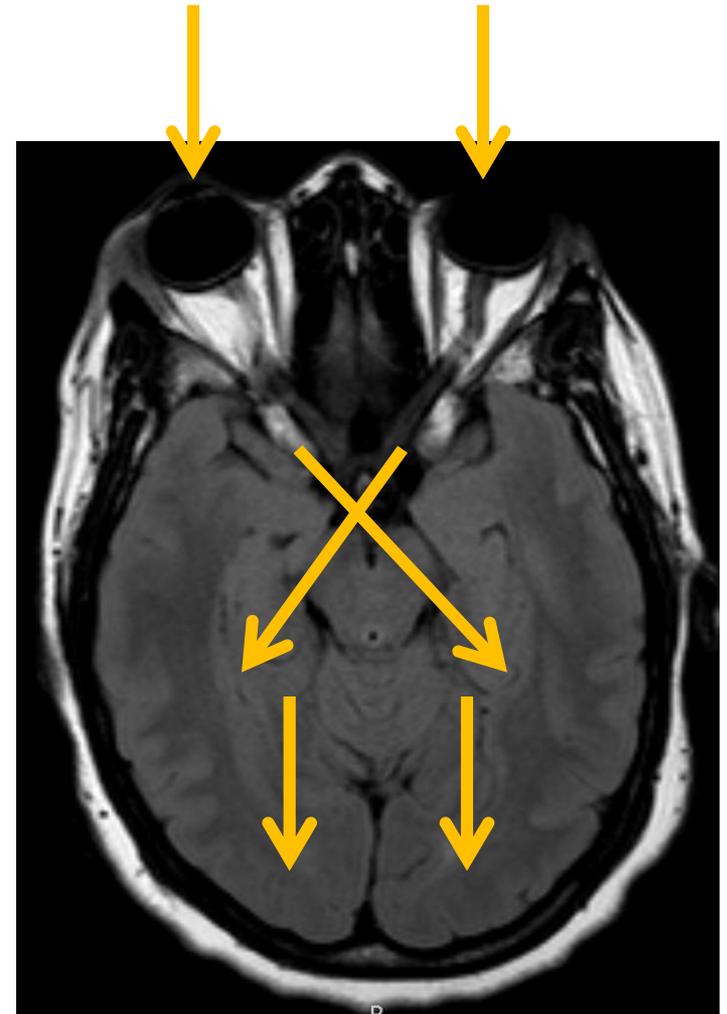
What is Neuro-Ophthalmology?

1) Afferent

– Seeing

2) Efferent

– Moving the eyes to see



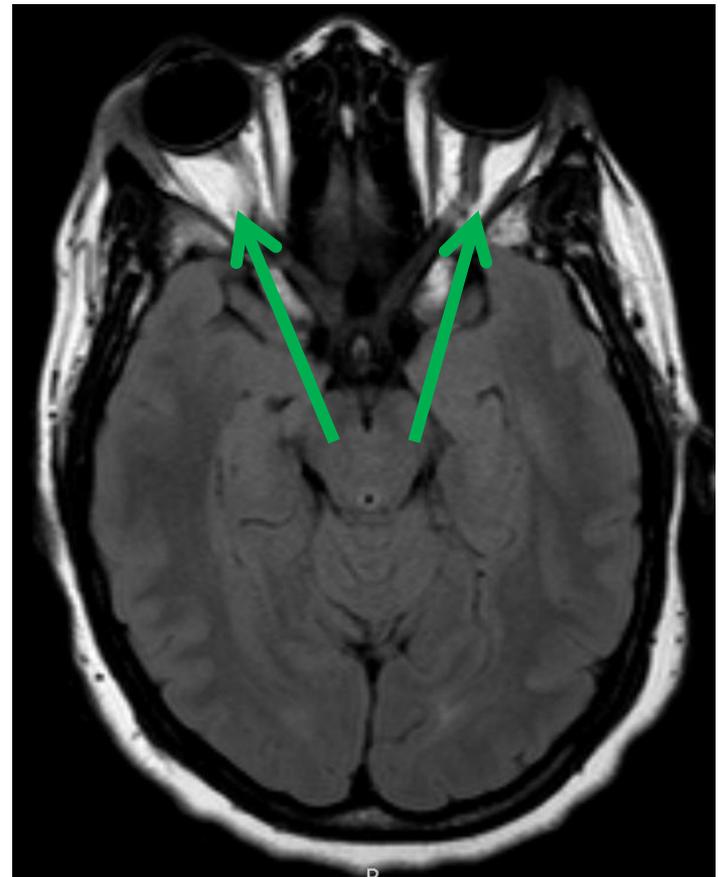
What is Neuro-Ophthalmology?

1) Afferent

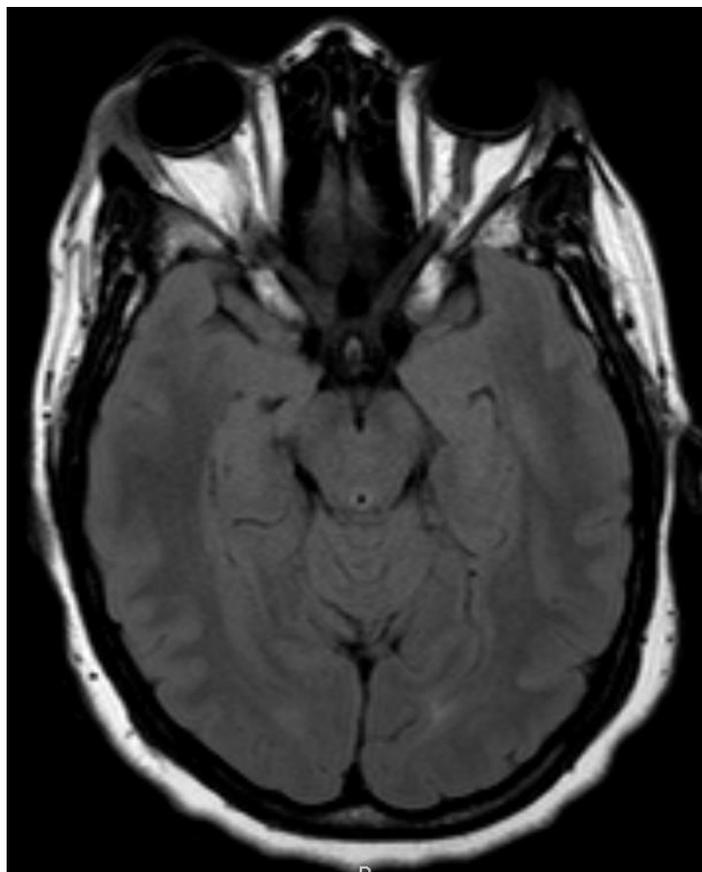
– Seeing

2) Efferent

– Moving the eyes to see



Where is the Problem?



