

Curriculum Vitae

EDUCATION

- 2020 – 2024 **Ph.D. in Psychological Sciences**. University of Bologna. Thesis title: “Exploring the Psychometric Dimensions: Theoretical and Practical Applications of Artificial Intelligence and Gamification in Education, Learning, and Neuropsychological Assessment”. Grade: Excellent cum laude
- 2019 – 2020 Second level short specialization degree in “**Machine learning and big data in precision medicine and biomedical research**”. 60 ECTS. University of Padova, Italy. Grade: 4/4.
- 2019 State examination qualifying for the profession of psychologist. I Session 2019.
- 2016 – 2018 **MCs in “Neuroscience and Neuropsychological Rehabilitation”**, University of Bologna, Italy. Grade: 108/110.
- 2012 – 2015 **BCs in Psychology**, University of Bologna, Italy. Grade: 108/110
- 2006 – 2011 High-school graduation in Scientific field, “E.Mattei”, Italy.

TRAINING AND COURSES

- 2024 “Annual JAGS Workshop: Bayesian Modeling for Cognitive Science” (3 ECTS). University of Amsterdam. 8 – 14 July 2024
- 2022 “**Applied Reinforcement Learning**” (2 ECTS). ZHAW Life Sciences and Facility Management, Zürich, Campus Zentrum, Lagerstrasse 41 (online). 26 August – 30 September 2022
- 2021 **XXXV Conference on Neural Information Processing Systems (NeurIPS) (online)**. 6-14 December 2021.
- 2021 **Computational Psychiatry Course (online)**. Held by the Translational Neuromodeling Unit (TNU), University of Zurich & ETH Zurich. 13-18 September 2021.
- 2021 **3rd International Summer School on Artificial Intelligence and Games (online)**. Held by modl.ai in partnership with Unity, DeepMind, and Creative Assembly. 5-9 July 2021.
- 2021 **Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning**. Coursera Course Certificate. Credential ID: V97344VESXVA. <https://www.coursera.org/account/accomplishments/certificate/V97344VESXVA>

- 2020 **Explainable Machine Learning with LIME and H2O in R**. Coursera Course Certificate. Credential ID: 5SVQCD9QWWTN.
<https://www.coursera.org/account/accomplishments/certificate/5SVQCD9QWWTN>
- 2020 **Applied Data Science Specialization**, Coursera Course Certificate. Credential ID: X5U7E6U3FQPB.
<https://www.coursera.org/account/accomplishments/specialization/certificate/X5U7E6U3FQPB>
- 2020 Think Open Rovereto workshop, University of Trento/CiMec, Italy.
- 2019 Symposium in honor of Prof. Bolzani, “Open Statistics: Methods and Thinking in Psychological Research”. Department of Psychology, University of Bologna (Cesena, Italy).
- 2019 Lectio Magistralis in “Statistical Learning with Big Data” given by Prof. Trevor Hastie, University of Bologna, Bologna, Italy.
- 2019 “50th European Mathematical Psychology Group Meeting (EMPG), University of Heidelberg, Heidelberg, Germany.
- 2018-2019 Professionalising internship:
- 04/2018 – 10/2018 “Gli Amici di Luca” Association, Casa dei Risvegli Luca De Nigris, Bologna, Italy (500 hours). Under the supervision of Prof. Di Sant’Antonio Anna.
 - 10/2018 – 04/2019 University of Bologna, Cesena, Italy (500 hours). Under the supervision of Prof. Giovagnoli Sara.
- 2018 Conference: “Possibility and limits of the return to drive after acquired brain injuries” 20° National day of awakenings for coma research, “Gli Amici di Luca” Association, Bologna, Italy.
- 2018 XI National conference in Psychology of Aging, SIPI, Catholic university of the Sacred Heart, Milan, Italy.
- 2017 Advanced training course in: “Integrated neuropsychological Diagnosis in adult and senior”. “Spazio Iris” Association, Milan, Italy.

