Francesco Poli Francesco.poli@mrc-cbu.cam.ac.uk

CURRICULUM VITAE

◆ PROFESSIONAL HISTORY AND EDUCATION

2024- ongoing	**Postdoctoral Researcher**, *MRC Cognition and Brain Sciences Unit* University of Cambridge, Cambridge, UK Advisor: Prof. Duncan Astle
2023-2024	**Postdoctoral Researcher**, *Donders Institute* Radboud University, Nijmegen, the Netherlands Advisor: Prof. Sabine Hunnius
2018-2023	**Ph.D. Candidate**, *Donders Institute* Radboud University, Nijmegen, the Netherlands Thesis title: *Developing models for learning and exploration* Ph.D. awarded *Cum Laude* on 22/02/2024 Advisors: Prof. Sabine Hunnius & Prof. Rogier B. Mars
2022	**Visiting Ph.D. Student**, *University of Oxford* Wellcome Centre for Integrative Neuroimaging Project: Modelling reward learning with time-varying hidden Markov models Advisor: Prof. Jill O'Reilly
2021	**Visiting Ph.D. Student**, *Max Planck Institute for Human Development* Berlin, Germany Project: Developing gaze-contingent eye-tracking paradigms for infant research Advisor: Prof. Azzurra Ruggeri
2016-2018	**Master's Degree**, *University of Padua* Cognitive Neuroscience and Clinical Neuropsychology Project: The development of implicit Theory of Mind (*University of St. Andrews*) Final Grade: 110/110 *Cum Laude* Thesis Advisors: Profs. C. Krupenye, M. Carpenter, J. Call, & F. Simion

2018	**Visiting Student**, *Max Planck Institute for Evolutionary Anthropology* Leipzig, Germany Project: Calibrating and testing great apes with eye-tracking techniques Advisor: Prof. Christopher Krupenye
2015-2018	**Research Assistant**, *University of Milano-Bicocca* Behavioural Insight Bicocca (BIB) Lab Projects: Communicative and logical abilities in problem-solving Advisor: Prof. Laura Macchi

2013-2016	**Bachelor's Degree**, *University of Milano-Bicocca* Psychological Sciences and Techniques Final Grade: 110/110 *Cum Laude* Thesis Advisor: Prof. Laura Macchi

◆ Grants and Scolarships

221,374 €	**NWO Rubicon Postdoctoral Fellowship 2024** To: **F. Poli** Unifying brain and cognitive development through network models
789,791 €	**NWO SSH Open Competition L 2023** Morality as a hyperparameter in social decision making: A new approach to studying an age-old problem To: R.B. Mars (Main applicant), I. Brazil, **F. Poli**, R. J. Blair
5,892 €	**Erasmus+ Staff mobility for teaching and training 2022** To: **F. Poli**
6,000 €	**INPS excellence scholarship 2015-2018** To: **F. Poli**

◆ Awards

10,000 $	**Glushko Dissertation Prize (Cognitive Science Society)** To: **F. Poli**

◆ PUBLICATIONS

All publications are listed in reverse chronological order.

When not first author, the following legend specifies contributions: **C**: Conceptualisation; **E**: performed Experiments; **A**: performed Analyses; **W**: Wrote the manuscript; **S**: Supervised the study.

