Pedro CARDOSO-LEITE

ATTRACT fellow (consolidator, ass. Prof.)
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Current Position

2017- **ATTRACT consolidator fellow at the University of Luxembourg (2M€)**
My research uses an interdisciplinary approach to study and create interactive digital environments (e.g., video games) to assess and improve human cognitive abilities such as learning and attention.

2019 - **Member of the Scientific Advisory Board** at the Chambre de commerce et d'industrie de région Paris Ile-de-France (French for Business) for the development of new language skills assessment methods.

Past Positions

2011-2017 Post Doc / Maître Assistant at the University of Geneva (Switzerland), working with Prof. Daphne Bavelier

2009-2011 Post Doc at the Max Planck Institute for Human Cognitive and Brain Sciences (Leipzig, Germany), working with Dr. Jöran Lepsien and Dr. Florian Waszak.

2008-2009 Post Doc in psychophysics at the Laboratoire Psychologie de la Perception, Université Paris Descartes & CNRS (Paris, France), working with Dr. Pascal Mamassian and Dr. Florian Waszak.

2005-2006 Research assistant (Laboratoire de Psychologie Expérimentale, CNRS, Paris, France).

Education

2008 **PhD in Experimental Psychology, University of Paris Descartes.**
Highest rank; best thesis of 2008 by the Doctoral School. Université Paris Descartes, France. PhD under the supervision of Dr. Andrei Gorea and in collaboration with Dr. Florian Waszak and Dr. Pascal Mamassian.

2005 **Master in Cognitive Sciences and in Psychology**
M1: double major in computer science and in differential and developmental psychology at the Université Nancy 2, France, supervised by Prof. Houssemand and Prof. Martin; M2 in Cognitive Science jointly organized by Université Paris 5, Université Paris 6, Ecole Normale Superieure, Ecole des Hautes Etudes en Sciences Sociales, Paris, France, under the supervision of Dr. Pouthas and Dr. Gorea.

2003 **Bachelor in Cognitive Sciences and in Psychology.** Université Nancy 2, France.

2000 **High School diploma.** Major in biology. Lycée Classique de Diekirch, Luxembourg.

Publications (selected)

For full list of publications, see google scholar profile

Open Access

1. Ansarinia, M., Schrater, P., & **Cardoso-Leite, P.** (2022). Linking Theories and Methods in Cognitive Sciences via Joint Embedding of the Scientific Literature: The Example of Cognitive Control. ArXiv:2203.11016 [Cs, q-Bio]. http://arxiv.org/abs/2203.11016
2. **Cardoso-Leite, P.**, Buchard, A., Tissieres, I., Mussack, D., & Bavelier, D. (2021). Media use, attention, mental health and academic performance among 8 to 12 year old children. PLOS ONE, 16(11), e0259163. https://doi.org/10.1371/journal.pone.0259163
3. Castañón, S. H., **Cardoso-Leite, P.**, Altarelli, I., Green, C. S., Schrater, P., & Bavelier, D. (2021). A mixture of generative models strategy helps humans generalize across tasks (p. 2021.02.16.431506). bioRxiv. https://doi.org/10.1101/2021.02.16.431506
4. **Cardoso-Leite, P.**, Ansarinia, M., Schmück, E., & Bavelier, D. (2021). Training cognition with video games. In K. Cohen Kadosh (Ed.), *The Oxford Handbook of Developmental Cognitive Neuroscience*. Oxford University Press. https://oxfordhandbooks.com/view/10.1093/oxfordhb/9780198827474.001.0001/oxfordhb-9780198827474-e-38

