
BIOGRAPHICAL SKETCH

NAME: Scheggia Diego

POSITION TITLE: Associate Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
Marche Polytechnic University, Italy	Bachelor degree	07/2006	Biology
University of Parma, Italy and University of Groningen, The Netherlands	Master degree	04/2009	Medical Biology
University of Genoa and Istituto Italiano di Tecnologia (IIT, Genoa), Italy	PhD	04/2013	Neuroscience and Brain Technologies
Istituto Italiano di Tecnologia (IIT, Genoa)	Research Fellow	07/2014	Neuroscience and Brain Technologies
Center for Psychiatric Neuroscience, Lausanne University Hospital (CHUV), Switzerland	PostDoc	06/2018	Neuroscience
Istituto Italiano di Tecnologia (IIT, Genoa)	PostDoc	12/2019	Neuroscience
University of Milan, Italy	PostDoc	12/2022	Neuropharmacology

A. Personal Statement

My research interest is understanding how the brain computes decisions in the social space, how much of these choices is innate or learned through previous experience, what are the contextual determinants and the underlying neural circuits, and how these circuits are shaped and wired across the different stages of life. To explore how the basic decision-making systems operate within a socially interactive environment we use mice operant conditioning chambers that allow to combine analysis using behavioral tracking softwares with automated data collection, which do not require the experimenter intervention. We use mice models because there are significant commonalities in fundamental processes underlying social decision-making, involving: *i)* social perception, *ii)* social learning, valuation and reward and *iii)* social action. Furthermore, these processes involve common areas between mice and humans such as the prefrontal cortex (DLPFC in humans, mPFC in mice), the basolateral amygdala, and the anterior cingulate cortex. In the Lab we use this approach to gain insight about the neurobiological basis and the underlying neural circuits of social decision-making to demonstrate that mice and humans share identical neural systems. For this reason, we combine optogenetic examination of brain circuits with *in vivo* recording, during behavioral tasks, of neural activity through genetically encoded calcium sensors using fiber photometry and miniscopes for calcium imaging.

In the Lab we have recently developed a model of social decision-making in mice, in which preferences for other- or self-regarding choices develop through reinforcement learning driven by social motivation and rewards. These choices can be influenced by several interindividual factors such as familiarity, sex,

social contact, and importantly, emotional state matching and emotion discrimination. I believe this model could be extremely useful for the understanding of the brain circuits underlying functional and dysfunctional social learning and could be relevant for brain disorders.

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments	2026 – present 2023 – 2025 2020 – 2022 2020 – present 2020 – 2022 2019 – present 2019 2014 – 2018 2014 – 2018 2013 – 2014	Associate Professor of Pharmacology. Department of Pharmacological and Biomolecular Sciences, University of Milan. Assistant Professor of Pharmacology. Department of Pharmacological and Biomolecular Sciences, University of Milan. Adjunct Professor. Cognitive Sciences and Decisional Processes, University of Milan. Member, Italian Society of Neuroscience (SINS) and European Federation of Neuroscience Societies (FENS) Postdoctoral fellow. Department of Pharmacological and Biomolecular Sciences, University of Milan. Research: <i>Brain circuits for social decision-making in mice</i>. Member, Italian Society of Pharmacology (SIF) Postdoctoral fellow. Istituto Italiano di Tecnologia, Genoa Genetics of Cognition Lab. Research: <i>Animal model for emotional discrimination and its neurobiological bases in mice</i> Postdoctoral fellow. Center for Psychiatric Neuroscience, Department of Psychiatry, Lausanne University Hospital Center, Prilly-Lausanne, Switzerland Laboratory of Prof. Ron Stoop. Research: <i>A translational model for the role of the amygdala in fear behavior</i>. Member, Swiss Society of Neuroscience (SSN) Research fellow, Neuroscience and Brain Technologies Department (NBT), Istituto Italiano di Tecnologia (Genoa, IIT, supervisor Dr. Francesco Papaleo)
Fellowships and Awards	2021 2019 2017 2015 2010 – 2012 2007 – 2008	Alberico Benedicenti Award <i>for contribution in Pharmacology</i>. Italian Society of Pharmacology and University of Florence. Postdoctoral Fellowship research grants Fondazione Umberto Veronesi European Commission, Marie Skłodowska-Curie action – Individual fellowship (MSCA-IF 2016, GA 708539) - PI Spring 2015 JOVE/Med Associates Competition. PhD fellowship, Italian Ministry of Education, Doctoral School in “Neuroscience and Brain Technologies”, University of Genoa, Italy. Master fellowship, (Erasmus Programme) Neurobiology Department, Groningen Institute for Evolutionary Life Sciences, University of Groningen Laboratory of Prof. Peter Meerlo.
Fundings	2023 2022 2021 2020	Italian Ministry for University and Research, Fondo Italiano per la Scienza – Italian Science Fund (FIS) - Member Italian Ministry for University and Research, Linea 2 Azione A, Piano di Sostegno alla Ricerca (PSR 2023) – PI Horizon Europe (HORIZON), Marie Skłodowska-Curie Actions Doctoral Networks (MSCA-DN, grant No 101072759) – Member Italian Ministry for University and Research, Linea 2 Azione A, Piano di Sostegno alla Ricerca (PSR 2022) – PI Italian Ministry for University and Research, Linea 2 Azione A, Piano di Sostegno alla Ricerca (PSR 2022) – PI Fondazione Cariplo, Biomedical research conducted by young researchers (2019-1747) – PI

