Kognition hos voksne med cerebral parese - visuoperceptuelle vanskeligheder

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Formål med ph.d.-projektet

- At beskrive hvilke typer for visuelle vanskeligheder voksne med CP oplever
- At undersøge hvilke typer af visuoperceptuelle vanskeligheder som voksne med CP kan have, med et neuropsykologisk testbatteri

Ph.d.-projektet - delprojekter

Projekt 1:

- **Sand, K.,** Starrfelt, R., & Robotham, R. J. (2024). Cognitive Functioning and Assessment in Adults with Cerebral Palsy: A Scoping Review. *Developmental Neurorehabilitation*, 27(1–2), 57–67. https://doi.org/10.1080/17518423.2024.2347991

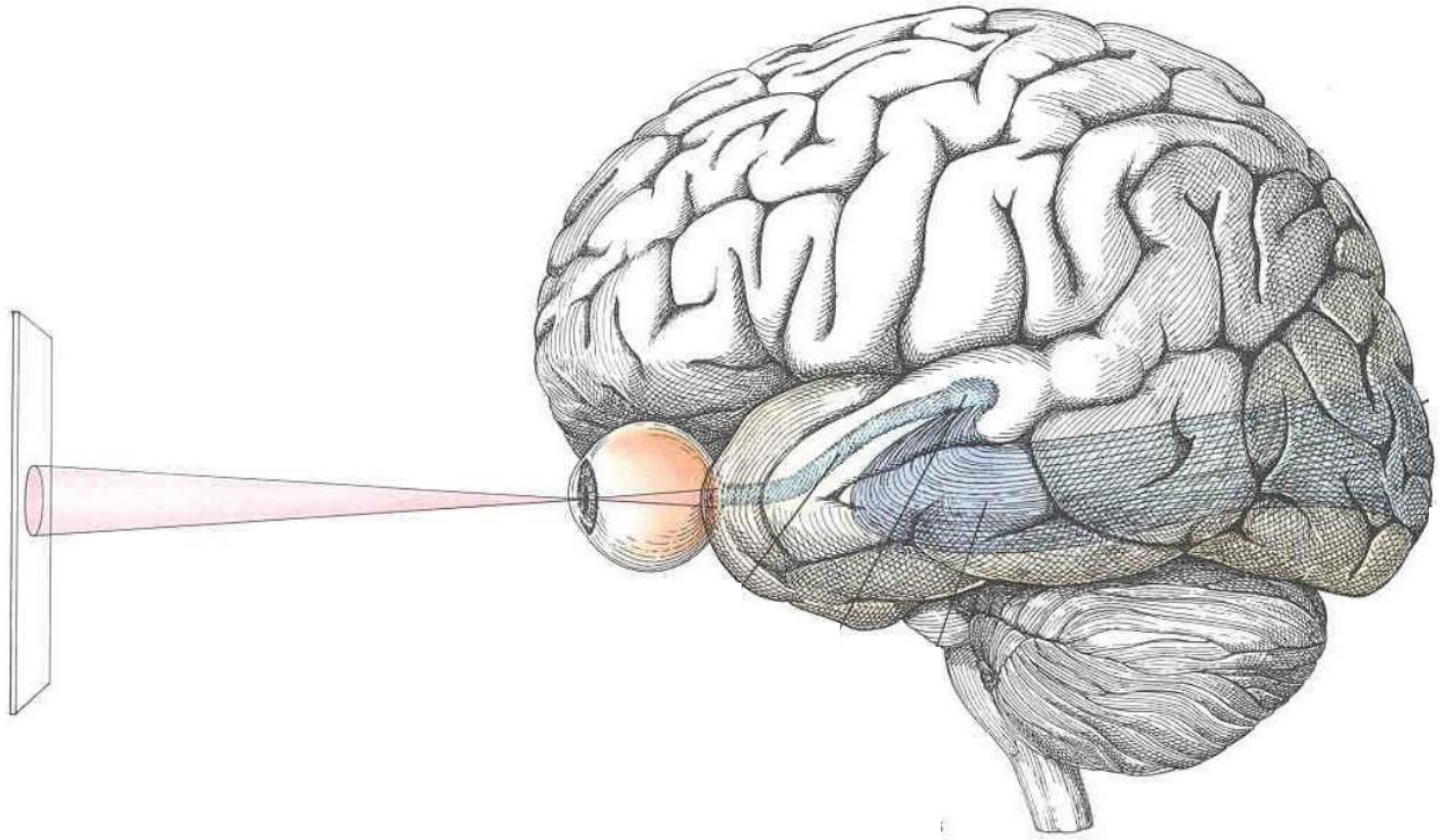
Projekt 2:

- **Sand, K.,** Starrfelt, R., & Robotham, R. J. (in prep). Visual impairments in adults with cerebral palsy: First person experiences.

