



# Data Collection Guidelines

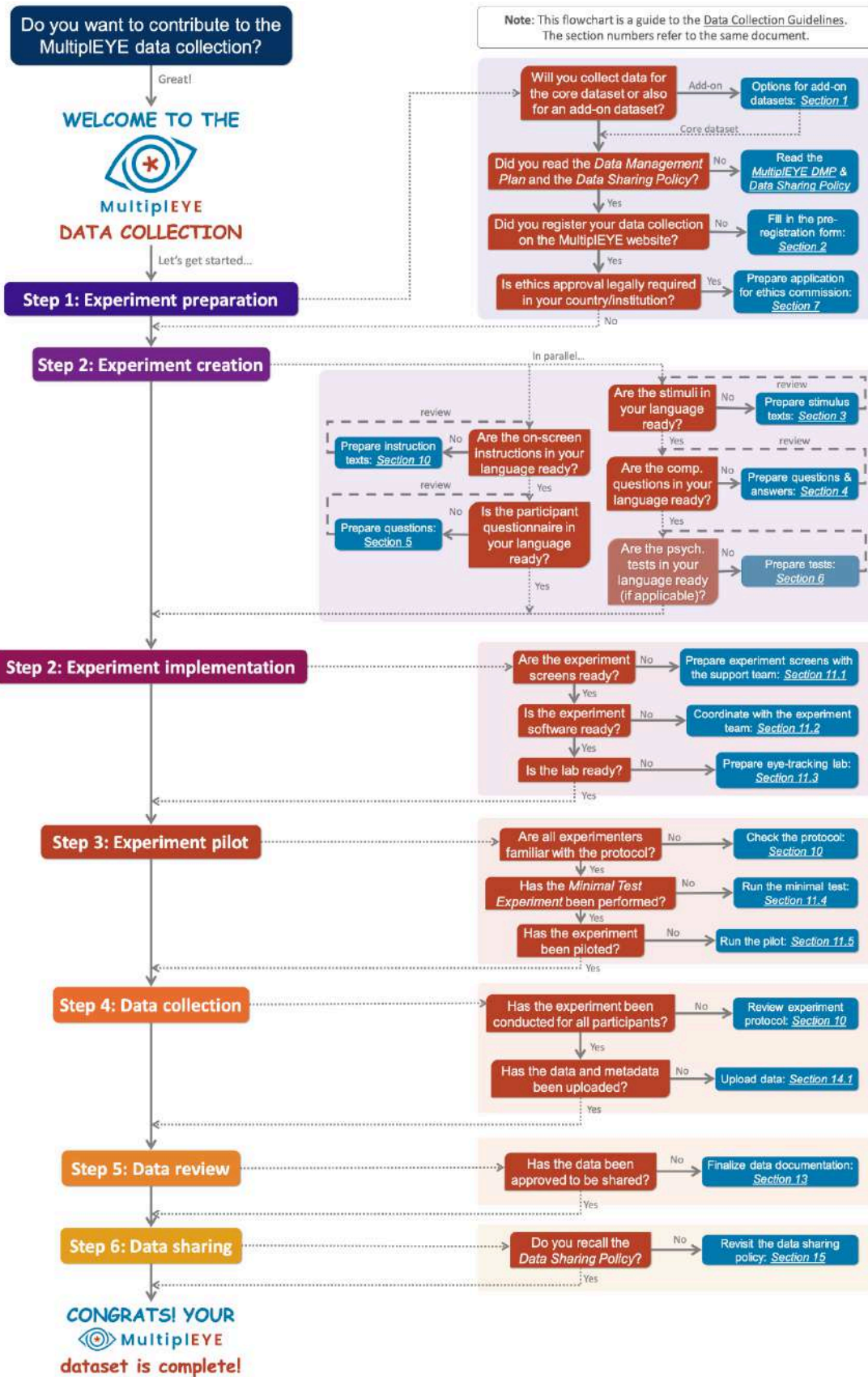
History of changes		
Version	Date	Changes
0.1	06/03/24	Work in progress - First version to be published on MultiplEYE website
0.2	18/03/24	Details about responsible researchers & other team members in Section 2
0.3	19/04/24	Completed information about psychometric tests in Section 6
0.4	06/05/24	Added <a href="#">general rules for translation</a> for the psychometric tests (Section 6.1); description and instructions of comprehension questions (Section 4); specified data upload process (Section 14.1)
0.5	15/05/24	Added <a href="#">checklist for experiment preparation</a> ; changes related to shortened experiment duration (back-up texts)
0.6	22/05/24	Updated links to documentation forms; minor changes regarding WG1 meeting in Kaunas



## **Welcome to the MultiplEYE data collection project!**

Our goal is to collect a large dataset from eye-tracking-while-reading in as many languages as possible. Within the MultiplEYE network, we have designed and implemented an eye-tracking experiment and we encourage all labs with eye-tracking equipment to participate in this study. The collected eye-tracking data will be made freely available for the research community in various formats on a shared repository, the MultiplEYESTore (connected to PsychArchives). Furthermore, we have created a detailed [Data Management Plan](#) (DMP) and a [Data Policy Agreement](#). As a MultiplEYE contributor, you agree and adhere to these documents.

This document contains all the details needed to participate in the data collection. The experiment implementation and the data preprocessing will be done by MultiplEYE team members. Follow the steps in the flowchart below to get started.





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## 1 Core dataset and add-on datasets

MultiplEYE aims to produce a large core dataset consisting of eye-tracking data in multiple languages from a participant population described in Section 8. This dataset is the main objective of the MultiplEYE data collection.

Within the [MultiplEYE Data Management Plan](#) (Section 1), you can find a detailed data description of the MultiplEYE core dataset.

**This document is a guide on how to collect data for the core dataset.**

We welcome multiple datasets of the same language. If your language is already part of the MultiplEYE data collection, please contact us so we can provide access to the already prepared parts of the experiment and connect you with the responsible team(s).

Furthermore, if you wish to collect additional data for your research purposes, we also invite researchers to collect add-on datasets in the MultiplEYE repository.



Please contact us before starting with the preparations for recording an add-on dataset! Additionally, check out Section 1.2 of the [MultiPEYE Data Management Plan](#) to find more details.

An **add-on dataset** could consist of:

- Second language (L2) data (i.e., also running the experiment in any other available language than the native language of your participants)
- Data from additional populations (readers with dyslexia or attention disorders, younger and older readers, etc.)
- Additional cognitive and lexical assessment tests or individual differences tests
- Additional sessions with additional stimuli texts, but keeping the experiment implementation the same
- Different methods on the same stimuli: webcam eye-tracking, mouse tracking, self-paced reading experiments

These additional types of data will become MultiPEYE add-on datasets. It will be possible to filter the MultiPEYE data repository with all these criteria.

You are welcome to collect such additional data and to re-use the prepared stimuli in English (or any other language). All add-on datasets will also run through the same processing pipelines to ensure the data can be shared in the same formats as the core dataset.

**Note that if you do collect an add-on dataset, this is in addition to the core dataset and the structure, protocol, and stimuli of the core dataset cannot be modified.**

However, recording any add-on data is not a requirement. You can simply collect data for the core dataset and adhere to the guidelines in this document. An add-on dataset should only be considered once a core dataset for the given language already exists.

## 1.1 FAQs

### **What does a core MultiPEYE dataset include?**

A core MultiPEYE dataset includes the eye-tracking experiment as described in this document. In short: The eye-tracking recordings of 100 participants reading the stimuli texts silently in their native language (see [Section 8](#)), including the comprehension questions (see [Section 4](#)), the psychometric test(s) (see [Section 6](#)), and a short questionnaire (see [Section 5](#)).

### **How will add-on datasets be handled in the repository?**

Add-on datasets will be clearly marked as such and can be filtered by various criteria, e.g. native language, test type, etc.