1. de Boer, E. R., **Poli, F.**, Meyer, M., Mars, R. B., & Hunnius, S. (2025). Individual Differences in Infants' Curiosity Are Linked to Cognitive Capacity in Early Childhood. *Developmental Science*, *29*(1), e70090. https://doi.org/10.1111/desc.70090 Contributions: CAS
2. Ward, E., Rutar, D., Zaadnoordijk, L., **Poli, F.**, & Hunnius, S. (2025). Beyond the adult mind: A developmental framework for predictive processing in infancy. *Topics in Cognitive Science*. *https://doi.org/10.1111/tops.70028* Contributions: CA
3. Ghilardi, T., Serino, G., & **Poli, F.** (2025). DevStart: A Cognitive Scientist's Guide to Open Tools and Methods. *PsyArXiv*, https://doi.org/10.31234/osf.io/w5yqk_v1 Contributions: CWS
4. **Poli, F.**, Oldham, S., Mousley, A., Bullmore, E. T., Vertes, P. E., & Astle, D. E. (2025). Right time, right place: Heterochronicity shapes brain network formation. *BioRxiv*, 2025.10.13.682136. https://doi.org/10.1101/2025.10.13.682136
5. **Poli, F.**, Ghilardi, T., Bersee, J. H., Mars, R. B., & Hunnius, S. (2025). Volatility-driven learning in human infants. *Science Advances*, *11*(26), eadu2014. https://www.science.org/doi/10.1126/sciadv.adu2014
6. **Poli, F.**, Tcaci Popescu, S., Marusic, J., Khoury, J.A.M., & Hoffmann, M. (2025) Exploration Patterns in Spontaneous Self-Touch Actions in Infancy. *2025 IEEE International Conference on Development and Learning (ICDL)*. https://ieeexplore.ieee.org/abstract/document/11204454
7. Krol, M.A., Moiseenko, O., Praat, A.C., Jessica Ramos-Sanchez, J., Hunnius, S., Meyer, M., & **Poli F.** (2025) Changes in cognitive effort across infancy and early childhood. *Proceedings of the Annual Meeting of the Cognitive Science Society*, Volume 47. https://escholarship.org/uc/item/1vp7z855 Contributions: AWS
8. Scatolin, S., **Poli, F.**, Hunnius, S., Lustermans, H., de Weerth, C., & Beijers, R. (2025). Revisiting associations between infant cognitive functioning and maternal caregiving quality using eye-tracking and Bayesian cognitive modelling. *Infant Behavior and Development*, *80*, 102075. https://doi.org/10.1016/j.infbeh.2025.102075 Contributions: CAS
9. Li, Y. L., **Poli, F.**, & Ruggeri, A. (2025). Active control over exploration improves memory in toddlers. *Proceedings B*, *292*(2039), 20242555. https://doi.org/10.1098/rspb.2024.2555 Contributions: DS
10. Macchi, L., **Poli, F.**, & Caravona, L. (2025). Dissociable Effects of Verbalization on Solving Insight and Non-Insight Problems. *Journal of Intelligence*, *13*(3), 36. https://doi.org/10.3390/jintelligence13030036

Contributions: CEAW

11. **Poli, F.**, Meyer, M., Mars, R. B., & Hunnius, S. (2025). Exploration in 4-year-old children is guided by learning progress and novelty. *Child Development*, *96*(1), 192-202. https://doi.org/10.1111/cdev.14158
12. **Poli, F.** (2025). How infants learn and explore: From behavior to computations. *PsyArXiv*, https://osf.io/preprints/psyarxiv/5vn8p_v1
13. **Poli, F.,** Koolen, M., Velazquez-Vargas, C.A., Ramos-Sanchez, J., Meyer, M., Mars, R.B., Rommelse, N., Hunnius, S. (2024) Autistic traits foster effective curiosity-driven exploration. *PLoS Computational Biology*. 20(10): e1012453. https://doi.org/10.1371/journal.pcbi.1012453
14. **Poli, F.**, Li, Y. L., Naidu, P., Mars, R. B., Hunnius, S., & Ruggeri, A. (2024). Toddlers strategically adapt their information search. *Nature Communications*, *15*(1), 5780. https://doi.org/10.1038/s41467-024-48855-4
15. **Poli, F.**, Ghilardi, T., Bersee, J. H., Mars, R. B., & Hunnius, S. (2024). Infants Track Environmental Volatility to Optimize Their Learning. In *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 46). https://escholarship.org/uc/item/68r1k5gh
16. **Poli, F.**, O'Reilly, J. X., Mars, R. B., & Hunnius, S. (2024). Curiosity and the dynamics of optimal exploration. *Trends in Cognitive Sciences*, 28(5), 441-453. https://doi.org/10.1016/j.tics.2024.02.001
17. Ghilardi, T., **Poli, F.**, Meyer, M., Colizoli, O., & Hunnius, S. (2023). Early roots of information-seeking: Infants predict and generalize the value of information. *Elife preprint*. https://doi.org/10.31234/osf.io/pevq9
    Contributions: CAW
18. **Poli, F.**, Ghilardi, T., Beijers, R., de Weerth, C., Hinne, M., Mars, R. B., & Hunnius, S. (2023). Individual differences in processing speed and curiosity explain infant habituation and dishabituation performance. *Developmental Science*, e13460. https://doi.org/10.31234/osf.io/thszj
19. **Poli, F.**, Ghilardi, T., Mars, R. B., Hinne, M., & Hunnius, S. (2023). Eight-Month-Old Infants Meta-Learn by Downweighting Irrelevant Evidence. *Open Mind*, 1-15. https://doi.org/10.1162/opmi_a_00079 [CEAWO]
20. Meyer, M., van Schaik, J. E., **Poli, F.**, & Hunnius, S. (2023). How infant-directed actions enhance infants' attention, learning, and exploration: Evidence from EEG and computational modeling. *Developmental Science*, 26(1), e13259. https://doi.org/10.1111/desc.13259
    Contributions: A
21. **Poli, F.**, Meyer, M., Mars, R. B., & Hunnius, S. (2022). Contributions of expected learning progress and perceptual novelty to curiosity-driven exploration. *Cognition*, *225*, 105119. https://doi.org/10.1016/j.cognition.2022.105119
22. **Poli, F.**, Serino, G., Mars, R.B., & Hunnius, S. (2020). Infants tailor their attention to maximize learning. *Science Advances*, 6(39). https://www.science.org/doi/10.1126/sciadv.abb5053
23. Bagassi, M., Salerni, N., Castoldi, V., Sala, V., Caravona, L., **Poli, F.**, & Macchi, L. (2020). Improving Children's Logical and Mathematical Performance via a