5. **Cardoso-Leite, P.**, Joessel, A., & Bavelier, D. (2020). Games for enhancing cognitive abilities. In J. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of Game-based Learning*. MIT Press. https://mitpress.mit.edu/books/handbook-game-based-learning
6. Defossez, A., Ansarinia, M., Clocher, B., Schmück, E., Schrater, P., & **Cardoso-Leite, P.** (2020). The structure of behavioral data. ArXiv:2012.12583 [q-Bio, Stat]. http://arxiv.org/abs/2012.12583
7. Levy, J., Mussack, D., Brunner, M., Keller, U., **Cardoso-Leite, P.**, & Fischbach, A. (2020). Contrasting Classical and Machine Learning Approaches in the Estimation of Value-Added Scores in Large-Scale Educational Data. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.02190
8. Mussack, D., Flemming, R., Schrater, P., & **Cardoso-Leite, P.** (2019). Towards discovering problem similarity through deep learning: Combining problem features and user behavior. Proceedings of The 12th International Conference on Educational Data Mining. *Educational Data Mining*, Montreal. http://educationaldatamining.org/edm2019/proceedings/
9. Schmuck, E., Flemming, R., Schrater, P., & **Cardoso-Leite, P.** (2019). Principles underlying the design of a cognitive training game as a research framework. 2019 11th International Conference on Virtual Worlds and Games for Serious Applications (*VS-Games*), 1–2. https://doi.org/10.1109/VS-Games.2019.8864551
10. Libertus, M. E., Liu, A., Pikul, O., Jacques, T., **Cardoso-Leite, P.**, Halberda, J., Bavelier, D. (2017). The impact of action video game training on mathematical abilities in adults. *AERA Open,* 3(4), 2332858417740857
11. **Cardoso-Leite, P.**, Kludt, R., Vignola, G., Ma, W. J., Green, C. S., & Bavelier, D. (2016). Technology consumption and cognitive control: Contrasting action video game experience with media multitasking. *Attention, Perception & Psychophysics,* 78(1), 218-41.
12. **Cardoso-Leite, P.**, Green, C. S., & Bavelier, D. (2015). On the impact of new technologies on multi-tasking. *Developmental Review*, 35, 98-112.
13. Yung, A., **Cardoso-Leite, P.**, Dale, G., Bavelier, D., & Green, C. S. (2015). Methods to Test Visual Attention Online. *Journal of Visualized Experiments*, 96, e52470, doi: 10.3791/52470.
14. **Cardoso-Leite, P.**, & Bavelier, D. (2014). Video game play, attention, and learning: how to shape the development of attention and influence learning? *Current Opinion in Neurology*, Special Issue on Developmental Disorders, 27(2), 185–91.

Games and Software

A main objective of my research is to understand how to improve human cognition with behavioral training. Research shows that Action Video Games, specifically, can improve cognition—but, it remains unclear how this works. Our strategy to address these questions of how and why is a) to design, develop and scientifically test video games and b) use the Internet to scale up research in this domain (this is necessary given the large number of hypotheses to tests and the replication crisis in psychology). Over the past 5 years we have dedicated large efforts to develop the following technologies, which we believe will have a major impact on this research field:

Behaverse (http://behaverse.org/) comprises an expanding collection of computerized tools to scale up cognitive science research. The *Behaverse Assessment Battery* (http://behaverse.org/cognitive_assessment.html) contains cognitive tests and surveys which have been extensively used in the scientific literature. This collection is being curated to provide a comprehensive and time-effective evaluation of a person's cognitive abilities. Each test has been carefully redesigned for greater inter-test consistency and to improve user experience. Each test is also highly customizable and supports adaptive testing. The *Behaverse Training Game* (http://behaverse.org/cognitive_training.html) on the other hand provides a customizable framework to configure and deploy video games that can be played for tens of hours and can be used to test scientific hypotheses by contrasting the impact on cognition (assessed via the Behaverse Assessment Battery) of playing well-controlled alternative version of the game.

Mathemarmite (http://mathemarmite.lu) is a video game designed to help 3-6 year old children hone their counting skills, recognize and transcode numbers under various representational formats (e.g., Arabic digits, dice). The game was released on October 2018 on the Apple store and Google Play Store and was nominated but for an Indie Development Award at Game Connection Europe 2019.

