MARCO A. PETILLI
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CURRENT POSITION

From Apr 2021 — **Post-doctoral research fellow**, Department of Psychology, University of Milano-Bicocca, Milan, Italy. Current mentor: Prof. Marco Marelli

EDUCATION

Feb 2018 — **Ph.D.** in *Experimental Psychology, Linguistics and Cognitive Neurosciences* Department of Psychology, University of Milano-Bicocca, Milan, Italy Dissertation: "Proactive top-down processes in visual search". Supervisor: Prof. Roberta Daini

Jul 2013 — **Master's degree** in *Developmental Psychology and Neuropsychology*, Department of Psychology, University of Milano-Bicocca, Milan, Italy. Thesis: "Dynamic assessment of drawing: spatial and temporal indicators of neuropsychological disorders". Grade: 110/110 cum laude. Supervisor: Prof. Roberta Daini

Jul 2010 — **Bachelor's degree** in *Psychological Sciences and Techniques*, Department of Psychology, University of Milano-Bicocca, Milan, Italy. Thesis: "Visual discrimination of numerosity: no psychophysical evidence of the subitizing phenomenon". Grade: 110/110 cum laude. Supervisor: Prof. Roberta Daini

PROFESSIONAL RESEARCH EXPERIENCE

Sep 2020 - Mar 2021: **Post-doctoral research fellow**, Department of Psychology, University of Milano-Bicocca, Milan. Research topic: "The timing of remote learning: identifying factors influencing students' sustained attention in remote lessons". Mentor: Prof. Roberta Daini.

Apr 2018 - Jul 2019: **Post-doctoral research fellow**, Department of Psychology, University of Milano-Bicocca, Milan. Research topic: "Development of a multimodal model of the conceptual system". Mentor: Prof. Marco Marelli.

Feb 2020 - May 2020: **Research Fellowships**, Department of Psychology, University of Milano-Bicocca. Project: "Computer Vision and Linguistic Processing". Supervisor: Prof. Marco Marelli.

Sep 2019 - Dec 2019: **Research Fellowships**, Department of Psychology, University of Milano-Bicocca. Project: "Development of a new paradigm for studying attention across the lifespan using virtual reality". Supervisor: Prof. Emanuela Bricolo.

Mar 2018 - Apr 2018: **Research Fellowships**, Department of Psychology, University of Milano-Bicocca. Project: "Modulation of attention on visual perception". Scientific supervisor: Prof. Emanuela Bricolo.

Oct 2016 - Oct 2017: **Visiting PhD Student**, Swartz Center for Computational Neuroscience, University of California San Diego, La Jolla, California (USA), Duration: 12 months. Research topic: Expectations and attention in visual search using electrophysiological techniques. Advisor: Prof. Scott Makeig.

Feb 204 - Dec 2014: **Research collaborator**, Scientific Institute Santa Maria Nascente, Don C. Gnocchi. Foundation ONLUS, Milan, Italy. Project: Evaluation of the Effectiveness of a New Drug on Neurodegeneration and Cognitive Disorders in Patients with Multiple Sclerosis". Supervisor: Dr. Marco Rovaris.

TEACHING ACTIVITIES

Academic Years: 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-23:

MATLAB Laboratory for PhD Students (language: English). Description: Course on data analysis in MATLAB and programming of experiments with Psychophysics Toolbox, aimed at PhD students in Psychology, Linguistics, and Cognitive Neuroscience. Department of Psychology, University of Milano-Bicocca. Duration: 24 hours.

Academic Year: 2020-21:

Cognitive and Behavioral Measures (language: English). Description: Course for first-year students of the master's degree in Applied Experimental Psychological Sciences. Focus on cognitive and behavioral measurements. Department of Psychology, University of Milano-Bicocca. Duration: 32 hours.

Academic Years: 2017-18, 2018-19, 2019-20, 2020-21, 2021-22:

Cognitive Psychology (language: English). Description: Laboratory dedicated to learning MATLAB and programming experiments in the field of cognitive psychology. Aimed at first-year students of the master's degree in Applied Experimental Psychological Sciences. Department of Psychology, University of Milano-Bicocca. Duration: 16 hours.

RESEARCH ACTIVITIES

Research Interests

My research focuses primarily on cognitive psychology, ranging from attention and perception phenomena to semantic memory representations. I adopt a multidisciplinary approach, integrating cognitive psychology with computational analysis to understand how mental representations based on experience (e.g., vision and language) influence behaviour.

Main Technical Skills

Programming languages: MATLAB, R

Computational models: Deep convolutional neural networks, distributional semantic models.

