



# MultipleYE

CA21131

## NEWSLETTER ISSUE #1 - JAN 2023



### Who we are?

MultipleYE is a COST Action funded by the European Union. COST Actions are research networks supported by the European Cooperation in Science and Technology, or COST for short. As a funding organisation, COST supports our continuously growing network of researchers across Europe and beyond by providing financial means for conducting several types of networking activities. These activities include working group meetings, training schools to share skills with younger researchers and scientific research visits, among others.

The project title of the MultipleYE COST Action is: Enabling multilingual eye-tracking data collection for human and machine language processing research. This means that the MultipleYE COST Action aims to foster an interdisciplinary network of research groups working on collecting eye-tracking data from reading in many languages. The goal is to support the development of a large multilingual eye-tracking corpus and enable researchers to collect data by sharing infrastructure and their knowledge between various fields, including linguistics, psychology, and computer science. This data collection can then be used to study human language processing from a psycholinguistic perspective as well as to improve and evaluate computational language processing from a machine learning perspective.

### Supported Languages

**MultipleYE**

- Romance languages**
  - French - Switzerland, Canada
  - Portuguese - Portugal
  - Rhaeto-Romanic - Switzerland
  - Romanian - Rumania
  - Spanish - Spain, Mexico
- Germanic languages**
  - Danish - Denmark
  - Deutsch - Germany
  - English - UK, USA, Canada
  - Dutch - Netherlands
  - Norwegian - Norway
  - Swedish - Sweden
- Uralic language**
  - Estonian - Estonia
- Semitic languages**
  - Arabic - Turkiye
  - Hebrew - Israel
  - Maltese - Malta
- Isolated languages**
  - Basque - Spain
- Turkish language**
  - Turkish - Turkiye
- Slavic languages**
  - Croatian - Croatia
  - Macedonian - North Macedonia
  - Polish - Poland
  - Serbian - Serbia
  - Slovenian - Slovenia
  - Czech - Czech Republic
  - Ukrainian - Ukraine
- Balkan Indo-Germanic**
  - Albanian - Albania
  - Greek - Greece, Cyprus
- Baltic languages**
  - Latvian - Latvia
  - Lithuanian - Lithuania

MultipleYE also supports languages beyond Europe (US, Canada, Mexico, Pakistan) and aims to broaden language coverage in the future.

### Action Details



**Chair:** *Dr. Nora HOLLENSTEIN*

**Vice Chair:** *Prof. Lena JAEGER*

**Grant Holder:** **University of Zurich, Switzerland**

**Start of Action:** **28 September, 2022**

**End of Action:** **27 September, 2026**

**CSO approval date:** **27 May, 2022**

### Areas of Expertise

- Linguistics: Corpus creation and annotation, databases, data mining, data curation, computational modelling.
- Psychology: Psycholinguistics: human language comprehension, language pathologies, L1 and L2 language processing, language acquisition, reading.
- Computer and Information Sciences: Natural Language Processing, Machine Learning algorithms.



# Working Groups



The action research topics are structured in five Working Groups collaborating and providing mutual feedback within MultiPEYE. Each WG is independently managed by a WG Leader to ensure the timely production of deliverables and to facilitate and coordinate between the participants.

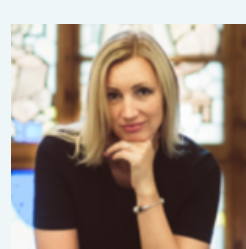
## WG1: Enabling eye-tracking data collection

This Working Group will focus on the multilingual data collection, compiling a large resource of eye-tracking data from natural reading in many languages. These data collection efforts will include larger European languages as well as smaller languages. Researchers will be enabled to conduct eye-tracking experiments by sharing expertise and infrastructure through Short-Term Scientific Missions. One of the main aims is to provide a resource of reading from naturally occurring texts including comprehension questions. Eye-tracking data will be collected from both native readers and second language learners. In addition to the reading data, the Action will assess participants' cognitive and linguistic skills via psychometric testing, for instance, working memory capacity, cognitive control, vocabulary size, and print exposure, as well as some information concerning their demographic and educational background.