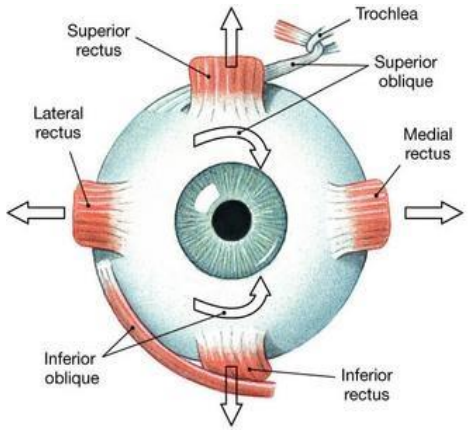
Projekt 3:

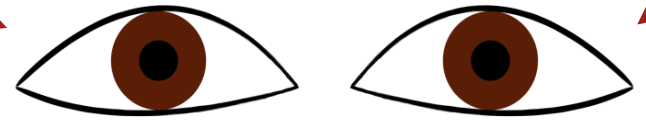
- **Sand, K.,** Vancleef, K., Starrfelt, R., & Robotham, R. J. (2025). Visual perception in adults with CP - assessment and individual differences: An exploratory study. *The Clinical Neuropsychologist, 1–21.* https://doi.org/10.1080/13854046.2025.2596803

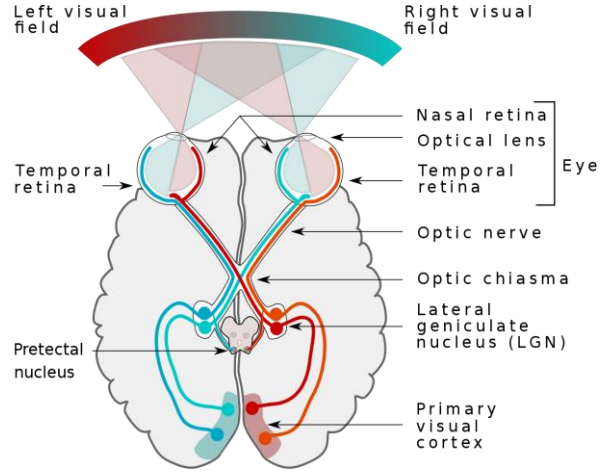
Synet og hjernen

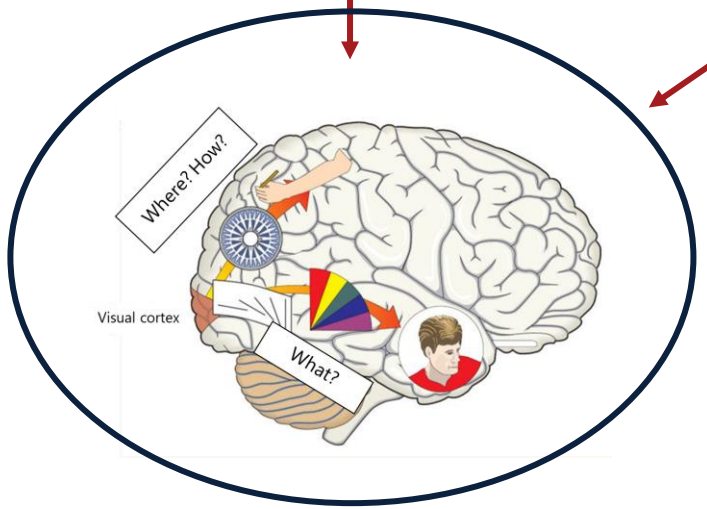


Det visuelle system









CVI/Hjernebetinget synsnedsættelse

Widely used definition:

"Cerebral Visual Impairment is a verifiable visual dysfunction which cannot be attributed to disorders of the anterior visual pathways or any potentially co-occurring ocular impairment."