Analysis and manipulation of multidimensional vector spaces.

Acquisition, data analysis, and programming of experiments and software.

Development of computerised tools to assess cognitive functions.

Acquisition and analysis of electrophysiological data, including EEG, EMG, and HR.

Use of Eye Trackers to acquire and analyse eye movements.

Administration of neuropsychological tests to assess various cognitive domains, such as attention, visuospatial skills, language, memory, and executive functions.

Language Skills: Italian, native. English, fluent.

Publications In International Journals

Petilli, M. A., & Marelli, M. (in press). Visual Intuitions in the Absence of Visual Experience: The Role of Direct Experience in Concreteness and Imageability Judgements.
Journal of Cognition.

Pancani, L., **Petilli**, M. A., Riva, P., & Rusconi, P. (2023). I can't live without you: delay discounting in smartphone usage.
Journal of Cognitive Psychology
https://doi.org/10.1080/20445911.2023.2195031

Günther, F., Marelli, M., Tureski, S., & **Petilli**, M. (2023). ViSpa (Vision Spaces): A computer-vision-based representation system for individual images and concept prototypes, with large-scale evaluation.
Psychological Review
https://doi.org/10.1037/rev0000392

Petilli, M. A., Günther, F., & Marelli, M. (2022). The Flickr frequency norms: What 17 years of images tagged online tell us about lexical processing.
Behavior Research Methods
https://doi.org/10.3758/s13428-022-02031-y

Petilli, M. A., Daini, R., Saibene, F. L., & Rabuffetti, M. (2021). Automated scoring for a Tablet-based Rey Figure copy task differentiates constructional, organisational, and motor abilities.
Scientific Reports
https://doi.org/10.1038/s41598-021-94247-9

Petilli, M. A., Günther, F., Vergallito, A., Ciapparelli, M., & Marelli, M. (2021). Data-driven computational models reveal perceptual simulation in word processing.
Journal of Memory and Language
https://doi.org/10.1016/j.jml.2020.104194

Petilli, M. A., Marini, F., & Daini, R. (2020). Distractor context manipulation in visual search: How expectations modulate proactive control.
Cognition
https://doi.org/10.1016/j.cognition.2019.104129

Petilli, M. A., Rinaldi, L., Trisolini, D. C., Girelli, L., Vecchio, L. P., & Daini, R. (2020). How difficult is it for adolescents to maintain attention? The differential effects of video games and sports.
Quarterly Journal of Experimental Psychology
https://doi.org/10.1177/1747021820908499

Günther, F., **Petilli**, M. A., & Marelli, M. (2020). Semantic transparency is not invisibility: A computational model of perceptually-grounded conceptual combination in word processing.
Journal of Memory and Language
https://doi.org/10.1016/j.jml.2020.104104

Vergallito, A., **Petilli**, M. A., & Marelli, M. (2020). Perceptual modality norms for 1,121 Italian words: A comparison with concreteness and imageability scores and an analysis of their impact in word processing tasks.
Behavior Research Methods
https://doi.org/10.3758/s13428-019-01337-8

Günther, F., **Petilli**, M. A., Vergallito, A., & Marelli, M. (2020). Images of the unseen: Extrapolating visual representations for abstract and concrete words in a data-driven computational model.

Psychological Research
https://doi.org/10.1007/s00426-020-01429-7

Vergallito, A*., **Petilli**, M. A.*, Cattaneo, L., & Marelli, M. (2019). Somatic and visceral effects of word valence, arousal and concreteness in a continuum lexical space.
Scientific Reports
https://doi.org/10.1038/s41598-019-56382-2 * first co-authorship

Petilli, M. A., Trisolini, D. C., & Daini, R. (2018). Sustained-paced finger tapping: A novel approach to measure internal sustained attention.
Frontiers in Psychology
https://doi.org/10.3389/fpsyg.2018.00881

Trisolini, D. C., **Petilli**, M. A., & Daini, R. (2018). Is action video gaming related to sustained attention of adolescents?
Quarterly Journal of Experimental Psychology
https://doi.org/10.1080/17470218.2017.1310912

Feldmann-Wüstefeld, T., Miyakoshi, M., **Petilli**, M. A., Schubö, A., & Makeig, S. (2017). Reduced visual attention in heterogeneous textures is reflected in occipital alpha and theta band activity.
PLOS One
https://doi.org/10.1371/journal.pone.0187763

Preprints Under Review

Petilli, M. A., Rodio, F., Günther, F., & Marelli, M. (2023). Visual search and real-image similarity: an empirical assessment of the search surface through the lens of deep learning. *PsyArXiv*
https://doi.org/10.31234/osf.io/cxkzt