PEER-REVIEWED PUBLICATIONS

Print

1. Benassi M., Garofalo S., Ambrosini F., Sant’Angelo R.P., Raggini R., De Paoli G., Ravani C., Giovagnoli S., **Orsoni M.**, and Giovanni Piraccini. Using Two-Step cluster analysis and Latent Class Analysis to classify the cognitive heterogeneity of cross-diagnostic psychiatric inpatients. *Frontiers in Psychology*, section Quantitative Psychology and Measurement. doi: 10.3389/fpsyg.2020.01085
2. Spinoso M., Novelli C., Giovagnoli, S., Magri, S., Vetere, F., **Orsoni M.**, Lunghi, V., Bertani, S., Bartolini, L., Benassi M. Uno studio preliminare di validazione di Attento alle parole!. (2021) *Logopedia e comunicazione*. doi: 10.14605/LOG1712110
3. Fini, C., Zannino, G. D., **Orsoni, M.**, Carlesimo, G. A., Benassi, M., & Borghi, A. M. (2022). Articulatory suppression delays processing of abstract words: The role of inner

speech. *Quarterly Journal of Experimental Psychology*, 75(7), 1343-1354.

<https://doi.org/10.1177/17470218211053623>

4. Villani, C., **Orsoni, M.**, Lugli, L., Benassi, M., & Borghi, A. M. (2022). Abstract and concrete concepts in conversation. *Scientific Reports*, 12(1), 17572.
<https://doi.org/10.1038/s41598-022-20785-5>
5. Garofalo S., Giovagnoli S., **Orsoni M.**, Starita F., Benassi M (2022) Interaction effect: Are you doing the right thing?. *PLOS ONE* 17(7): e0271668.
<https://doi.org/10.1371/journal.pone.0271668>
6. **Orsoni, M.**, Giovagnoli, S., Garofalo, S., Magri, S., Benvenuti, M., Mazzoni, E., & Benassi, M. (2023). Preliminary evidence on machine learning approaches for clusterizing students' cognitive profile. *Heliyon*, 9(3), e14506. <https://doi.org/10.1016/j.heliyon.2023.e14506>
7. **Orsoni, M.**, Pögel, A., Duong-Trung, N., Benassi, M., Kravcik, M., Grützmüller, M. (2023). Recommending Mathematical Tasks Based on Reinforcement Learning and Item Response Theory. In: Frasson, C., Mylonas, P., Troussas, C. (eds) Augmented Intelligence and Intelligent Tutoring Systems. ITS 2023. *Lecture Notes in Computer Science*, vol 13891. Springer, Cham. https://doi.org/10.1007/978-3-031-32883-1_2
8. Benvenuti, M., Cangelosi, A., Weinberger, A., Mazzoni, E., Benassi, M., Barbaresi, M., & **Orsoni, M.** (2023). Artificial intelligence and human behavioral development: A perspective on new skills and competences acquisition for the educational context. *Computers in Human Behavior*, 148, 107903. <https://doi.org/10.1016/j.chb.2023.107903>
9. **Orsoni, M.**, Dubé, A., Prandi, C., Giovagnoli, S., Benassi, M., Mazzoni, E., & Benvenuti, M. (2023). Learning Landscape in Gamification: The Need for a Methodological Protocol in Research Applications. *Perspectives on Psychological Science*, 0(0).
<https://doi.org/10.1177/17456916231202489>
10. de Chiusole, D.; Spinoso, M.; Anselmi, P.; Bacherini, A.; Balboni, G.; Mazzoni, N.; Brancaccio, A.; Epifania, O.M.; Orsoni, M.; Giovagnoli, S.; et al. PsycAssist: A Web-Based Artificial Intelligence System Designed for Adaptive Neuropsychological Assessment and Training. *Brain Sci.* 2024, 14, 122. <https://doi.org/10.3390/brainsci14020122>
11. **Orsoni M.**, Benassi M., & Scutari M. (2024) Information Theory, Machine Learning, and Bayesian Networks in the Analysis of Dichotomous and Likert Responses for Psychometric Validation. *Psychological Methods*. <https://doi.org/10.1037/met0000713>.
12. Garofalo S., Finotti G., **Orsoni M.**, Giovagnoli S., Benassi M. (2024). Testing Bayesian Informative Hypotheses in 5 steps with R and JASP. *Advances in Methods and Practices in Psychological Science*. <https://doi.org/10.1177/25152459241260259>