Sakki et al. (2018)

New working definition:

(1) CVI encompasses a spectrum of visual impairments caused by an underlying brain abnormality that affects the development of visual processing pathways and is characterized by deficits in visual function and functional vision.

(2) The visual dysfunction in CVI is greater than expected by any comorbid ocular conditions alone.

(3) The visual dysfunction in CVI may manifest as lower-order or higher-order afferent visual deficits, or both, leading to characteristic behaviors in affected individuals.

(4) Although CVI may be comorbid with other neurodevelopmental disorders, CVI is not primarily a disorder of language, learning, or social communication.

(5) The underlying neurologic insult of the developing brain may go unrecognized or undiagnosed until later in life.

Chang et al. (2024)

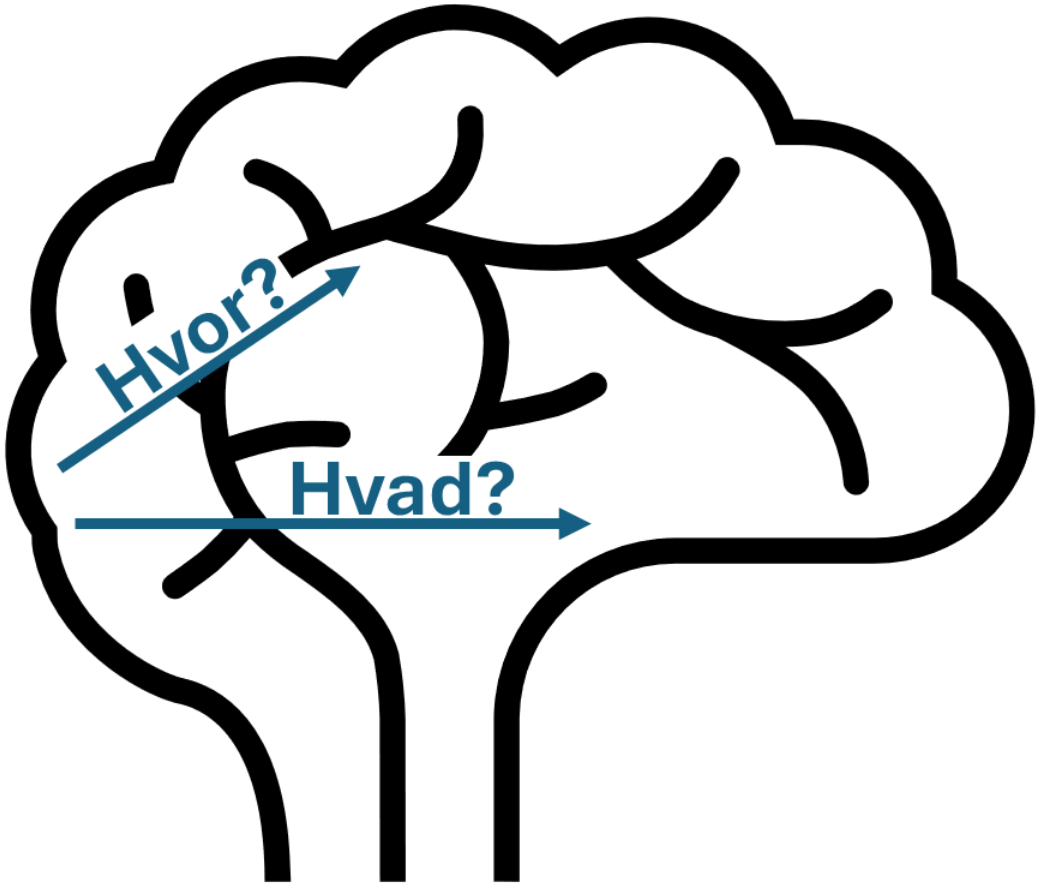
CVI/Hjernebetinget synsnedsættelse

- Ca. 50% af børn med CVI har også CP

- Antallet af børn med CP+CVI afhænger af hvordan CVI defineres:
  - Nedsat synsskarphed: 10%-16%
  - Visuoperceptuelle vanskeligheder: 40-50%
  - Alle typer synsvanskeligheder: 70%

