PERSONAL INFORMATION

Giovanni Granato

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Sex M | Date of birth 02/10/1992 | Nationality Italian

PROFILE

I'm a **researcher in "Computational Neuropsychology/Psychiatry"** at the Italian National Research Council (CNR), Institute of Cognitive Science and Technologies (ISTC), where I coordinate a research line at the LENAI lab. My training spans **Cognitive Sciences, Neuroscience, Machine Learning, Computational Modeling, and Cognitive Robotics**. My research focuses on the **neurocognitive mechanisms of goal-directed flexible cognition and consciousness**, with formal theories such as the "Three-components theory", the "Motivated Categorical Perception theory" and the "Goal-Aligning Representation Internal Manipulation theory". I develop and validate neuro-inspired **computational models in typical and clinical populations** (e.g. autism, schizophrenia), especially through **digital-twin pipelines**. These pipelines aim to simulate and profile higher-order cognition (e.g. metacognition, executive functions), they are validated using **standard neuropsychological tests** widely adopted in both research and clinical settings, and support clinicians in **diagnosis and psychotherapy planning**. Furthermore, these digital-twin pipelines are also being **implemented and shared on the EBRAINS-Italy platform** to foster accessibility and integration within the European research ecosystem. My research also shows applications in **digital-twin technologies for Human Resources** (e.g, model-based profiling tools), **Machine Learning** (e.g., Generative Models), and **Robotics** (e.g., Machine Consciousness).

WORK EXPERIENCE

June 2023 - Present

Researcher lvl. III (fixed-term) at "Institute of Sciences and Technologies of Cognition" (ISTC), "Laboratory of Embodied Natural and Artificial Intelligence" (LENAI) at "National Research Council" (CNR).

Research focus: "Computational models of brain and behavior, with particular reference to higher cognition, executive functions, metacognition, and consciousness. Study and validation of computational models with data collected in experiments with normo-typical or pathological human participants. Implementation of machine learning pipelines for data analysis with particular reference to EBRAINS research infrastructure. Contribution to the training and innovation activities of the "EBRAINS-Italy Training and Innovation Centre (ETIC)" based in Rome.

March 2025

Expert support in team-building based on educational Robotic for "Italiacamp srl"

Topic: "Team-building with educational robotics in group problem solving" (target: *Middle adults)*

October 2022 - May 2023

Post-doc research Fellowship at "Institute of Sciences and Technologies of Cognition" (ISTC), "Laboratory Of Computational Embodied Neuroscience" (LOCEN) at "National Research Council" (CNR).

Research focus: "Computational models of the brain system supporting flexible goal-directed behaviour"

September 2022 - Present

Research consultancy for the project "Terza missione" at the Social and Cognitive Neuroscience laboratory (ISCNL), Dept. of Psychology, "Sapienza, University of Rome"

Topic: "Participatory research in Autism"

November 2022

Consultancy/teaching in Educational Robotic for "Italiacamp srl"

Topic: "Impact and elements of Autonomous Robotics" (target: *Middle adults)*

October 2022

Consultancy/teaching in Educational Robotic for "Italiacamp srl"

Topic: basic elements of Robotics (target: *Middle school teenagers)*

June 2022 - July 2022

Consultancy and collaboration as "STEAM Training Specialist in Educational Robotics" at "Italiacamp srl"

June 2019 - September 2022

Research Fellowship at "Institute of Sciences and Technologies of Cognition", laboratory of "Computational Embodied Neuroscience" at "National Research Center".

Research focus: "Computational models of the brain system supporting flexible goal-directed behaviour"

January 2019 - May 2019

Research collaboration at "Institute of Sciences and Technologies of Cognition", laboratory of "Computational Embodied Neuroscience" at "National Research Center".