13. **Orsoni M**, Giovagnoli S, Garofalo S, Mazzoni N, Spinoso M and Benassi M (2025). Comparing factor mixture modeling and conditional Gaussian mixture variational autoencoders for cognitive profile clustering. *Front. Psychol.* 16:1474292. Doi: 10.3389/fpsyg.2025.1474292

Accepted – In press

1. **Orsoni, M.**, Spinoso, M., Garofalo, S., Mazzoni, N., Giovagnoli, S., de Chiusole, D., ... Benassi, M. (2025, May 16). Bayesian Networks to Evaluate and Test the Raven's Colored Progressive Matrices. *Intelligence* https://doi.org/10.31234/osf.io/kp4b2_v3
2. Anselmi Pasquale., Brancaccio Andrea.,, **Orsoni Matteo.**,, Stefanutti Luca (2025). Two Markov Solution Process Models for the Assessment of Planning in Problem-Solving. *Psychometrika*.

Under Review

1. Debora de Chiusole., Ottavia M. Epifania., Pasquale Anselmi., Andrea Brancaccio., Noemi Mazzoni., Matilde Spinoso., **Matteo Orsoni.**, Sara Giovagnoli., Irene Pierluigi., Alice Bacherini., Mariagrazia Benassi., Giulia Balboni., & Luca Stefanutti. Multi-method validation of the new computerized test of fluid intelligence MatriKS.
2. Spinoso Matilde. Benassi Mariagrazia., Balboni Giulia., Mazzoni Noemi., **Orsoni Matteo.**, Stefanutti Luca., Anselmi Pasquale., de Chiusole Debora., Bacherini Alice., Pierluigi Irene., Garofalo Sara., & Giovagnoli Sara. Psychometric Properties of the Usability and Attitude Scale (UAS) for evaluating digital tools in children and adolescent users.
3. Marco Badioli*, **Matteo Orsoni***, Chiara Ruscelli, Silvia Dal Col, Sara Giovagnoli, Rosa Sant'Angelo, Graham Murray, Mariagrazia Benassi, Sara Garofalo. Antisaccade error rate as a potential biomarker of schizophrenia: a pre-registered meta-analysis.

* co-first author

In Preparation

1. **Orsoni Matteo & Benassi Mariagrazia.** Bayesian Network-Driven Reinforcement Learning for Adaptive Solving of Raven's Progressive Matrices.
2. Orsoni Matteo., Mazzoni Noemi., Spinoso Matilde., Garofalo Sara., Giovagnoli Sara., Balboni Giulia & Benassi Mariagrazia. Fluid Intelligence and Error Analysis in MatriKS: Preliminary Results in Schizophrenic Patients
3. Orsoni, Matteo & Benassi, Mariagrazia. Integrated Network System for Probabilistic Inference and Reliable Evaluation (INSPIRE).

BOOK CHAPTERS

1. Elvis Mazzoni, Martina Benvenuti, **Matteo Orsoni**, *Robotica e tecnologie per lo sviluppo: come costruire le competenze del futuro*, in: La società dei Robot, Milano, Mondadori Education, Mondadori Università, 2022, pp. 215 - 226 [capitolo di libro]