3. What Visual Symptoms Should I Be Aware Of?



Visual Symptoms are Common in PD

- **78% of patients report at least one visual symptom!**

Archibald NK, Clarke MP, Mosimann UP, Burn DJ. Visual symptoms in Parkinson's disease and Parkinson's disease dementia. *Mov Disord* 2011; 26: 2387–95.



Uncommon

– What we will not talk about today

- Blepharospasm
- Apraxia of eyelid opening
- Vertical eye movement limitations
- Other eye movement abnormalities



PD and the Eye

Common

– What we will talk about today



Common Visual Symptoms in PD

- 1) Central and color vision abnormalities
- 2) Blinking and ocular surface abnormalities
- 3) Eye movement abnormalities
- 4) Hallucinations

A) Central and Color Vision Abnormalities

SYMPTOMS of Central and Color Abnormalities

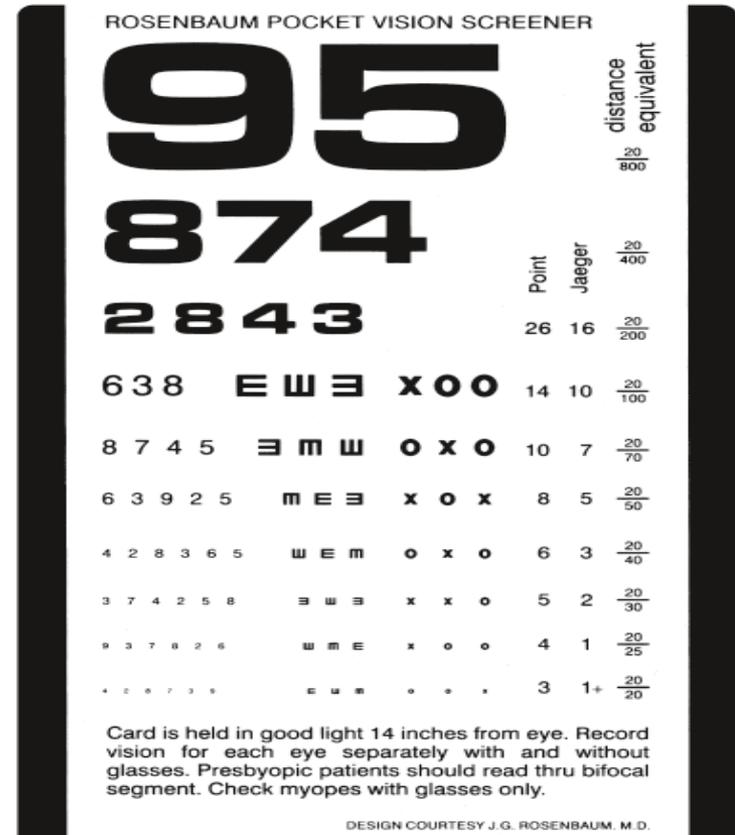
- Blurriness
- Images aren't clear
- Difficulty with vision in twilight hours or when raining
- Colors looked washed out/not as vibrant
- Vision “just isn't the same” ...

DIAGNOSIS of visual symptoms?