Pragmatic Approach. *Frontiers in Education,* 5(54). https://doi.org/10.3389/feduc.2020.00054
Contributions: A

24. Macchi, L., Caravona, L., **Poli, F.**, Bagassi, M., & Franchella, M. A. (2020). Speak your mind and I will make it right: the case of "selection task". *Journal of Cognitive Psychology*, 1-15. https://doi.org/10.1080/20445911.2019.1707207
Contributions: CEA
25. Caravona, L., Macchi, L., **Poli, F.**, Vezzoli, M., Franchella, M. A., & Bagassi, M. (2019). How to Get Rid of the Belief Bias: Boosting Analytical Thinking via Pragmatics. *Europe's Journal of Psychology*, 15(3), 595. https://doi.org/10.5964/ejop.v15i3.1794
Contributions: CEAW

◆ Conference Talks and Symposia

Poli, F. (2025) Curiosity and the Dynamics of Human Exploration. **Keynote presentation** at the *Fourth International Conference on Beauty and Change*, Turin, Italy.

Poli, F. (2025) Exploration Patterns in Spontaneous Self-Touch Actions in Infancy. **Oral presentation** at the *IEEE International Conference on Development and Learning (ICDL)*, Prague, Czech Republic.

Poli, F. (2025) Developing models for learning and exploration. **Oral presentation** at *CogSci 2025*, San Francisco, USA.

Poli, F., Lewis, L.S. (2025) Comparing curiosity: Changes in information-seeking across development and evolution. **Symposium** at *Budapest CEU Conference on Cognitive Development 2025*: Budapest, Hungary.

Poli, F., Ghilardi, T., Bersee, J., Mars, R.B., Hunnius, S. (2024) Infants track environmental volatility to optimize their learning. **Oral presentation** at *CogSci 2024*, Rotterdam, the Netherlands.

Poli, F. (2024) Infant attention as precision-weighting of prediction errors. **Oral presentation** at *ICIS 2024: Glasgow, Scotland.*

Poli, F. Ghilardi, T., Bersee, J., Mars, R.B., Hunnius, S. (2024) Learning in uncertain worlds: The dynamics of infant brain and behaviour in response to change. **Symposium** at *ICIS 2024: Glasgow, Scotland.*

Poli, F., Ghilardi, T., Mars, R.B., Hunnius, S. (2023) Pupil dilation as a window onto infants' learning processes. **Oral presentation** at the *52nd annual meeting of the Jean Piaget Society*: Madrid, Spain.

Poli, F., Ghilardi, T. (2023) Learning how to explore: The developmental mechanisms of information-seeking. **Symposium** at *Budapest CEU Conference on Cognitive Development 2023*: Budapest, Hungary.

Poli, F., Li, Y., Naidu, P., Mars, R.B., Hunnius, S., Ruggeri, A. (2022) Infants are active and adaptive ecological learners: Evidence from a novel gaze-contingent search task**. Oral presentation** at *ICIS 2022: Ottawa, Canada.*

Poli, F., Mars, R.B., Hunnius, S. (2020) Infants track learning progress and allocate their attention based on it: an eye-tracking study. **Oral presentation** at the *Budapest CEU Conference on Cognitive Development 2020*: Budapest, Hungary.