CONFERENCES PRESENTATION – TALK

- 2025 European Congress of Methodology organized by the European Association of Methodology (EAM). University of La Laguna, Tenerife, Spain, 23-25 July 2025. “Probabilistic Information and Network Evaluation System (PINES): A Bayesian Framework for Advancing Psychometric Testing”. **Matteo Orsoni**, Matilde Spinoso, Sara Giovagnoli, Sara Garofalo, Noemi Mazzoni, Giulia Balboni, Mariagrazia Benassi. In the Symposium: “Innovations in test development and validation”.
- 2024 Annual Workshop PRIN2020 “Computerized, Adaptive and Personalized assessment of executive functions and fluid intelligence”. Perugia, Italy, 16-17 September 2024. “Analisi preliminare delle Relazioni tra gli Item delle Matrici Colorate di Raven: Un approccio con Reti Bayesiane”. **Matteo Orsoni**, Noemi Mazzoni, Matilde Spinoso, Sara Garofalo, Sara Giovagnoli, Mariagrazia Benassi
- 2024 International Test Commission (ITC). Granada, Spain, 2-5 July 2024. “Unlocking Cognitive Patterns: A Comparative Exploration of Linear and Deep Dimensionality Reduction Approaches in clusterizing Student Cognitive Profiles”. **Matteo Orsoni**, Giovagnoli Sara., Garofalo, Sara., Mazzoni Noemi., Spinoso Matilde., and Benassi Mariagrazia
- 2023 19th International Conference on Intelligent Tutoring Systems «Augmented Intelligence and ITS». Corfu, Greece, 2-5 June 2023. “Recommending Mathematical Tasks Based on Reinforcement Learning and Item Response Theory”. **Matteo Orsoni**, Alexander Pögel, Nghia Duong-Trung, Mariagrazia Benassi, Milos Kravcik, and Martin Grützmüller
- 2023 European Congress of Methodology organized by the European Association of Methodology (EAM), University of Ghent, Belgium, 11-14 July 2023. “Improving Questionnaire Efficiency: A Bayesian Networks, Jensen-Shannon, and Machine Learning Approach for Selecting Relevant Items and Assessing Symptomatology Risk”. **Matteo Orsoni**, Marco Scutari, Luca Tarasi, Sara Giovagnoli, Vincenzo Romei, Mariagrazia Benassi.
- 2022 European Mathematical Psychology Group (EMPG), University of Trento: “Bayesian Networks and Jensen-Shannon divergence for item selection”. **Orsoni Matteo**, Scutari Marco., Tarasi Luca., Romei Vincenzo., Benassi Mariagrazia.

- 2022 International Meeting of the Psychometric Society (IMPS): “Unsupervised and supervised learning algorithms for accurate classification of cognitive profiles”. **Orsoni Matteo**, Garofalo, Sara., Giovagnoli Sara., Benassi Mariagrazia. Symposium: Advanced methods to explore individual differences.
- 2021 XXIII Congresso Nazionale Associazione Italiana di Psicologia, Sezione di Psicologia dello Sviluppo e dell’Educazione: “Robotica e tecnologie dello sviluppo: come iniziare a costruire le competenze del XXI secolo a partire dalla scuola dell’infanzia”, **Matteo Orsoni**, Mariagrazia Benassi, Sara Giovagnoli, Elvis Mazzoni in Sabrina Panesi & Martina Benvenuti – Promuovere abilità cognitive nella scuola dell’infanzia nell’era digitale: tecnologie sì, tecnologie no?
- 2021 25th Annual CyberPsychology, CyberTherapy & Social Networking Conference (CYPSY), Milan, Italy, 13-15 September 2021. “PROFFILO: a new digital assessment tool to evaluate learning difficulties in secondary school”, **Matteo Orsoni**, Martina Benvenuti., Sara Giovagnoli., Elvis Mazzoni., Sara Magri., Lorenzo Bartolini., Samuele Bertani., Mariagrazia Benassi.
- 2021 XXVII Congresso Nazionale Associaizione Italiana di Psicologia, Sezione Sperimentale: “La combinazione di modelli di apprendimento non supervisionato e supervisionato per una corretta classificazione dei profili cognitivi di studenti di scuola secondaria”, **Matteo Orsoni**, Martina Benvenuti, Sara Garofalo, Elvis Mazzoni, Mariagrazia Benassi, Sara Giovagnoli in Sara Garofalo, Livio Finos e Ebisch Sjoerd Johannes Hendrikus - Metodi e tecniche per lo studio delle differenze individuali nelle neuroscienze e nella psicologia cognitiva
- 2020 XXVI Congresso Nazionale Associazione Italiana di Psicologia, Sezione Sperimentale, Virtual Edition: “Linear and non-linear regression models for antisaccade parameter prediction in healthy and psychiatric subjects: a simulation study”, **Matteo Orsoni**, Roberto Bolzani, Sara Garofalo, Rosa Sant’Angelo, Roberta Raggini, Giovanni Piraccini, Giovanni De Paoli & Mariagrazia Benassi.
- 2020 XXVI Congresso Nazionale Associazione Italiana di Psicologia, Sezione Sperimentale, Virtual Edition: “Eye-movements deficits as biomarkers of schizophrenia: a metanalysis of evidence”, Sara Garofalo, **Matteo Orsoni**, Silvia Dal Col, Chiara Ruscelli, Sara Giovagnoli, Mariagrazia Benassi.