Neuro-ophthalmology exam

Visual acuity

- Near
- Distance



DIAGNOSIS of visual symptoms? Neuro-ophthalmology exam

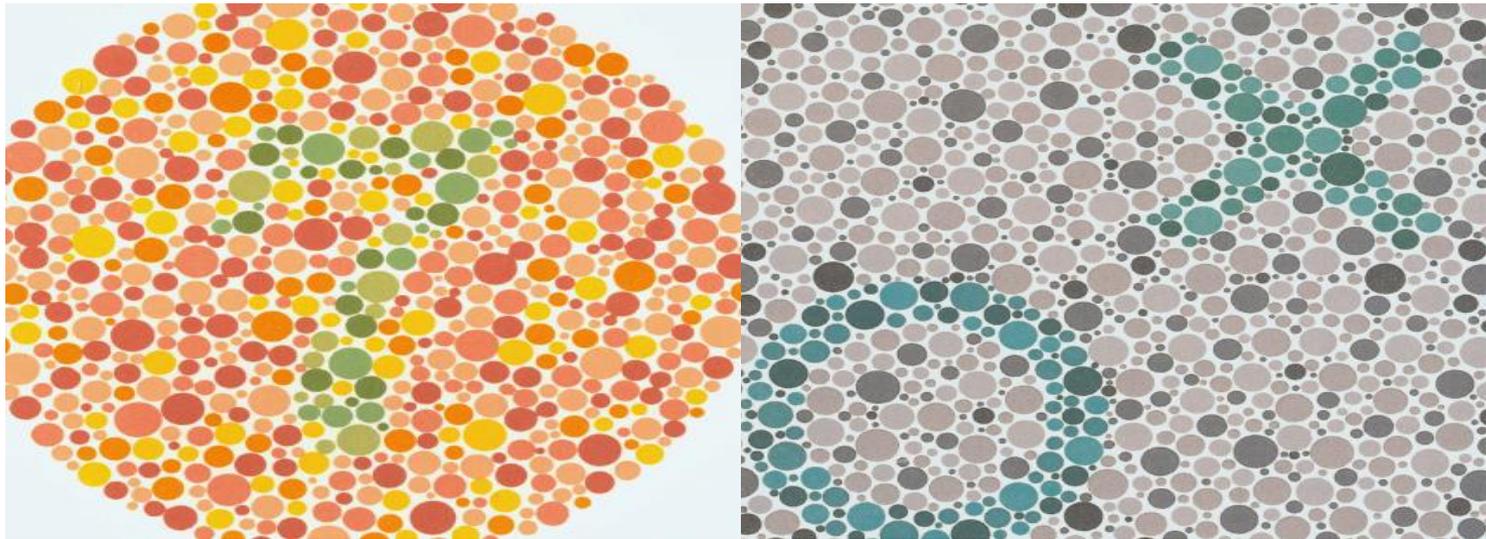
Contrast sensitivity



Focusing the Brain on Better Vision, By [Jan Hoffman](#) April 6, 2015

DIAGNOSIS of visual symptoms? Neuro-ophthalmology exam

Color vision



Other Reported Abnormalities in PD

Visual processing

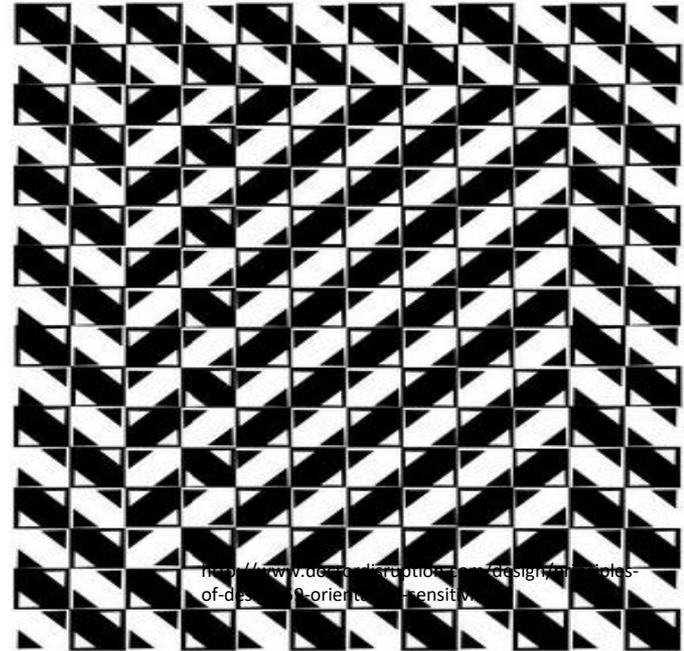
Peripheral vision

Object perception

Visuospatial construction

Motion perception

Face and emotion recognition



Sun L, Zhang H, Gu Z, Cao M, Li D, Chan P. Stereopsis impairment is associated with decreased color perception and worse motor performance in Parkinson's disease. Eur J Med Res 2014; 19: 29.

Other Reported Abnormalities in PD

Visual processing

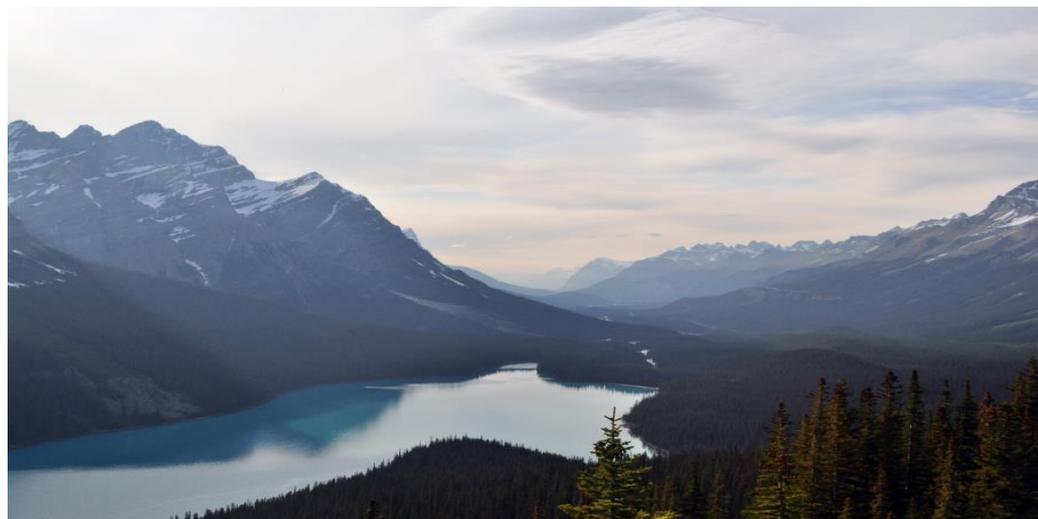
Peripheral vision

Object perception

Visuospatial construction

Motion perception

Face and emotion recognition



Sampaio J, Bobrowicz-Campos E, Andre R, Almeida I, Faria P, Januario C, et al. Specific impairment of visual spatial covert attention mechanisms in Parkinson's disease. *Neuropsychologia* 2011; 49: 34–42.

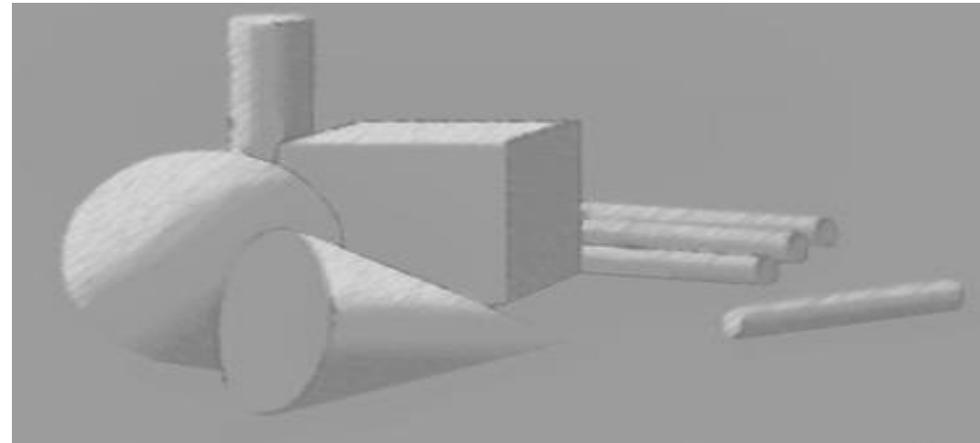
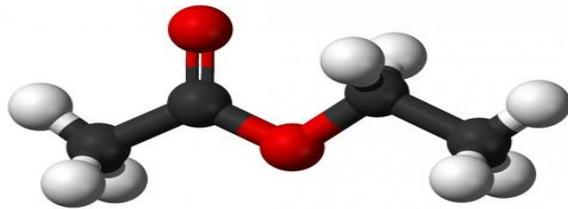


