

Maurício Martins | Curriculum Vitæ

Hierarchical Cognition Group Leader, SCAN-Unit, Faculty of Psychology, University of Vienna
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Historical Psychology; Computational Social Sciences; Hierarchies; Cognitive Neuroscience

1. Education

- 2010-2014** PhD in Neuroscience, Lisbon Faculty of Medicine, Portugal (with honours and distinction), conferred on the 08.9.2014
- 2002-2009** Integrated Master in Medicine, Lisbon Faculty of Medicine, Portugal

2. Career

- May 2022-** Social Cognitive and Affective Neuroscience Unit, University of Vienna
(Group Leader, non-tenure track)
- 2021-2022** School of Collective Intelligence, Mohammed VI Polytechnic University, Morocco
(Assistant Professor, Coordinator of the Master's Program)
- 2019-2021** Département d'Etudes Cognitives, École Normale Supérieure, Paris
(Post Doc Fellow).
- 2014-** Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig
(Post Doc Fellow).
- 2014-2019** Berlin School of Mind and Brain, Humboldt Universität zu Berlin
(Post Doc Fellow)
- 2012-2014** Shared Neural Resources Research Cluster, University of Vienna and Medical University of Vienna
(PhD Student – Cluster Coordinator)
- 2010-2014** Department of Cognitive Biology, University of Vienna
(PhD student)
- 2006-2014** Language Research Laboratory, Lisbon Faculty of Medicine
(Undergraduate and PhD student)
- 2006-2008** Psychiatry Unit, Hospital de Santa Maria, Portugal
(Undergraduate researcher)

3. Teaching and supervising activities

- **Lecturer** of ‘*Computational Social Sciences*’ and ‘*Political and Moral Psychology*’ at the University of Vienna (3 semesters 2022-2023, 18h each course x 6 = 108h)
- **Lecturer** of ‘*Computational Social Sciences*’ and ‘*Political Science*’ at the School of Collective Intelligence, UM6P, Morocco (Winter semester 2021-2022, 48h each course x 2 = 96h)
- Course **tutorial** ‘*Neuroanatomy and Neurophysiology*’ at the Berlin School of Mind and Brain Master Program (3 Winter semesters 2014-2017, 18h each year x 3 = 54h)
- 3 **Invited Lectures** ‘Cognitive and Neural Bases of Recursion’: International Max Planck Research School (IMPRS) - UCL Summer School (2021); Bachelor Program of Psychology, Porto University (2017); IMPRS - PhD program Max Planck Institute for Human Cognitive and Brain Sciences (2016).
- Co-supervisor of 2 **PhD theses** (ongoing): Robert Scholz at the Max Planck School of Cognition and Arya Liao at the interdisciplinary MSCA Doctoral Network on Adolescence & Politics.
- Supervisor of 3 **master theses** at the Faculty of Psychology – University of Vienna (2023):
 - o Michael Kvasin (2023). *Exploring the dynamics of prosociality and authoritarianism in German literature across the 17th to 20th centuries.*
 - o Elisa Grünauer (2023). *Dynamics of Tolerance and Ambiguity in textual sources in the 20th and 21st centuries.*
 - o Lukas Mayrhofer (2023). *Radical flank effect in news media: How disruptive climate protests shape opinions on moderate activist groups.*
- Supervisor of 3 **master theses** at the Berlin School of Mind and Brain (2017-2020):
 - o Robert Scholz (2020). *A novel paradigm for testing the initial coding of hierarchical relationships within the medial temporal lobe in a circuit-specific manner.* (Robert was accepted into the prestigious Max Planck School of Cognition in 2021, and his work with me was recently accepted for publication in eLife.)
 - o Katrin Müller (2019). *Comparing Schemas and Rules: Developing an Empirical Approach to Find Meaningful Differences.*
 - o Dan Cook (2017). *The Effects of Lexical Retrieval and Recursive Arithmetic on the Discrimination of Fractal Patterns.*
- Supervisor of 12 total lab rotations at the CogMaster - École Normale Supérieure (2020-2021), Berlin School of Mind and Brain (2017-2020) and Middle European interdisciplinary master program in Cognitive Science, University of Vienna (2011-2012, 2012-2013, 2022-2023).

