

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**. Currently, these digital-twin pipelines are being **tested in experimental-clinical projects and are implemented/shared on the EBRAINS-Italy platform** to foster accessibility and integration within the European research ecosystem. Beyond clinical applications, my work also extends to **Human Resources** (e.g., model-based profiling tools), **Human-robot interaction** (e.g., human-centred robotics), and **Robotics** (e.g., Machine Consciousness).

WORK EXPERIENCE

October 2025 - Present **Researcher Ivl. 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: "Development of neuro-inspired computational models of higher-order human cognition (executive functions, metacognition) and their integration into automated pipelines for neuropsychological profiling in human-robot interaction as part of the "Purposeful Intrinsically Motivated Lifelong Learning Autonomous Robots" (PILLAR-Robots).

June 2023 - September 2025 **Researcher Ivl. 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 - 2025 **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

October 2025 - Present **Purposeful Intrinsically Motivated Lifelong Learning Autonomous Robots" (PILLAR-Robots)**

Activities: neuropsychological testing, data analysis, data modeling, human-robot interaction

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: scientific supervision, 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 - 2025 **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")

SCIENTIFIC LEADERSHIP, EDITORIAL & COMMITTEE ROLES, AND OTHER POSITIONS

March 2025 - Present **Scientific supervisor (ethics-approved study)**

Roles: scientific supervisor of the clinical-computational study "Metacognition and executive functions in typical and atypical neurodevelopment: towards a translational neuropsychology" (CNR-ISTC, ISS, AS-ETS).

24 July 2025 - Present **Scientific lead/responsible (ethics-approved study)**

Roles: scientific responsible for the ethics-approved clinical-computational study "Toward a Computational Neuropsychology of metacognitive and goal-directed cognition: integrating theoretical, computational and experimental research" (CNR-ISTC, La Sapienza).

5 May 2025 - Present **Guest Editor (Frontiers in Psychology)**

Roles: topic coordinator in a special issue on "Bridging Language and Consciousness:

Insights from Brains, Minds, and Machines" (Research Topic)

December 2024 - Present

Officina Ricerca Partecipativa Autismo (ORPA)

Roles: permanent member of the group

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

4 August 2025

ISTC-CNR, research grant (notice n. ISTC-BR-7-2025-RM)

Roles: member of the commission

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

20 May 2024

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

Roles: member of the commission (secretary)

20 July 2023

University of Rome "La Sapienza" ("Cognitive Neuroscience"), MA graduation commission

Roles: External supervisor

EDUCATION AND TRAINING

September 2025

EBRAINS-Italy Scientific Academy – BRAiN Dynamics academy, Oristano, Italy

Topics: Advanced training on neuroscience research, from molecular to cellular and systems neuroscience, and embracing multiple methodological approaches.

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, publications, seminars)

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

IN PREPARATION, SUBMITTED, UNDER REVIEW, ACCEPTED, IN PRESS

- **Granato G.**, Di Giulio J., Manzi G., Puzzo C., Mattera, A., Giocondo F., Adriani W., Capobianco M., Baldassarre G. (2025). **From task administration to digital-twin profiling: an automated neuropsychological pipeline for assessing executive functions and metacognition across the lifespan.** Behaviour Research Methods. In preparation.
- Mattera A., Alfieri V., **Granato G.**, Mannella F., Baldassarre G. (2025). **Oscillations, but not chaos, confer stochastic-like properties to a deterministic neural network.** Neural Networks. In preparation.
- **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/dqsfm_v1.

PUBLISHED

- **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.** Front. Behav. Neurosci. 19:1655310.
- 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, 1-14.
- 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

- (2/10/2025; Agropoli, Italy) **Behavioural Neuroscience Conference 2025.**

Speaker presentation: "Towards automated and model-based digital-twin pipelines for neuropsychological assessment and intervention selection"
- (04/12/2025; Naples, 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 & EDITORIAL COMMUNITY SERVICE

Community roles

- **Community Reviewer**, Frontiers in Psychiatry – Computational Psychiatry Section (2025–present).

Invited reviewer

- **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)

COLLABORATION AND SUPERVISIONS

Collaborations

- **ASL (Roma 6)** (Responsible: Giovanni Granato)

Country: Italy

Referent: Miriam Troianello

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

- **Italian National Institute of Health** (Responsible: 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"** (Responsible: 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".