Dutton & Jacobson (2001), West et al. (2021), Ortibus et al. (2009, 2019), Ego et al. (2015), Novak et al. (2012)

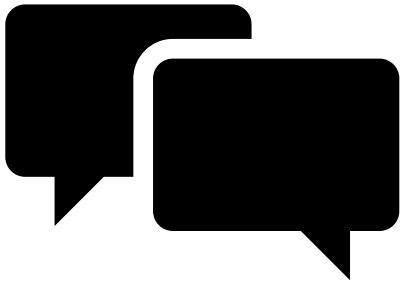
Visuoperceptuelle vanskeligheder og CVI



Sværhedsgrad af CP hos deltagerne

Grovmotorisk funktion (GMFCS)
Niveau I-V

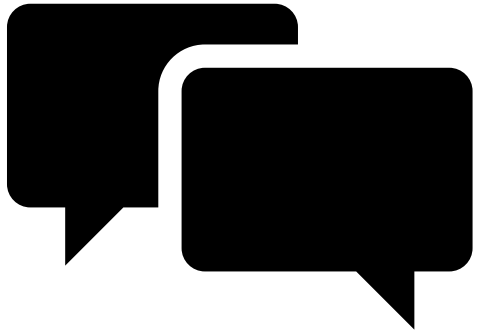
Finmotorisk funktion (MACS)
Niveau I-V



Kommunikation (CFCS)
Niveau I-III

Projekt 2:
Subjektive oplevelser af visuelle vanskeligheder hos voksne med CP

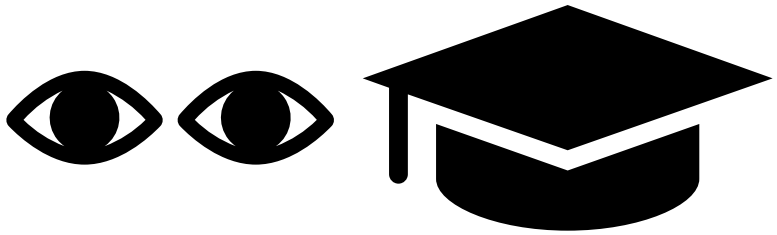
7 deltagere
Alder: 21-50

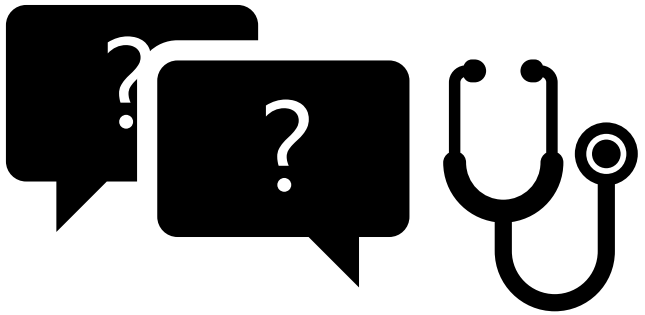


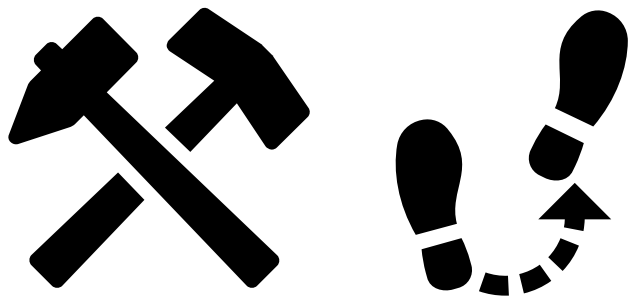
Semistrukturerede interviews

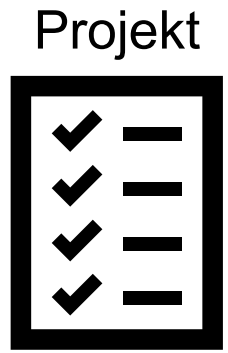
Tematisk analyse

Resultater - generelt









Projekt 2: Resultater

Wide range of visual impairments reported

”[…] I is simply because I sometimes find it difficult to find out the distance from A to B, and what am I actually looking at? I am not that good at finding landmarks. Like, you know, so that you know that when you reach the yellow signpost you must turn right.”