### **Can I collect data in multiple languages?**

Yes, you can run the experiment in as many languages as you wish. You can use the existing materials in all available languages. Please ensure all criteria for each language are met (e.g., enough participants, stimulus texts are available, etc.). However, the native



language (L1) experiment should be conducted first, in case participants are included in multiple experiments.

## 2 Prerequisites for participation

There will be three metadata forms for each lab to fill in on the [MultiplEYE website](#):

### 1. **BEFORE data collection:** [Dataset pre-registration form](#)

The first form is filled in BEFORE the data collection. Labs must enter their name, city, etc. (see metadata documentation form: title). In this form, we only collect the name of the responsible researcher. All additional team members who contribute to a dataset will be recorded at a later stage.

We also collect information about resolution, monitor size, etc., as well as contact details of the researchers involved or other relevant information. When pre-registering, it is also important to mention if you are planning to use multiple eye-trackers (i.e., different eye-tracker models) for your data collection. Please note that the pre-registration form cannot be edited after submission. We recommend carefully reviewing the entered information to avoid any typos. If you need to make changes or corrections after submission, please contact us directly via email at [multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch).

Once your data collection is registered you will receive access to a folder on a secure private cloud for all necessary data uploads (i.e., the output files of the [minimal experiment test](#), of the [experiment pilot](#), and of the [complete dataset](#)).

### 2. **DURING/AFTER preparation of the stimulus materials**

When preparing and/or translating the stimulus texts into your language, it is likely that there will be deviations from the English texts (e.g. changes or errors in translation, misaligned experiment pages, etc.). Please take notes about all these differences and submit them through the [Stimulus Deviation Documentation Form](#). You can submit one form per text, and you can resubmit a form for a given text multiple times as the information will be aggregated in the background.

3. See [Section 13](#) for information about the metadata documentation form to be completed **AFTER data collection**.

## 2.1 Eye-tracking lab

Before getting started, make sure your eye-tracking facilities are ready by following the checklist below.

Checklist:

- Do you have access to a lab with an eye-tracker?
- Do you know how to use the eye-tracker?
- Do you have experience in running eye-tracking experiments?



- Do you have the capacity to collect data from 100 participants for the language of the experiment?
- Do you have the funds to reimburse the lab assistants and participants?

If your answer is no to any of the above questions, but you would still like to collect data for MultiplEYE in your language, please contact us ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

## 2.2 FAQs

### **I have a different eye-tracker than the ones mentioned in [Section 9.1](#), how should I proceed?**

Please contact the experiment support team to work out whether it is possible to convert the experiment for your specific eye-tracker ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

### **Can one dataset be recorded in multiple labs?**

If two labs from the same country wish to share the load of data collection, this is possible. However, this is only possible if the same eye-tracker model is used in both labs. Make sure to register as a joint lab effort in the metadata form.

## 3 Stimulus materials

In this section, we describe the texts that are read by the participants during the experiment as well as any details related to the text selection.

In [this file](#) (StimulusTexts.xlsx - Sheet “FinalSelectionEN”), you can see an overview of the 10 stimulus texts, 2 practice texts and 2 backup texts that have been selected to be part of the MultiplEYE core dataset.

The texts for the MultiplEYE experiment were selected based on criteria of text genre, original language, and available translations.

In the same file, in the Sheet “LanguageOverview”, please mark all the texts you have added for your language.

If there are texts that are not available in your language, please contact us so that together we can try to procure translations ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

**Changelog:** If you have been working on this task for some time, please make sure to check [the changelog](#) before finalizing your files to ensure that you have considered any changes that have occurred in the English files.

### 3.1 Required files

[In this folder](#) you will find a directory for each language. For each of the texts, please upload the following two formats and the metadata file:





### 1. Text files

Upload a TXT file for each of the 14 texts into the “texts” subfolder of your language’s directory. The first line is for the title, followed by an empty line. Please make sure the encoding of the file is UTF-8 so that special characters will be displayed correctly. Even if you already found all these texts in your language and have uploaded them, please make new files with the correct excerpt and title. You can follow the English files for guidance. Please format the titles and filenames in the same way as in the English files.

**Filename:** *TextID\_Language.txt*, for example, *PopSci\_MultiplEYE\_en.txt*

Note: For the language code, please use the lowercase two-letter ISO 639-1 standard. You can find a list here: [https://en.wikipedia.org/wiki/List\\_of\\_ISO\\_639-1\\_codes](https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes)

### 2. Experiment Excel file

Upload an Excel file containing the 2 practice texts and the 10 stimulus texts split into the experiment pages. You can copy and adapt the English file (*multipleye\_stimuli\_experiment\_en.xlsx*). **Follow the English separation of the pages as closely as possible.**

This file is the input for the experiment code and will be used by the experiment presentation team to automatically generate the experiment screens (see [Section 11.1](#)).

Please **do not** change columns A, B, and C (the ID and the title should stay the same across all languages).

The final version of the file should have one row for each of the 12 texts. The number of filled columns is variable for each text, depending on the text length. Please do not delete any columns even if they are empty for all rows.

**Filename:** *multipleye\_stimuli\_experiment\_Language.xlsx*, for example, *multipleye\_stimuli\_experiment\_da.xlsx*

### 3. Backup Excel file

This Excel file has the same structure as the experiment Excel file (2.), but only contains the 2 backup texts.

You can copy and adapt the English file (*BACKUP\_multipleye\_stimuli\_experiment\_en.xlsx*).

**Follow the English separation of the pages as closely as possible.**

This file will **not** be used for the experiment. However, it provides additional texts that can be used by you or other researchers for additional eye-tracking studies.

**Filename:** *BACKUP\_multipleye\_stimuli\_experiment\_Language.xlsx*, for example, *BACKUP\_multipleye\_stimuli\_experiment\_da.xlsx*

### 4. Metadata Excel file

Please also fill in a file with the name *metadata\_Language.xlsx* (e.g., *metadata\_en.xlsx*) and add/replace the missing information for each text in your language. Instructions for each column can be found in the Sheet “Guidelines”.



You can check the English file for reference and copy it as a template for your language. You can find the metadata for all the English texts [here](#). In this file, you can also find the source URLs to where the English texts were found (sometimes these URLs lead to the same text in additional languages).

**Filename:** *metadata\_Language.xlsx*, for example, *metadata\_de.xlsx*

Note that, in addition to the stimuli texts, we need translations of the on-screen instructions and the comprehension questions. Please refer to [Section 10.3](#) and [Section 4](#) in the current document, respectively.

## 3.2 Stimulus texts

There are two categories of texts: The 10 texts used in the main experiment ([Section 3.2.1](#)), the 2 texts used in the practice trials ([Section 3.2.2](#)), and the 2 backup texts ([Section 3.2.3](#)). The texts are of different types: popular science texts (*PopSci*), literary texts (*Lit*), argumentative texts (*Arg*), institutional texts (*Ins*), and encyclopedic texts (*Enc*).

### 3.2.1 Main experiment texts

There are 10 texts in the main reading experiment. The texts are described in this section.

#### **1: PopSci\_MultiplEYE**

This popular science text is about the MultiplEYE project. It needs to be translated by a native speaker and reviewed by a second person, preferably with translation experience. You can make use of machine translation tools as long as the text is revised manually by at least two native speakers.

We use the full text.

#### **2: PopSci\_Caveman**

This popular science text is a short article from the Guardian. It needs to be translated by a native speaker and reviewed by a second person, preferably with translation experience. You can make use of machine translation tools as long as the text is revised manually by at least two native speakers.

We use the full text.

#### **3: Ins\_HumanRights**

We use the Preamble of the Universal Declaration of Human Rights as defined by the United Nations Organisation. This text is available in many languages; check the English metadata file for the source URL.

#### **4: Ins\_LearningMobility**

This text is a progress report on a Learning Mobility Benchmark from EUR-Lex, a database that provides access to European Union law in many languages. We use the first part of the



introduction of this text (in the English version, until and including line 13). This text is available in many languages; check the English metadata file for the source URL.

