

Alexandre Zénon

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Researcher, CNRS
Institute of Cognitive and Integrative Neuroscience of Aquitaine
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Education

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|------|---|
| 2009 | PhD in Biomedical Sciences (Neuroscience specialization) Supervision: Prof. Etienne Olivier, IoNS, UCL, Brussels and Jean-René Duhamel, Institute of Cognitive Sciences, Bron, France Thesis title: "Mechanisms of gaze and attention guidance in visual exploration" |
| 2002 | Medical degree, UCL, Brussels |

Research Positions

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| 2025- | Associate researcher at Bordeaux School of Economics, Bordeaux |
| 2017- | CNRS Researcher, INCIA, Bordeaux |
| 2011-2017 | Postdoctoral researcher at the Institute of Neuroscience, UCL, Brussels |
| 2008-2011 | Postdoctoral researcher at the Salk Institute, San Diego, CA, USA; Supervisor: Prof. Rich Krauzlis |

Awards and Grants

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| 2024-2028 | ANR PRC (co-applicant) |
| 2019-2023 | ANR JCJC |
| 2019-2022 | ANR PRC (co-applicant) |
| 2017-2021 | Junior Chair, IdEx Bordeaux |
| 2017 | Solvay Prize |
| 2016-2017 | Fondation Louvain, Brussels, Belgium |
| 2014-2017 | Queen Elisabeth Medical Foundation (co-applicant) |
| 2014-2018 | FNRS PDR (co-applicant) |
| 2011-2016 | Brains back to Brussels, Innoviris, Belgium |
| 2010-2011 | Kirby Foundation Scholarship, USA |
| 2008-2009 | Francqui Foundation Fellowship, Belgian American Educational Foundation |
| 2007-2008 | Special Research Fund, University of Louvain (UCL) |
| 2002-2006 | Fund for Research in Industry and Agriculture – FRIA |

Student Supervision

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| 9 PhD students | 2011: Monika Gergelyfi; 2012: Andrea Alamia; 2013: Vincent Moens; 2014: Oleg Solopchuk, 2017: Sze Ying Lam, 2018: Stefano Ioannucci, 2020: Simon Boylan, 2024: Axel Plantey-Veux (co-supervision), 2024: Laure Pelloux (co-supervision) |
| 4 postdoctoral researchers | 2014: Dr. Emanuele Pasqualotto, 2015: Dr. Charles-Etienne Benoît, 2019: Dr. Ernesto Sanz, 2024: Adrien Coudière (co-supervision) |
| 22 Master's students | Mariam Sidibé, Sophie Devesse, Laureen Slongo, Mélanie Ronsse, Julie Dupont, Margaux Bourrillon, Clémence Bourdoux, Marie-Victoire de Lassus Saint-Génie, Adrien Moncousin, Maelig Patrigeon, Anita Keshmirian, Laurent Beaupoil, Simon Boylan, Caroline Bertsch, Benjamin Loustaunau, Arthur Bruneau, Margaux Nussbaumer, Léa Capdevielle, Amélie Rivoire, Elodie Kopp, Lisa Bagneris |

Invited Presentations

2 nanosymposia (SFN 2013, San Diego, USA); Belgian Society for Neuroscience, 2013; Belgian Society for Neurorehabilitation, 2014; Sixth Biology of Decision Making meeting, Paris, 2016; British Cognitive Neuroscience Society, Budapest, 2016; invited speaker at several research centers (e.g., Institute of Neurosciences of La Timone, Marseille; Cognitive Neuroscience Center, Lyon; INCIA, Bordeaux, ...); Neurocampus Day 2017 (Bordeaux); Conference "ADHD: new perspectives?", Strasbourg, 2017; Conference "Attention, a precious asset, a shared resource", Bordeaux, 2017; CFPPS Conference "Motivation" 2017; Radio show "Les experts", France Bleu Gironde, 2017; Ghent University 2018; Geneva Neuroscience & Biotech Campus, Geneva, 2019; Workshop on Effort, Nice, 2021; Seminar, Munich (LMU), 2021; Seminar, Marseille University, 2021; Conference Spring Meetings SNLF 2021; Seminar, GREThA Bordeaux 2021; Seminar, CREIDD Troyes 2021; Club Eye tracking and Autism, Grenoble 2021; Seminar CeRCA, Poitiers 2022; Seminar at the Laboratory of Perceptual Systems, ENS, Paris, 2022; Seminar U. Liège, Belgium, 2022; Neuronus, Krakow, 2022; Seminar at LINP2 Laboratory (University of Paris Nanterre), 2023; Lecture at the Cognition and Action Workshop, Brussels, 2024; Seminar at Cerco, Toulouse, 2024; Seminar at Institute of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Germany, 2024.