	2014	Swiss National Science Foundation (SNF) (148803) – Co-PI
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C. Contributions to Science

Contribution to social neuroscience

- La Greca F., Zianni E., Coccia, G., Cerchiaro I., Gusmini M., Castoldi C., Maggioni D., Silva B., Gardoni F., DiLuca M., **Scheggia D***. Individual differences in prosocial learning are represented in the hippocampal dorsal CA1. (*Preprint Research Square* 2024). *Nature Neuroscience* 2025, Accepted - NN-A87390C, *corresponding author
- Coccia G, La Greca F, Di Luca M, **Scheggia D***. Dissecting social decision-making: a spotlight on oxytocinergic transmission. *Front. Mol. Neurosci.* 2022. doi: 10.3389/fnmol.2022.1061934
- **Scheggia D***, La Greca F, Maltese F, Chiacchierini G, Italia M, Molent C, Bernardi F, Coccia G, Carrano N, Zianni E, Gardoni F, Di Luca M, Papaleo F. Reciprocal cortico-amygdala connections regulate prosocial and selfish choices in mice. *Nature Neuroscience* 2022. 25, 1505–1518. <https://doi.org/10.1038/s41593-022-01179-2> *corresponding author
 - News&views: Altruism and social rewards (*Nature Neuroscience*). <https://doi.org/10.1038/s41593-022-01190-7>
 - Featured in Nature.com/Italy: For mice, altruism starts in the amygdala. <https://www.nature.com/articles/d43978-022-00157-3>
- **Scheggia D**, Managò F, Maltese F, Bruni S, Dautan D, Nigro M, Latuske P, Contarini G, Gomez-Gonzalo M, Reque LM, Ferretti V, Castellani G, Mauro D, Bonavia A, Carmignoto G, Yizhar O, Papaleo F. Somatostatin interneurons within the prefrontal cortex control affective state discrimination in mice. *Nature Neuroscience* 2020, 23, 47–60, doi:10.1038/s41593-019-0551-8.
 - Featured in News&views: SOM cells are better at detecting emotion (*Nature Neuroscience*). <https://doi.org/10.1038/s41593-019-0557-2>
- Ferretti V, Maltese F, Contarini G, Nigro M, Bonavia A, Huang H, Gigliucci V, Morelli G, Scheggia D, Managò F, Castellani G, Lefevre A, Cancedda L, Chini B, Grinevich V and Papaleo F. Oxytocin Signaling in the Central Amygdala Modulates Emotion Discrimination in Mice. *Current Biology* 2019; 29(12): 1938-1953.
- Terburg D*, **Scheggia D***, Triana del Rio R, Klumpers F, Ciobanu AC, Morgan B, Montoya ER, Bos PA, Giobellina G, van den Burg E, de Gelder B, Stein DJ, Stoop R[#] & van Honk J[#]. The Basolateral Amygdala is Essential for Rapid Escape: A Human and Rodent Study. *Cell* 2018, 175: 723-735. ^{##}These authors equally contributed.
 - Featured in Spotlight: A Pathway to Avoiding Threats? (*Neuron*). <https://doi.org/10.1016/j.neuron.2018.11.014>
- **Scheggia D**, Papaleo F. Social neuroscience: rats can be considerate to others. *Current Biology*, 2020, 30, R263–R285. doi: 10.1016/j.cub.2020.01.093.
- Chronic and acute intranasal oxytocin produce divergent social effects in mice. Huang H, Michetti C, Busnelli M, Managò F, Sannino S, **Scheggia D**, Giancardo L, Sona D, Murino V, Chini B, Scattoni ML, Papaleo F. *Neuropsychopharmacology*. 2014 Apr;39(5):1102-14.