Maria, 35 years

Varying amounts of support and interventions

”They threw a pair of glasses my way and said: ‘well there you go’, but these glassess, they did not work and they [the health professionals] more or less did not care, as they [the glasses] were the only thing they had to offer.”

Thomas, 34 years

That is just the way it is

“I have gotten used to, that is because, you are used to your vision being as it is, so it is just the way it is.“

Laura, 27 years

Wishes for improving services provided in relation to visual impairments in CP

"[…] I can sometimes think, 'I wish I had known that when my parents’ (pauses) or, I wish they had known, so it would not just have become something that was attached to me, but actually something, that was attached to my diagnosis. Instead of me as a person.“

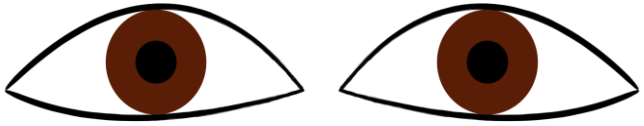
Christina, 36 years

The impact of visual impairments

“No, no, it (pauses) no, it hasn't really stopped me in that way. I think I just accept the consequence and try to (pauses) then you must work harder to get through it.”

Peter, 24 years

Projekt 2: Konklusion



Projekt 3:
Neuropsykologisk undersøgelse af visual perception hos voksne med CP

21 deltagere med CP

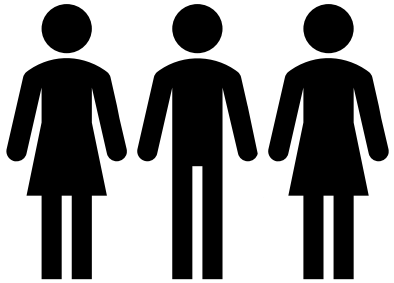
Alder: 18-40

Alle CP subtyper

Alle sværhedsgrader ift. GMFCS og MACS

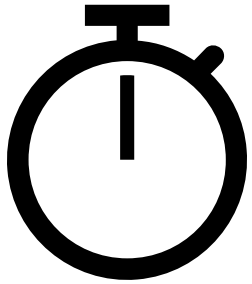
Kan bruge hjælpemidler til kommunikation