Petilli, M. A., Marelli, M., Mazzoni, G., Marchetti, M., Rinaldi, L., & Gatti, D. (2023). From Vector Spaces to DRM lists: False Memory Generator, a software for automated generation of lists of stimuli inducing false memories. *PsyArXiv*
https://doi.org/10.31234/OSF.IO/4KSD6

Günther, F., Marelli, M., & **Petilli, M. A.** (2023). The challenge of representation learning: Improved accuracy in deep vision models does not come with better predictions of perceptual similarity. ArXiv:2303.07084. *ArXiv*
https://doi.org/10.48550/arXiv.2303.07084

de Varda, A., **Petilli**, M. A., & Marelli, M. (2023). SemanticScape: A Distributional Model of Concepts Grounded in Distance Patterns between Objects. *PsyArXiv*
https://doi.org/10.31234/OSF.IO/4C5RX

Giraud, M., Zapparoli, L., Basso, G., **Petilli**, M. A., Paulesu, E. & Nava, E., (2023) Mapping the Emotional Homunculus with fMRI. *SSRN*
http://dx.doi.org/10.2139/ssrn.4552294

PRESENTATIONS AT NATIONAL AND INTERNATIONAL CONFERENCES

Petilli, M.A., Rodio, F., Günther, F. & Marelli, M., Visual Search and Stimulus Similarity Revisited in the Era of Deep Learning: An Empirical Investigation using Real Image Stimuli.
29th Italian Association of Psychology Congress (all sections), 18-20 September 2023 – Lucca, Italy. Oral presentation

Petilli, M.A., Rodio, F., Gatti D., Rinaldi, L. & Marelli, M. Predicting False Memories with Data-Driven Computational Models: The Role of Visual and Linguistic Similarity in the DRM Paradigm.
23rd Conference of the European Society for Cognitive Psychology (ESCOP), 06-09 Sep 2023, Porto – Portugal. Oral presentation

Petilli, M.A. & Marelli, M., Visual Intuitions in Blind People: The Role of Direct Sensory Experience on Concreteness and Imageability Ratings.
20th edition of Psycholinguistics in Flanders (PiF), 29-31 May 2023, Ghent - Belgium Poster presentation

Petilli, M.A., Rodio F., Gatti D., Rinaldi L., & Marelli M., Predicting False Memories with Convolutional Neural Networks: The Effect of Visual Similarity in a DRM Paradigm with Pictorial Stimuli.
18th Annual Conference of the Italian Association of Cognitive Sciences, 15-17 December 2022 - Rovereto, Trento – Italy Oral presentation

Petilli, M.A. & Marelli, M., Imageability and Concreteness Ratings in Blind People: The Role of Direct Experience in Perceptual Judgments.
30th Italian Association of Psychology (AIP) (all sections), 27-30 September 2021 – Padova, Italy. Oral presentation

Petilli, M.A. & Marelli, M., Visual Intuitions in Blind People: The Role of Direct Experience in Perceptual Judgments.
European Workshop on Cognitive Neuropsychology 2022, 24-28 January 2022 – Online Conference Oral presentation

Petilli, M.A., Günther F., & Marelli M., Objective Visual Frequency Norms: What 15 Years of Images Uploaded on Flickr.com Tell Us About Lexical Processing.
27th Italian Association of Psychology (AIP), Section: Experimental Psychology, 8-10 September 2021 – Lecce, Italy. Oral presentation

Petilli, M.A., Marini, F., & Daini, R., Proactive Attentional Mechanisms in Visual Search
Rovereto Attention Workshop 2019, 24-26 October 2019 – Rovereto, Italy. Poster presentation

Petilli, M.A., Ciapparelli, M., Günther, F., Vergallito, A., & Marelli, M., Does Understanding Words Require Visual Simulation? Study of Lexical Priming with Data-Driven Computational Models.
25th Italian Association of Psychology (AIP), Section: Experimental Psychology, 18-20 September 2019, Milan, Italy. Oral presentation

Petilli, M.A., Günther, F., Vergallito, A., Ciapparelli, M., & Marelli, M., Does Word Processing Involve Perceptual Simulations? An Experiment with Semantic Priming and Vision-Based Distributional Models.
European Workshop on Cognitive Neuropsychology 2019, 21-25 January 2019 – Bressanone, Italy. Oral presentation

Petilli, M.A., D. Trisolini, Daini, R., Sustained-Paced Finger Tapping: A New Approach to Measure Sustained Attention.
27th AIRIPA Congress, 28-29 September 2018, Arezzo, Italy. Oral presentation