Contribution to study cognition and social behaviors in animal models relevant for brain disorders

- Cyclase-associated protein 2 gene delivery: A potential multi-target approach for preventing synaptic failure in Alzheimer's disease. Stringhi R., Pelucchi S., D'Andrea L., La Greca F., Zianni E., Targa L., Mosconi C., Vandermeulen L., Ascagni M., Speciani M.C., Gardoni F., **Scheggia D.**, Edefonti V., Di Luca M., Marcello E. *Mol Ther.* 2025 Dec 11:S1525-0016(25)01046-9. doi: 10.1016/j.ymthe.2025.12.023. Online ahead of print
- Anti-GluA3 autoantibodies define a new sub-population of frontotemporal lobar degeneration patients with distinct neuropathological features. Italia M, Salvadè M, La Greca F, Zianni E, Ferrari E, Archetti S, Alberici A, Benussi A, Solje E, Haapasalo A, Doffmann H, Katisko K, Krüger J, Facchinetti R, Scuderi S, Padovani A, DiLuca M, **Scheggia D**, Borroni B, Gardoni F. *Brain, Behavior, and Immunity* 2024, 118, pp. 380–397
- Carrano N[†], Ribeiro A[†], Italia M, La Greca F, Genova F, D'Andrea L, Zianni E, Ponzoni L, Barthet G, Collins SC, Sala M, Mitro N, Mulle C, Yalcin B, Marcello E, Gardoni F*, DiLuca M & **Scheggia D**. Adaptive decision-making requires RNF10-mediated synapse-to-nucleus signaling. *Under review Molecular Psychiatry- 2023MP002054*
- Managò F, **Scheggia D**, Pontillo M, Mereu M, Mastrogiacomo R, Udayan G, Valentini P, Tata MC, Weinberger DR, Weickert C, Pompa PP, De Luca MA, Vicari S, Papaleo F. Dopaminergic signaling and behavioral alterations by Comt-Dtnbp1 genetic interaction and their clinical relevance. *British Journal of Pharmacology*, 2023. doi: 10.1111/bph.16147. Online ahead of print.
- Ferrari E, **Scheggia D**, Zianni E, Italia M, Brumana M, Palazzolo L, Parravicini C, Pilotto A, Padovani A, Marcello E, Eberini I, Calabresi P, DiLuca M, Gardoni F. Rabphilin-3A as a novel target to reverse α -synuclein-induced synaptic loss in Parkinson's disease. *Pharmacological Research* 2022. 183, 106375. doi: 10.1016/j.phrs.2022.106375.
- **Scheggia D**, Stanic J, Italia M, La Greca F, Zianni E, Benussi A, Borroni B, Di Luca M, Gardoni F. GluA3 autoantibodies induce alterations in dendritic spine and behavior in mice. *Brain, Behavior, and Immunity* 2021, 97,89-101. 10.1016/j.bbi.2021.07.001
- Gardoni F, Stanic J, **Scheggia D**, Benussi A, Borroni B, Di Luca M. NMDA and AMPA Receptor Autoantibodies in Brain Disorders: From Molecular Mechanisms to Clinical Features. *Cells* 2021, 10(1):E77. doi: 10.3390/cells10010077. (Review).
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- Gorinski N, Bijata M, Prasad S, Wirth A, Galil A, Zeug A, Bazovkina D, Kondaurova E, Kulikova E, Ilchibaeva T, Zareba-Kozioł M, Papaleo F, **Scheggia D**, Kochlamazashvili G, Dityatev A, Smyth I, Krzystyniak A, Włodarczyk J, Richter D, Strekalova T, Sigrist D, Bang C, Hobuss L, Fiedler J, Thum T, Naumenko V, Pandey G. Attenuated palmitoylation of serotonin receptor 5-HT1A in brain affects receptor functions and triggers depressive symptoms. *Nature Communications* 2019. 10:3924, doi:10.1038/s41467-019-11876-5.
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- **Scheggia D**, Mastrogiacomo R, Mereu M, Sara Sannino S, Straub RE, Armando M, Managò F, Guadagna S, Piras F, Zhang F, Kleinman JE, Hyde TM, Kaalund SS, Maria Pontillo M, Orso G, Caltagirone C, Borrelli E, De Luca MA, Vicari S, Weinberger DR, Spalletta G, Papaleo F. Variations in Dysbindin-1 are associated with cognitive response to antipsychotic drug treatment. *Nature Communications* 2018. 11;9(1):2265.