4. Invited talks

1. 'The rise and fall of epistemic authorities: a cognitive and information theoretical model'. *City University London* (November 2023)
2. 'Using Historical Psychology to Understand Social and Political Change'. *Complexity Science Hub, Vienna*. (April 2023)
3. 'The rise of prosociality in fiction preceded democratic revolutions in Early Modern Europe'. *Cognition, Values and Behaviour group colloquium*. Ludwig Maximilian University of Munich (Feb 2021)

'Recursive Hierarchical Embedding in the Visual, Musical and Motor Domains':

3. *Department of Comparative Language Science Colloquium*, University of Zurich (Sept 2022).
4. *Neuropsycholinguistics Lab Seminar*, University of Geneva (Feb 2021).
5. *McDonnell Foundation Workshop on Recursion*, Harvard, Boston, MA (Jan 2021).
6. *PAD Seminar*, Royal Holloway, University of London (December 2020)
7. *Meeting of the central UCL auditory research group*, UCL Ear Institute (November 2020).
8. *Guest Colloquium, Master Program "Developmental, Cognitive and Neuroscience"*, Department of Psychology, University of Zurich (Nov 2020)
9. *Workshop Ontogeny of hierarchical cognition: variations and commonalities between domains*. Leipzig (September 2019)
10. *Workshop Artificial Grammar Learning: Implications of domain, modality and species differences* Torun, Poland (April 2018)
11. *Seminar Introduction to language, music, and cognition*. Musikwissenschaftliches Institut, University of Cologne (October 2017)

5. Awards and grants

2023 – Second stage for WWTF grant on Digital Humanism (20 grants were selected out of 100 in the first stage) 600K € (second stage due 20 February, probability of award is now 50%).

2022 - Collaborative Seed Grant (w/ Stephen Ferrigno), James S. McDonnell Foundation, Project Title: Visuospatial recursion in non-human primates (sub-award under “The Nature and Origins of the Human Capacity for Abstract Combinatorial Thought”): 20k

2022 – Final interview stage for WWTF young group leader 1.6€ grant “Evolution, Mechanisms and Social Functions of Hierarchical cognition” (2 positions, **not awarded**)

2019 – Final interview stage for VW Freigeist 1M€ grant “Mapping the structure of hierarchical representations: a modeling and multimodal neuroimaging approach” (10 positions, **not awarded**)

2016 - Best paper 2015 - Portuguese Association of Experimental Psychology.

2014 - Best PhD presentation - Science Day 2014 (Faculty of Life Sciences, University of Vienna)

2014 - Hurford prize: Best student oral presentation of the 10th International Conference on the Evolution of Language.

2009 - FCT PhD research grant number SFRH/BD/64206/2009 for the project “Language Evolution and Recursion: Developing Analysis Methods for Recursive Patterns Recognition” (4 years funding)

6. Technical and Language Skills

Python, Praat, Matlab, Psychopy, Nodebox, R, SPM, NLTK.

Fluent in English and Portuguese; Intermediary Spanish; Basic German (B1), French and Italian.

7. Committee and reviewing activities

Hiring committee for 3 new PhD students at the University of Vienna within the interdisciplinary MSCA Doctoral Network on Adolescence & Politics (2023). Co-supervision of one PhD student.

Scientific committee member: International Conference for the Evolution of Language 2020 and Joint Conference on Language Evolution 2022.

Reviewer of PhD applications to the Berlin School of Mind and Brain 2017-2023 (total 350 applications) and the School of Collective Intelligence in 2021 (50 applications).

Reviewer of 3 grant proposals for the Agence Nationale de La Recherche.

Invited reviewer of manuscripts in Biolinguistics, Cerebral cortex, Cognition, Cognitive Processing, Cognitive Psychology, Cognitive Science, Consciousness and Cognition, Cortex, Current Psychology, Developmental Psychology, European Journal of Pain, Frontiers in Psychology, International Conference for the Evolution of Language, Joint Conference on Language Evolution, Mind and Language, Nature Communications, Philosophical Transactions of Royal Society B, Psychiatry Research, Psychological Research, Psychological Reviews, Psychonomic Bulletin & Review, Psychophysiology, Science Advances, Scientific Reports.

8. Cooperation Partners

Within the field of Computational Social Sciences and Historical Psychology, I work with a network of collaborators.

- With Nicolas Baumard, Coralie Chevalier, and Lou Safra, from the Department d'Études Cognitives at the École Normale Supérieure in Paris, I am working to develop the theoretical and technical foundations of Historical Psychology.
- With Peter Turchin from the CSH, we are applying these tools to study the relationship between political instability and the content of expressed culture in the large arch of history.
- With Stefano Palminteri from the Department d'Études Cognitives at the École Normale Supérieure in Paris, I am developing a reinforcement learning model of trust in epistemic authorities in which agents attempt to minimize cognitive load and prediction error while over-reacting to mistakes from experts.
- With Markus Wagner and Fariba Karimi, we submitted a WWTF grant to develop models and algorithmic tools to reduce the cognitive cost of epistemic exploration and the burden of epistemic bubbles.
- Finally, I work with Claus Lamm and Jakob Pietschnig from the Faculty of Psychology, University of Vienna, to experimentally validate our computational approaches using behavioral and fMRI paradigms.