Petilli, M.A., Marini, F., Daini, R., Proactive Control Mechanisms for Distractor Expectation in Visual Search.
European Conference on Visual Perception, 26–30 August 2018 – Trieste, Italy. Poster presentation

Petilli, M.A., Marini, F., Daini, R., Distractor Expectation Modulates Proactive Control Mechanisms in Visual Search.
1st Joint Congress SEPEX, SEPNECA, AIP, 3-6 July 2018, Madrid, Spain. Oral presentation

Petilli, M.A., Marini, F., Daini, R., Distractor Expectation Modulates Proactive Control Mechanisms in Visual Search.
Society for Neuroscience, 12-16 November 2016 – San Diego, California, USA. Poster presentation

Petilli, M.A., Marini, F., & Daini, R., Proactive Control Processes in Serial and Parallel Visual Search Tasks.
22nd National Congress of the Experimental Psychology Section, 20-22 September 2016, Rome, Italy. Oral presentation

Petilli, M.A., Marini, F., & Daini, R. Proactive Control Mechanisms in Visual Search.
European Conference on Visual Perception, 28 August – 1 September 2016, Barcelona, Spain. Poster presentation

Petilli, M.A., Marini, F., Daini, R., Proactive Attentional Mechanisms in Visual Search.
Rovereto Attention Workshop, 5-8 November 2015 – Rovereto, Italy. Poster presentation

Petilli, M.A., F. L. Saibene, M. Rabuffetti, F Baglio, R. Nemni, Daini, R., Spatial, Temporal and Procedural Indicators of Neuropsychological Disorders of Drawing.
24th European Congress of Psychology, 07-10 July 2015 – Milan, Italy. Poster presentation

Petilli, M.A., F. L. Saibene, M. Rabuffetti, F Baglio, R. Nemni, Daini, R., Spatial and Temporal Indicators of Neuropsychological Disorders of Drawing.
33rd European Workshop on Cognitive Neuropsychology, 25-30 January 2015 – Bressanone, Italy. Poster presentation

SOFTWARE AND WEB PAGES

ViSpa (Vision Spaces) Web Page

ViSpa offers high-dimensional vector spaces (derived from a convolutional neural network trained in object recognition tasks) and allows for the calculation of visual similarity between images and visual prototypes of concepts, as well as the exploration of visual "neighbourhoods" in the image domain.

Web page available at: http://vispa.fritzguenther.de. Related article: https://doi.org/10.1037/rev0000392 .

T-RCF (Tablet-based Automated Assessment of Rey Figure Copy Test) Software

MATLAB software for automated analysis of complex figure copying to extract visuospatial, procedural, and motor performance indicators.

The software is freely available on the OSF platform under the "CC-By Attribution 4.0 International" license at: https://doi.org/10.17605/OSF.IO/RT4HP . Related article: https://doi.org/10.1038/s41598-021-94247-9 .

FMG (False Memory Generator) Software

Automated and data-driven MATLAB software for generating DRM lists starting from vector-spaces.

The software is freely available on the OSF platform under the "CC-By Attribution 4.0 International" license at: https://osf.io/gsrfu . Related article: https://doi.org/10.31234/OSF.IO/4KSD6 .

GRANTS AND AWARDS

Best Research Poster Presentation Bicocca Research Day 2023 (€ 500).
University of Milano-Bicocca, Milan, Italy.
Research project: Visual search and stimulus similarity in the era of deep learning: an empirical investigation using real image stimuli.
Role: presenter.

Research Projects of National Interest PRIN 2022 as associate investigator (€ 208,770).
Research Project: "The World in Words: Moving beyond a spatiocentric view of the human mind".
P.I. Luca Rinaldi.
Role: associate investigator.

Vittorio Girotto Award Contribution as a finalist among the works nominated for the "Vittorio Girotto" award for the best AISC 2022 paper.
Title contribution: Predicting false memories with convolutional neural networks: the effect of visual similarity in a DRM paradigm with pictorial stimuli.
Role: presenter.

Best Research Poster Presentation Bicocca Research Day 2022 (€ 500).
Research Project: The Vision Space (ViSpa) project: Vision-based concept representations induced from computer vision models.
Role: presenter.

Best Research Poster Presentation Bicocca Research Day 2021 (€ 250).
Research Project: Tablet-based Rey Figure Copy task differentiates constructional, organizational, and motor abilities.
Role: presenter.

Deutsche Forschungsgemeinschaft Research Grant 2020 (€ 22,000).
Research Project: Systematically evaluating the psychological validity of computer-vision models for vision-based conceptual representations.
P.I. Fritz Günther.
Role: associate investigator.