### **5: Lit\_Alchemist**

This text is an excerpt from “The Alchemist”, by Paulo Coelho, originally written in Brazilian Portuguese.

We use the first paragraphs of Chapter 1 (after the preface).

In the English version, the first sentence is “*The boy’s name was Santiago.*”. The last sentence of the excerpt we use is “*A friend had told the boy about the shop, and he had taken his sheep there.*”

### **6: Lit\_MagicMountain**

This text is an excerpt from “The Magic Mountain” by Thomas Mann, originally written in German.

We use the foreword at the beginning of the book (except for the last sentence “*And now we begin.*”).

### **7: Lit\_Solaris**

This text is an excerpt from “Solaris” by Stanislaw Lem, originally written in Polish.

We use a part of Chapter 2 “The Solarists” (Polish: “Solaryści”). The excerpt is directly after the paragraph referring to the book “History of Solaris” by Hughes and Eugel (the names should be the same in every language).

In the English version, the first sentence reads “*The discovery of Solaris dated from about 100 years before I was born.*”, and the last sentence of the excerpt ends with “*... the Gamow-Shapley doctrine, unchallenged for eighty years, was shaken for the first time.*”

### **8: Lit\_BrokenApril**

This text is an excerpt from “Broken April” by Ismail Kadare, originally written in Albanian.

We use a part of Chapter 3, starting from the 2nd paragraph.

In the English version, the first sentence reads “*Holding his wife’s hand, Bessian Vorpsi moved his head...*”, and the last sentence of the excerpt ends with “*It will do both of you good, and especially Bessian.*”

### **9: Arg\_PISACowsMilk**

This text is a multi-document reading task. It is part of the PISA (Programme for International Student Assessment) test conducted in 2018. The multiple-document text is treated as a single unit.

We use the introduction paragraph, the 1st and the 2nd text snippets. These text snippets are two online articles (“The Nutritional Value of Milk” and “Just say ‘no’ to cow’s milk”).

Make sure to also include the links to the websites as presented in the English version.

### **10: Arg\_PISARapaNui**

This text is a multi-document reading task. It is part of the PISA (Programme for International Student Assessment) test conducted in 2018. The multiple-document text is treated as a single unit.



We use the introduction paragraph, the 1st and the 2nd text snippets (the professor's blog post including the comments, and the book review).

Make sure to also include the links to the websites as presented in the English version.

### 3.2.2 Practice texts

The following two texts will be used in the practice trials:

#### **11: Enc\_WikiMoon**

This text is the beginning of the English Wikipedia article about the moon.

Please use Google Translate (or any similar translation tool) to translate the English file "Enc\_WikiMoon\_en.txt" into your language and revise it manually by at least two native speakers. When translating this text, please leave in the URL and the reference numbers in square brackets as they are in the English version.

Note: Since this text will be only used in the practice trials, it does not need to be a perfect translation, but merely a fluent version of it in your language.

#### **12: Lit\_NorthWind**

"The North Wind and the Sun" is one of Aesop's fables, originally from ancient Greece.

We use the complete text.

### 3.2.3 Back-up texts

We additionally prepare two back-up texts, which will be included in the MultiplEYE linguistic corpus and can be used in any available language for additional eye-tracking studies or studies related to reading comprehension. These texts also have corresponding comprehension questions available for additional studies.

#### **13: Lit\_HarryPotter**

This text is an excerpt from "Harry Potter and the Philosopher's Stone" by J.K. Rowling, originally written in English.

We use the first paragraphs of Chapter 1 - "The boy who lived" (4 paragraphs in the English version).

In the English version, the first sentence starts with "*Mr. and Mrs. Dursley, of number four, Privet Drive, were proud to say...*" and the last sentence of the excerpt ends with "*they didn't want Dudley mixing with a child like that.*".

#### **14: Lit\_EmperorClothes**

This text is the fairytale "The Emperor's New Clothes" by H.C. Andersen, originally written in Danish.

We use the complete story.



### 3.3 Alignment between languages

To make the experiment design comparable in all languages, we align the texts on the screen (= experiment pages) between the languages as equally as possible. However, due to differences in translation as well as lexical characteristics of the languages (e.g., word length and spacing, paragraph splitting in the respective translations), it might not be possible to achieve a perfect alignment of the experimental screens in your language to the English version.

In any language, the maximum number of lines on a screen is 9, and the maximum number of characters per line is 82. Note that **words cannot be split at the end of a line**. Therefore, most lines will not reach the maximum number of characters.

Therefore, we take the following two measures:

- **All languages should align as closely as possible to the English version.**
- We ensure that the first screens of each text are aligned across languages.
- We try not to add too many new screens for a given language, but rather try to add overflowing text to the beginning of the next screen.
- We provide an alignment mapping between the languages (more specifically, between English and all the other languages), where interested researchers can check the corresponding pages across languages. The mapping can be accessed [here](#) (in the Sheet *PageAlignment*).

If researchers need to split the pages differently than in the English experiment, because, e.g., one sentence in English is split into two sentences in their language or the page becomes too long, they should add a note in the documentation (there is an additional column for comments for each language).

### 3.4 FAQs

#### **What about texts that are under copyright?**

The MultiPLEYE Data Management Plan contains a detailed description of the copyright situation for our reading experiments (see Section 4 of [DMP](#)).

But the baseline is that we can use all these excerpts from copyrighted books as long as it is for research purposes only. Copies or any reproduction of the copyrighted material must not be made available to the public. Only the metadata of the copyrighted material will be a part of the MultiPLEYE repository (MultiPLEYESTore). The other texts (which are copyright-free) will be made available as a PDF on MultiPLEYESTore.

#### **What if a text is only available in print?**

You can scan and digitize the texts from a print copy in the library. We suggest either typing shorter texts manually or using OCR software to automatically detect the text and review the text for any mistakes. Please contact us if you need help with the digitalization process ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

#### **Which language code should we use?**



In the MultiplEYE project, we use the lowercase two-letter ISO 639-1 standard for language codes. You can find a list here: [https://en.wikipedia.org/wiki/List\\_of\\_ISO\\_639-1\\_codes](https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes)

**We needed to make changes to the page alignment. How should we document this?**

Document any deviations in the stimulus texts or in the alignment of the experimental screen in the [Stimulus Deviation Documentation Form](#).

**What if a text is not available in my language?**

If there are texts that are not available in your language, you can translate the English version of the text into your language. You may use machine translation systems such as Google Translate or DeepL for help, but the translations need to be revised manually. Make sure to have an additional person revising the translations. Please contact us if you need any assistance with the translations ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

**How do I qualify as a translator?**

Translators are required to self-identify as native speakers of the target language and demonstrate a high level of proficiency in English. In the MultiplEye project, we do not enforce specific professional qualifications, we welcome individuals who possess a strong passion for language and a keen motivation to collaborate on the translation tasks. Experience as a professional translator is a plus.

**Which language should a text be translated from?**

Always translate from the English version.

**How to choose the translation version of a text?**

If possible, choose the more established/most common/most widely available translation of the text. Choose the translation where the language seems most suitable and most similar to the original (if it is possible to judge).

**What if the available translation contains typos or errors?**

Please correct any typos, orthographic mistakes, or inconsistent uses of punctuation (e.g., unsystematic use of single or double quotation marks). Do not improve any translations just because you don't agree with the style if the text is accurate. Document any correction you make in the [Stimulus Deviation Documentation Form](#).

**What if the translation contains names of places or characters that are different than in the English version (or in the original language version)?**

It is ok if the names differ in your language from the original language version of a text. Make sure to use the same names consistently throughout the texts and the comprehension questions, and document any deviations from the English version in the [Stimulus Deviation Documentation Form](#).

Please check whether the name of the English translation also differs from the original language version. If this is the case, please also document this deviation from the original language version.