Intet krav om synsvanskeligheder



40 kontroldeltagere

Alder: 18-40



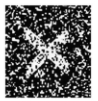
Tidsforbrug

1.5 – 2 timer

Projekt 3: Testbatteri

Visuospatial index
Face recognition index
Object recognition index
Reading index

Low and intermediate visual processing



VOSP Shape detection

Pelli-Robson contrast sensitivity

CORVIST C R O W D I N G

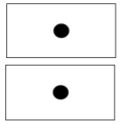
Biological motion detection

Fragmented outline

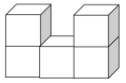
Embedded figure detection

L-POST

Dorsal stream processing



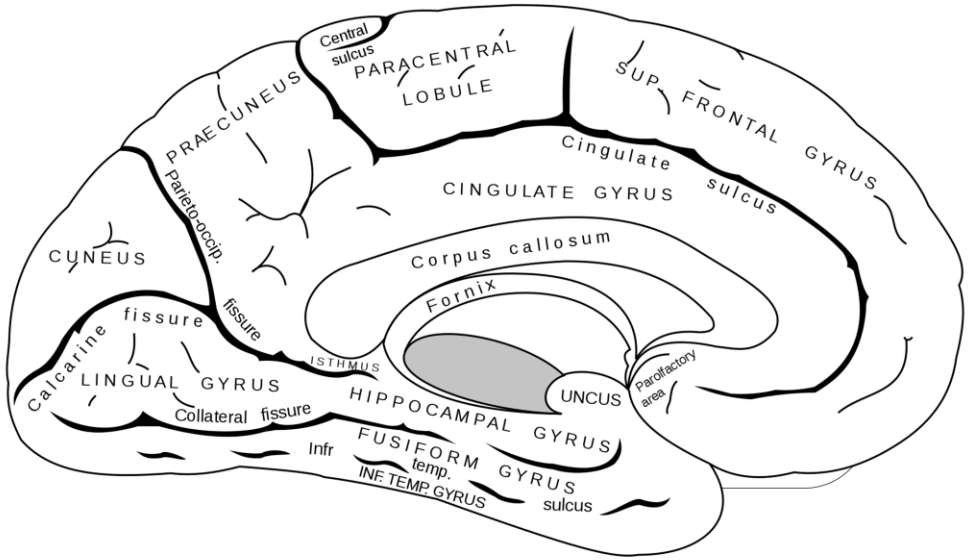
Position discrimination



Cube analysis VOSP

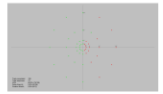
Dot counting

Heart cancellation OCS



Sensory vision

Acuity: LogMar



Visual fields: Copenhagen perimetry and confrontation test

Ventral stream processing

Face recognition

CFMT

OxVPS

Object recognition

OxVPS

L-POST

VOSP

Reading

Text reading *Word reading*

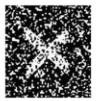
Radner Reading

OxVPS CAT

Projekt 3: Testbatteri

Visuospatial index
Face recognition index
Object recognition index
Reading index
Overall accuracy index