Other Reported Abnormalities in PD

Visual processing

Peripheral vision

Object perception



Visuospatial construction

Motion perception

Face and emotion recognition

Mosimann UP, Mather G, Wesnes KA, O'Brien JT, Burn DJ, McKeith IG. Visual perception in Parkinson disease dementia and dementia with Lewy bodies. *Neurology* 2004; 63: 2091–6.

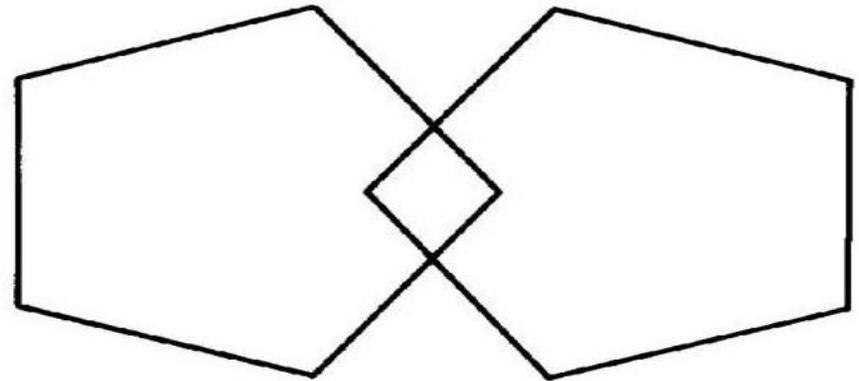
Other Reported Abnormalities in PD

Visual processing

Peripheral vision

Object perception

Visuospatial construction



Motion perception

Face and emotion recognition

Uc EY, Rizzo M, Anderson SW, Qian S, Rodnitzky RL, Dawson JD. Visual dysfunction in Parkinson disease without dementia. *Neurology* 2005; 65: 1907–13.

Other Reported Abnormalities in PD

Visual processing
Peripheral vision
Object perception



Visuospatial construction
Motion perception
Face and emotion recognition

Trick GL, Kaskie B, Steinman SB. Visual impairment in Parkinson's disease: deficits in orientation and motion discrimination. *Optom Vis Sci* 1994; 71: 242–5



Other Reported Abnormalities in PD

Visual processing
Peripheral vision
Object perception
Visuospatial construction
Motion perception
Face and emotion recognition



<http://www.bbc.com/future/story/20180510-why-our-facial-expressions-dont-reflect-our-feelings>

Levin BE, Llabre MM, Reisman S, Weiner WJ, Sanchez-Ramos J, Singer C, et al. Visuospatial impairment in Parkinson's disease. *Neurology* 1991; 41: 365–9.



Visual Symptoms and Gait?

- **Visual deficits are frequently associated with postural instability**



Deficits in visual acuity, contrast and color are at least partly due to retinal dopamine deficiency

– Corrected with dopamine?

Making sure that other treatable visual issues are addressed

Each of these abnormalities are subtle/mild, but when they occur in combination...

Rimona WS, et al. Visual dysfunction in Parkinson's disease. Brain 2016 Jul 13 (epub ahead of print)



B) Blinking and Ocular Surface Abnormalities

Why Should We Care About The Ocular Surface?

Optical clarity

Protective barrier

Decreased friction

Hydration

Johnny L Gayton. Etiology, prevalence, and treatment of dry eye disease. Clinical Ophthalmology
2009.

Why Do We Blink?

- Redistributes tear film uniformly
- Secretion of tears from tear glands
- When do we blink less?
 - Reading
 - Computer work/television
 - Driving

Tamer C, Melek IM, Duman T. Tear film tests in Parkinson's disease patients. *Ophthalmology* 112:1795–1800
<http://www.myvmc.com/diseases/dry-eye-syndrome-keratoconjunctivitis-sicca/>

SYMPTOMS of Ocular Surface Irritation

- Dry eyes
- Gritty/sandy sensation
- Burning
- Redness
- Crusting on the lashes
- Eyes getting stuck shut in the morning
- Sensitivity to light

Tamer C, Melek IM, Duman T. Tear film tests in Parkinson's disease patients. *Ophthalmology* 112:1795–1800

Ocular Surface and Blinking in PD

Ocular surface

- Poor tear production

Blinking

- Reduced

Result:

- Poor tear film, dry eye and irritation

Medications?