Research focus: "Computational models of goal-directed behaviour and cognitive flexibility"

October 2016 - December 2017

Research consultancy at the social and cognitive neuroscience laboratory (SCNL), Dept. of Psychology, "Sapienza, University of Rome"

Topic: "Virtual reality and Autism"

April 2016 - July 2018

Experimental thesis at "Institute of Sciences and Technologies of Cognition", laboratory of "Computational Embodied Neuroscience" at "National Research Center"

Title: "Consciousness and Goal-directed Behavior: from theoretical neuroscience to computational models"

PROJECTS

September 2024 - Present

Disturbo da Deficit di Attenzione/Iperattività (ADHD): gli SNiPs del gene DAT in relazione alla presenza di patologie auto-immuni familiari

Activities: team coordination, neuropsychological testing, data analysis, data modeling

June 2023 - Present — **EBRAINS-Italy (European Brain ReseArch INfrastructureS-Italy)**

Activities: management and training activities, and scientific production ("Computational models of brain and behavior, with particular reference to higher cognition, executive functions, metacognition, and consciousness")

September 2022 - Present — **Project "Terza Missione: Ascoltare la comunità autistica per migliorare la conoscenza dell'autismo, l'accessibilità degli studenti autistici all'università e la ricerca scientifica sull'autismo" (La Sapienza, University of Rome)**

Activities: autistic research consultancy and participation in the workgroup "participatory research in Autism"

April 2019 - April 2021 — **GOAL Robots (Goal-based Open-ended Autonomous Learning Robots)**

Activities: scientific production ("Neuro-inspired computational models of goal-directed behavior with potential applications in Robotics/Cognitive Robotics")

PARTICIPATION IN SCIENTIFIC AND EDITORIAL COMMITTEES, COMMISSIONS AND OTHER POSITIONS

5 May 2025 — **Guest Editor (Frontiers in Psychology)**

Roles: topic coordinator in a special issue on "Language and Consciousness: Unraveling Their Interactions in Cognition and Neuroscience" (Research Topic)

2 May 2025 — **ISTC-CNR, research grant (notice n. ISTC-BR-2-2025-RM)**

Roles: member of the commission

12 February 2025 — **ISTC-CNR, Senior research fellow grant (notice n. ISTC-AdR-430-2024-RM)**

Roles: member of the commission

December 2024 - Present — **Officina Ricerca Partecipativa Autismo (ORPA)**

Roles: permanent member of the group

20 May 2024 — **ISTC-CNR, Senior research fellow grant (notice n. ISTC-AdR-400-2024-RM)**

Roles: member of the commission (secretary)

March 2024 - Present — **"EBRAINS-Italy Training and Innovation Committee (ETICo)"**

Roles: Definition of the ETIC training offer, management of the training and technological transfer activities

November 2023 - Present — **"Italiacamp association"**

Roles: Teaching and dissemination in the AI/Robotics fields

20 July 2023 — **University of Rome "La Sapienza" ("Cognitive Neuroscience"), MA graduation commission**

Roles: External supervisor

EDUCATION AND TRAINING

April 2019 - October 2022

PhD in "Computer science" ("Computational Neuropsychology") at "School of Computer Science, Electronics and Mathematics", University of Plymouth, United Kingdom

Project title: "Flexible goal-directed manipulation of representations: computational models of healthy and pathological human cognition"

Topics: Machine learning, Deep learning, Generative models, Artificial neural networks, Clinical Neuropsychology, Computational Neuroscience/Neuropsychology, Neuro-robotics

October 2018 - April 2019

Advanced School in Artificial Intelligence at "CNR-ISTC"

Project title: "Flexible goal-directed behavior and internal attention: building blocks for consciousness "

Topics: Machine learning, Artificial neural networks, Agent-based models, Computational Neuroscience/Neuropsychology

October 2015 - July 2018

Master's degree in "Cognitive Neuroscience and Psychological Rehabilitation" at University of Rome "La Sapienza", Dept. of Medicine and Psychology, Faculty of Psychology

Thesis title: "Consciousness and Goal-directed Behavior: from theoretical neuroscience to computational models"

Topics: Cognitive Neuroscience, Neuropsychology, Systemic Neuroscience, Neurobiology, Computational Neuroscience/Neuropsychology

October 2012 - July 2015

Bachelor's Degree in "Psychological Sciences and Techniques" (curriculum: "Cognitive Processes") at "University of Florence", Faculty of Psychology

Thesis title: "Emergence of a consciousness from a hyper-connected neuronal system: neurobiological models and hypotheses "

Topics: General psychology, Psychobiology, Developmental psychology, Work psychology, Psychodynamics, Psychometrics, Physiological psychology, Research methodology, Developmental psychobiology, Cognitive neuropsychology

RESEARCH CONTRIBUTIONS

Software and tools

- **Digital-Twin Neuropsychology Pipeline**
  - **Authors:**
    - **Main author:** Giovanni Granato
  - **Type:** research tool
  - **Platform:** EBRAINS
  - **Link:** https://www.ebrains-italy.eu/resources/analysis-tools/9
  - **Description:** A neuro-inspired and model-based pipeline, validated on human experimental data, that supports the interpretation/prediction of data collected with gold-standard neuropsychological tests of executive functions and metacognition (e.g. WCST, meta-WCST).