### DELIVERABLES

- Data statement: format, documentation, and metadata requirements & open access repository to collect all sub-datasets as well as tools and software useful for multilingual eye-tracking data collection.
- Stimulus corpus: an initial collection of texts to be used in the experiments for all involved languages.
- Implementation of the experimental presentation and the data preprocessing pipeline including the development of a Python package for preprocessing eye-tracking data.
- Training School and Workshop on data collection.

### WORKING GROUP LEADER



**Dr. Ramunė KASPERĖ**  
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## WG2: Experiment Design and Methodology

Eye-tracking methodology and experimental decisions play a crucial role in this endeavour. There is a range of methodological choices that needs to be carefully addressed. These include font choices in reading experiments, paragraph-level and document-level linguistic and layout characteristics and other formatting aspects. The objective of this Working Group is to converge to a standard experiment design for natural reading experiments. This Working Group will also investigate current state-of-the-art possibilities of using low-cost eye-tracking technology such as webcam-based eye-tracking for reading studies and analyse to what extent and in what way self-paced reading data corresponds to certain reading measures extracted from eye-tracking data. There is a lack of research in that area and the quality of these methods has not yet been thoroughly evaluated for natural reading.

### DELIVERABLES

- Guidelines defining general desiderata for experiment design used for natural reading.
- Publication(s) addressing methodological research questions including a paper on lessons learned and best practices for eye-tracking methodology for naturalistic reading experiments.
- Training School and Workshop on eye-tracking methodology.

### WORKING GROUP LEADER



**Prof Duygun EROL BARKANA**  
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## WG3: Eye-tracking for Psycholinguistic Research Questions

A large multilingual eye-tracking corpus will provide a long-awaited resource for tackling psycholinguistic research questions from a cross-linguistic perspective and hence allow for more generalizable results. WG 3 will make use of this resource and, by means of statistical hypothesis testing as well as computational cognitive modelling, will address different scientific questions.

WG 3 is tightly coupled with WG 1 and will be in close contact to corroborate the linguistic characteristics of the reading corpus and the additional assessments to be conducted.

### DELIVERABLES

- Publications in (psycho-)linguistics journals based on collected data addressing the research questions of this Working Group.
- Training School in statistics and computational modelling for psycholinguistics.
- Workshop to address cross-linguistic research questions.

### WORKING GROUP LEADER



**Prof Mila VULCHANOVA**  
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## WG4: Natural Language Processing Applications Leveraging Eye-tracking Data

WG4 will investigate the potential applications of eye-tracking data in natural language processing. The WG will study the cognitive plausibility of multilingual language models by providing a method for intrinsic evaluation as well as opportunities to analyse the similarities and differences in human and machine attention. The WG will further study how eye-tracking data can be used to improve transfer learning between similar languages as well as from a high-resource to a low-resource language. The large eye-tracking data collection will enable researchers to study machine translation acceptability, and to develop personalized text summarization.

### DELIVERABLES

- Publications in NLP conference proceedings and journals including a review paper summarizing the applications of eye-tracking data in NLP.
- Training School and Workshop in machine learning and NLP for linguists.

### WORKING GROUP LEADER



**Dr Jamal ABDUL NASIR**  
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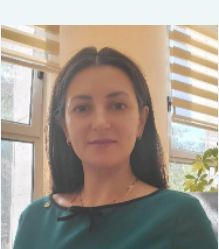
## WG5: Dissemination

The Dissemination Working Group will coordinate with the other four groups to ensure timely dissemination of the results through various channels. Firstly, it will promote and coordinate the publication of the results on scientific venues (conferences and journals) and advertise these via the COST Action's website and social media channels. This Working Group will further be in charge of handling conference grants for junior researchers and open access publication costs and, lastly, of writing the final project report.

