

Roberta Rocca, PhD, MSc

Profile

I am a researcher in neuroinformatics with an interdisciplinary background and a strong interest in AI and data science. My work focuses on developing methods and open-source software for psychology and neuroscience, and on making machine learning practices more available to these research communities. As a Data Fellow at the United Nations' Centre for Humanitarian Data, I have also done research on the potential of predictive modeling to inform intervention in humanitarian contexts. I am passionate about deep learning and NLP, and I am looking for opportunities to further develop my skills in these sectors, while contributing to increasing the fairness and positive societal impact of current models and technologies.

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Experience

Postdoctoral Researcher

December 2019 – ongoing

Psychoinformatics Lab, University of Texas at Austin, USA

Focus area: Neuroinformatics, Deep Learning

Main projects

- Contributions to NeuroScout (<https://neuroscout.org>), an open-source platform for re-analysis of neuroimaging data
 - Implementation (and validation) of ML/NLP pipelines for feature extraction using *pliers*
 - Implementation (and validation) of extractors for auditory features
 - Scientific validation of the platform through a series of large-scale meta-analyses (preprint forthcoming)
 - QA testing, documentation, outreach
- Development of context-aware transformers for user-sensitive text encoding
 - Creation of a large-scale dataset of Reddit submissions grouped by user id
 - Design, implementation, and training of three novel DistilBERT-based architectures – a batch encoder, a hierarchical encoder, and a biencoder – supporting context-aware MLM pretraining
 - Evaluation on masked language modeling and triplet-based author discrimination
- Methods development research on ML-based improvements to model evaluation in psychology

Postdoctoral Researcher

December 2020 – ongoing

Interacting Minds Centre, Aarhus University, Denmark

Focus area: Computational Social Science, Applied NLP

Main responsibilities

- Built a large-scale dataset of multilingual Twitter data to map cross-national attitudes towards the European Union
- Deployed transformer-based topic modeling techniques and sentiment pipelines for data analysis
- Designed large-scale online study aimed at identifying factors mediating political identity in a text-driven fashion

Predictive Analytics Data Fellow / Consultant

June - August 2021

Centre for Humanitarian Data, United Nations

Focus area: Complex Systems, Predictive Modeling

Main responsibilities

- Researched desirability, feasibility and impact of “complex systems” approaches to predictive modeling of humanitarian crises
- Identified data requirements, modeling techniques, and partnerships for a pilot
- Wrote a [blog](#) and an [extended report](#) outlining outcomes and recommendations

Education

PhD, Cognitive Neuroscience

September 2016 – October 2019

Aarhus University, Denmark

MSc, Cognitive Science

September 2014 – July 2016

University of Trento, Italy

Additional research experience

Visiting Researcher, Department of Applied Mathematics and Computer Science; Technical University of Denmark

Visiting Researcher, Institute of Cognitive Science and Technologies; National Research Council, Italy

Research Assistant, Department of Experimental Psychology, University College London, United Kingdom

Research Assistant, Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands

Skills

Programming languages: Python; R; Matlab; SQL (SQLite); bash; PERL

Technologies: Git/Github; Tensorflow/Keras; Docker; Scikit-learn; numpy; scipy; pandas; PyTorch (basic)

Methods: Machine Learning; Data Analysis; Stats; Complex Systems (Agent-based simulations, Network Modeling)

Languages: Italian (native); English (excellent); Danish (excellent); French (intermediate)

Teaching experience

Learning Session *Language as Data*, Centre for Humanitarian Data, United Nations (June 2021)
 Guest Lecturer, *Advanced Cognitive Neuroscience*, MSc Cognitive Science (Fall 2019)
 Full-course teaching assistant, *Introduction to Cognitive Neuroscience*, BSc Cognitive Science (Spring 2018)
 Guest lecturer, *Social and Cultural Dynamics*, BSc Cognitive Science (Spring 2018)
 Full-course lecturer and instructor, *Cognitive Science*, MA Cognitive Semiotics, (Fall 2017)
 Instructor, *Workshop on Statistical Analyses in Language Sciences Using R*, staff course at Aarhus University (Fall 2017)

Invited talks (selected)

Introducing Neuroscout, a platform for flexible (re)analysis of naturalistic datasets

September 2021

Embodied Computation Group

Aarhus University

Complex systems modeling for humanitarian action: exploring opportunities and impact

July 2021

Data Fellows Programme Final Showcase

Centre for Humanitarian Data, United Nations

Opportunities for integrating complex systems modeling in humanitarian planning and response

June 2021

Webinar: Complex Systems Modelling: An Opportunity to Better Understand and Anticipate Humanitarian Needs?