CONFERENCES PRESENTATION - POSTER

- 2021 European Psychiatric Association (EPA), Virtual conference: “Eye-movements deficits in schizophrenia: A metanalysis of evidence”, **Matteo Orsoni**, Silvia Dal Col, Chiara Ruscelli, Rosa Sant’Angelo & Mariagrazia Benassi.
- 2021 European Psychiatric Association (EPA), Virtual conference: “Bayesian models to explain autistic traits in psychiatric population”, Mariagrazia Benassi, Sara Garofalo, Laura Vitali, **Matteo Orsoni**, Rosa Sant’Angelo, Roberta Raggini & Giovanni Piraccini.
- 2019 50th European Mathematical Psychology Group Meeting (EMPG), University of Heidelberg: “Neuro-Fuzzy Inference System predicts heterogeneity of eye movements in psychiatric populations”, **Matteo Orsoni**, Federica Ambrosini, Sara

- Garofalo, Giovanni Piraccini, Roberta Raggini, Rosa Sant'Angelo & Mariagrazia Benassi.*
- 2019 50th European Mathematical Psychology Group Meeting (EMPG), University of Heidelberg: "Fisherian and Bayesian approaches to eye movements analysis in psychotic disorders", **Matteo Orsoni**, Sara Garofalo, Federica Ambrosini, Giovanni Piraccini, Giovanni De Paoli, Rosa Sant'Angelo, Sara Giovagnoli, Roberto Bolzani & Mariagrazia Benassi.

PARTICIPATION IN RESEARCH PROJECT

German Federal Ministry of Education and Research (BMBF). "Personalisierte Kompetenzentwicklung und hybrides KI-Mentoring" (tech4compKI). DFKI (Deutsches Forschungszentrum für Künstliche Intelligenz). Project id: 16DHB2208.

From 07/2021 to 07/2023

Progetti di Ricerca di Interesse Nazionale (PRIN). "Computerized Adaptive and Personalized Assessment of Executive Functions and Fluid Intelligence". 2020. Project id: 20209WKCLL_003 [Member of Research Unit]. Principal Investigator: Prof. Luca Stefanutti, University of Padua. University of Padua, University of Bologna, University of Perugia.

From 1/06/2022 to 1/06/2025

Progetti di Ricerca di Interesse Nazionale (PRIN). "Decision-making through the lens of the motor system: a neurocomputational perspective". PRIN 2022 PNRR [Member of Research Unit]. Principal Investigator: Dott. Sara Garofalo, University of Bologna. University of Bologna, Centro Nazionale delle Ricerche (CNR).

ESTABLISHED COLLABORATIONS

Prof. Luca Stefanutti,
FISPPA Department, University of Padova.

Dr. Milos Kravcik.
DFKI (Deutsches Forschungszentrum für Künstliche Intelligenz). The German Research Center for Artificial Intelligence. Educational Technology Lab, Berlin, Germany.

Prof. Marco Scutari
IDSIA (Dalle Molle Institute for Artificial Intelligence). Lugano, Switzerland.

Prof.ssa Prandi Catia,
Department of Computer Science and Engineering

Prof. Dubé Adam,
Department of Educational and Counselling Psychology, McGill University, Canada

OUTREACH AND DIVULGATION OF SCIENCE

2018	European Researcher's Night – University of Bologna, Cesena, Italy
2020	European Researcher's Night – University of Bologna, Online Edition, Italy

EDITORIAL BOARDS

2022	Topic Coordinator for Frontiers in Virtual Reality in Medicine with a Research Topic in: "The use of Gamification, Serious Game and Virtual/Augmented Reality for Psychological Interventions and Mental Health". Topic Editors: Dott.Bertini, Flavio., Dott.Lindner Philip., and Dott.Prandi Catia.
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SCIENTIFIC PEER-REVIEWER (since)

2021	Current Psychology
2023	Child: Care, Health & Development
2024	Frontiers in Psychology
2025	Journal of Enabling Technologies

MEMBERSHIPS

- Italian Psychological Society (Ordine degli Psicologi dell'Emilia-Romagna) - Member (n.9645)
- Associazione Italiana di Psicologia (AIP). Socio Affiliato (SA) since 2020.