- **Online repository of computational models**
  - **Authors:**
    - **Main author:** Giovanni Granato
  - **Type:** online repository
  - **Platform:** Git-hub

- **Link:** https://github.com/GiovanniGranato
- **Description:** Online repository that stores and shares several computational models of higher-order cognition

Publications

SUBMITTED, UNDER REVIEW, ACCEPTED, IN PRESS

- **Granato G**., Manzi G., Di Giulio J., Puzzo C., Mattera, A., Adriani W., Baldassarre G., Capobianco M. (2025). **Assessing executive functions and metacognition: translational potential of the Metacognitive Wisconsin Card sorting Test for developmental neuropsychology**. Submitted to "Frontiers in "Behavioural Neuroscience".

- **Granato G.**, Mattera A, Cartoni E, Baldassarre G (2025). **Modeling metacognition and executive functions in the Metacognitive Wisconsin Card Sorting Test: from clinical data to neuropsychological digital-twins, and backward**. Scientific Reports. Under review. Pre-print: https://doi.org/10.31219/osf.io/dgsfm_v1.

- Bartolomei, G., Ozcan, B., **Granato, G.**, Baldassarre, G., & Sperati, V. (2025). **A proposal for an AI-based toy to encourage and assess symbolic play in autistic children**. Behaviour & Information Technology. In press.

PUBLISHED

- Bartolomei, G., **Granato, G.,** Baldassarre, G., Ozcan, B., & Sperati, V. (2025). **A Proposal for a Multimodal Interactive Platform for Data Collection in Autism Play-Based Therapy Sessions**. Poster presented at "ISWC 2025 and UbiComp".

- Bartolomei, G., Ozcan, B., **Granato, G.**, Baldassarre, G., & Sperati, V. (2025). **Echo: an AI-based toy to encourage symbolic play in children with Autism Spectrum Conditions**. In Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction (pp. 1-6).

- **Granato, G.**, Costanzo, R., Borghi, A., Mattera, A., Carruthers, S., Rossell, S., & Baldassarre, G. (2025). **An experimental and computational investigation of executive functions and inner speech in schizophrenia spectrum disorders**. Scientific Reports, 15(1), 5185.

- Mattera, A., Alfieri, V., **Granato, G.**, & Baldassarre, G. (2024). **Chaotic recurrent neural networks for brain modelling: A review**. Neural Networks, 107079.

- **Granato, G**., & Baldassarre, G. (2024). **Bridging flexible goal-directed cognition and consciousness: The Goal-Aligning Representation Internal Manipulation theory**. Neural Networks, 106292.

- Cavallo A., Mattera A., **Granato G.**, Baldassarre G. (2023). **Emergence of neuronal ensembles in a chaotic corticostriatal circuit.** In 2023 Conference on Cognitive Computational Neuroscience.

- **Granato, G.** (2022). **Flexible goal-directed manipulation of representations: computational models of healthy and pathological human cognition** (Doctoral dissertation, University of Plymouth).

- **Granato, G.**, Borghi, A. M., Mattera, A., & Baldassarre, G. (2022). **A computational model of inner speech supporting flexible goal-directed behaviour in Autism**. Scientific reports, 12(1), 1-15.

- **Granato G.**, Cartoni E, Da Rold F, Mattera A, Baldassarre G (2022) **Integrating unsupervised and reinforcement learning in human categorical perception: A computational model**. PLoS ONE 17(5): e0267838.

- Mattera, A., Cavallo, A., **Granato, G.**, Baldassarre, G., & Pagani, M. (2022). **A Biologically Inspired Neural Network Model to Gain Insight Into the Mechanisms of Post-Traumatic Stress Disorder and Eye Movement Desensitization and Reprocessing Therapy.** Frontiers in Psychology, 3681.