### DELIVERABLES

- Science communication plan.
- Project website.
- Social media channels.
- Open access publications.
- Final report on dissemination activities.

### WORKING GROUP LEADER



**Dr. Evis TRANDAFILI**  
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# MultiEYE events

## Management Committee kick-off meeting

COST Action MultiEYE had its first management committee meeting on September 28th, 2022. The meeting was held in COST offices in Brussels, Belgium. MultiEYE Management Committee (MC) has representatives from all the action COST member countries reflecting the intergovernmental character of COST. The MC has the decision powers for governing MultiEYE in order to implement activities and manage the budget in view of achieving the MoU objectives. During the meeting the MC elected leadership positions, voted for having co-leader positions for all working groups and decided to delegate part of its powers to a Core Group. Furthermore, MC discussed of augmenting the potential of the network by increasing external research funding and grants and possible industry involvement.



## Core Group Online Meeting on 15 November 2022

MultiEYE Core Group met at its first meeting on November 15th, 2022. The meeting was held online. During the virtual meeting responsibilities, tasks and current status of each leadership position were discussed.

The Core Group consists of the Action Chair, Vice-Chair, Working Group Leaders, the Science Communication Officer, the Grant Awarding Coordinator, and the Grant Holder Scientific Representative. The Core Group has delegated powers from the management committee.