Centre for Humanitarian Data, United Nations

Language models as person(al)ity encoders: a text-driven approach to modeling individual differences

May 2021

Department of Linguistics, Cognitive Science and Semiotics

Aarhus University

Introducing benchmarks in psychology: rethinking model evaluation with an eye on prediction and the real world

February 2021

Joint online seminar series

McGill University / University of Toronto / Karolinska Institute

Organization of scientific events

Organizer of Natural Language Processing Workshop @ Interacting Minds Centre, Aarhus University (Fall 2019)

Co-organizer of SALC7, Conference of the Scandinavian Association for Language and Cognition (Spring 2019)

Co-organizer of Symposium “From fieldwork to modelling: Explaining the variability of linguistic spatial referencing systems”, ICSC 2018 (Fall 2018)

Reviewing services

Journal of Experimental Psychology

Journal of Memory and Language

Psychology of Language and Communication

F1000Research

Publications

de la Vega, A., **Rocca, R.** (co-first), Blair, R., Mentsch, J., Markiewicz, C., Ghosh, S., Poldrack, R., Yarkoni, T., (in prep).
 Neuroscout: a platform for large-scale reproducible fMRI research

Tylén, K., **Rocca R.** (in prep). Cognitive diversity promotes collective creativity: an agent-based simulation

Rocca, R., de la Vega, A. (submitted). Evaluating the role of non-lexical markers in GPT-2 language modeling behavior

Rocca, R., Yarkoni, T. (2021). Putting psychology to the test: rethinking model evaluation through benchmarking and prediction,
Advances in Methods and Practices in Psychological Science

Todisco, E., **Rocca, R.**, Wallentin, M. (2021). The semantics of spatial demonstratives in Spanish: a demonstrative choice task study.
Language and Cognition

- Rocca, R.**, Wallentin, M. (2020). Demonstrative reference and semantic space: a large-scale demonstrative choice task (DCT) study. *Frontiers in Psychology*
- Wallentin, M., **Rocca, R.** (2020). The semantics of spatial demonstratives. *Proceedings of the 42nd Annual Meeting of the Cognitive Science Society*
- Rocca, R.**, Coventry, K. R., Tylén, K., Staib, M., Lund, T. E., & Wallentin, M. (2020). Language beyond the language system: dorsal visuospatial pathways support processing of demonstratives and spatial language during naturalistic fast fMRI, *NeuroImage*
- Rocca, R.**, Wallentin, M., Vesper, C., & Tylén, K. (2019). This is for you: social modulations of proximal vs. distal space in collaborative interaction, *Scientific Reports*
- Rocca, R.**, Tylén, K., Wallentin, M. (2019), *This shoe, that tiger*: Semantic properties reflecting manual affordances of the referent modulate demonstratives use, *PlosOne*.
- Wallentin, M., **Rocca, R.**, Stoustrup S. (2019), Grammar, gender and demonstratives in lateralized imagery for sentences, *Journal of Psycholinguistic Research*
- Rocca, R.**, Wallentin, M., Vesper, C. & Tylén, K. (2018). *This and that* back in context: grounding demonstrative reference in manual and social affordances, *Proceedings of the 40th Annual Meeting of the Cognitive Science Society*
- Wallentin, M., **Rocca, R.**, Stoustrup, S. (2018), Lateralized imagery for sentence content: Testing grammar, gender and demonstratives, *Proceedings of the 40th Annual Meeting of the Cognitive Science Society*
- Carapezza, M., & **Rocca, R.** (2017). In-seguire la Regola: Giochi Linguistici e Arti Performative. *Rivista Italiana di Filosofia del Linguaggio*, 11(2). (in Italian)
- Rocca, R.** & Augustin, M. (2016), Gesturing in L2: Evidence for cross-linguistic transfer in the visual modality, in *TwistX Proceedings of the 10th Linguistics Student Conference, Leiden 22nd April 2016*
- Carapezza, M. & **Rocca, R.** (2014), Ceci n'est pas une ontologie: a contribution to a quasi-resolute reading of the *Tractatus Logico-Philosophicus*, in Rinhofner-Kreidl S. & Wilsche H. (eds), *Analytical and Continental Philosophy: Methods and Perspectives. Paper of the 37th Wittgenstein Symposium*, Austrian Ludwig Wittgenstein Society, Kirchberg am Wechsel