**How should the project name “MultiplEYE” in the *PopSci\_MultiplEYE* text be translated?**

Apply what is most common in modern/daily use of your experiment language. In most languages, the term “MultiplEYE” was kept as it is, because people are used to reading brand and company names in English. If this is also the case in your language, you can do the same, but if it is too uncommon for readers then it is ok to translate the name. If the project name deviates from the English name in your language, make sure to document it in the [Stimulus Deviation Documentation Form](#).

**When preparing the Experiment Excel file, the pages do not match the English pages. What should I do about this?**

Please document the page alignment as described in [Section 3.3](#).

**Some of the translations contain text in bold or italics. What should I do about this?**

The experiment software does not consider text formatting. Therefore, just present the text in a raw text format without spans in bold or italics.

## 4 Comprehension questions

A set of comprehension questions will be asked after each of the texts to ensure the participants' continuous attention and to measure reading comprehension. We designed questions for the particie texts, the stimulus texts, and the backup texts. The questions will be presented at the end of each text. The questions are designed following [these guidelines](#).

### Questions IDs

Each comprehension question related to a text unit constitutes one item, and it possesses a distinct item identifier (item ID).

The item IDs follow the structure “MPRC\_[stimulus name]\_[language code]\_VVXYZXXY,” comprising several components: “MP” for MultiplEye, “RC” for reading comprehension, “[stimulus name]XX” denoting the assigned names for the text unit (e.g., “Lit\_Alchemist”), “VV” representing an index ranging from 01 to 14 for the text units, “X” indicating the snippet number, typically between 1 and 2 (applicable to the second snippet of multiple-text documents like Arg\_PISACowsMilk or Arg\_PISARapaNui), “Y” serving as an index between 1 and 32 for various conditions, and “Z” indexing the question number (ranging from 1 to 2) for questions associated with the same text unit and condition.

### 4.1 Translation of the questions to other languages

The English questions and answer options are to be translated into the language of your dataset. To translate the questions and answers into your language, please follow these instructions: [Translation Instructions for the MultiplEYE Comprehension Questions](#)



Once you have finalized the translation of the comprehension questions, please follow the steps in [Section 11.1](#) and contact the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)) to finalize the experiment screens for your language.

## 4.2 FAQs

**I have a question regarding the guidelines for designing comprehension questions. What should I do?**

Please contact Maja Stegenwallner ([Maja.Stegenwallner@uni-potsdam.de](mailto:Maja.Stegenwallner@uni-potsdam.de)).

## 5 Participant questionnaire

After the reading part, the experiment is followed by a short questionnaire to ask about the demographics of the participants. There are four types of questions:

- Questions regarding general demographics
- Questions regarding the languages the participants speak
- Questions regarding their reading habits
- Questions regarding their current condition
- Rating questions regarding the perceived difficulty and familiarity of a text

The participant questionnaire is shown on the screen after the reading is finalized. It is directly integrated into the experiment software. The participants can answer independently and their answers will be saved directly to the local output files. The last type of question, the rating questions about the perceived difficulty and familiarity of a text will be asked after every text.

The questionnaire needs to be translated into the respective experiment languages. The participant questionnaire is always shown in the same language as the stimulus texts of the eye-tracking experiment, i.e. if the experiment is conducted in Albanian, the questions will be shown in Albanian.

The original English version of the questions can be found [here](#).

First, make a folder named “participant\_questionnaire” in your language folder. Copy the English files there and modify the copies.

Three files need to be translated.

The first one is called *multipleye\_questionnaire\_questions\_en.xlsx*. The questions and answer options are formatted in one Excel file.

The instructions for the participants are in an additional Excel file called *multipleye\_questionnaire\_instructions\_en.xlsx*.

Finally, there is a list of languages mapping the ISO codes to their names, called *language\_iso639\_1\_en.xlsx*. This file is used as a drop-down list of possible languages in the questionnaire. You can likely find this list in your language on [Wikipedia](#).

All 3 files need to be translated into the respective experiment language.





For the translation, please follow these steps for all 3 files:

1. Start by copying the English file to the folder of your language
2. Change the name of the files by replacing “en” with the two-letter ISO-code for your language. For example, change *multipleye\_questionnaire\_questions\_en.xlsx* to *multipleye\_questionnaire\_questions\_tr.xlsx*.
3. Replace the text in the cells with text in your language without changing the structure of the rows and columns:
  - a. In the file *multipleye\_questionnaire\_questions\_en.xlsx*, the Columns A and M do not need to be translated.
  - b. In the file *multipleye\_questionnaire\_instructions\_en.xlsx*, only the texts in Column B need to be translated. Please do not change the values in the other columns.
  - c. In the file *language\_iso639\_1\_en.csv*, only the texts in Column B need to be translated. Please do not change the values in the other columns.

## 5.1 FAQs

### **I want to add additional questions to the experiment in my language. Can I do this?**

You can add additional questions as part of an add-on dataset (see [Section 1](#)). However, you cannot modify the questionnaire as it is implemented as part of the graphical interface of the experiment. If you wish to add additional questions, please do so in a separate questionnaire AFTER the experiment is completed or even in a separate session.

### **How do I qualify as a translator?**

Translators are required to self-identify as native speakers of the target language and demonstrate a high level of proficiency in English. In the MultiplEye project, we do not enforce specific professional qualifications, we welcome individuals who possess a strong passion for language and a keen motivation to collaborate on the translation tasks. Experience as a professional translator is a plus.

### **Why do we ask about alcohol intake and tiredness?**

Because it influences the participants’ reading behavior, their mood, and state of mind. It can also affect the amount of liquid in a person’s eyes and ultimately their eye movements.

### **Why do we ask about socio-economic status?**

We ask a relative question about the participant’s socio-economic status because it can affect reading patterns.

## 6 Psychometric tests

To collect additional data about the participants, we have selected a set of 6 psychometric tests to assess various cognitive capacities. All tests are implemented to be conducted in a computer-based manner.



The tests are conducted **after** the eye-tracking part of the experiment and the participant questionnaire. To ensure that the participants are not tired, there must be a break of **minimum 30 minutes** after finishing the participant questionnaire.

This means that each lab has the flexibility of arranging the reading and the test session as preferred. For example, it is possible to have merely a 30-minute or 1-hour break (for lunch or taking a walk, etc.) and finalize the experiment in one day. It is also possible to split the experiment into a morning and an afternoon session and allow the participants a longer lunch break. Finally, it is also possible to perform the tests in a different session on a separate day, *after* the day of the reading session. To avoid a high drop-out rate we suggest reimbursing the participants only after the final session, if this is allowed and acceptable in your country.

Although administering these tests is **not strictly obligatory for the core dataset**, we **strongly recommend** collecting this additional participant-level information since it will increase the number of possible use cases of the MultiplEYE dataset and hence its value and impact on the community.

No additional consent form is required for the test session, just make sure to include it in the consent forms you are using for the complete MultiplEYE experiment.

The inclusion criteria for the tests were based on their availability and simplicity of the adaptation to many languages, as well as the test duration and availability in terms of licensing costs, etc. The following tests will be conducted in the following order:

**1. Verbal and non-verbal working memory: Lewandowsky Working Memory Capacity (LWMC) battery**

Description: The Lewandowsky Working Memory Capacity battery measures working memory capacity. It consists of four tasks that require the temporary storage and manipulation of information: Memory Update, Operation Span, Sentence Span, and Spatial Short-Term Memory.

Approximate duration: 30 minutes

**2. Rapid automatized naming: RAN task**

Description: The Rapid Automatized Naming (RAN) digits task tests the speed and efficiency of naming digits. It is used to assess the speed of processing and the ability to retrieve information quickly from memory. In the MultiplEYE RAN digits task, participants will read aloud 8 screens of digits, each consisting of a 5 x 10 digit matrix.