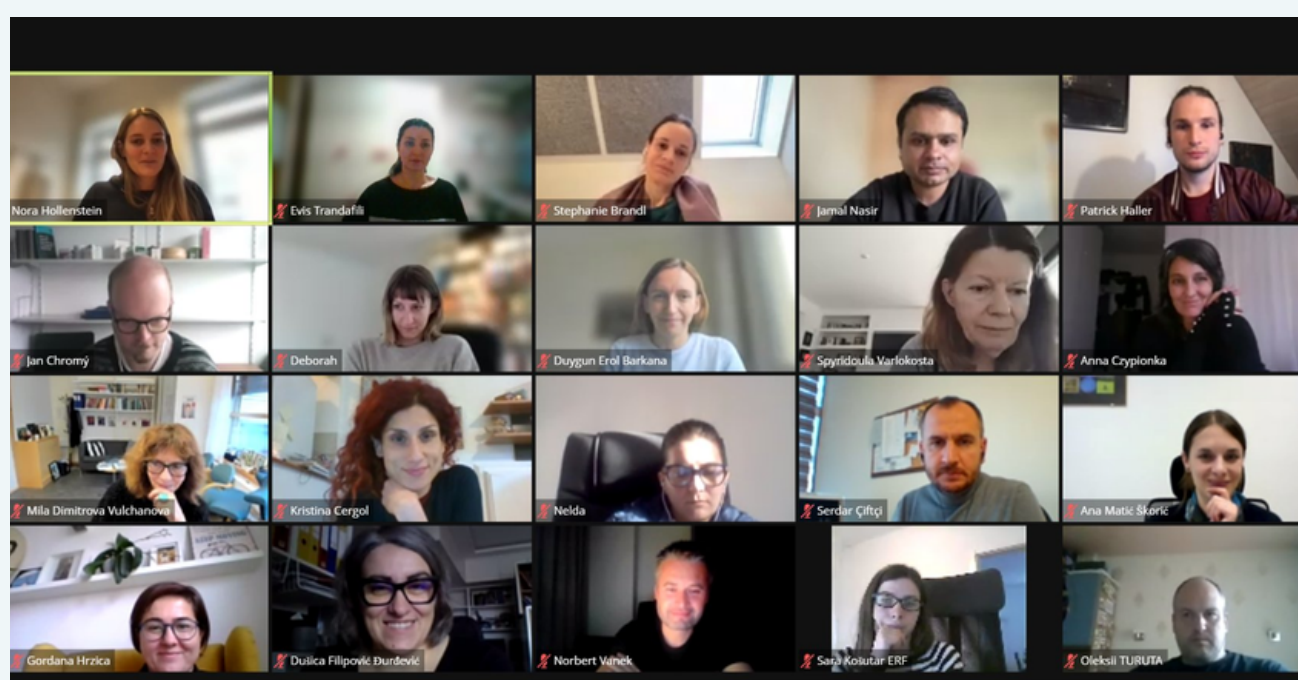
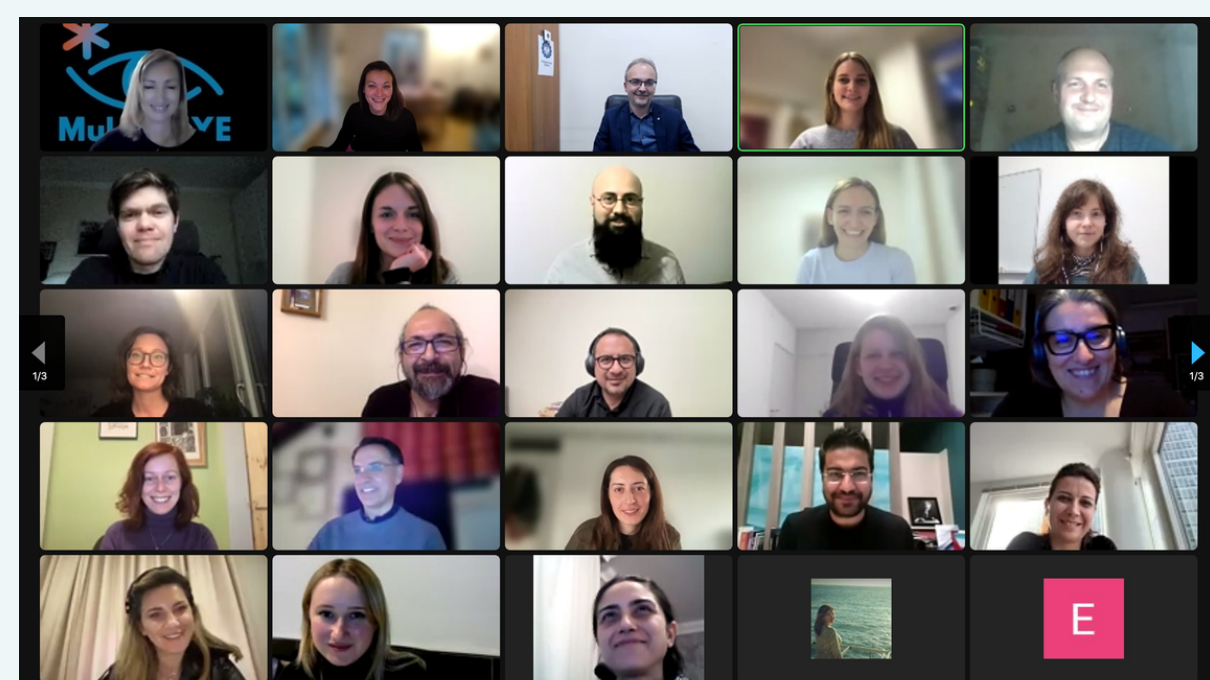
The MultiEYE Core Group is composed by:

- Dr. Nora Hollenstein, Chair of the action,
- Prof. Lena JÄGER, Vice Chair and Grant Holder Scientific Representative
- Dr. Ana MATIC SKORIC, Grant Awarding Coordinator
- Anna Bondar, Grant Holder Manager
- Dr. Evis Trandafili, Science Communication Coordinator and Leader of WG5
- Dr Ramunė KASPERĖ, Leader of WG1
- Prof. Duygun EROL BARKANA, Leader of WG2
- Prof. Mila VULCHANOVA, Leader of WG5
- Dr Jamal ABDUL NASIR, Leader of WG4



