

# SUSHRUT THORAT

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## CONTACT INFORMATION

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## MISSION

Understanding and building resource-constrained agents that can learn and function in the wild

## RESEARCH AREAS

Lifelong learning, decision-making & reasoning, recurrent computations, explainable AI

## ACADEMIC TRAJECTORY

**Postdoc in Machine Learning** 2022 - present  
*Institute of Cognitive Science, Osnabrück University, Germany*  
Advisor: Tim Kietzmann

**Ph.D. in Cognitive Neuroscience** 2017 - 2021  
*Donders Centre for Cognition, Radboud University, The Netherlands*  
[Thesis](#): Smart Search - Investigations into human visual search in structured environments  
Advisors: Marius Peelen and Marcel van Gerven

**M.Sc. (cum laude) in Cognitive Neuroscience** 2015 - 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** 2011 - 2015  
*Department of Physics, Indian Institute of Technology - Bombay (IIT-B), India*  
[Thesis](#): Quadcopter Flight Control using Modular Spiking Neural Networks  
Advisor: Bipin Rajendran

## KEY PUBLICATIONS

[Thorat S\\*](#), [Aldegheri G\\*](#), [Kietzmann TC](#) (2021). Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization. *Shared Visual Representations in Human & Machine Intelligence Workshop @ NeurIPS*. \*equal contribution.

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

[Anthes D](#), [Thorat S](#), [Konig P](#), [Kietzmann TC](#) (2023). Diagnosing catastrophe: Large parts of accuracy loss in continual learning can be accounted for by readout misalignment. *Conference on Cognitive Computational Neuroscience (CCN)*: 748-751.

[Thorat S](#), [Quek GL](#), [Peelen MV](#) (2022). Statistical learning of distractor co-occurrences facilitates visual search. *Journal of Vision* 22(10), 2-2.

[Thorat S](#), [Peelen MV](#) (2022). Body shape as a visual feature: evidence from spatially-global attentional modulation in human visual cortex. *NeuroImage*: 119207.

~ A full list of publications can be accessed on [Google Scholar](#); short descriptions on my [website](#).

## 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 EXPERIENCE

**Programming languages:** Python, MATLAB, Javascript

**Machine learning frameworks:** TensorFlow, PyTorch, MatConvNet

**Experimentation frameworks:** PsychToolbox, jsPsych, Pavlovla

**Imaging techniques:** fMRI, EEG, EyeLink

#### CONFERENCE TALKS

Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization

(Talk) *European Conference on Vision Perception (ECVP)*, Nijmegen, 2022

(Flash talk) *Neuromatch conference 4.0*, Online, 2021

Body silhouettes as features in visual search: evidence from spatially-global attention modulation in visual cortex

(Talk) *Neuromatch conference 3.0*, Online, 2020

The functional role of cue-driven feature-based feedback in object recognition

(Talk) *Perception Day*, Nijmegen, 2018

Using convolutional neural networks to measure the contribution of visual features to the representation of object animacy in the brain

(Talk & Poster) *Rovereto Workshop on Concepts, Actions and Objects (CAOs)*, Rovereto, 2017

#### REVIEWING WORK

Nature Human Behavior, Neural Networks, PLOS Computational Biology, Nature Communications, Science Advances, NeurIPS workshops, Memory & Cognition, eLife, CCN

#### SUPERVISION EXPERIENCE

Supervision of 11 undergraduate, 3 masters, and 3 PhD students. Notable theses are listed.

- (Bachelors) Lotta Piefke: *Investigating the practicality and emergence of the Attention Schema Theory* Osnabrück University, 2023
- (Masters) Jochem Koopmans: *How our predictions do not deceive us: an investigation of the illusory perception of upside-down letters* Radboud University, 2022
- (Bachelors) Sjoerd Meijer & Ilze Thoonen: *Primed modulation of low-level object features using real-world objects and scenes* Radboud University, 2018

#### TEACHING EXPERIENCE

- **Lecturer:** *Reading group on integrative systems approaches in computational cognitive neuroscience* (design, supervision, & evaluation; Masters) Osnabrück University, 2024
- **Lecturer:** *Topics in cognitive neuroscience* (design, teaching, & evaluation; Masters) Osnabrück University, 23-24
- **Lecturer:** *Machine learning for cognitive computational neuroscience* (teaching, & evaluation; Masters) Osnabrück University, 2023
- **Lecturer:** *Reading group at the intersection of neuroscience & machine learning* (design, supervision, & evaluation; Masters) Osnabrück University, 2023
- Mentor: *Neuromatch Academy (Deep Learning course)* Online, 2022
- Teaching Assistant: *Advanced Academic & Professional Skills* (evaluation; Masters) Radboud University, 2020
- Teaching Assistant: *Neural Networks* (supervision & evaluation; Bachelors) Radboud University, 2019
- Guest Lecturer: *Academic Skills 2* (teaching & evaluation; Bachelors) Radboud University, 18-19

- Teaching Assistant: *Brain for AI* *Radboud University, 2018*  
(supervision & evaluation; Bachelors)

**WORKSHOPS  
ATTENDED**

**Analytical Connectionism (AC)** *September, 2023*  
London, United Kingdom  
Project: Visual feature manifolds in a convolutional RNN.

**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.

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

**INVITED TALKS**

Useful scene representations  
(Lab meeting talk) Kaiser lab, JLU, Giessen, 2023

Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization  
(Guest talk) MSc course on *Advanced Neural and Cognitive Modelling*, UvA, Amsterdam, 2022

Representations: Useful, useless or harmful?  
(Seminar talk) Foundations of Cognition Series, Donders Institute, Nijmegen, 2019

**OTHER WORK  
EXPERIENCE**

**General Secretary** *2014-15*  
Undergraduate division - Department of Physics, IIT Bombay

**Content Developer** *Summer 2013*  
Avanti Fellows, Delhi