AARHUS UNIVERSITY

Press release

Please fill in this form and return it to graduateschoolhealth@au.dk in Word format no later than three weeks prior to your defence.

Basic information

Name: Rune Nguyen Rasmussen Email: runerasmussen@biomed.au.dk Phone: 61337698

Department of: Biomedicine

Main supervisor: Keisuke Yonehara

Title of dissertation: On the contributions of retinal direction selectivity to cortical motion processing

Date for defence: 05-03-2021 at (time of day): 10 am Place: Online — Zoom

Press release (Danish)

Nethindens bidrag til sansning af bevægelse i hjernebarken

Et nyt Ph.d.-projekt fra Aarhus Universitet, Health. Projektet er gennemført af Rune Nguyen Rasmussen, der forsvarer det d. 5. marts, 2021.

Synet er en fundamental sans, og sansningen af bevægelse er velsagtens en af de vigtigste opgaver for synsapparatet. Til dette formål findes der celler, som særligt reagerer på objekter, der bevæger sig i en bestemt retning og derfor siges at være retnings-selektive (RS). Siden denne type celler først blev opdaget i den primære visuelle hjernebark, har man fundet RS-celler i nethinden hos en række dyrearter inklusiv mus, hvilket indikerer, at sansningen af bevægelser starter allerede her, i det første trin af synsbearbejdningen. Disse RS-celler sender forbindelser til den visuelle hjernebark via den visuelle del af thalamus, men man ved ganske lidt om, hvordan nethindens RS-celler bidrager til sansningen af visuel bevægelse i den visuelle hjernebark. Denne PhD afhandling sigtede mod at belyse netop dette spørgsmål.

Alt i alt præsenterer denne PhD afhandling en ny fortælling om hvordan hjernen bearbejder visuel bevægelse i omgivelserne. Vores resultater viser hvordan specialiseret neuronal aktivitet i særlige områder af den visuelle hjernebark på mus afhænger af sansningen af visuel bevægelse i øjets nethinde — en del af synsapparatet som man tidligere mente bidrog langt mere beskedent til aktiviteten i højerestående områder. Således bør fundne fra disse studier få os til at revidere vores forestillinger om, hvordan hjernen skaber komplekse visuelle repræsentationer, og de understreger vigtigheden af sansebearbejdning i den perifere del af sensoriske systemer.

Forsvaret af Ph.d.-projektet er offentligt og finder sted den 5. marts, 2021, kl. !!!! på Zoom.
Titlen på projektet er ”On the contributions of retinal direction selectivity to cortical motion processing”. Yderligere oplysninger: Ph.d.-studerende Rune Nguyen Rasmussen, e-mail: runerasmussen@biomed.au.dk, tlf. 61337698.

Bedømmelsesudvalg:

Associate Professor Mai Marie Holm — chairman of the committee and moderator of the defence
Department of Biomedicine, Aarhus University, Denmark

Professor Sonja Hofer
Sainsbury Wellcome Centre for Neural Circuits and Behaviour, University College London, United Kingdom

Professor Hajime Hirase
Center for Translational Neuromedicine, University of Copenhagen, Denmark

Press release (English)
Retinal contributions to cortical motion processing

The project was carried out by Rune Nguyen Rasmussen, who is denfending the dissertation on March 5, 2021.

Vision is an essential sensory modality, and motion is arguably one of the most salient features that the visual system needs to detect. Cells preferentially responding to visual motion in a particular direction are said to be direction-selective (DS), and these were first identified in the primary visual cortex. Since then, DS responses have been observed in the retina of a number of species, including mice, indicating motion analysis has begun even at the earliest stage of the visual hierarchy. These retinal DS cells send projections to the visual cortex via the visual thalamus. Yet little is known about how direction selectivity computed in the retina contributes to motion processing in primary and higher-order areas of the visual cortex. The aim of this PhD project was to provide answers to this question.

Altogether, this PhD dissertation presents a novel account of how the brain processes motion from the visual world. Our work demonstrates that direction selectivity computed at the level of the retina — a stage of the visual hierarchy previously held to provide considerably more mundane contributions to higher-order levels — serves to establish specialized motion responses in distinct areas of the mouse visual cortex. Thus, the findings gathered from these lines of investigation should compel us to revisit our notions of how the brain builds complex visual representations, and underscores the importance of the processing performed in the periphery of sensory systems.

The defence is public and takes place March 5, 2021, on Zoom. The title of the project is "On the contributions of retinal direction selectivity to cortical motion processing". For more information, please contact Ph.d. student Rune Nguyen Rasmussen, email: runerasmussen@biomed.au.dk, phone: +45 61337698.

Assessment committee:
Associate Professor Mai Marie Holm - chairman of the committee and moderator of the defence
Department of Biomedicine, Aarhus University, Denmark

Professor Sonja Hofer
Sainsbury Wellcome Centre for Neural Circuits and Behaviour, University College London, United Kingdom

Professor Hajime Hirase
Center for Translational Neuromedicine, University of Copenhagen, Denmark

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