Other Activities

- Associate Editor for Frontiers in Cognition
- Participation in PhD thesis juries (11).
- Teaching neuroscience at undergraduate (Bachelor's) and Master's levels.
- Participation in evaluation panels (FWO, ERC, ESF, BBSRC, Sorbonne).
- Science communication (Capitaine Déclics)
- Coordinator of the scientific committee of L'Oasis du Coq à l'Âme (secured funding of approximately €400k in this role)
- Co-founder of the "Observatoire des écolieux"

Bibliography

[Google Scholar](#)
[Research Gate](#)

- Boylan, S., Lam, S. Y., & **Zenon, A.** (2025). Transfer entropy predicts pupillary response and cognitive effort during a tracking task. bioRxiv, 2025-04.
- Su, S., Vanvoorden, T., Le Denmat, P., **Zénnon, A.**, Braconnier, C., & Duque, J. (2025). Transcutaneous Vagus Nerve Stimulation Boosts Accuracy During Perceptual Decision-Making. Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation, Volume 0, Issue 0

- **Zénon, A.**, Salvaggio, S., & Andres, M. (2024). Pupil size variations reveal Bayesian inference in cognitive arithmetic. *bioRxiv*, 2024-11.
- Derosiere, G., Vassiliadis, P., Dricot, L., Dessain, Q., Delinte, N., **Zénon, A.**, & Duque, J. (2024). Fronto-motor circuits linked to subclinical apathy. *BioRxiv*, 2024-10.
- Fievez, F., Cos, I., Carsten, T., Derosiere, G., **Zénon, A.**, & Duque, J. (2024). Task goals shape the relationship between decision and movement speed. *Journal of Neurophysiology*, 132(6), 1837-1856.
- Ioannucci, S., Chirokoff, V., Dilharreguy, B., Ozenne, V., Chanraud, S., & **Zénon, A.** (2023). Neural fatigue by passive induction: repeated stimulus exposure results in cognitive fatigue and altered representations in task-relevant networks. *Communications Biology*, 6(1), 142.
- Behrens, M., Gube, M., Chaabene, H., Prieske, O., **Zénon, A.**, Broscheid, K. C., ... & Weippert, M. (2022). Fatigue and human performance: an updated framework. *Sports medicine*, 1-25.
- Ioannucci, S., Borragán, G., & **Zénon, A.** (2022). Passive visual stimulation induces fatigue under conditions of high arousal elicited by auditory tasks. *Journal of Experimental Psychology: General*.
- Salvaggio, S., Masson, N., **Zénon, A.**, & Andres, M. (2022). The predictive role of eye movements in mental arithmetic. *Experimental Brain Research*, 240(5), 1331-1340.
- Salvaggio, S., Andres, M., **Zénon, A.**, & Masson, N. (2022). Pupil size variations reveal covert shifts of attention induced by numbers. *Psychonomic Bulletin & Review*, 1-10.
