

PERSONAL INFORMATION

Giovanni Granato



 Via dei Durantini, 60, 00157, Roma (RM), Italy

 3336269749

 giovanni.granato@istc.cnr.it

 (PEC) giovanni.granato1002@pec.it

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

WORK EXPERIENCE

October 2022 - Present

Post-doc 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"

September 2022 - Present

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

November 2022

Consultancy and teaching in Educational Robotic for "Italiacamp srl" (Topic: "Impact and elements of Autonomous Robotics", target: *Middle adults*).

October 2022

Consultancy and 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 in "Computational models of goal-directed behaviour and cognitive flexibility"

October 2016 - December 2017

Research consultancy for a project on "Virtual reality and Autism" at the social and cognitive neuroscience laboratory (SCNL), Dept. of Psychology, "Sapienza, University of Rome"

April 2016 - July 2018

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

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

EDUCATION AND TRAINING

April 2019 - October 2022

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

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

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 in "Flexible goal-directed behavior and internal attention: building blocks for consciousness ", concerning the design of a bio-inspired computational model of internal attention processes, having a key role in goal-directed behaviour and in consciousness.

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

October 2015 - July 2018 Master's degree in "Cognitive Neuroscience and Psychological Rehabilitation"
 Faculty of Psychology, Dept. of Medicine and Psychology, University of Rome "La Sapienza" , Rome

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

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

October 2012 - July 2015 Bachelor's Degree in "Psychological Sciences and Techniques", address "Cognitive Processes"
 Faculty of Psychology, "University of Florence", Florence

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

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

RESEARCH ACHIEVEMENTS

Publications

- 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)"
- Baldassarre, G., & Granato, G. (2021). A Neuro-Computational Theory of Consciousness based on the Internal Manipulation of Representations. *Psychological Review*. Under revision. Pre-print: arxiv.org/pdf/1912.13490.pdf
- 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)"

Reviewing activity

- Reviewer for "Cognitive Computational Neuroscience conference"
- Reviewer for "Neural Networks"
- Reviewer for "Frontiers in Artificial Intelligence"

Interdisciplinary collaborations

- 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
Country: Italy
Referent: Riccardo Santilli
Topic: "Educational Robotics"
- Social and Cognitive Neuroscience Laboratory (SCNL, PI: Salvatore Aglioti)
Country: Italy
Referent: Iliaria 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: Iliaria Minio Paluello
Topic: "Virtual reality and Autism"

Supervisions

- Costanzo R. (2022). 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). Project at "Advance School of Artificial Intelligence" (ASAI). Topics: "ML applications in Computational Psychiatry (DNN supporting clinical diagnosis of Autism)".
- Fabrizio Carlo (2020). Project at "Advance School of Artificial Intelligence" (ASAI). Topics: "Models human working memory with ML methods (LSTM)".

- Buttinelli Alessandro (2019). Project at "Advance School of Artificial Intelligence" (ASAI). Topics: "Models of Inner-Speech in human flexible cognition"
- Muratore Paolo (2019). 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 1	B 2	C 1

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

Skills Computer

- 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
- Individual behavior of living beings
- Humans interactions
- Neuroscience
- Technology:
 - Applied Sciences
 - Robotics
 - Domotics
- Videogames (Real Time Strategy, RTS)
- PC Assembling

Research interests

I'm a Computational Neuropsychologist and my training includes Cognitive Sciences, Neuroscience, Machine Learning, Computational Modeling. My research focuses on the neurocognitive processes underlying human flexible cognition and behavior (e.g. Executive Functions). In particular I proposed the concept of "goal-directed manipulation of internal

representations at the basis of flexible cognition” supported by the “Three-components theory of flexible cognition” (Granato and Baldassarre, 2021, Granato et al., 2020). In short, I investigate how artificial and biological agents manipulate their representations (e.g., Inner-Speech, Goal-directed attention, etc) to flexibly achieve their goals. My research is extended to the investigation of goal-directed representations manipulation at the basis of Consciousness and Metacognition. Overall, I adopt the integrated top-down / bottom-up method of Computational Neuroscience/Neuropsychology, thus building simulated neuro-inspired embodied agents and comparing their cognition and behavior with that of humans. My research investigations show applications also in Machine Learning (Neuro-inspired ML, Generative Models, etc) and Robotics (e.g., Machine Consciousness).

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".