- **Granato G.**, Baldassarre G. (2022). **Manipulation of internal representations underlying flexible human goal-directed behaviour: supporting Computational Psychiatry and towards Machine Consciousness**. Poster session presented at "The symposium: from cortical microcircuits to consciousness (CORTICON)"

- **Granato, G.**, & Baldassarre, G. (2021). **Internal manipulation of perceptual representations in human flexible cognition: A computational model**. Neural Networks, 143, 572-594.

- **Granato, G.**, Borghi, A. M., & Baldassarre, G. (2020). **A computational model of language functions in flexible goal-directed behaviour**. Scientific reports, 10(1), 1-13.

- Baldassarre, G., & **Granato, G.** (2020). **Goal-Directed Manipulation of Internal Representations Is the Core of General-Domain Intelligence**. Journal of Artificial General Intelligence, 11(2), 19-23.

- **Granato, G.**, & Baldassarre, G. (2019). **Goal-directed top-down control of perceptual representations: A computational model of the Wisconsin Card Sorting Test.** In 2019 Conference on Cognitive Computational Neuroscience (pp. 2019-1168).

- Baldassarre, G., Lord, W., **Granato, G.**, & Santucci, V. G. (2019). **An embodied agent learning affordances with intrinsic motivations and solving extrinsic tasks with attention and one-step planning**. Frontiers in neurorobotics, 13, 45.

- **Granato G.**, Baldassarre G. (2018). **Goal-directed imagination and cognitive flexibility: A computational model of the Wisconsin Sorting Card Test.** Poster session presented at "The Eighth International Symposium on Biology of Decision Making (SBDM)"

Seminars and Speeches

- (04/12/2025; Naple, Italy) **Research Infrastructure EBRAINS-Italy, workshop on "The EBRAINS-Italy Research Infrastructure for Neuroscience challenges".**

  Speaker presentation: "An automated toolbox for modeling flexible goal-directed cognition: advancements and achievements"

- (08/03/2024; Rome, Italy) **"Project Terza Missione: Ascoltare la comunità autistica per...",** workshop on "**Autismo e Ricerca Partecipativa - Online Workshop**".

  Speaker presentation: "The italian autism participatory research working group"

- (26/09/2023; Palermo, Italy) **Research Infrastructure EBRAINS-Italy,** workshop on "**The EBRAINS-Italy Research Infrastructure for Neuroscience challenges**".

  Speaker presentation: "Modeling Flexible goal-directed cognition: an automated research toolbox."

- (18/07/2023; Rome, Italy) "**Poste Italiane**", seminar on "**Transizioni di vita, disabilità e vulnerabilità nell'organizzazione come comunità**".

  Invited speaker presentation: "Autism/Asperger in organizations: from disability to life changes"

- (28/06/2019; Rome, Italy) **"Fondazione Mondo Digitale**", seminar on "Vagone FMD. da 01 a 100: aperitivo con l'innovazione ".

  Speaker presentation: "Flexible goal-directed behaviour and internal attention"

Reviewing activity

- **International journals:**
  - **"Neural Networks"** (Elsevier; topic: neuro-inspired Machine Learning)
  - **"Scientific Reports"** (Nature Publishing Group; topic: Neuro-robotics, Neuroscience)
  - **"Frontiers in Artificial Intelligence"** (Frontiers Media SA; topic: linguistics, computational modeling)
  - **"Frontiers in Psychiatry"** (Frontiers Media SA; topic: executive functioning, computational modeling)
  - **"Journal of Cognitive Psychology"** (Taylor & Francis; topic: experimental psychology, inner-speech, theory of mind, emotion recognition)
  - **"Intelligenza Artificiale"** (SAGE Publications; topic: machine learning applied to clinical diagnosis)
- **International conferences:**
  - **"International Conference on Social Robotics + AI 2025 (ICSR, 2025)"** (topic: Social developmental robotics)
  - **"Cognitive Computational Neuroscience conference (CCNC, 2023)"** (topics: Various)

- **"Cognitive Computational Neuroscience conference (CCNC, 2019)"** (topics: Various)

Project evaluations

- "La Sapienza, university of Rome" (2023)

Collaborations

- **ASL (Roma 6)** (Responsable:Giovanni Granato)
  Country: Italy
  Referent: Miriam Troianello

  Topic: "Executive functions and metacognition in clinical and control conditions of childhood"

- **Italian National Institute of Health** (Responsable: Walter Adriani)
  Country: Italy
  Referent: Walter Adriani