In the topic of hierarchical cognition in vision, music, action, and language, I have hinged on collaborations spread through labs and countries.

- Faculty of Life Sciences and the Medical University of Vienna. I worked with Prof. W. Tecumseh Fitch, Florian Fischmeister, Prof Dr. Roland Beisteiner on the neural bases of fractal cognition.
- Max Planck Institute for Human Cognitive and Brain Sciences (where I am still an Associate Researcher). I worked with Prof Dr. Arno Villringer, Prof. Daniela Sammler, and Roberta Bianco on the neural bases underlying the representation of hierarchical action and music.
- Psychology Department at the University of Wisconsin, Madison. I work with Prof. Stephen Ferrigno on a project to investigate Visuospatial recursion in non-human primates. We were recently awarded a collaborative Seed Grant from the James S. McDonnell Foundation.

Publications (25 peer-reviewed journal papers, 18 first and 1 senior author,
h-index: 16, citations: 806; cumulative IF: 172.7; average IF: 6.9)

<https://orcid.org/0000-0003-0247-8473>

1. **Martins M** & Baumard N (2023). Reproductive Strategies and Romantic Love in Early Modern Europe. *Archives of Sexual Behavior*. <https://doi.org/10.1007/s10508-023-02759-4> (IF 4.5)
2. Scholz R, Villringer A & **Martins M*** (2023). Distinct hippocampal and cortical contributions in the representation of hierarchies. *eLife* 12 <https://doi.org/10.7554/eLife.87075.1> (*senior author). (IF 8.7)
3. Baumard N, Safra L, **Martins M.**, Chevallier C (2023). Cognitive fossils: How literature, music and the arts can be used to recover psychological changes throughout history. *Trends in Cognitive Sciences*. <https://doi.org/10.1016/j.tics.2023.10.001> (IF: 19.9).
4. **Martins M**, Baumard N (2022). How to Develop Reliable Instruments to Measure the Cultural Evolution of Preferences and Feelings in History? *Frontiers in Psychology* 13 <https://doi.org/10.3389/fpsyg.2022.786229> (IF:3.8)
5. **Martins M**, Baumard N (2020). The rise of prosociality in fiction preceded democratic revolutions in Early Modern Europe. *PNAS* 117 (46) <https://doi.org/10.1073/pnas.2009571117> (IF:11.1)
6. **Martins M**, Fischmeister F, Gingras B, Bianco R, Puig-Waldmueller E, Villringer A, Fitch WT & Beisteiner. (2020). Recursive music elucidates neural mechanisms supporting the generation and detection of melodic hierarchies. *Brain Structure and Function*, 225 <https://doi.org/10.1007/s00429-020-02105-7> (IF:3.1)
7. **Martins M**, Krause C, Neville D, Pino D, Villringer A, Obrig H (2019). Recursive Hierarchical Embedding in vision is impaired by posterior Middle Temporal Gyrus lesions. *Brain* 142 (10) <https://doi.org/10.1093/brain/awz242> (IF:14.5)
8. Udden J, **Martins M**, Zuidema J, Fitch WT (2019). Hierarchical structure in sequence processing: how do we measure it and what's the neural implementation? *Topics in Cognitive Science* 12(3) <https://doi.org.uaccess.univie.ac.at/10.1111/tops.12442> (IF:3.0)
9. **Martins, M**, Bianco, R., Sammler, D., & Villringer, A. (2019). Recursion in action: An fMRI study on the generation of new hierarchical levels in motor sequences. *Human brain mapping* 40(9) <https://doi.org.uaccess.univie.ac.at/10.1002/hbm.24549> (IF:4.8)
10. **Martins M**, Gingras B, Puig-Waldmueller E., Fitch WT (2017). Cognitive representation of “musical fractals”: Processing hierarchy and recursion in the auditory domain. *Cognition* 161 <https://doi.org/10.1016/j.cognition.2017.01.001> (IF:3.4)
11. **Martins M**, Di Paolo L, (2017). Hierarchy, multi-domain modules and the evolution of intelligence: a commentary to Burkart et al. (2016) *Behavioral and Brain Sciences* 40 <https://doi.org/10.1017/S0140525X16001710> (IF: 21.36)
12. Fischmeister F*, **Martins M***, Beisteiner R, Fitch WT (2016). Self-similarity and Recursion as Default Modes of Human Cognition. *Cortex* 97 <https://doi.org/10.1016/j.cortex.2016.08.016>. (*shared first author) (IF:3.6)
13. **Martins M**, Fitch WT (2015) Do we represent intentional action as recursively embedded? The answer must be empirical – a comment on Vicary and Adenzato (2014) *Consc. & Cogn.* 38 <https://doi.org/10.1016/j.concog.2015.10.003> (IF:2.7)
14. Albuquerque L, **Martins M**, Coelho M, Guedes, L, Ferreira JJ, Rosa M, Martins IP (2015). Advanced Parkinson disease patients have impairment in prosodic processing. *Journal of Clinical and Experimental Neuropsychology* 38 (2) <https://doi.org/10.1080/13803395.2015.1100279> (IF:2.1)