- Atkinson-Clement, C., Cavazzini, É., **Zénon, A.**, Legou, T., Witjas, T., Fluchère, F., ... & Eusebio, A. (2021). Subthalamic stimulation breaks the balance between distal and axial signs in Parkinson's disease. *Scientific Reports*, 11(1), 1-9.
- Ioannucci, S., Boutin, A., Michelet, T., **Zénon, A.**, & Badets, A. (2021). Conscious awareness of motor fluidity improves performance and decreases cognitive effort in sequence learning. *Consciousness and Cognition*, 95, 103220.
- Gergelyfi, M., Sanz-Arigita, E. J., Solopchuk, O., Dricot, L., Jacob, B., & **Zénon, A.** (2021). Mental fatigue correlates with depression of task-related network and augmented DMN activity but spares the reward circuit. *NeuroImage*, 118532.
- Solopchuk, O., & **Zénon, A.** (2021). Active sensing with artificial neural networks. *Neural Networks*.
- Ficarella SC, Desantis A, **Zénon, A.**, Burle B. (2021) Preparing to React: A Behavioral Study on the Interplay between Proactive and Reactive Action Inhibition. *Brain Sciences*; 11(6):680. <https://doi.org/10.3390/brainsci11060680>
- Lam, S. Y., & **Zénon, A.** (2021). Information rate in humans during visuomotor tracking. *Entropy*, 23(2), 228.
- **Zénon, A.**, (2019) Eye pupil signals information gain. *Proceedings of the Royal Society B*
- Atkinson-Clement, C., Cavazzini, É., **Zénon, A.**, Witjas, T., Fluchère, F., Azulay, J.-P., Baunez, C., Eusebio, A., (2019) Effects of subthalamic nucleus stimulation and levodopa on decision-making in Parkinson's disease. *Mov. Disord*.
- Alamia A., VanRullen R., Pasqualotto E., Mouraux A., and **Zénon, A.** (2019) Pupil-linked arousal responds to unconscious surprisal. *Journal of Neuroscience*.
- Moens V., **Zénon, A.** (2019) Learning and Forgetting Using Reinforced Bayesian Change Detection. *PLoS Comp. Biol.*
- **Zénon, A.**, Solopchuk, O., Pezzulo, G., (2019) An information-theoretic perspective on the costs of cognition. *Neuropsychologia*.
- Benoit, C.-E., Solopchuk, O., Borragán, G., Carbonnelle, A., Van Durme, S., **Zénon, A.**, (2019) Cognitive task avoidance correlates with fatigue-induced performance decrement but not with subjective fatigue. *Neuropsychologia*.
- Moens, V., & **Zénon, A.** (2018). Recurrent auto-encoding drift diffusion model. *bioRxiv*, 220517.
- Alamia, A., **Zénon, A.**, VanRullen, R., Duque, J., Derosiere, G., (2018) Implicit visual cues tune oscillatory motor activity during decision-making. *Neuroimage*.