  Topic: "Executive functions and metacognition in clinical and control conditions of childhood"

- **Private clinics - ETS "Bimbo al centro"** (Responsable: Micaela Capobianco)
  Country: Italy
  Referent: Micaela Capobianco

  Topic: "Executive functions and metacognition in clinical and control conditions of childhood"

- **Centre for Mental Health at Swinburne University of Technology** (PI: Susan Rossell)
  Country: Australia
  Referent: Sean Carruthers

  Topic: "Computational models of flexible cognition in Schizophrenia"

- **Consciousness, Cognition, and Computation Group** (CO3, PI: Axel Cleeremans)
  Country: Belgium
  Referent: Axel Cleeremans

  Topic: "Metacognition and flexible goal-directed behavior"

- **ItaliaCamp, srl** (AD: Fabrizio Sammarco)
  Country: Italy
  Referent: Riccardo Santilli

  Topic: "Educational Robotics"

- **Social and Cognitive Neuroscience Laboratory** (SCNL, PI: Salvatore Aglioti)
  Country: Italy

Referent: Ilaria Minio Paluello

Topic: "Participatory research in Autism"

- **Body Action Language Lab** (BALLAB, PI: Anna Borghi)
  Country: Italy
  Referent: Anna Borghi

  Topic: "Inner speech and Flexible goal-directed Behaviour in healthy, pathological and divergent conditions".

- **Social and Cognitive Neuroscience Laboratory** (SCNL, PI: Salvatore Aglioti)
  Country: Italy
  Referent: Ilaria Minio Paluello

  Topic: "Participatory research in Autism", "Virtual reality and Autism"

Supervisions

- Di Giulio J. (2024/2025). **Post-lauream internship** at "Laboratory of Natural and Artificial Intelligence" (ISTC-CNR).

  Topics: "Experimental and computational neuropsychology of higher-order cognition: development of experimental protocols and neuropsychological tests to probe Executive Functions and Metacognition".

- Manzi G. (2024/2025). **Pre-lauream internship** at "Laboratory of Natural and Artificial Intelligence" (ISTC-CNR).

  Topics: "Experimental and computational neuropsychology of higher-order cognition: development of experimental protocols and neuropsychological tests to probe Executive Functions and Metacognition".

- Costanzo R. (2022/2023). **MA thesis** at "University of Rome La Sapienza, Department of Medicine and Psychology".

  Topics: "Models of Executive Functions and Inner-Speech in Computational Psychiatry".

- Tortora L., De Bei F., Biris I. (2020). **Advanced research project** at "Advance School of Artificial Intelligence" (ASAI).

  Topics: "ML applications in Computational Psychiatry (DNN supporting clinical diagnosis of Autism)".

- Fabrizio Carlo (2020). **Advanced research project** at "Advance School of Artificial Intelligence" (ASAI).

  Topics: "Models human working memory with ML methods (LSTM)".

- Buttinelli Alessandro (2019). **Advanced research project** at "Advance School of Artificial Intelligence" (ASAI).

Topics: "Models of Inner-Speech in human flexible cognition"

- Muratore Paolo (2019). **Advanced research project** at "Advance School of Artificial Intelligence" (ASAI).

  Topics: "Development of Neuro-inspired algorithms in Machine Learning"

PERSONAL SKILLS

Mother tongue Italian

Other languages

	COMPARED		PARLATO		WRITTEN PRODUCTION
	Listening	Reading	Interaction	Production	
English	B 2	C 1	B 2	B 2	C 1

Levels: A1 / A2: Basic user - B1 / B2: Intermediate user - C1 / C2: Advanced user
Common European Framework Reference of Languages

Computer skills

- General:
  - European Computer Driving License ECDL "Advanced" level
  - PC Assembly
- Operating systems used:
  - Windows
  - Linux
- Programming languages used:
  - Python
  - Scratch for Educational Robotics
  - MatLab
  - C ++
  - R
  - Latex
  - PHP
  - SQL
  - VBA

Personal interests

- Consciousness
- Humans interactions
- Neuropsychology/Psychiatry
- Technology:
  - Applied Sciences
  - Robotics
  - Domotics
- Videogames (Real Time Strategy, RTS)
- PC Assembling

Personal data

I authorize the processing of my personal data pursuant to the Legislative Decree June 30, 2003, n. 196 "Code regarding the protection of personal data".