

# SUSHRUT THORAT

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## CONTACT INFORMATION

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## CURRENT INTERESTS

Task-based modulation of visual processing and visual statistical learning, in human and artificial neural networks.

## FUTURE GOALS

Working on the building blocks of an open-domain artificial conversational agent - contextual memory, theory of mind, continual learning, and open-domain information retrieval.

## EDUCATION

**Ph.D. in Cognitive Neuroscience** *Ongoing*  
Donders Centre for Cognition, Radboud University, The Netherlands  
Advisors: Marius Peelen and Marcel van Gerven

**M.Sc. (cum laude) in Cognitive Neuroscience** *July, 2017*  
Center for Mind/Brain Sciences (CIMEC), University of Trento, Italy  
**Thesis:** Using Convolutional Neural Networks to measure the contribution of visual features to the representation of object animacy in the brain  
Advisor: Marius Peelen

**B.Tech. in Engineering Physics** *August, 2015*  
Department of Physics, Indian Institute of Technology - Bombay (IIT-B), India  
**Thesis:** Quadcopter Flight Control using Modular Spiking Neural Networks  
Advisor: Bipin Rajendran

## PEER-REVIEWED PUBLICATIONS

Thorat S, Proklova D, Peelen MV. (2019) The nature of the animacy organization in human ventral temporal cortex. *eLife* 8: e47142.

Thorat S\*, Aldegheri G\*, van Gerven MAJ, Peelen MV. (2019) Modulation of early visual processing alleviates capacity limits in solving multiple tasks. *Conference on Cognitive Computational Neuroscience (CCN)*: 226-229. \*equal contribution

Thorat S, van Gerven MAJ, Peelen MV. (2018) The functional role of cue-driven feature-based feedback in object recognition. *Conference on Cognitive Computational Neuroscience (CCN)*: 1-4.

Thorat S, Choudhari V. (2016) Implementing a Reverse Dictionary, based on word definitions, using a Node-Graph Architecture. *Proceedings of COLING 2016, the 26th International Conference on Computational Linguistics: Technical Papers*: 2797-2806.

Thorat S, Rajendran B. (2015) Arithmetic computing via rate coding in neural circuits with spike-triggered adaptive synapses. *International Joint Conference on Neural Networks (IJCNN)*: 1-8.

## UNDER-REVIEW PUBLICATIONS

Thorat, S\*, Aldegheri, G\*, Kietzmann TC. (2021) Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization. \*equal contribution. *SVRHM, NeurIPS*.

Thorat, S, Peelen MV. (2021) Body shape as a visual feature: evidence from spatially-global attentional modulation in human visual cortex. *Journal of Neuroscience*.

## ACHIEVEMENTS/ AWARDS

- Voted **best poster/short-pitch**, among **15 posters**, in the 'Perception, Action, and Control' theme at the annual Donders Poster Session (2020)
- Recipient of the **Merit Award** (2017), awarded to students who achieve remarkable results at the end of their degree, by the University of Trento, Italy.

- Recipient of the **Abstract Award**, awarded to **5 of the 57** accepted abstracts at the Rovereto Workshop on Concepts, Actions and Objects (2017).
- Ranked **721 among 450,000** students in the Joint Entrance Examination (**JEE, 2011**) conducted towards admission to the Indian Institute of Technology (IIT).
- Recipient of the **KVPY scholarship** (2009), awarded to **215 students across India** with talent and aptitude for research, by the Dept. of Science & Technology, Govt. of India.
- Recipient of the **NTSE scholarship** (2007), awarded to **1000 students across India** with high intellect and academic talent, by the National Centre for Educational Research and Technology, Govt. of India.

**TECHNICAL SKILLS**      **Programming:** Python (TensorFlow, PyTorch), MATLAB (PsychToolbox, MatConvNet, SPM, CoSMoMVPA), Javascript (jsPsych)  
**Neuro-Imaging:** fMRI (MVPA)

**CONFERENCE TALKS/POSTERS**      Statistical learning of distractor regularities facilitates visual search  
(Poster) *European Conference on Vision Perception*, Online, 2021

Body silhouettes as features in visual search: evidence from spatially-global attention modulation in visual cortex  
(Poster) *Donders Poster Session*, Nijmegen, 2020  
(Talk) *Neuromatch conference 3.0*, Online, 2020

The nature of the animacy organization in human ventral temporal cortex  
(Poster) *Conference on Cognitive Computational Neuroscience (CCN)*, Berlin, 2019

Modulation of early visual processing alleviates capacity limits in solving multiple tasks  
(Poster) *Conference on Cognitive Computational Neuroscience (CCN)*, Berlin, 2019

The functional role of cue-driven feature-based feedback in object recognition  
(Talk) *Perception Day*, Nijmegen, 2018  
(Poster) *Donders Discussions*, Nijmegen, 2018  
(Poster) *Conference on Cognitive Computational Neuroscience (CCN)*, Philadelphia, 2018

Using convolutional neural networks to measure the contribution of visual features to the representation of object animacy in the brain  
(Poster) *Donders Discussions*, Nijmegen, 2017  
(Talk & Poster) *Rovereto Workshop on Concepts, Actions and Objects (CAOs)*, Rovereto, 2017  
(Tweets) *Brain Twitter Conference (brainTC)*, 2017

Arithmetic computing via rate coding in neural circuits with spike-triggered adaptive synapses  
(Poster) *International Joint Conference on Neural Networks (IJCNN)*, Killarney, 2015

**WORKSHOPS ATTENDED**      **IBRO-SIMONS Computational Neuroscience Imbizo (ISi-CNI)**      *January, 2017*  
Cape Town, South Africa  
Project: Assessing the role of feature attention in object detection with CNNs.  
Advisor: Timothy Lillicrap

**Computational Approaches to Memory and Plasticity (CAMP)**      *June, 2015*  
Bangalore, India  
Project: The role of the billions of granule cells in the cerebellum.

**TEACHING EXPERIENCE**      • Teaching Assistant - Advanced Academic & Professional Skills      *Radboud University, 2020*  
(writing/reviewing research reports; Masters course)  
• Guest Lecturer - Academic Skills 2 (research methods; UG course)      *Radboud University, 2019*  
• Teaching Assistant - Neural Networks (UG course)      *Radboud University, 2019*

- Teaching Assistant - Advanced Academic & Professional Skills (writing/reviewing research reports; Masters course) *Radboud University, 2019*
- Supervisor - Research Project 3 (3 students; UG thesis project) *Radboud University, 2018*
- Co-supervisor - Research Project 3 (4 students; UG thesis project) *Radboud University, 2018*
- Guest Lecturer - Academic Skills 2 (research methods; UG course) *Radboud University, 2018*
- Teaching Assistant - Brain for AI (UG course) *Radboud University, 2018*

**REVIEWING WORK**      eLife'20, Monk Prayogshala'19 , Conference on Cognitive Computational Neuroscience (CCN)'19