- Alamia, A., Solopchuk, O., **Zénon, A.**, (2018) Strong conscious cues suppress preferential gaze allocation to unconscious cues. *Front. Hum. Neurosci.* 12, 427.
- Derosiere, G., Klein, P.-A., Nozaradan, S., **Zénon, A.**, Mouraux, A., Duque, J., (2018) Visuomotor correlates of conflict expectation in the context of motor decisions. *J. Neurosci.* 38, 9486–9504.
- Atkinson-Clement, C., Cavazzini, E., **Zénon, A.**, Witjas, T., Fluchere, F., Baunez, C., Azulay, J.P., Eusebio, A., (2018) Subthalamic nucleus stimulation normalises effort-based decision-making in Parkinson's disease, in: *MOVEMENT DISORDERS*. pp. S730–S731.
- Solopchuk, O., Sebti, M., Bouvy, C., Benoit, C.-E., Warlop, T., Jeanjean, A., **Zénon, A.**, (2018) Locus Coeruleus atrophy doesn't relate to fatigue in Parkinson's disease. *Sci. Rep.* 8, 12381.
- Atkinson-Clement, C., Cavazzini, E., **Zénon, A.**, Witjas, T., Fluchere, F., Azulay, J.-P., Baunez, C., Eusebio, A., (2018) Subthalamic nucleus high frequency and Levodopa treatment effects on effort-based decision-making in Parkinson's disease, in: *EUROPEAN JOURNAL OF NEUROLOGY*. p. 309.
- Derosiere, G., **Zénon, A.**, Alamia, A., Duque, J., (2017) Primary motor cortex contributes to the implementation of implicit value-based rules during motor decisions. *Neuroimage* 146, 1115–1127. doi:10.1016/j.neuroimage.2016.10.010
- Solopchuk, O., Alamia, A., Dricot, L., Duque, J., **Zénon, A.**, (2017) cTBS disruption of the supplementary motor area perturbs cortical sequence representation but not behavioural performance. *Neuroimage* 163, 34–40. doi:10.1016/j.neuroimage.2017.09.013
- Derosiere, G., Vassiliadis, P., Demaret, S., **Zénon, A.**, Duque, J., (2017) Learning stage-dependent effect of M1 disruption on value-based motor decisions. *Neuroimage* 162, 173–185. doi:10.1016/j.neuroimage.2017.08.075
- **Zénon, A.**, (2017) Time-domain analysis for extracting fast-paced pupil responses. *Scientific Reports*, Article number: 41484, doi:10.1038/srep41484
- Alamia, A., Solopchuk, O., D'Ausilio, A., Van Bever, V., Fadiga, L., Olivier, E., & **Zénon, A.** (2016) Disruption of broca's area alters higher-order chunking processing during perceptual sequence learning. *Journal of Cognitive Neuroscience*, 28(3).
- Alamia, A., Solopchuk, O., Olivier, E., & **Zénon, A.** (2016) Non-parametric algorithm to isolate chunks in response sequences. *Frontiers in Behavioral Neuroscience*, 10(SEP).
- Alamia, A., & **Zénon, A.** (2016) Statistical regularities attract attention when task-relevant. *Frontiers in Human Neuroscience*, 10(FEB2016).
- Alamia, A., de Xivry, J.-J. O., San Anton, E., Olivier, E., Cleeremans, A., & **Zénon, A.** (2016) Unconscious associative learning with conscious cues. *Neuroscience of Consciousness*, 2016(1), niw016.
- Derosiere, G., **Zénon, A.**, Alamia, A., & Duque, J. (2016) Primary motor cortex contributes to the implementation of implicit value-based rules during motor decisions. *NeuroImage*.
- Solopchuk, O., Alamia, A., Olivier, E., & **Zénon, A.** (2016) Chunking improves symbolic sequence processing and relies on working memory gating mechanisms. *Learning and Memory*, 23(3). <https://doi.org/10.1101/lm.041277.115>
- Solopchuk, O., Alamia, A., & **Zénon, A.** (2016) The role of the dorsal premotor cortex in skilled action sequences. *Journal of Neuroscience*, 36(25). <https://doi.org/10.1523/JNEUROSCI.1199-16.2016>
- **Zénon, A.**, Devesse, S., & Olivier, E. (2016) Dopamine manipulation affects response vigor independently of opportunity cost. *Journal of Neuroscience*, 36(37). <https://doi.org/10.1523/JNEUROSCI.4467-15.2016>
- **Zénon, A.**, Duclos, Y., Carron, R., Witjas, T., Baunez, C., Regis, J., ... Eusebio, A. (2016) The human subthalamic nucleus encodes the subjective value of reward and the cost of effort during decision-making. *Brain*, 139(6). <https://doi.org/10.1093/brain/aww075>