- Artane (trihexane trihexyphenidyl)

DIAGNOSIS

Thorough evaluation by an ophthalmologist or optometrist

TREATMENT

Artificial tears

- 3-4 times/day + more as needed

Prescription medications



Inflammation of the eyelids (blepharitis)

- Hot compresses or lid scrubs

C) Eye Movement Abnormalities

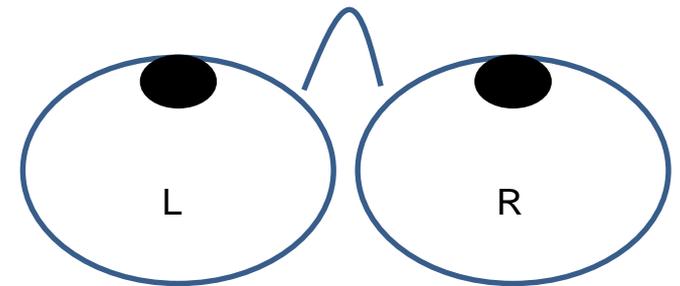


DOUBLE VISION



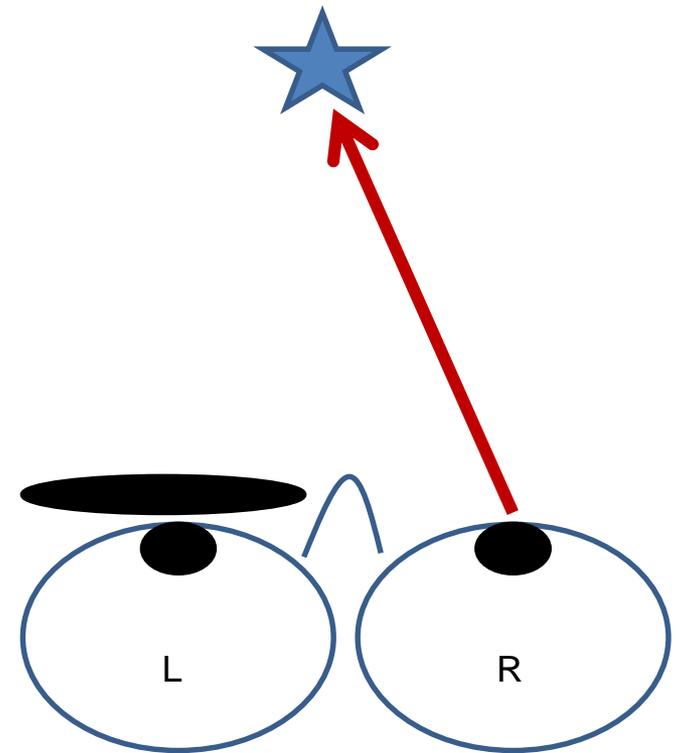
DIAGNOSIS of Diplopia

1) Monocular (non-neurologic)



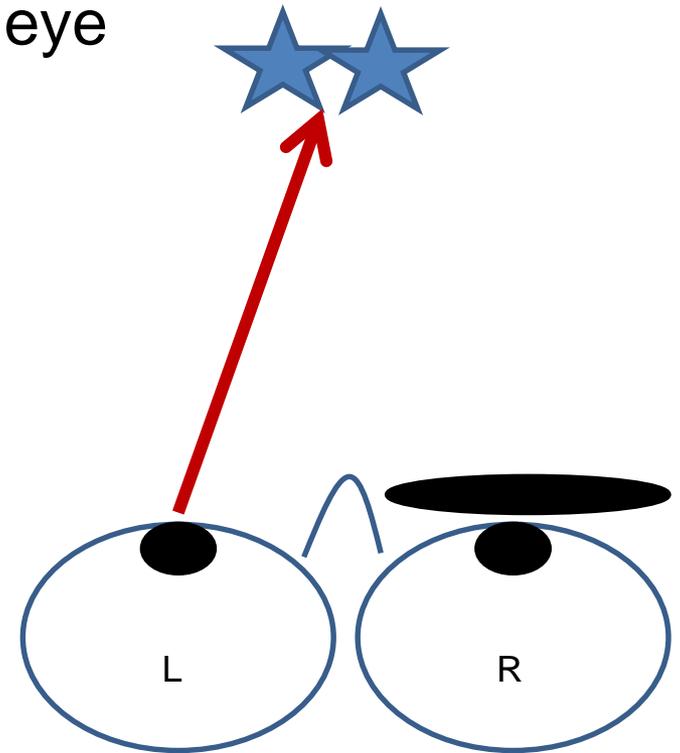
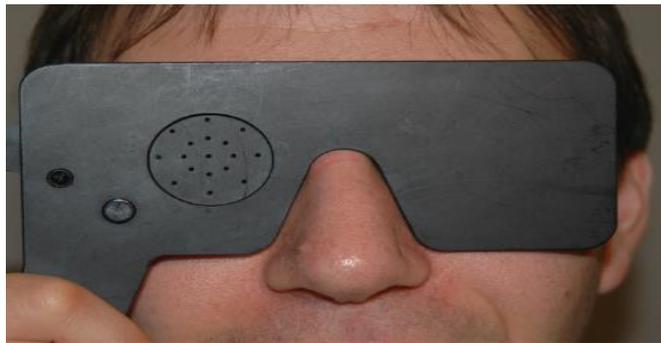
DIAGNOSIS of Diplopia

1) Monocular (non-neurologic)



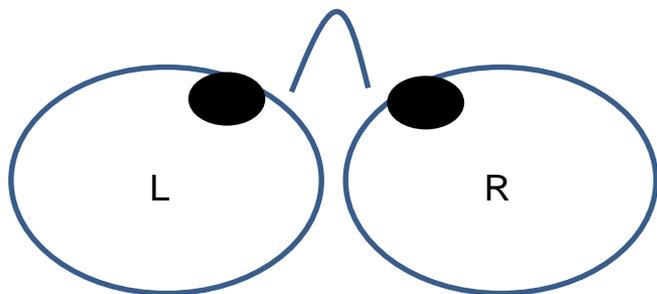
DIAGNOSIS of Diplopia

1) Monocular double vision in the left eye
(*NOT NEUROLOGIC*)