## Working Groups Virtual Meetings on December 1-2, 2022

Many interdisciplinary researchers came to work together on collecting eye-tracking data from reading in many languages. The MultiEYE working groups met online on December 1-2, 2022. The Chair Dr. Nora Hollenstein and the Vice Chair of the action Prof. Lena Jaeger attended the WGs meetings and introduced to the members the overall objectives of this Cost Action. WG Leaders introduced the specific objectives of each WG and discussed the WG deliverables, plans for year 1, upcoming funding calls, etc. with all the members.



# Forthcoming Events

## First in-person WG1 & WG2 meeting in Poland

The first in-person WG1 & WG2 meetings will take place on February 9-10, 2023, in Warsaw, Poland at the SWPS University of Social Sciences and Humanities.

The main objective of the meeting is establishing the design for the MultiEYE data collection and eye-tracking methodology.

Everyone (not only Management Committee members) who is a member of WG1 and/or WG2 is eligible to apply for attendance and will be reimbursed upon the completion of the event if he/she is elected by the COST Action Committee.

There are 25 eligible places that will be reimbursed by COST for members of WG1 and/or WG2 who wish to participate in the meeting(s). Priority is given to WG1 and WG2 members, although action members from other Working Groups can also apply.

Members interested in attending, will apply by sending the [application form](#) via e-mail to the official action email address [multipleye.2022@gmail.com](mailto:multipleye.2022@gmail.com) by January 9, 2023. The application form should contain a brief letter of motivation where members should explain why they wish to attend the meeting, how it will benefit their research and how they plan to contribute to the WG and Action objectives.



## First Training School

For inexperienced researchers wanting to learn about eye-tracking, MultiEYE will organize a training school in April 19-21, 2023 with the topic "Eye-Tracking data collection and methodology". The focus of the training school will be teaching eye-tracking skills to researchers inexperienced in this field.

The agenda and application details will follow soon. Check our website for up to date information.