Low and intermediate visual processing



VOSP Shape detection

Pelli-Robson contrast sensitivity

CORVIST C R O W D I N G

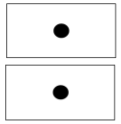
Biological motion detection

Fragmented outline

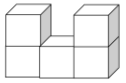
Embedded figure detection

L-POST

Dorsal stream processing



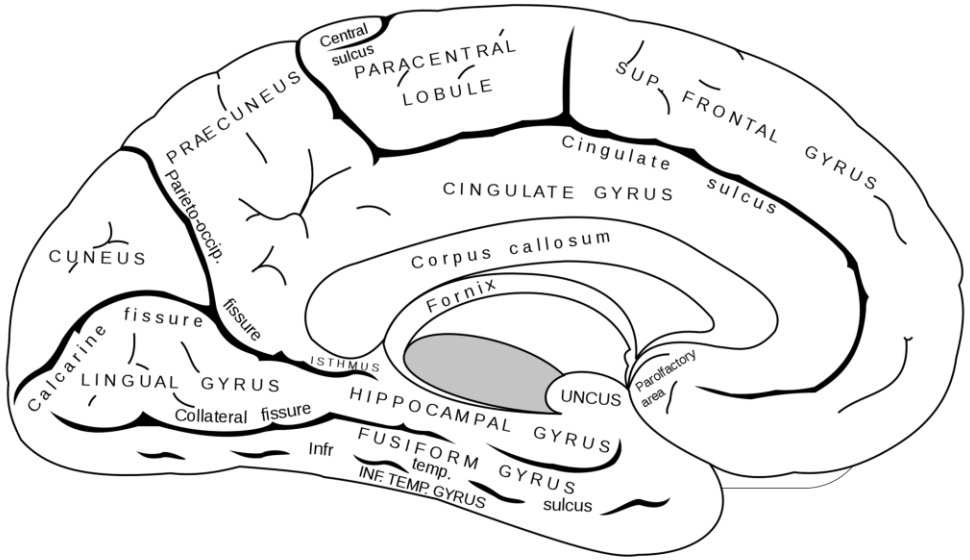
Position discrimination



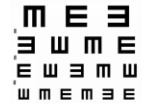
Cube analysis VOSP

Dot counting

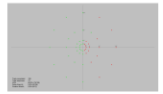
Heart cancellation OCS



Sensory vision



Acuity: LogMar



Visual fields: Copenhagen perimetry and confrontation test

Ventral stream processing

Face recognition

CFMT OxVPS

Object recognition

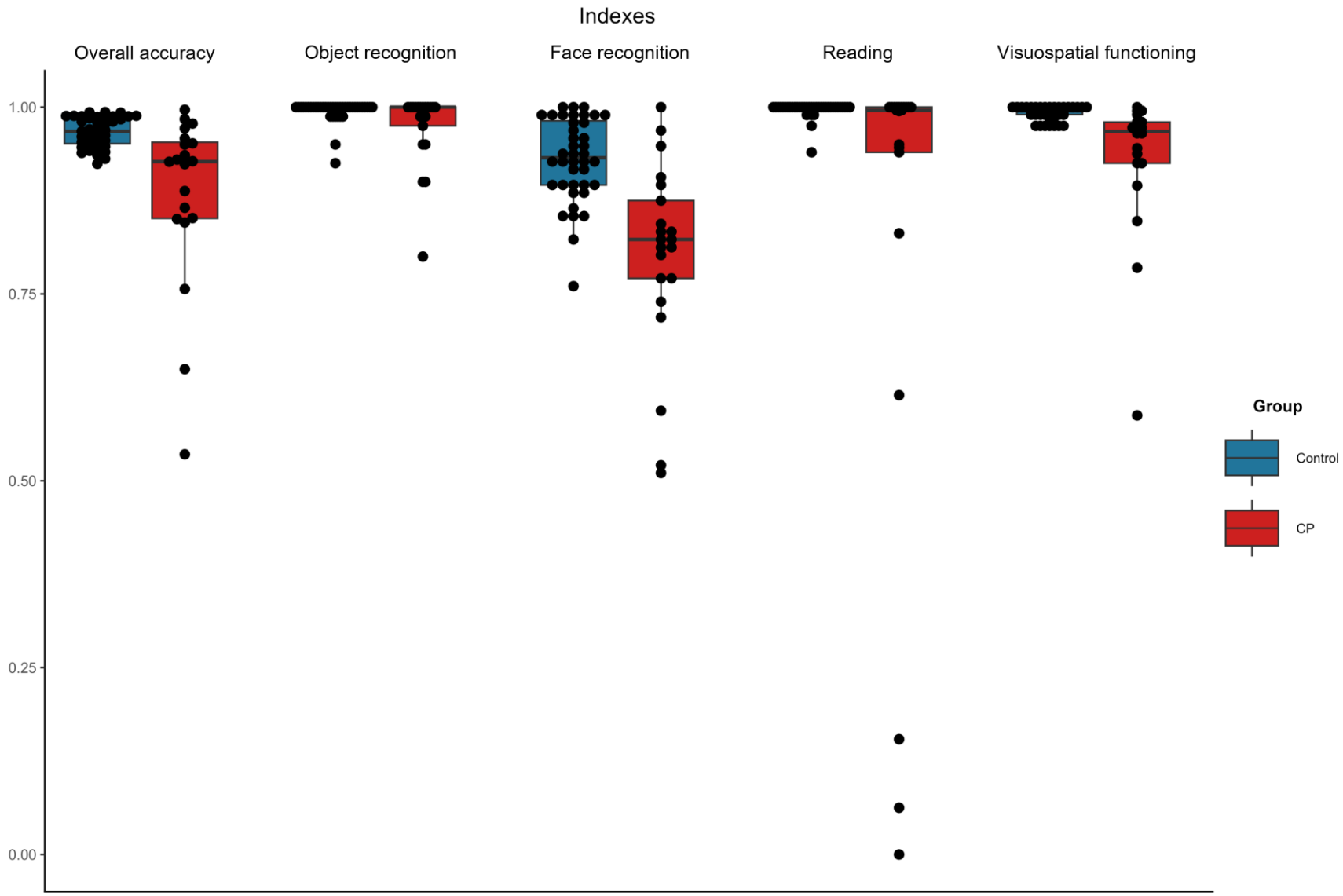
OxVPS L-POST VOSP

Reading

Text reading *Word reading*

Radner Reading OxVPS CAT

Projekt 3: Gruppeanalyser

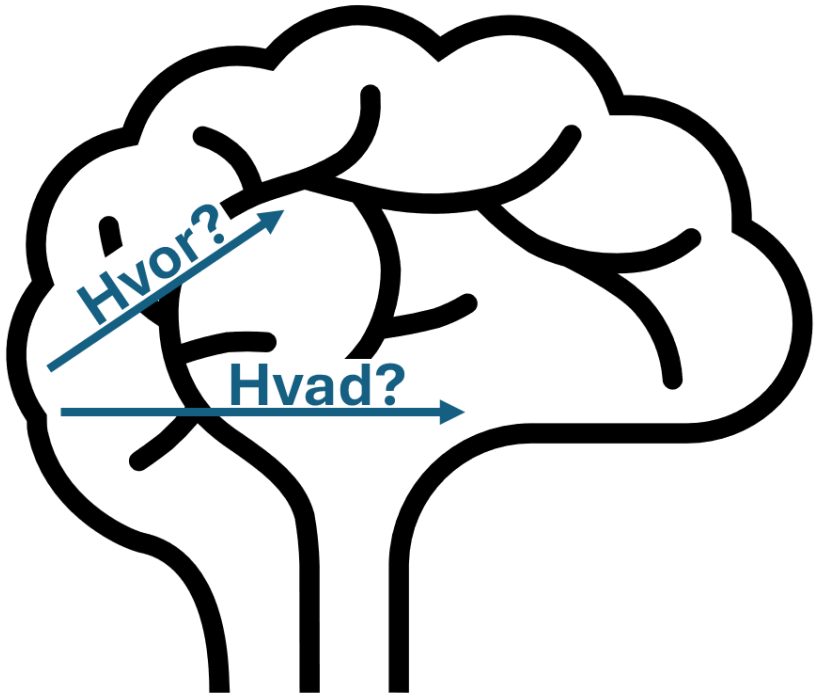


Projekt 3: Individuelle resultater

ID	GMFCS	L-POST Recognition of objects in isolation	L-Post Recognition Of Objects in a scene	OxVPS Picture naming	VOSP Incomplete letters	CFMT*	OxVPS Face recognition	CAT Single words	CAT Complex words	CAT Non words	OxVPS Reading accuracy	OCS Broken hearts Accuracy	VOSP Dot counting	VOSP Position discrimination	VOSP Cube analysis	VOSP Shape detection	L-POST RFP fragmented outline	L-POST Biological motion	L-POST Embedded figure detection	OxVPS Reading wpm*	Radner reading wpm*	OCS Broken hearts Allocentric	OCS Broken hearts Egocentric
Max score		5	5	4	20	48	4	48	6	10	60	50	10	20	10	20	5	5	5	∞	∞	±50	±50
Cut-off		<5	<4	<4	<18		<4	<44	<6	<8	<58	<47	<9	<19	<10	<18	<4	<5	0			±0	±0
CP01	II																						
CP06	III											■											
CP12	II						■																