GRANT AND FUNDING

		AMOUNT
2020	Fellowship: "Evaluation methods for DSA". Awarded by Department of Psychology, University of Bologna (IT). Under the supervision of Prof. Mariagrazia Benassi.	4.000 €
2020 - 2023	Ph.D Fellowship in Psychological Sciences.	45.000 €
2022	Datathon winner: "Predict Item difficulty in multiplication games: linear and non-linear models to detect feature effects". International Meeting of Psychometric Society (IMPS), 2022.	1.000 €
2020	PRIN 2020 – Project Title: "Computerized Adaptive and Personalized Assessment of Executive Functions and Fluid Intelligence" [Member of Research Unit]	518.000 €

Awards

Datathon winner: "Predict Item difficulty in multiplication games: linear and non-linear models to detect feature effects". International Meeting of Psychometric Society (IMPS), 2022.

Best full paper award: “Orsoni, M., Pögel, A., Duong-Trung, N., Benassi, M., Kravcik, M., Grützmüller, M. (2023). Recommending Mathematical Tasks Based on Reinforcement Learning and Item Response Theory. In: Frasson, C., Mylonas, P., Troussas, C. (eds) Augmented Intelligence and Intelligent Tutoring Systems. ITS 2023. *Lecture Notes in Computer Science*, vol 13891. Springer, Cham. https://doi.org/10.1007/978-3-031-32883-1_2”

Best Ph.D Thesis Award in Psychometrics (2025): “Exploring the Psychometric Dimensions: Theoretical and Practical Applications of Artificial Intelligence and Gamification in Education, Learning, and Neuropsychological Assessment”. The Italian Annual Meeting of the Psychometric sector. Bari, Italy 10-13 June.

TEACHING ACTIVITIES

2023-2024 Contract Professor in the bachelor’s degree course in: “Filosofia e Scienze e Tecniche Psicologiche” for the course in “Psicometria e Teorie e Tecniche dei Test”. University of Perugia. 12CFU. 72 hours.

2024-2025 Contract Professor in the Bachelor Degree course in: “Filosofia e Scienze e Tecniche Psicologiche” for the course in “Psicometria e Teorie e Tecniche dei Test”. University of Perugia. 12CFU. 72 hours.

2025-2026 Contract Professor in the Bachelor Degree course in: “Filosofia e Scienze e Tecniche Psicologiche” for the course in “Psicometria e Teorie e Tecniche dei Test”. University of Perugia. 12CFU. 72 hours.

OTHER ACTIVITIES

2019-2022 Clinical Activity: "Conducting Neuropsychological Evaluations for DSA" at AUSL della Romagna in collaboration with the Servizio di Potenziamento dell’Età Evolutiva (SPEV), University of Bologna. The service is overseen by Prof. Mariagrazia Benassi and Prof. Sara Giovagnoli from the University of Bologna, Italy.

2024- Subject Expert (Cultore della Materia) in Psychometrics

TECHNICAL SKILLS AND COMPETENCES

- Operative Systems: Linux (Ubuntu), Windows, Mac OS.
- Spreadsheet: Advanced in Excel.
- Statistical Analysis software: SPSS, JASP, R, Python
- Null Hypothesis Significance Testing (NHST).
- Bayesian Data Analysis (Bayesian Generalized Mixed Models); Bayesian Networks (BNs)
- Computational Cognitive Models: Drift Diffusion Models (DDM), Reinforcement Learning (RL)
- Machine Learning models: with MATLAB (ANFIS (Adaptive Neuro-Fuzzy Inference System)), with R (KNN, CART, CIDT, Random Forest, SVM, Neural Networks, Cluster

Analysis (K-means, K-medoids), PCA, Text Mining. With Python (an introduction to Deep Learning Models (Forward Neural Networks, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Adaptive Boosting), Variational Autoencoders (VAE).

- Deep Learning Frameworks: Tensorflow, Pytorch
- Reinforcement Learning Frameworks: Gym, Gymnasium, RLlib, StableBaseline3
- Programming languages: Basic in MATLAB, Advanced in Python, Advanced in R.
- Toolboxes/Software: Neuro-Fuzzy Inference System Toolbox.
- Research techniques: Eye-Tracking.
- Psychological and neuropsychological tests: administration and scoring.