Talks at conferences/workshops

- Rocca, R.**, Milano, L., (October 2021). Exploring dynamic approaches to needs modeling in humanitarian action. Conference on Complex Systems #CCS2021, Lyon – Satellite Meeting “Complex Systems for the Most Vulnerable”
- Rocca, R.**, Wallentin, M., (November 2019). Representing word meaning using cognitive features. NLP workshop at Interacting Minds Centre, Aarhus University
- Rocca, R.**, Staib, M., Tylén, K., Coventry, K.R., Wallentin, M. (July 2019). Here and there, what and where. Bilateral network of dorsal regions supports comprehension of spatial demonstratives in naturalistic language processing. *Deictic Communication: Theory and Application*, University of East Anglia
- Rocca, R.**, Staib, M., Tylén, K., Coventry, K.R., Wallentin, M. (May 2019). The neural correlates of spatial deictics: A fast fMRI study using naturalistic auditory stimuli. SALC7 – Conference of the Scandinavian Association for Language and Cognition, Aarhus University
- Rocca, R.**, Tylén, K., Wallentin, M. (May 2019). Crocodiles, peace and harmonicas: (how) does word semantics modulate demonstrative use? SALC7 – Conference of the Scandinavian Association for Language and Cognition, Aarhus University
- Rocca, R.**, Rabe, F., Madsen, KH, Siebner H., Lehmann, S., Konvalinka, I. (November 2018), Interpersonal coordination mechanisms in a real-world social network, *Social Cognition Workshop*, The Interacting Minds Centre, Aarhus University
- Rocca, R.**, Wallentin, M., Vesper, C. & Tylén, K. (July 2018). This and that back in context: grounding demonstrative reference in manual and social affordances; Oral presentation at *40thth Annual Meeting of the Cognitive Science Society*, Madison, Wisconsin, USA.
- Augustin, M., & **Rocca, R.** (April 2016), Gesturing in L2: Evidence for cross-linguistic transfer in the visual modality, Oral presentation: *TWISTx Conference*, Leiden.
- Rocca, R.** & Augustin, M. (March 2016), A cross-cultural study on gestural transfer in Italian, Dutch and English, oral presentation: Annual Juniorendag of the Dutch Society for Applied Linguistics (Anéla), Amsterdam
- Rocca, R.** & Carapezza, M. (August 2014), *Ceci n'est pas une ontologie*: a contribution to a quasi-resolute reading of the *Tractatus Logico-Philosophicus*, oral presentation: 37th ALWS Conference, Kirchberg am Wechsel

Poster presentations

- Rocca, R.**, Staib, M., Tylén, K., Coventry, K., Lund, T.E., Wallentin, M. (August 2019), Here and there, what and where: investigating the role of the dorsal visuospatial stream in linguistic encoding, Annual Conference of the Society for the Neurobiology of Language, Helsinki, Finland
- Rocca, R.**, Staib, M., Tylén, K., Coventry, K., Lund, T.E., Wallentin, M. (June 2019), Investigating the neural correlates of spatial demonstratives using naturalistic fast fMRI, Organization for Human Brain Mapping Annual Meeting, Rome
- Rocca, R.**, Lund, T.E., Staib, M., Tylén, K., Coventry, K.R., Wallentin, M. (August 2018), Spatial attention and perceptual-motor representations of demonstratives: a fast fMRI study using naturalistic auditory stimuli, *SNL 2018 – Conference of the Society for the Neurobiology of Language*, Québec City, Canada.
- Wallentin, M., Lund, T. E., Andersen, C. M., & **Rocca, R.** (August 2018). Fast phonotopic mapping with oscillation-based fMRI– Proof of concept, *SNL 2018 – Conference of the Society for the Neurobiology of Language*, Québec City, Canada.
- Wallentin, M., **Rocca, R.**, Stoustrup, S. (July 2018), Lateralized imagery for sentence content: Testing grammar, gender and demonstratives, Poster presentation at *40th Annual Meeting of the Cognitive Science Society*, Madison, Wisconsin, USA.
- Rocca, R.**, Staib, M., Tylén, K., Coventry, K., Lund, T.E., Wallentin, M., *Here and There* around the brain: The role of extra-linguistic spatial representations in the comprehension of spatial deictics
- Brain Prize Meeting 2017, Hindsgavl Castle – Middelfart (Denmark), October/November 2017;
 - 7th IMPRS/ICN *NeuroCom* Summer School, University College London, 12-14 July 2017;
 - *Language as a Form of Action*, National Research Council (CNR), Rome (Italy), 21-23 June 2017.