## Recent Network Publications

- **Nora Hollenstein, Itziar Gonzalez-Dios, Lisa Beinborn, and Lena Jäger.** 2022. Patterns of Text Readability in Human and Predicted Eye Movements. In Proceedings of the Workshop on Cognitive Aspects of the Lexicon, pages 1–15, Taipei, Taiwan. Association for Computational Linguistics. <https://aclanthology.org/2022.cogalex-1.1>
- **Stephanie Brandl & Nora Hollenstein.** Every word counts: A multilingual analysis of individual human alignment with model attention. Accepted at ACL 2022. <https://arxiv.org/abs/2210.04963>
- Christoforou, C. **Papadopoulos, T. C., & Theodorou, M.** (2022). Toward the study of the neural underpinnings of dyslexia during final-phoneme elision: A machine learning approach. *Brain Informatics, LNAI 13406*, 74–85., [https://doi.org/10.1007/978-3-031-15037-1\\_7](https://doi.org/10.1007/978-3-031-15037-1_7)
- **Siegelman, N.,** Schroeder, S., Acartürk, C. et al. Expanding horizons of cross-linguistic research on reading: The Multilingual Eye-movement Corpus (MECO). *Behav Res* 54, 2843–2863 (2022). <https://doi.org/10.3758/s13428-021-01772-6>
- **Kuperman, V., Siegelman, N.,** Schroeder, S., Acartürk, C., Alexeeva, S., Amenta, S., . . . Usal, K. (2022). Text reading in English as a second language: Evidence from the Multilingual Eye-Movements Corpus. *Studies in Second Language Acquisition*, 1-35. [doi:10.1017/S0272263121000954](https://doi.org/10.1017/S0272263121000954)
- Yang, J., Van den Bosch, A., & **Frank, S.L.** (2022). Unsupervised text segmentation predicts eye fixations during reading. *Frontiers in Artificial Intelligence*, 5, 731615. <https://doi.org/10.3389/frai.2022.731615>
- **Matić, A., Kovačević, M.** (2022). Challenges of different approaches and methodologies in psycholinguistics: the example of an RC attachment preference study in Croatian. In: G. Csibra, J. Gervain i K. Kovács (Eds.), *A Life in Cognition Studies in Cognitive Science in Honor of Csaba Pléh*. Springer Nature Switzerland AG, 125-136. [DOI: 10.1007/978-3-030-66175-5\\_10](https://doi.org/10.1007/978-3-030-66175-5_10)
- **Palmovic, Marijan & Matić Škorić,** Ana & Zelenika Zeba, Mirta & Kovacevic, Melita. (2022). Phonological and Lexical Effects on Reading in Dyslexia. [https://www.researchgate.net/publication/363173432\\_Phonological\\_and\\_Lexical\\_Effects\\_on\\_Reading\\_in\\_Dyslexia](https://www.researchgate.net/publication/363173432_Phonological_and_Lexical_Effects_on_Reading_in_Dyslexia)
- **Joseph Marvin Imperial.** 2022. NU HLT at CMCL 2022 Shared Task: Multilingual and Crosslingual Prediction of Human Reading Behavior in Universal Language Space. In Proceedings of the Workshop on Cognitive Modeling and Computational Linguistics, pages 108–113, Dublin, Ireland. Association for Computational Linguistics. [doi: 10.18653/v1/2022.cmcl-1.12](https://doi.org/10.18653/v1/2022.cmcl-1.12)
- Cybulski, P., & **Krassanakis, V.** (2022). The effect of map label language on the visual search of cartographic point symbols. *Cartography and Geographic Information Science*, 49(3), 189–204. <https://doi.org/10.1080/15230406.2021.2007419>
- Reich, David & Prasse, Paul & Tschirner, Chiara & Haller, Patrick & Goldhammer, Frank & **Jäger, Lena.** (2022). Inferring Native and Non-Native Human Reading Comprehension and Subjective Text Difficulty from Scanpaths in Reading. 1-8. <https://doi.org/10.1145/3517031.3529639>.
- **Daniel Krakowczyk** and **David Robert Reich** and Paul Prasse and Sebastian Lapuschkin and **Lena Ann Jaeger** and Tobias Scheffer, (2022), Selection of XAI Methods Matters: Evaluation of Feature Attribution Methods for Oculomotoric Biometric Identification. <https://openreview.net/forum?id=GOLdDAP2AtI>
- **Frank, S.L.** & Aumeistere, A. (2022). An Eye-tracking-with-EEG Coregistration Corpus of Narrative Sentences. Manuscript submitted for publication. Preprint: <https://psyarxiv.com/j5fgd>
- Birawo, B., & **Kasprowski, P.** (2022). Review and Evaluation of Eye Movement Event Detection Algorithms. *Sensors*, 22(22), 8810. <https://doi.org/10.3390/s22228810>
- Harezlak, K., Basek, P., & **Kasprowski, P.** (2022). Side Keyboard—the New Approach for Eye-typing. *Procedia Computer Science*, 207, 3348–3357. <https://doi.org/10.1016/j.procs.2022.09.393>
- **Kasprowski, P.** (2022). eye-tracking Hardware: Past to Present, and Beyond. In *eye-tracking* (pp. 31-48). Humana, New York, NY. [https://doi.org/10.1007/978-1-0716-2391-6\\_3](https://doi.org/10.1007/978-1-0716-2391-6_3)
- Amenta, S., **Hasenäcker, J.,** Crepaldi, D. & Marelli, M. (2022). Prediction at the intersection of sentence context and word form: Evidence from eye movements and self-paced reading. *Psychonomic Bulletin & Review*, Online First. [doi:10.3758/s13423-022-02223-9](https://doi.org/10.3758/s13423-022-02223-9)

## Funded Projects

MultipleYE aims to augment the potential of the MultipleYE COST Action with additional research funding inside the network.