CP14	I											■					■						
CP09	V									■		■		■									
CP16	I					■						■		■									
CP17	I					■					■		■										
CP08	II	■	■			■									■								
CP15	I					■				■			■							■			
CP20	II					■								■	■						■		
CP11	I					■								■	■					■	■		
CP19	II					■	■					■		■		■	■				■		
CP03	V										■	■		■	■		■			■	■		■
CP05	II		■							■	■		■		■		■			■	■		
CP10	V					■		■	■	■	■						■			■	■		
CP07	III					■		■	■	■	■						■	■		■	■		
CP04	II		■				■					■	■	■	■	■	■			■	■		
CP18	II		■					■	■	■	■				■		■	■		■	■		
CP02	V	■	■			■						■	■	■	■		■	■		■	■		
CP13	IV					■	■	■	■	■	■	■	■	■	■		■			■	■	■	■
CP21	III				■	■	■	■	■	■	■	■	■	■	■		■	■		■	■	■	■
		Object index				Face index		Reading index				Visuospatial index								Not in index			
		Overall accuracy index																					

Projekt 3: Konklusion

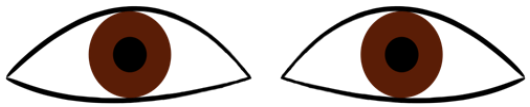
- På gruppeniveau klarede deltagerne med CP sig signifikant dårligere end kontrolgruppen.
- Stor variation i gruppen: Nogle deltagere klarede sig på niveau som kontrolgruppen, andre havde svære vanskeligheder.
- Tegn på påvirkning af både den dorsale og/eller den ventrale strøm.

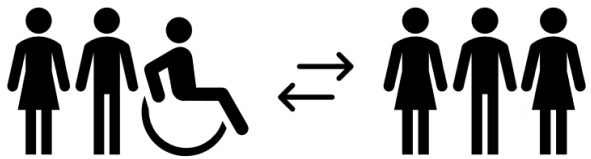


Samlet konklusion

Projekt 2

Projekt 3





Tak for opmærksomheden

Ph.d.-vejledere

Primær vejleder: Professor Randi Starrfelt

Projektvejleder: Lektor Ro J. Robotham

International samarbejdspartner

Lektor Kathleen Vancleef, Durham University, UK

Særligt tak til:

Deltagere med CP og kontroldeltagere

Professor Jens Bo Nielsen, Københavns Universitet og Elsass Fonden

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elsass fonden

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