15. **Martins M**, Martins IP, Fitch WT (2015). A novel approach to investigate recursion and iteration in visual hierarchical processing. *Behavioral Research Methods*. 48(4) <https://doi.org/10.3758/s13428-015-0657-1> (IF:5.4)
16. **Martins M**, Mursic Z, Oh J, Fitch WT (2015). Representing visual recursion does not require verbal or motor resources. *Cognitive Psychology* 77 <https://doi.org/10.1016/j.cogpsych.2015.01.004> (IF:3.5)
17. **Martins M**, Laaha S, Freiberger E, Choi S, Fitch WT (2014). How children perceive fractals: hierarchical self-similarity and cognitive development. *Cognition* 133 <https://doi.org/10.1016/j.cognition.2014.05.010> (IF:3.4)
18. Ravnani A*, **Martins M*** & Fitch WT (2014). Vocal learning, prosody and basal ganglia: Don't underestimate their complexity. *Behavioral and Brain Sciences* 37 (06) *equal contribution. <https://doi.org/10.1017/S0140525X13004184> (IF: 21.36)
19. **Martins M**, Fishmeister F, Puig Waldmüller E, Oh J, Geissler A, Fitch WT, Beisteiner R (2014). Fractal Image Perception provides Novel Insights into Hierarchical Cognition. *NeuroImage* 96 <https://doi.org/10.1016/j.neuroimage.2014.03.064> (IF:5.6)
20. Fitch WT, **Martins M** (2014). Hierarchical Processing in Music, Language and Action: Lashley revisited. *Annals of the New York Academy of Sciences* 1316 <https://doi.org/10.1111/nyas.12406> (IF:5.2)
21. Albuquerque L, Coelho M, **Martins M**, Martins IP (2014). STN-DBS does not change emotion recognition in Parkinson's disease. *Parkinsonism and Related Disorders* <https://doi.org/10.1016/j.parkreldis.2014.01.020> (IF: 4.4)
22. Albuquerque L, Coelho M, **Martins M**, Guedes LC, Rosa MM, Ferreira JJ, Catton MB, Carvalho H, Ferreira AG, and Martins IP (2014). STN-DBS does not change emotion recognition in advanced Parkinson's disease. *Parkinsonism & Related Disorders* 20(2) <https://doi.org/10.1016/j.parkreldis.2013.10.010> (IF: 4.4)
23. **Martins M** (2012). Distinctive signatures of recursion. *Phil. Trans. R. Soc. B* 367 <https://doi.org/10.1098/rstb.2012.0097> (IF: 6.3)
24. **Martins M**, Moura BM, Martins IP, Figueira ML, Prkachin K (2011). Sensitivity to expressions of pain in Schizophrenia patients. *Psychiatry Research* 189 <https://doi.org/10.1016/j.psychres.2011.03.007> (IF: 11.1)
25. **Martins M**, Martins IP (2010). Memory Malinger: evaluating WMT criteria. *Applied Neuropsychology* 17(3) <https://doi.org/10.1080/09084281003715709> (IF: 1.7)

Preprints/in prep.