- The language leak: the statistics of language as a novel window into the multilingual mind. Awarded to Stefan Frank by the Dutch Research Council. 2023-2027 <https://www.ru.nl/cls/our-research/research-groups/grammar-cognition/current-projects/current-projects/language-leak-statistics-language-novel-window/>
- Language emergence and development in the absence of a conventionalized linguistic model. Awarded to Funda Yildirim by BIDEB, Jan 2019-Dec 2022. <http://www.rabiaergin.com/language-emergence-and-evolution.html>
- External research grant from the Foundation for Research in Science and the Humanities at the University of Zurich to partially fund the data collection. Title: “Creating a Multilingual Eye-Tracking Corpus for Human and Machine-Based Language Processing” <https://www.cl.uzh.ch/en/digital-linguistics/research/eyetracking-corpus.html>
- Internal funding from Department of Computational Linguistics, University of Zurich for setting up data management system and data repository.
- External research grant by the Swiss National Science Foundation and the Croatian Science Foundation collection. Title: “Measurement Reliability of Individual Differences in Sentence Processing” <https://www.cl.uzh.ch/en/digital-linguistics/research/MeRID.html>
- External industry funding from EyeLOGIC GmbH (Berlin) who is willing to lend one eye-tracker to the Action’s researchers. Negotiations in progress
- External grant for data management & storage by SwissUniversities. Grant application under review

## Recommended Activities

7th Special Session on Eye Movement Data Processing and Analysis, Special Session during KES 2023 Conference, 6-8 September 2023, Athens, Greece, [www.emdpa.org](http://www.emdpa.org)  
*Session devoted to eye-tracking during the renowned KES Conference in Athens (September). Submission deadline: April. All details on the web page.*

Special Issue "Eye-Tracking Sensors Data Analysis with Deep Learning Methods", Special Issue in the journal (IF: 3.847) [https://www.mdpi.com/journal/sensors/special\\_issues/222OW6L8TU](https://www.mdpi.com/journal/sensors/special_issues/222OW6L8TU)  
*Deadline: end of March. Possibility for FREE publication (contact the Special Issue Editor)*

## Software Tools



A Python package for processing eye movement data.  
<https://github.com/eye-lab/pymovements>

## Contact Us

### Action Chair



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### Action Vice Chair Grant Holder Scientific Representative



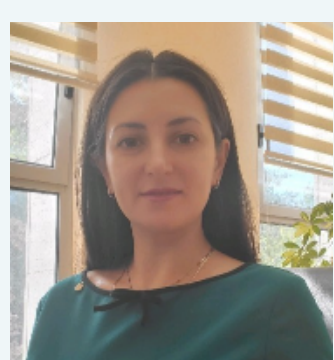
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## Join Us

The network of CA21131 is supported by 35 countries (29 Cost Member Countries, 2 Near Neighbour Countries and 4 International Partner Countries) with native speakers (and language learners) of 28 languages. So far, 129 members have joined the action working groups, a number which is continuously growing since MultipleYE network is open to new participants

To participate as a Working Group member, contact the Action's Chair or the WG Leaders to discuss your potential contribution in each Working Group.

If you are affiliated to an institution, you can join MultipleYE as a member of one or two Working Groups (WGs).

If you are affiliated in a COST country that has not yet representation in the CA21131 - MultipleYE Management Committee (MC), you can contact the COST National Coordinator (CNC) of your country to be included. For each Action, up to two representatives per COST Member can be nominated to the MC. The MC is responsible for the coordination, implementation, and management of an Action.



## JOIN MULTIPLEYE NETWORK

Any researcher or innovator working in eye-tracking data collection for human and machine language processing research, can request joining the network by sending a membership application here:

<https://www.cost.eu/actions/CA21131/>