ViRo (https://youtu.be/aZ40sqNMBTI) is a 3D-VR implementation of the Multiple Object Tracking Task which has been used to assess attentional control but also for cognitive training.

Grants & Awards

- 2021 (co-PI) Erasmus+, "AI4T: AI for and by teachers"; priority "Digital Education and Competencies". Total budget: 2'600'000€
- 2021 (co-PI) FNR IPBG: Collaboration 21: Leveraging technologies for enhanced collaborative work and learning experiences (C21). Total budget: 3'800'000€
- 2021 (coordinator/co-PI): FNR INITIATE: Education-21. Total Budget: 381'567€
- 2020 (co-PI) Online cognitive assessment for tracking the impact of a pharmaceutical treatment of Fredreich's ataxia patients: a pilot study. Total budget: 280'000€
- 2017-2020 FNR InterMobility grant; Intermobility/17/11765868/ULALA/Cardoso-Leite
- 2017-2022 FNR ATTRACT Consolidator grant; ATTRACT/2016/ID/11242114/DIGILEARN
- Participated in writing FNS research grant (PI: Prof. Daphne Bavelier, 2015-2018)
- Post-doctoral fellowship by the Fyssen Foundation (2009-20011)
- Prix d'excellence for doctoral thesis (2008)

Teaching (current)

2022-	**Structural Equation Modeling (I).** Lectures and hands-on activities on Structural Equation Modeling and its prerequisites to Master Students in Psychology
2021-2022	**Psychologie Différentielle.** Lecture series on human intelligence to Master Students in Psychology
2021-	**Introduction to R.** Workshop on the use of R for Bachelor Students in Psychology
2020	**Minds and Machines Workshop: Cognitive Sciences, AI and Education.** One-week hands on workshop (https://xcit-lab.github.io/minds-and-machines/)
2020-	**Data Science Projects in R.** This applied course/workshop is taught to doctoral students at the University of Luxembourg.
2018-	**Introduction to Data Science in R.** This hands-on course is taught to doctoral students at the University of Luxembourg.
	Game-Based Learning. Lecture given to students in the Master of Secondary Education.
2013-2017	**Cognitive Neuroscience.** This course is co-taught with Prof. Bavelier to c.a. 180 Psychology Bachelor students per year at the university of Geneva. In this course I cover Attention, Learning and Memory, Motor Control and Visual Perception.

Ad-hoc reviewer

Current Biology, Nature Neuroscience, Trends in Cognitive Sciences, Cerebral Cortex, Journal of Experimental Psychology, Psychonomic Bulletin & Review, European Journal of Cognitive Psychology, Journal of Vision, Seeing and Perceiving, Attention, Perception and Psychophysics, Plos One, Journal of Physical Education and Sport Management, Neuropsychologia, Maternal and Child Health Journal, Transactions on Neural Systems & Rehabilitation Engineering, Neural Plasticity, Acta Paediatrica, Computers & Education, Proceeding of the National Academy of Sciences, peerJ, Intelligence

Supervision and Mentoring

Morteza Ansarinia (PhD candidate), Emmanuel Schmück (PhD candidate), Kamelia Jamaati (PhD candidate), Hainan Yu (PhD candidate), Dominic Mussack (PostDoc), Xihui Chen (PostDoc), Aurélien Defossez (R&D Specialist), Brice Clocher (R&D Specialist), Lindie van der Westhuizen (Research Assistant), E'Louise Botes (Research Assistant), Philipp Sonnleitner (CORE junior mentor).

Outreach / In the press (selected)

- https://issuu.com/euresearcher/docs/scientifically_validated_digital_learning_environm
- https://www.forbes.com/sites/nickmorrison/2021/11/17/pre-teens-spend-eight-hours-a-day-on-screenbut-gaming-linked-to-better-mental-health/
- https://www.telegraph.co.uk/news/2021/11/17/using-two-screens-harms-childrens-mental-health-video-games/