...**Martins M**, Barner D, Baumard N (preprint). Quantifying Numeric Cognition in Early Modern Theatre: Psychological and Environmental Determinants of Numeracy Before the Industrial Revolution. <https://psyarxiv.com/rn6mg>

...**Martins M**, Lamm C, Baumard N. (in prep) Diachronic analysis of complexity in movie dialogues within 1920-2020: 1) comparison between movies preferred by the critics and general audience; 2) socio-economic predictors of complexity. <https://osf.io/2kwsm/>

... Kelemen A, Baumard N, Bonalumi F, Lamm C, **Martins M** (in prep). Diachronic analysis of moral virtues in the early modern period preceding the Industrial Revolution <https://osf.io/8kzrc>

...**Martins M**, Palminteri S. (in prep). The rise and fall of social hierarchical systems: a cognitive and information-theoretical model. <http://bit.ly/MartinsPalminteri>

...Reiter D, Lamm C, **Martins M**, (in prep.) From singing in the rain to tears in the rain: characterization of pessimism during the New Hollywood era and its socio-demographic determinants. <https://osf.io/kndb4/>

...Grunauer E, Lamm C, **Martins M** (in prep.) Temporal dynamics of dichotomous thinking in expressed culture. <https://osf.io/7nzau/>

...**Martins M**, Bergmann Z, Leonova E, Bianco R, Sammler D, Villringer A (preprint). Acquisition and Utilization of Recursive Rules in Motor Sequence Generation. <https://osf.io/kzptv>

...Rosselló J, Celma-Miralles A, **Martins M*** (preprint). Visual Recursion can Develop in the Absence of Linguistic Recursion: A Case Study (***senior author**). <https://psyarxiv.com/d9k3a/>

Book chapters

26. **Martins, M**. (forthcoming 2024). Cognitive and neural representations of fractals in vision, music, and action. In *The Fractal Geometry of the Brain, 2nd ed* (Ed. Antonio di Leva), Springer, NY (preprint: <https://osf.io/preprints/osf/sdjrg>)

27. **Martins, M**, Fitch, WT (2014). Investigating recursion within a domain-general framework. In *Language and Recursion* (Eds. F. Lowenthal & L. Lefebvre), pp. 15-26. Springer, New York. https://doi.org/10.1007/978-1-4614-9414-0_2

28. **Martins M**, Raju A, Ravignani A (2014). Evaluating the role of quantitative modelling in language evolution". In *The Past, Present and Future of Language Evolution Research* (Eds. Luke McCrohon, Hajime Yamauchi, Bill Thompson & Tessa Verhoef), pp 84-93. Evolang 9 Local Organizing Committee. <https://core.ac.uk/download/pdf/294828512.pdf>

Selected papers in (peer-reviewed) conference proceedings

29. **Martins M** (2018). The human arcuate fasciculus provides specific advantages to process complex sequential stimuli, not hierarchies in general. In *The Evolution of Language - Proceedings of the 12th International conference* (Eds. C. Cuskey, L. McCrohon, M. Flaherty, A. Ravignani, H. Little, T. Verhoef) <https://wydawnictwo.umk.pl/upload/files/OPEN%20ACCESS/The%20Evolution%20of%20Language/070.pdf>

30. Cook D, **Martins M** (2018). How domain-specific is Merge? In *The Evolution of Language - Proceedings of the 12th International Conference* (Eds. C. Cuskey, L. McCrohon, M. Flaherty, A. Ravignani, H. Little, T. Verhoef). https://evolang.org/torun/proceedings/paperpdfs/Evolang_12_paper_23.pdf

31. **Martins, M** (2017). The Cognitive Architecture of Recursion: Behavioral and fMRI Evidence from the Visual, Musical and Motor Domains. In *Proceedings of the 39th Annual Conference of the Cognitive Science Society* (Eds. G. Gunzelmann, A. Howes, T. Tenbrink, & E. J. Davelaar), pp. 1920-1924. Austin, TX: Cognitive Science Society. <https://hdl.handle.net/21.1116/0000-0004-C619-1>

32. **Martins M** (2014). Recursion is not language domain-specific: interim results of a research program. In *The Evolution of Language - Proceedings of the 10th International conference* (Eds. Erica A Cartmill, seán Roberts, Heidi Lyn, Hanna Cornish), pp.177-184. Singapore: World Scientific. https://doi.org/10.1142/9789814603638_0021
33. **Martins M**, Fischmeister F, Puig-Waldmueller E, Geissler A, Oh J, Fitch WT, Beistiner R. (2014). Discrimination of self-similar visual hierarchies activates the parieto-medial temporal pathway. In *the 20th Annual Meeting of the Organization for Human Brain Mapping (OHBM), Volume: 5*
34. **Martins M**, Fitch WT (2012). Empirical Approaches to Recursion. In *The Evolution of Language - Proceedings of the 9th International conference* (Eds. Scott-Phillips, Monica Tamariz, Erica A Cartmill and James R Hurford), pp.219-225. Singapore: World Scientific. https://doi.org/10.1142/9789814401500_0029