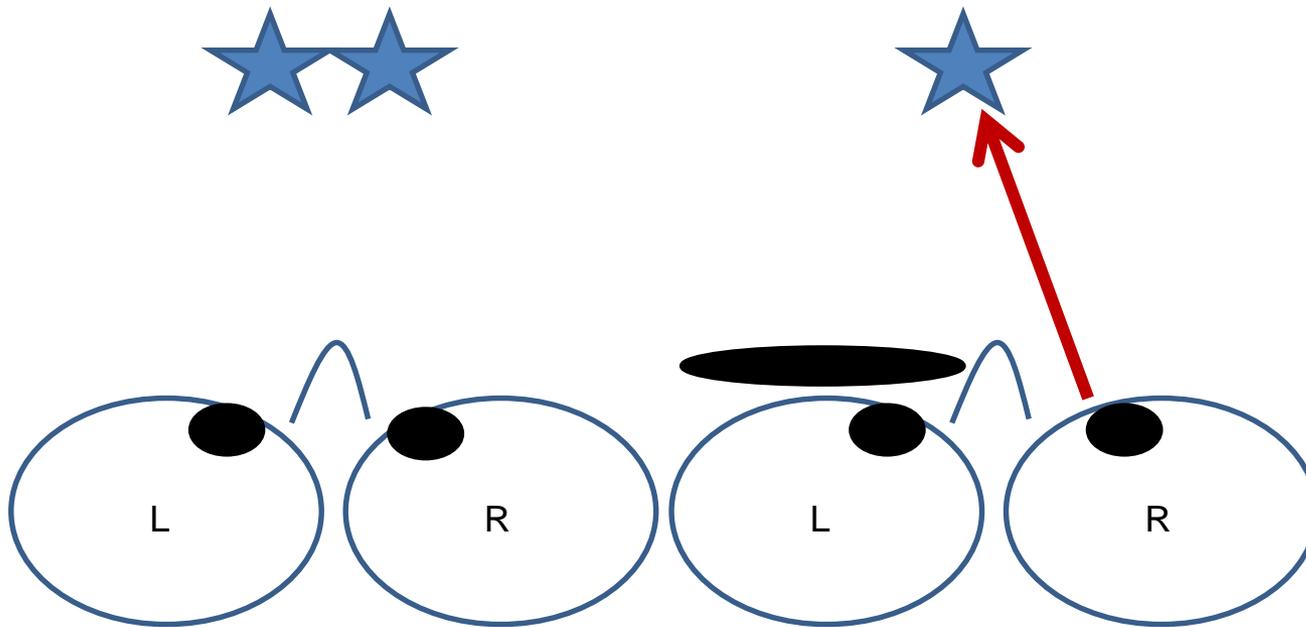
DIAGNOSIS of Diplopia

2) Binocular (neurologic)



DIAGNOSIS of Diplopia

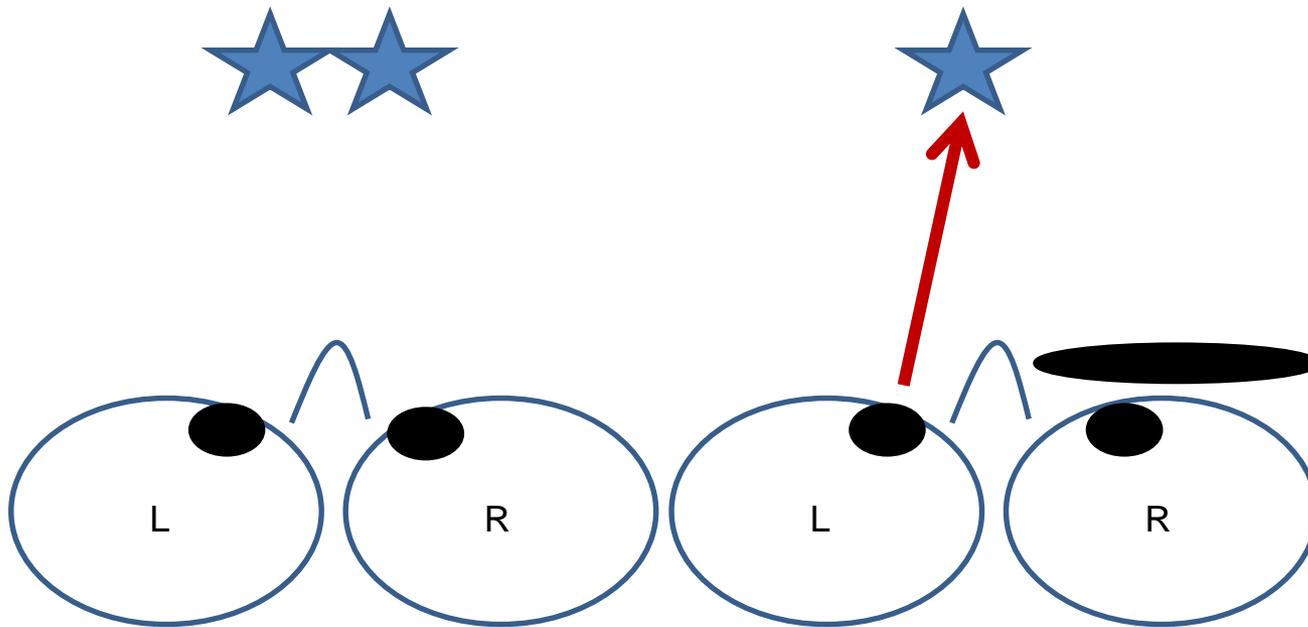
2) Binocular (neurologic)



DIAGNOSIS of Diplopia

2) Binocular (neurologic)

- Eyes misaligned → neuro-ophthalmology



TREATMENT of Diplopia

Acutely



TREATMENT of Diplopia

Subacute-chronic (press-on or ground in)



Strabismus surgery (unusual in PD)



<http://www.theblaze.com/stories/2013/01/25/the-medical-issue-that-closeup-pictures-of-hillarys-glass-may-reveal/>