Approximate duration: 2 minutes

**3. Cognitive control: Stroop task**

Description: The Stroop task is a test of cognitive control that measures the ability to inhibit automatic responses. MultiplEYE uses a color-naming Stroop task, where participants must state the color of the ink in which words are printed, rather than reading the words themselves. This discrepancy creates a cognitive conflict, testing the participant's ability to control attention and inhibit automatic reading responses.

Approximate duration: 3 minutes

**4. Cognitive control: Flanker task**



Description: The Flanker task is a test of cognitive control that measures the ability to inhibit irrelevant information. During the test, participants are required to focus on the direction of a central arrow (either left “<” or right “>”) while ignoring distracting arrows on either side. This setup tests the efficiency of an individual's attention and response inhibition mechanisms.

Approximate duration: 2 minutes

#### 5. **Metalinguistic aptitude: PLAB**

Description: The Pimsleur Language Aptitude Battery (PLAB) test is a test of language aptitude designed to measure an individual's ability to learn a foreign language. It evaluates skills such as grammatical sensitivity, and inductive language learning ability. MultiplEYE only uses part 4: Language Analysis.

Approximate duration: 5 - 10 minutes

#### 6. **Vocabulary test: WikiVocab**

Description: The [WikiVocab test](#) is an online test of vocabulary knowledge that is based on Wikipedia data and created automatically for a wide range of languages. It is designed to measure the breadth of an individual's vocabulary knowledge. Note that the items used in this test are not perfect, since the test is generated automatically. Therefore, if WikiVocab is not good in your language, we recommend replacing it with another lexical decision task available in your language.

Approximate duration: 2 - 3 minutes

The psychometric tests are fully digitalized and presented on screen through a user-friendly interface. The interface runs in the same Python & Anaconda environment as the eye-tracking experiment (see [Section 11.2](#)).

#### **Key Features of the graphical interface:**

1. Participants can independently perform the tests at their own pace, following the onscreen instructions.
2. The program saves the reaction times, audio recordings, and responses to local output files immediately and automatically, ensuring the integrity and efficiency of data collection.
3. The program cuts down on the administrative and logistical efforts typically placed on experimenters.
4. By standardizing the testing procedure across all labs and all participants, the influence of different experimenters on test outcomes is reduced, ensuring the accuracy and validity of data collection.

## 6.1 Adaption of the psychometric tests to other languages

The instructions and stimuli of the psychometric tests need to be translated into the respective experiment languages.

All tests are translated from English into the corresponding experiment languages. You may use machine translation systems such as Google Translate or DeepL for help, but the translations need to be revised manually. Make sure to have an additional person revising



the translations. Please contact us if you need any assistance with the translations ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

The English version of the tests can be found [here](#).

To translate the psychometric tests for your language, please follow these steps:

### 1. Create a folder for your language:

- In the folder "[languages](#)", create a folder with the [two-letter ISO code](#) for your language, using **uppercase** letters.
- Download the English folder "EN" to your computer. You will see the English version of all the psychometric tests listed in this folder. Preserve the same sub-folder structure in the folder of your language.
- To preserve the correct folder structure easily and to have a backup, you can directly rename the "EN" folder with your language ISO code or make a copy of it and rename it.

### 2. Translate the instructions:

- In the sub-folder "[instructions](#)", you will find one WMC instruction doc file and three <task name>*instructions*\_en.xlsx files.
  - File: "WMCInstructions\_onscreen\_en.doc"  
Translate the complete document.
  - For each .xlsx instruction file:
    - Create a new column with the ISO code for your language, using **uppercase** letters.
    - Translate all the instructions in the "EN" column to the column for your language.  
**Important: Make sure to leave the newline marks "\n" in the same positions in the translated text.**
    - Save your changes.
- Rename the four files by replacing "\_en" with "\_xx" ("xx" is ISO code for your language).  
If your ISO code is "hr", you will change "PLAB\_instructions\_en.xlsx" to "PLAB\_instructions\_hr.xlsx". Here, we are using **lowercase**.

### 3. Translate the test stimuli:

- Go to the sub-folder for each test, change the language code in the stimulus file name from "\_en" to "\_xx". xx is the ISO code for your language.
- Edit each stimulus file by finding the columns storing stimuli, and translating the English stimuli into your language. The following files need to be translated:
  - **WMC:**
    - File: "sentence\_span\_sentences\_en.yaml"  
Lines to translate: Translate only the lines starting with "-".
    - File: "experiment\_messages\_en.yaml"



Translate the text following the colon, and please keep the double quotations.

- File: “config.yaml”  
If your lab have specific preference for the font, please specify it in line 2 and change ‘Arial’ to your preferred font. Please keep the quotations. By default, it is ‘Arial’.
- File: “instructions\_en.yaml”  
It specify the path to the instruction images. e.g. line 2 “instructions/InitInstruct.png” says the initial instruction image is stored in the “instructions” sub-folder in “WMC”, with a name “InitInstruct.png”. You don’t need to change anything here if you name all your images as the ones in “EN” folder as png file. If your images are stored in different format, e.g. jpg, then you also need to change png to jpg here.
- Folder: “instructions”  
You don’t need to translate anything here. They are 10 images screenshoted from the “WMCInstructions\_onscreen\_en.doc”. Once the “WMCInstructions\_onscreen\_xx.doc” for your language is ready, you can screenshot them by:
  - Open the doc file in full-screen mode
  - Zoom to 100% scale, which is shown at the right bottom corner in Microsoft Word.
  - Screenshot the same content as in English for each image and save it with the same name, no language code.
  - Note, you don’t want your mouse cursor to show in your screenshot.
- **RAN task**
  - No stimulus translation required
- **Stroop & Flanker tasks**
  - File: “Stroop\_practice\_trials\_en.xlsx”  
Columns to translate: Translate only column B  
If your lab needs specific keys due to differences in the script or layout, specify them in column D.
  - File: “StroopStim\_en.xlsx”  
Columns to translate: only Column B  
If your lab needs specific keys, specify them in column D.
  - File: “FlankerStim\_en.xlsx”  
Only change the filename, no translation needed  
If your lab needs specific keys, specify them in column D.
- **PLAB**
  - File: “PlabStim\_en.xlsx”  
Columns to translate: only column B; You do not need to edit the other columns.  
If your lab needs specific keys, specify them in column G.



- File: "slides\_pic\_en.pptx"  
It contains the instructions for PLAB you translated before, but in a better format, for us to screenshot.
  - Please replace the English words inside the blue frame with your languages by copying them from the instructions.
  - Adjust the font size etc. so that they fit into the blue frame
  - When the two slides are ready, click "slide show" to open them in the presentation mode.
  - Screenshot within and closely to the blue square frame; store and name them accordingly.
- **WikiVocab**
  - No stimulus translation required

#### 4. Translate the GUI interface (optional):

- Like in the eye-tracking experiment session, if your lab would like to display the GUI interface in your language for the experimenter, please translate the "experiment\_interface\_en.json" in "interface\_language" folder. Otherwise, the GUI is displayed in English.
  - Words to translate: Translate only the words appear after :, and please keep the quotations and the comma.
  - Rename the file to "experiment\_interface\_xx.json", e.g., "experiment\_interface\_hr.json" if your language is croatian. We are using **lowercase** language code here.

#### 5. Upload files:

- Upload all these files to your [language folder](#). Make sure to also save a copy locally on your computer as a backup!

#### 6. Update metadata file:

- Open [MultiplEYE Psychometric Tests Translation checklist.xlsx](#), mark with a "yes" for the tests or the instructions you finished translation.

Once you have completed the translation of all tests, please contact the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)). The experiment team will send you the link to the GitHub repository containing the test software. Within this repository you will find instructions for installing it.

The details for conducting the tests in the lab can be found in the [Experimenter Script - Psychometric Tests Session](#).

#### 6.1.1 General rules for translation

- Apply what is most common in modern/daily use of your experiment language. Keep sentences as natural as possible in the target language.