- **Scheggia D**, Zamberletti E, Realini N, Mereu M, Contarini G, Ferretti V, Managò F, Margiani G, Brunoro R, Rubino T, De Luca MA, Piomelli D, Parolaro D, Papaleo F. Remote memories are enhanced by COMT activity through dysregulation of the endocannabinoid system in the prefrontal cortex. *Molecular Psychiatry* 2018; 23(4):1040-1050.
- Managò F, Mereu M, Mastwal S, Mastrogiacomo R, **Scheggia D**, Emanuele M, De Luca MA, Weinberger DR, Wang KH, Papaleo F. Genetic Disruption of Arc/Arg3.1 in Mice Causes Alterations in Dopamine and Neurobehavioral Phenotypes Related to Schizophrenia. *Cell Reports* 2016; 16(8):2116-28.
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- **Scheggia D**, Bebensee A, Weinberger DR, Papaleo F. The ultimate intra-/extra-dimensional attentional set-shifting task for mice. *Biological Psychiatry* 2014; 75(8):660-70.
- **Scheggia D**, Sannino S, Scattoni ML, Papaleo F. COMT as a drug target for cognitive functions and dysfunctions. *CNS Neurol Disord Drug Targets* 2012; 11(3):209-21. (Review).

Contribution to development of methods for behavioral studies

- Ciampoli M, **Scheggia D**, Papaleo F. Automatic Intra-/Extra-Dimensional Attentional Set-Shifting Task in Adolescent Mice. *Front Behav Neurosci* 2021. 15:704684. doi: 10.3389/fnbeh.2021.704684
- Scarsi F, **Scheggia D**, Papaleo F. Automated Two-Chamber Operon ID/ED Task for Mice. *Current Protocol Neuroscience* 2020;94(1):e109. doi: 10.1002/cpns.109
- **Scheggia D**, Papaleo F. An operant Intra-/Extra-dimensional Set-Shift task for mice. *J Vis Exp*. 2016 22;(107).
- Giancardo L, Sona D, Huang H, Sannino S, Managò F, **Scheggia D**, Papaleo F, Murino V. Automatic visual tracking and social behaviour analysis with multiple mice. *PLoS One*. 2013; 8(9):e74557.
- L, Sona D, Huang H, Sannino S, Managò F, **Scheggia D**, Papaleo F, Murino V. Segmentation and tracking of multiple interacting mice by temperature and shape information. 21st International Conference on Pattern Recognition. 2012, Article number 6460680, Pages 2520-2523.