CONVERGENCE INSUFFICIENCY



SYMPTOMS of Convergence Insufficiency

Double vision

Headaches

Eye strain

Blurred vision

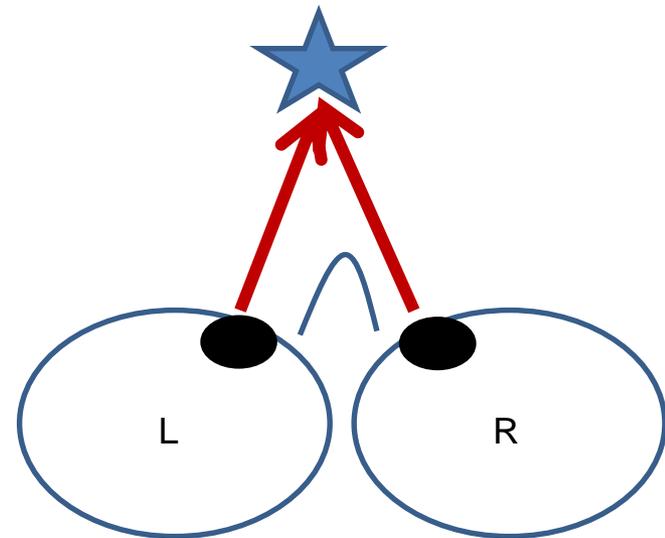
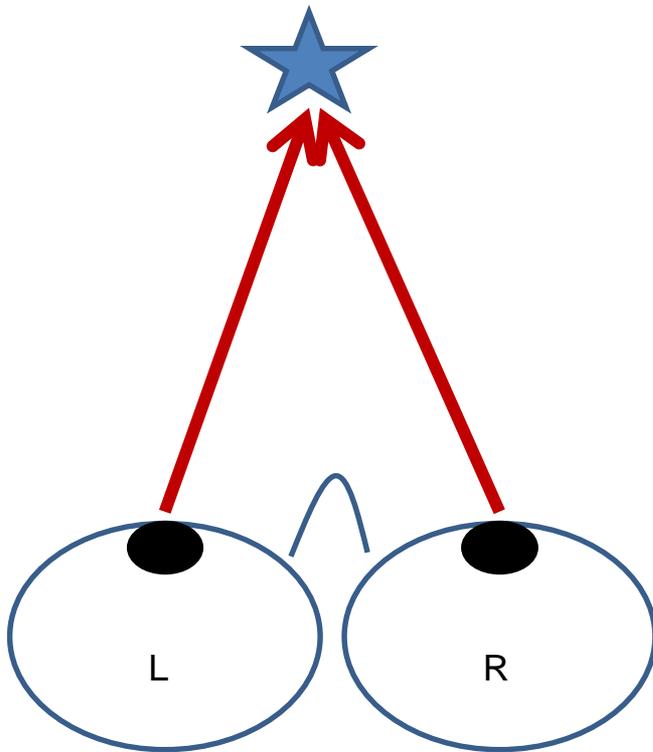
Loss of place while reading

- Excessive tiredness while reading
- Covering of one eye while reading
- Complaints of the words moving on the page
- Short attention span for reading
- Constant adjusting of the distance of a book or other to see better

Nowacka B, Lubinski W, Honczarenko K, Potemkowski A, Safranow K. Ophthalmological features of Parkinson disease. Med Sci Monit 2014; 20: 2243–9

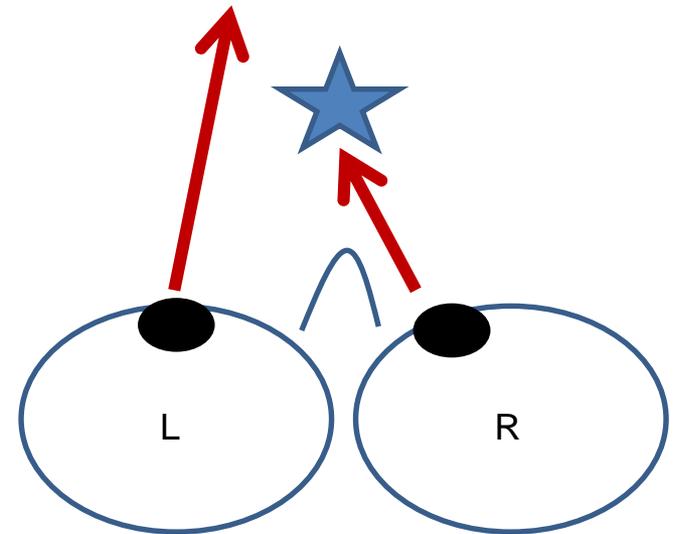
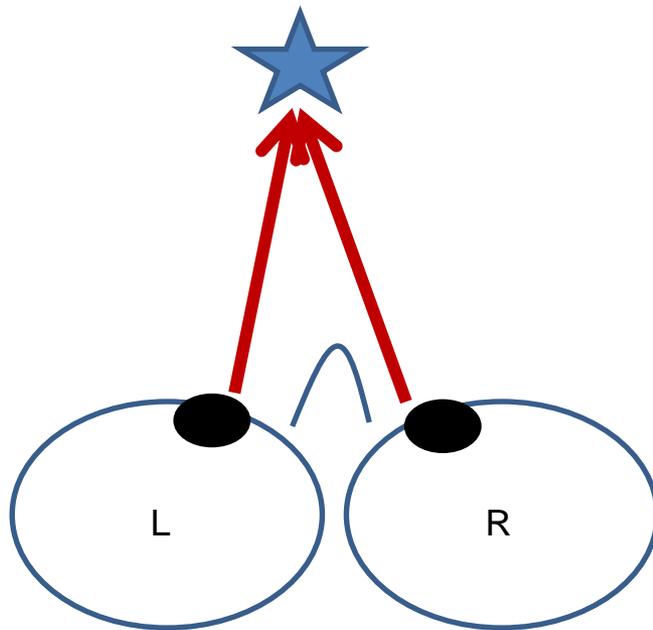


Convergence Insufficiency



Convergence Insufficiency

Near point of convergence



DIAGNOSIS of Convergence Insufficiency

- Eye movement examination performed by neurologist, ophthalmologist, or neuro-ophthalmologist

TREATMENT of Convergence Insufficiency

Home exercises

- “Pencil push-ups”

Therapy or computer exercises

- Vision therapy

Covering one eye, or putting Scotch tape or satin gift tape over one lens

Prisms placed in reading glasses **ONLY**



D) Hallucinations



In Parkinson's disease patients, associated with:

- Daytime somnolence or insomnia
- Moderate-severe cognitive issues
- Longer duration of PD
- Associated with reduced acuity

What about medications?