◆ Invited Talks and Workshops

Department of Psychology, IMéRA Institute for Advanced Studies (France, 2025). Invited talk.
Host: Prof. Antoni Rodriguez-Fornells

Developmental Dynamics Laboratory, University of East Anglia (UK, 2025). Invited talk.
Host: Prof. Teodora Gliga

Department of Psychology, University of **Göttingen** (Germany, 2024). Invited workshop.
Host: Prof. Nivedita Mani

Max Planck Institute for Evolutionary Anthropology (Germany, 2024). Invited workshop.
Hosts: Prof. Laura Lewis, and Prof. Hanna Schleihauf, Dr. Pierre-Etienne Martin

Department of Psychology, New York University Abu Dhabi (UAE, 2024). Invited talk.
Host: Dr. Stefania Vacaru

Department of Psychology, University of Milano-Bicocca (Italy, 2023). Invited seminar.
Host: Prof. Laura Macchi

Learning Adaptive Behaviour Lab, University of Ghent (Belgium, 2023). Invited talk.
Host: Prof. Tom Verguts

BabyDevLab, University of East London (United Kingdom, 2022). Invited talk.
Host: Prof. Sam Wass

◆ Teaching

04/2025	Eye-Tracking Workshop for Developmental Scientists DevStart **Workshop**, *Birkbeck University of London*
01/2025	Analyzing pupillometric data in R: A hands-on tutorial BCCCD pre-conference **Workshop**, *Central European University*
09/2024	Modelling Theories of Curiosity RTG Kick-Off **Workshop**, *University of Göttingen*
08/2024	Hands-On: Eye-Tracking with Python Bridging the Technological Gap **Workshop**, *Max Planck Institute - EVA*
01/2024	Python fundamentals for eye-tracking research BCCCD pre-conference **Workshop**, *Central European University*

2020-2021 | Perception and Development
Frontal lectures and hands-on classes (BSc), *Radboud University*

2019-2020 | Brain and Cognition
Grading (BSc), *Radboud University*

2019-2020 | Introduction to Brain and Behaviour
Hands-on classes (BSc), *Radboud University*

2019-2020 | Action and Development
Frontal lectures and hands-on classes (BSc), *Radboud University*

◆ SUPERVISION

Postdoctoral Researchers (co-supervised)

2024-ongoing | Manon Krol, investigating cognitive effort across early development

Ph.D. students (co-supervised)

2024-ongoing | William Mills, implementing a Python toolbox for generative network models

2022-2024 | Jessica Ramos-Sanchez, investigating information-seeking with EEG
Eline De Boer, investigating free play in toddlers

Master's students

2025-ongoing | Anchal Bhaskar, *University of Cambridge*
Individual differences in brain structure and cognition across development

2023 | Jana Bersee, *University of Amsterdam*
Infants' learning in stable and volatile environments: A pupillometry study

2022 | Pravallika Naidu, *Max Planck Institute for Human Development*
Investigating active learning in infants using a gaze-contingent paradigm

2022 | Sofia Weidle Scatolin, *Radboud University*
The effects of early environmental factors on infants' cognitive functioning

2022 | Maran Koolen, *Radboud University*
Curiosity-driven learning in autism spectrum disorder

2019 | Giulia Serino, *Radboud University*
The cognitive mechanisms underlying statistical learning in infants and adults

◆ Technical and Programming Skills

I developed the following tools and models:

- **DevStart** is an online guidebook to introduce students to cognitive science research methods and programming (https://devstart.org)
- **Generative network models** to simulate the development of the brain connectome across time (https://generative-network-models-toolbox.readthedocs.io/) [Python].
- **Gaze-contingent "Torchlight"** to allow infants to actively explore the screen controlling a torchlight with their eyes (https://osf.io/5y4tw) [Python].
- **Hierarchical Bayesian models** to measure individual differences in infants' cognitive functioning (https://osf.io/zux9v/) [Python].
- **Reinforcement learning models to measure learning, exploration, and sampling decisions (**https://osf.io/h2prm/**)** [JAGS/R]**.**
- **Information-theoretic models** to measure various forms of uncertainty (https://osf.io/a93qr/) [Python].

I set up the following labs:

- Eye-tracking lab for iSearch at the MPI for Human Development (Berlin, Germany)
  Installing software, training research assistants, piloting with adult and infant participants.

- Portable eye-tracking to test across field sites for FARO, in Livorno (Italy) in collaboration with the Technical University of Munich (Germany).
  Purchasing equipment, installing hardware and software, training research assistants, piloting with adult and infant participants.

◆ Journal Peer Reviews

Nature Communications, eLife, Child Development, Developmental Science (2), Psychological Review, Topics in Cognitive Science, Open Mind.