- Follow the four-eyes principle for translation, i.e., make sure to have an additional native-speaking person revising the translations.
- **WMC:** Keep the truth value judgement of a sentence the same. If a sentence is true in English, it needs to stay true in the target language. The translated sentences need to be unambiguous, but should sound natural. Thus, use the quantifiers that are most natural in your language (e.g. “every” vs. “all”), or change the number (singular vs. plural) as needed. If you encounter cross-cultural issues in translation, adjust the vocabulary as needed.

## 6.2 FAQs

### **In my lab I do not have the capacity to run the psychometric tests. What can I do?**

Administering these tests is not strictly obligatory for the core dataset, but we strongly recommend it.

### **Which language should the tests be translated from?**

Always translate from the English version.

### **I want to add additional tests to the experiment in my language(s). Can I do this?**

You can add additional tests as part of an add-on dataset (see [Section 1](#)). However, do not modify the experiment protocol. If you add additional tests, please do so *AFTER* the experiment is completed or even in a separate session.

### **I want to add additional tests to the experiment in my language(s). Which tests should I run?**

From related studies, we provide a list of additional tests. For example, we recommend the Peabody Picture Vocabulary Test (PPVT) and/or the Wisconsin Card Sorting Test. For these, we have a computer version available. Please contact us for more information ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

## 7 Ethics approval

The head of the contributing lab is responsible for ensuring that the local ethics requirements are respected. MultiplEYE provides certain templates and support for the most common questions.

Information can be found [here](#). The folder contains:

- Previous successful ethics applications for other eye-tracking studies
- A [table](#) with the most common questions and answers (specific to the MultiplEYE experiment procedure) to copy/paste for your application
- The successful [ethics application](#) for MultiplEYE of the University of Zurich



## 7.1 FAQs

### **I am not sure if I require ethics approval. What should I do?**

Please contact the ethics commission of your university, institution, or country. They can tell you if you require ethics approval for this eye-tracking experiment.

### **I have specific questions in the ethics application template from my university, but cannot find the answer in the materials described above. What can I do?**

Please contact us so that we can formulate an answer together ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

## 8 Participants

We expect a minimum of **100 healthy native speakers** of a minimum age of 18 years, reading texts in their own language.

**Population diversity:** While populations of young students are acceptable, we encourage researchers to recruit participants from a wider age range. There is no upper age limit. However, we do not recommend testing on elderly participants due to difficulties in calibration and data quality.

**Requirements:** Ensure that the participants have corrected-to-normal vision, are capable of reading comfortably (not illiterate or semi-literate), do not have any eye movement or alignment abnormalities (such as lazy eye, strabismus, nystagmus), eyelid ptosis, epiphora (watery eyes) or any recent eye surgeries (corneal, cataract, intraocular implants). Ensure that the participants do not have any language development disorders or diagnosed reading conditions (e.g., SLI, Dyslexia, Apraxia of Speech, Speech Sound Disorder, Auditory Processing Disorder, Expressive and Receptive Language Disorders, etc.).

The data from these participants will become the *MultiplEYE core dataset*.

The experimenter inputs the participant ID at the beginning of each experiment. The ID is a number between 1-999. The first pilot participant has ID "1".

Note: The final participant ID including the lab, country, and language codes will be generated automatically by the experiment software. If you are splitting the data collection across multiple labs in your country/language or across different types of eye-tracker devices, please contact the experiment support team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)) for an additional protocol to set the participant IDs correctly.

## 8.1 FAQs

### **I want to participate in the data collection, but I cannot reach enough participants because we are dealing with a smaller language. What should I do?**

Please get in touch with us to consult if a smaller number of participants can be accepted ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)). Note that it is possible to share the data collection load between multiple labs, if the same eye-tracker model is used.





**I want to record data from participants with visual conditions or language disorders. Can I do this?**

Not for the MultipleYE core dataset. But you can record an add-on dataset with a population that is different from the core dataset population (see [Section 1](#)).

**We have recorded participants with bad data quality. Should these participants be counted?**

In order to allow for a wide range of possible data analysis scenarios, we retain the data from all participants. Do not delete their data. If the participants read at least one full stimulus text with the corresponding comprehension questions, it will be made available in the MultipleYE data repository. However, if the resources allow it, add an additional participant for every participant with bad quality data.

## 9 Hardware requirements

### 9.1 Eye-tracking devices

#### 9.1.1 EyeLink (SR Research)

The experiment is ready to be set up for EyeLink Portable Duo eye-trackers. For any other EyeLink eye-trackers, the experiment has also been implemented but has not been tested thoroughly.

#### 9.1.2 Tobii

An earlier version of the experiment has been tested on Tobii Pro Nano and Tobii Pro. To collect the data using Tobii eye-trackers there is some additional implementational work that needs to be done but it is possible within reasonable efforts. If you plan to use Tobii eye-trackers please test the experiment early in the process to have enough time to finalize it for Tobii.

#### 9.1.3 Other devices

The experiment has not been tested for any other eye-tracking devices up to this point. If you plan to collect the data using a device that has not been mentioned above, please contact us ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)). Please plan additional time to set up the experiment for your device.

### 9.2 Experiment monitor

The screen size (without frame!) must be at least 37 cm (horizontal) x 28 cm (vertical).



## 9.3 Keyboard or controller

For the MultiplEYE experiment, any keyboard with arrow keys can be used to collect input from the participant. Alternatively, gaming controllers can be used, if available. The experiment has been implemented to be conducted with a computer keyboard. Therefore, we recommend using a keyboard if possible.

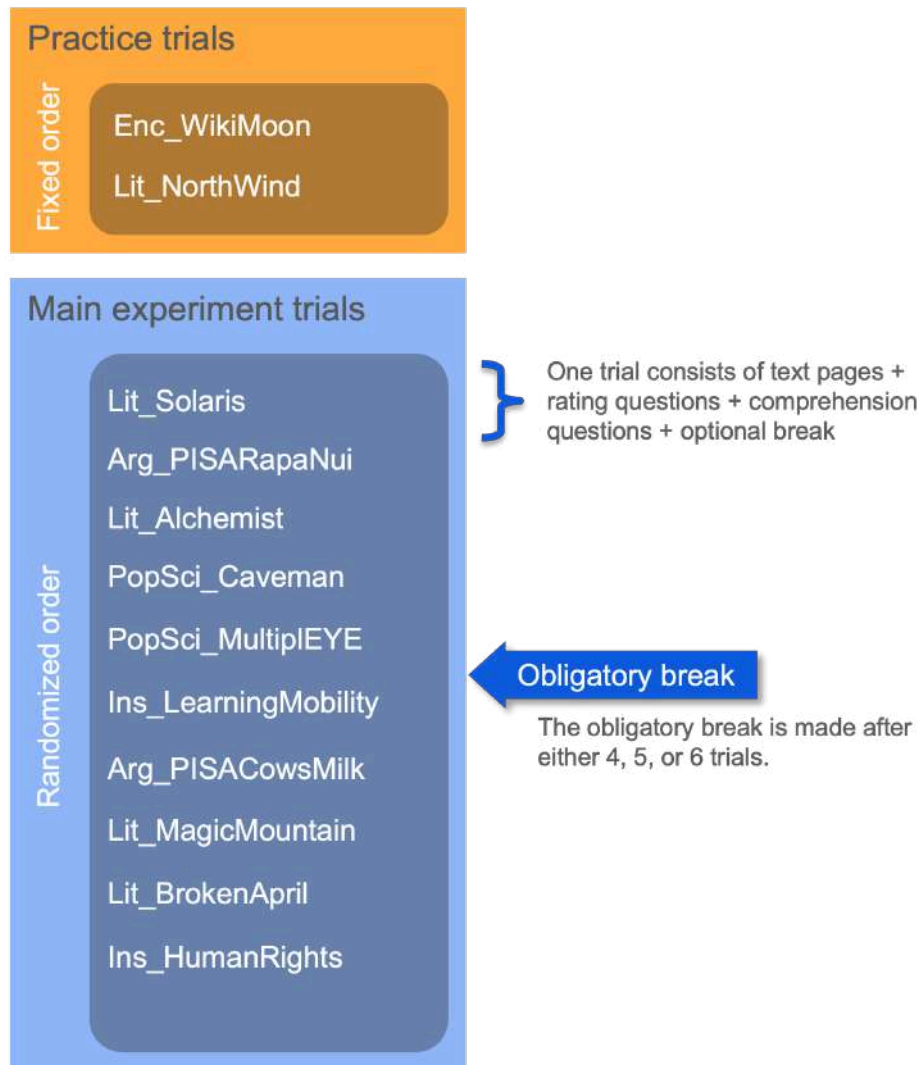
## 9.4 FAQs

# 10 Experiment procedure

## 10.1 Protocol

The experiment duration is approximately 90 minutes, including the participant briefing, the camera set-up, the questionnaire, and the main reading task. Note that due to personal reading speeds the total duration can vary.