- Courjon, J.-H., **Zénon, A.**, Clément, G., Urquizar, C., Olivier, E., & Pélisson, D. (2015) Electrical stimulation of the superior colliculus induces non-topographically organized perturbation of reaching movements in cats. *Frontiers in Systems Neuroscience*, 9(JULY).
<https://doi.org/10.3389/fnsys.2015.00109>
- Davare, M., **Zénon, A.**, Desmurget, M., & Olivier, E. (2015) Dissociable contribution of the parietal and frontal cortex to coding movement direction and amplitude. *Frontiers in Human Neuroscience*, 9(MAY).
<https://doi.org/10.3389/fnhum.2015.00241>
- Gergelyfi, M., Jacob, B., Olivier, E., & **Zénon, A.** (2015) Dissociation between mental fatigue and motivational state during prolonged mental activity. *Frontiers in Behavioral Neuroscience*, 9(JULY).
<https://doi.org/10.3389/fnbeh.2015.00176>
- **Zénon, A.**, Klein, P.-A., Alamia, A., Boursoit, F., Wilhelm, E., & Duque, J. (2015) Increased reliance on value-based decision processes following motor cortex disruption. *Brain Stimulation*, 8(5).
<https://doi.org/10.1016/j.brs.2015.05.007>
- **Zénon, A.**, Sidibé, M., & Olivier, E. (2015) Disrupting the supplementary motor area makes physical effort appear less effortful. *Journal of Neuroscience*, 35(23).
<https://doi.org/10.1523/JNEUROSCI.3789-14.2015>
- **Zénon, A.**, Corneil, B. D., Alamia, A., Filali-Sadouk, N., & Olivier, E. (2014) Counterproductive effect of saccadic suppression during attention shifts. *PLoS ONE*, 9(1).
<https://doi.org/10.1371/journal.pone.0086633>
- **Zénon, A.**, & Krauzlis, R. (2014) Superior colliculus as a subcortical center for visual selection | Le colliculus supérieur. *Medecine/Sciences*, 30(6–7).
<https://doi.org/10.1051/medsci/20143006013>
- **Zénon, A.**, & Olivier, E. (2014) Contribution of the basal ganglia to spoken language: Is speech production like the other motor skills? *Behavioral and Brain Sciences*, 37(6).
<https://doi.org/10.1017/S0140525X13004238>
- **Zénon, A.**, Sidibé, M., & Olivier, E. (2014) Pupil size variations correlate with physical effort perception. *Frontiers in Behavioral Neuroscience*, 8(AUG).
<https://doi.org/10.3389/fnbeh.2014.00286>
- Krauzlis, R. J., Lovejoy, L. P., & **Zénon, A.** (2013) Superior colliculus and visual spatial attention. *Annual Review of Neuroscience* (Vol. 36).
<https://doi.org/10.1146/annurev-neuro-062012-170249>
- Davare, M., **Zénon, A.**, Pourtois, G., Desmurget, M., & Olivier, E. (2012) Role of the medial part of the intraparietal sulcus in implementing movement direction. *Cerebral Cortex*, 22(6).
<https://doi.org/10.1093/cercor/bhr210>
- **Zénon, A.**, & Krauzlis, R. J. (2012) Attention deficits without cortical neuronal deficits. *Nature*, 489(7416).
<https://doi.org/10.1038/nature11497>
- Davare, M., **Zénon, A.**, Pourtois, G., Desmurget, M., & Olivier, E. (2011) Role of the medial part of the intraparietal sulcus in implementing movement direction. *Cerebral Cortex*, bhr210.
- Filali-Sadouk, N., Castet, E., Olivier, E., & **Zénon, A.** (2010) Similar effect of cueing conditions on attentional and saccadic temporal dynamics. *Journal of Vision*, 10(4), 21.1-13.
<https://doi.org/10.1167/10.4.21>
- **Zénon, A.**, Filali, N., Duhamel, J.-R., & Olivier, E. (2010) Saliency representation in the parietal and frontal cortex. *Journal of Cognitive Neuroscience*, 22(5), 918–930.
<https://doi.org/10.1162/jocn.2009.21233>
- **Zénon, A.**, Hamed, S. B., Duhamel, J.-R., & Olivier, E. (2009) Attentional guidance relies on a winner-take-all mechanism. *Vision Research*, 49(12).
<https://doi.org/10.1016/j.visres.2009.03.010>