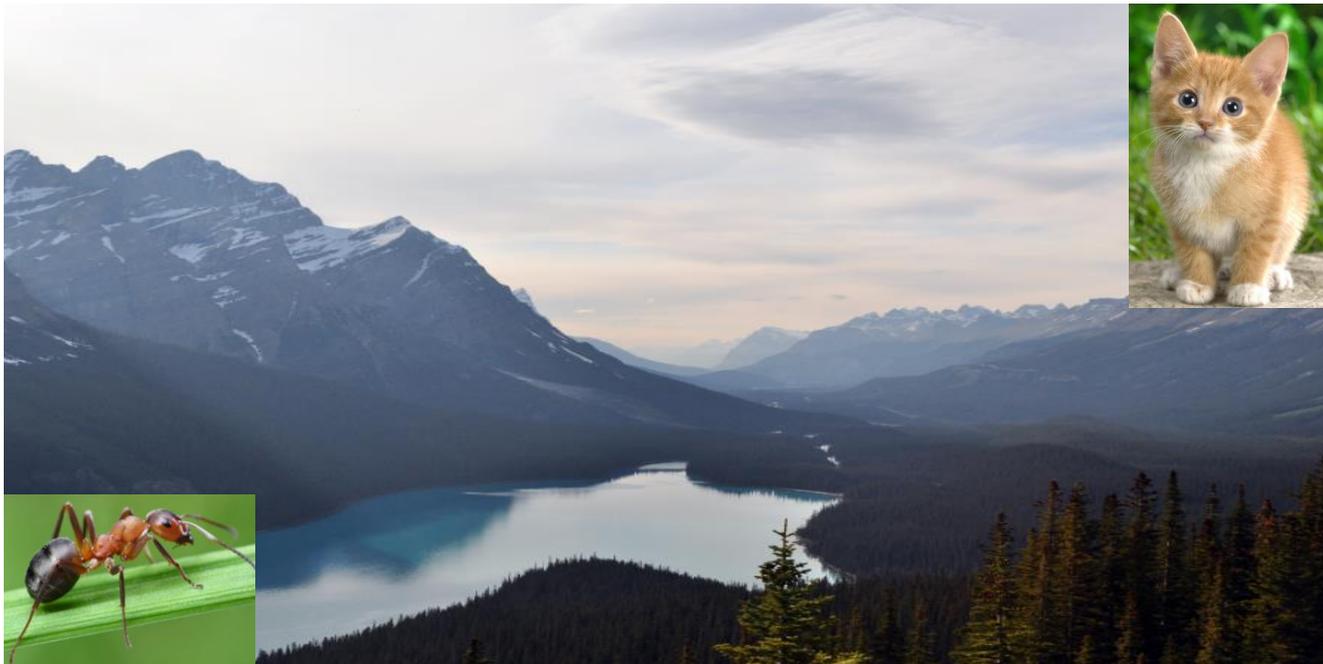
Archibald NK, Clarke MP, Mosimann UP, Burn DJ. Visual symptoms in Parkinson's disease and Parkinson's disease dementia. *Mov Disord* 2011; 26: 2387–95.

PD Medications

Medication	Hallucinations
Levodopa/carbidopa (Sinemet)	+
Levodopa/carbidopa, entacapone (Stalevo)	+
Amantadine	++
Entacapone (Comtan)	+
Rasagiline (Azilect)	+
Selegiline (Eldepryl)	+
Pramipexole (Mirapex)	++
Rotigotine (Neupro)	++
Ropinirole (Requip)	++

Passage Hallucinations

Objects, commonly insects and small animals in the periphery



McDowell SA, Harris JP. Visual problems in Parkinson's disease: a questionnaire survey. *Behav Neurol* 1997b; 10: 77–81.

- Again related to peripheral visual perception?



McDowell SA, Harris JP. Visual problems in Parkinson's disease: a questionnaire survey. Behav Neurol 1997b; 10: 77–81.

Complex Hallucinations

Usually animate objects

Often in center of vision in dim lighting



Ffytche DH, Howard RJ. The perceptual consequences of visual loss: 'positive' pathologies of vision. *Brain* 1999; 122 (Pt 7): 1247–60.
<https://explorecuriosity.org/Explore/ArticleId/188/why-is-it-that-light-reflects-off-of-animal-eyes-at-night-but-not-humans-188.aspx>

TREATMENT of Visual Hallucinations

If mild with preserved insight

- Reassurance
- Evaluate/remove certain medications

If moderate to severe or bothersome

- Evaluate/remove certain medications
- Certain neuroleptic medications
 - Pimavanserin (Nuplazid)
 - First drug approved to treat hallucinations and delusions in PD

CONCLUSIONS

- Dopamine is present in the visual system, and lack of dopamine contributes to visual complaints in PD
- The eyelids and ocular surface protect the eye and optimize the clarity of what we see
- Convergence insufficiency is a common eye movement abnormality seen in PD
- Many of these abnormalities are relatively mild, but in combination...
- The earlier symptoms are addressed, the earlier treatment can be initiated and quality of life improved





Register Today for ATTP!

Allied Team Training for Parkinson's Disease (ATTP®)



 Professional Education
Parkinson's Foundation

MARCH 27-30, 2019
IOWA CITY, IOWA

Resources



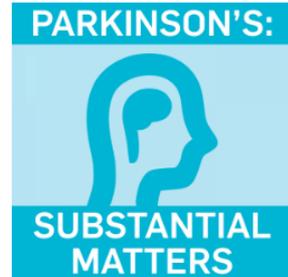
National Helpline

Available at
1-800-4PD-INFO or
Helpline@Parkinson.org
Mon- Friday 9 am to 8 pm ET

Podcast: Substantial Matters

New episodes every other Tuesday featuring Parkinson's experts highlighting treatments, techniques and research.

Parkinson.org/Podcast



Fact Sheets and Publications

Get the resources and information you need to start living a better life with Parkinson's.

Aware in Care Kit

Includes tools and information for people with PD to share with hospital staff during a planned or emergency hospital stay.

Parkinson.org/Awareincare