The main reading part of the experiment is split into a practice and a main experiment block:



The experiment protocol is as follows:

- 1) The experiment has started. The experimenter inputs the participant ID (a number between 1-999).  
Note: The final participant ID including the lab, country, and language codes will be generated automatically by the experiment software.
- 2) The welcome screen is shown.
- 3) The participant is prompted to sign the consent form (see [Section 10.2](#)).
- 4) The experiment instructions are presented on the screen.
- 5) The camera setup, including calibration and validation, is performed.
- 6) The practice trials with two short texts have started.  
The experiment is preceded by two short practice trials, including rating questions and comprehension questions for each trial. This is to allow the participants to become familiar with the experiment setup and with the keyboard. Eye-tracking is already recorded during the two practice texts.
- 7) The details of these two texts can be found in [Section 3.2.1](#).
- 8) The main part of the experiment begins.  
The main part consists of 10 trials. Each trial contains one text split into multiple



pages (i.e., screens) and is followed in this order by: the rating questions about perceived text difficulty and familiarity (see [Section 5](#)), the comprehension questions ([Section 4](#)), and an optional break.

- 9) The participant fills in the questionnaire on the screen.

If the experiment crashes, it can be opened again and if the same participant ID is used, it will automatically restart at the last trial. If one trial was not completed, the entire trial will be presented again. Please consult the [MultiplEYE Experimenter Script](#) for specific instructions.

There are certain criteria for termination and cancellation of an experiment session, which could lead to the experiment being discontinued. Possible criteria include difficulties in calibration, unwellness of the participant, participant wishes to cancel the experiment, the participant does not cooperate, etc. Any problems and inconsistencies can be documented at the end of the experiment, in which the experimenter inputs these details directly at the end of every session.

For specific recommendations for the experimenters in the lab during the experiment sessions, please follow the [MultiplEYE Experimenter Script](#).

For each participant, document the experiment session by adding a row to the Experiment Session Documentation Sheet. There is a [template for printing](#), for real-time documentation during the experiment, and [a digital version](#) to fill in after the experiment, which needs to be submitted at the end of the data collection. Please download the digital version and edit it locally until your data collection is complete.

## 10.2 Consent forms

Informed consent: The on-screen instructions will tell the experimenter and the participant when it is time to read and sign the consent forms. We recommend using consent forms on paper. However, as described in the [Data Management Plan](#) (Section 3.1), digital alternatives are also possible.

You can use the English consent forms we provide, or you can use your lab's adapted consent forms in your language as long as they are in line with the MultiplEYE Data Management Plan. The responsibility of creating the forms and requesting the signature for informed consent from the participants lies with each research lab.

## 10.3 On-screen participant instructions

The instructions for the experiment will be shown on the screen.

The original experiment instructions in English can be found [here](#). The file is called *multiplEYE\_participant\_instructions\_en.xlsx*. The instructions are formatted as an Excel file



and need to be translated into the respective experiment language. For the translation, please follow these steps:

4. Start by copying the English file to the folder of your language (unfortunately you cannot directly copy it, but need to download it and then upload it to your folder).
5. Change the name of the file to *multipleye\_participant\_instructions\_xx.xlsx*, where "xx" is the [two-letter ISO-639-1-code](#) for your language.
6. Replace the text in the cells in the column *instruction\_screen\_text* with text in your language without changing the structure of the rows and columns. Also, try to keep empty lines as consistent with the English original as possible. All other columns must not be changed.

**Note:** The order of the rows in the excel is not the order in which the screens will be presented on screen. There is a comment column which tells you more about when the screen appears. Also, there are three screens called *instruction\_screen\_x* where the number x tells you the order of these three screens.

The on-screen instructions are always shown in the same language as the stimulus texts, i.e. if the experiment is conducted in Albanian, the instructions will also be shown in Albanian.

#### Notes on translating:

- **\*\*word\*\*** → "\*\*\*" marks words/sentences that will appear in bold on the screen. Please add them around the respective words/sentences in your language at the exact same semantic position. **The asterisks should be preceded and followed by white space.** This means that if the last bold word is followed by a punctuation mark, the double asterisk should include the punctuation mark.

Example (white space marked in red before and after asterisks):

"...press the **\*\*space bar.\*\*** The..." → "...press the **space bar.** The..."

## 10.4 Experiment interface

The experimenter will need to start the experiment via an interface. The language of this interface is English by default. If not all experimenters are fluent in English, it can be translated to the respective language. The original English file to be translated can be found in a file called *experiment\_interface\_en.json* in the stimuli folder for [English](#).

The "\n" characters must not be changed and should stay approximately in the same position in the translated text. The file format must stay the same. The name should be changed to the respective language, e.g. *experiment\_interface\_de.json*. The file must be uploaded to the stimulus folder of the respective language. If you translate the texts for the interface, the translations must be carefully checked in a test run.

Note that this step of translating the experiment interface is **optional**. It is only required if the experimenters in your lab are not comfortable with an English interface.



## 10.5 Experimenter script

The experimenters in the lab should follow the MultiplEYE Experimenter Script to perform the sessions with all participants.

Share the following documents with all experimenters in your lab:  
[MultiplEYE Experimenter Script](#) - The experimenter should follow this script for each experiment session.

[MultiplEYE Experimenter Session Documentation Sheet](#) - This documentation sheet is for the experimenter to take hand-written notes during a session (in case of technical issues, calibration difficulties, or any other incidents).

## 10.6 FAQs

### **We have multiple eye trackers in our lab. Which one should I use?**

We recommend using an EyeLink eye tracker, if available.

### **We have an EyeLink 1000+ and an EyeLink Portable Duo. Which one is better?**

We recommend using the EyeLink 1000+ because it comes with a chin *and* forehead rest.

### **Calibration does not work right. What should I do?**

If there are calibration issues, you can try the following:

1. Try calibration multiple times until it shows improvement.
2. Instruct the participant to follow the dots more slowly and not move their gaze until the dot moves.
3. Check the sharpness of the camera image.
4. Check that the eye-tracker finds the pupil.
5. Restart the eye tracker/computer/experiment.

### **The experiment images do not fill our entire screen. There are black bars around the images. Do I need new images?**

No. It is intended that the image will not fill the entire screen but fill exactly as much space on every screen in every lab that follows our size restrictions. If your screen is very small, the images might fill the entire screen. If it is rather large, there will be a lot of black around the images. If you'd like to check you can manually measure the image size which should be 37x28 cm.

If you cannot solve the issue, cancel the trial and take your time to find out what the problem is (check the eye tracker manual, contact the manufacturer or someone who could help). Make sure the issues are fixed and calibration is tested before beginning the next trial.



# 11 Experiment implementation

In this section, we describe how the experiment will be implemented after the stimuli are ready. This involves two steps, the creation of the experiment screens ([Section 11.1](#)) and the software implementation ([Section 11.2](#)).