Non-academic publications (selected)

- Algoritmi di classe, *Doppiozero*, 22/01/2021
<https://www.doppiozero.com/materiali/algoritmi-di-classe>
- Chi ha paura dei data scientists? Numeri e pandemia, *Doppiozero*, 05/11/2020
<https://www.doppiozero.com/materiali/chi-ha-paura-dei-data-scientist-numeri-e-pandemia>
- Dati, miti, stati, *L'identità di Clio*, 07/07/2020
<https://www.lidentitadiclio.com/articoli/dati-pandemia>
- Montanelli, le statue e il colore della storia, *Lavoro culturale*, 06/07/2020
<https://www.lavoroculturale.org/montanelli-e-le-statue/marco-carapezza-e-roberta-rocca>
- Ricerca, democrazia e Unione Europea, *Doppiozero*, 03/06/2019
<https://www.doppiozero.com/materiali/ricerca-democrazia-e-ue>
- Chiamatemi Israele: storia di un monte, un tempio e il suo eremita, *Indiscreto*, 16/03/2018
<https://www.indiscreto.org/chiamatemi-israele-storia-un-monte-un-tempio-suo-eremita>
- Recreating space with “Oui” @ Aarhus Kunsthall, *Jutland Station*, 06/06/2017
<http://www.jutlandstation.dk/oui-aarhus-kunsthall>
- Art exhibition: Exploring the power of representation in contemporary media, *Jutland Station*, 28/03/2017
<http://www.jutlandstation.dk/thomas-hirschhorn-cecile-evans-kunsthall-aarhus>
- Art exhibition: Signe Klejs creates Hesitation Through Light, *Jutland Station*, 25/01/2017
<http://www.jutlandstation.dk/hesitation-of-light-signe-klejs-review>
- Capitali coraggiose, *Indiscreto*, 18/01/2017
<https://www.indiscreto.org/capitali-coraggiose>
- Music review: Who Killed Bambi & Ida Wenøe @ Aarhus Filmbyen, *Jutland Station*, 14/01/2017
<http://www.jutlandstation.dk/who-killed-bambi-ida-wenoe-filmbyen-aarhus-review>
- Art exhibition: “No man is an island – The Satanic verses” @ Aros, *Jutland Station*, 03/12/2016
- Art exhibition: PROCES by Holm/Ibjerg @ PLADS Artspace, *Jutland Station*, 16/11/2016
- Guttuso, la forza delle cose, *Indiscreto*, 21/09/2016
<https://www.indiscreto.org/guttuso-la-forza-delle-cose>
- In risposta all'Assoluto: Alberto Giacometti e Yves Klein, *Indiscreto*, 29/08/2016
<https://www.indiscreto.org/alberto-giacometti-yves-klein>
- Brulicamenti (ovvero: cartoline dalla nuova Tate), *Indiscreto*, 04/07/2016
<https://www.indiscreto.org/brulicamenti-ovvero-cartoline-dalla-nuova-tate>
- Bosch a Den Bosch, *Lavoro culturale*, 08/04/2016
<https://www.lavoroculturale.org/hieronymus-bosch/roberta-rocca>

Other interests

Culture journalism; Creative writing; Music; Art-house cinema