## 11.1 Experiment screens

Once the stimuli texts, the instructions, and the comprehension questions and answers are ready for your language, the experiment screens are created automatically from the stimulus Excel file. **Experiment screens are image files containing the stimuli pages for the experiment.**

In the experiment, to ensure the same conditions across labs, the texts are presented as fixed images. Please contact the experiment support team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)) to coordinate this process.

Once you receive the first version of the experiment screens, please review all the screens by following the checklist below.

### 11.1.1 Checklist for reviewing experiment screens

- Font (i.e., does this font work for all characters in the texts?)
- Lines (e.g., are some words separated by mistake? Are all line breaks where they are supposed to be?)
- Typos
- Punctuation: Are commas, quotation marks, full stops, etc. represented as expected?
- Encoding: Are all characters represented as expected? Especially check special characters that might only exist in your language
- Does the text fit on the screen?
  - The last line should be *above* the dot in the bottom right (left for right-to-left scripts) corner.
  - Is the text on the next page a direct continuation of the text on the page before, i.e., make sure no text got lost “outside” of the image borders.
- Are there any missing words?
- Are there any missing pages?
- Also make sure to check the participant instruction screens, welcome screen, etc.

If you notice any errors, please make changes accordingly in the Excel file of your language. Make sure to also correct the original TXT files for each text. For non-textual issues, please make a list of required corrections and send it back to the experiment support team.



## 11.2 Experiment software

The experiment implementation is based on Python using the *psychopy*<sup>1</sup> and *pygaze*<sup>2</sup> packages. to test the experiment for your device.

The experiment code can be found in our GitHub repository:

<https://github.com/MultiPLEYE-COST/wg1-experiment-implementation>

Download the code as a ZIP file (Click on the green “Code” button, then “Download ZIP”).

Next, follow the experiment installation tutorials provided as HTML files in the code to get started with installing Python, Anaconda, and the EyeLink software. Additionally, the tutorial contains the first steps to start the MultiPLEYE experiment. Please start by reading the README.html (or README.md, both versions contain the same information).

If you are using a different eye-tracker, please contact the experiment team to coordinate the next steps.

Please contact the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)) if you have any questions about accessing and installing the code.


## 11.3 Lab specifications


To ensure the data is collected in the same conditions at every lab, please strictly follow these specifications and refer to the image below for guidance.

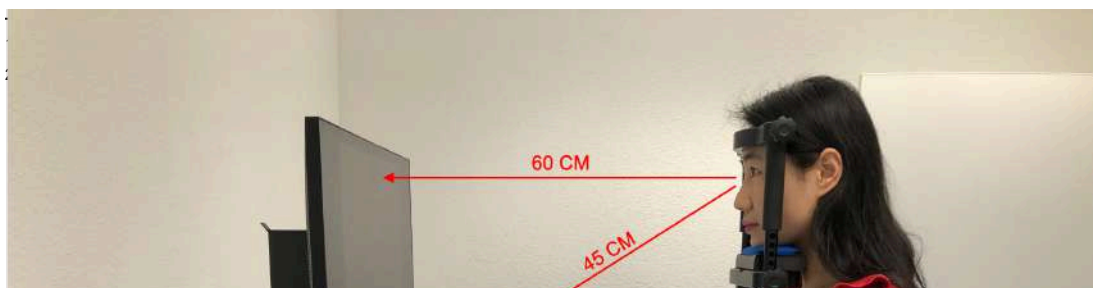
### 11.3.1 Eye-to-screen distance

The **eye-to-screen** distance has to be 60 cm (measured in cm, 90 degree angle).

*How to measure:* Please refer to the experimenter script (camera set-up & calibration section): [MultiPLEYE Experimenter Script - Eye-Tracking Session](#)

 **Tip:** If you are running multiple data collections with different eye-to-screen distances, you can mark the position of the monitor, chin-forehead-rest and the eye-tracker with differently colored small stickers on the desk. This way you will only have to make minor adjustments for each participant in each study.

 **Important:** In case that it is absolutely impossible to keep the 60 cm eye-to-screen distance, please contact the MultiPLEYE experiment team before proceeding ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)). Not using the same distance or specifying a different distance will lead to serious corruption of the data during preprocessing and in the worst case the data will have to be discarded.







### 11.3.2 Further obligatory specifications

Also, please strictly follow the following specifications:

- Testing for the MultiplEYE core data collection should only include **monocular tracking of the dominant eye**.
- The following specifications are provided for using an EyeLink eye tracker and are for monocular testing of the dominant eye.
- A **chair without any wheels** has to be used (the chair should be stable and not be moveable).
- We recommend using both, a **chin & headrest** (ideally height adjustable). Some eye-tracking devices come with a combined chin and headrest (such as EyeLink). This way, stability, reduction of data artifacts or calibration issues (for example due to head movements), and comfort for the participant will be provided. Using an appropriate chin and headrest for the experiment is essential in order to enhance data quality.
- We highly recommend using a height-adjustable table
- **Calibration:** We set the following calibration thresholds on the average error to ensure high-quality data:

Device	Maximum acceptable error	Recommended error
EyeLink 1000+	0.5°	<0.3°
EyeLink Portable Duo	0.5°	<0.3°
Tobii Pro Spectrum	0.8°	<0.3°
Tobii Eye Tracker 5	0.5°	
PupilLabs Core Glasses	0.6°	
PupilLabs Neon Glasses	4.6° (uncalibrated)	
Other devices	*	*

(\*) Please contact us ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)) if you have a different device and we will add it.

- **Light conditions:** Avoid windows or other bright light sources that could cause reflections on the host and display monitors. Supply sufficient light in the room with ceiling-mounted fluorescent lights.
- **Lab recommendations:** For more detailed recommendations, we refer to the “Suggested Equipment Layout” from SR Research (see [EyeLink Installation Guide](#), Section 1.1).
- You will document the details for your lab in the metadata form, where you will have the opportunity to describe any deviations and noteworthy aspects of your setup.



## 11.4 Minimal experiment test

To ensure that the experiment runs smoothly and everything is set up correctly, there is a minimal version of the experiment with toy stimuli. Contact the experiment team to get access to the minimal text experiment ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

As soon as everything is set up, the minimal experiment can be run without the need to recruit any participants but experimenters could just track themselves. The resulting output files can be processed by the preprocessing pipeline to make sure nothing was accidentally corrupted during the setup.

It will also give the experimenters the chance to check whether everything is clear in the experiment procedure.

**Important:** Although this minimal version uses toy stimuli, the rest of the experiment (e.g., instructions, calibration, etc.) is the same as for the actual experiment later on. This means that the instructions of the real experiment should be followed as if it were the real experiment.

Finally, upload the output files (the complete “data” folder in the experiment files) to your data upload folder and notify the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)). Once you receive their confirmation that everything looks fine, you can proceed with the experiment pilot ([Section 11.5](#)).

## 11.5 Experiment pilot

For the MultiplEYE data collection, we ask that you collect data from at least 3 participants as a pilot.

The pilot participants should have the same requirements as the participants for the main data collection (see [Section 8](#)). Inform the participants that this is a pilot experiment and that we would like to hear their feedback.

We require good calibration for testing the data quality pipeline and for practice for the experimenters (see [Section 11.3](#) for details about acceptable calibration errors).

You are allowed to give a new ID in case the experiment crashes, it does not need to be restarted with the same ID.

The goal is to collect feedback from the pilot participants. They should give feedback in the moment about anything that seems unusual to them, e.g., about typos, encoding, or wrong questions (order, content, layout), misunderstandings in the instructions, etc.

During the pilot sessions, it is possible to take longer breaks if needed, e.g. for more detailed instructions or for giving feedback. After a break or the giving of feedback, make sure the pilot participant keeps reading the text on the screen until the end (even if there is an interruption in the middle).

Finally, upload the output files (the complete “data” folder in the experiment files) to your data upload folder and notify the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)). Once you receive their confirmation that everything looks fine, you can proceed with the real data collection.



## 11.6 FAQs

### **Why do I need to run a minimal experiment test *and* a pilot study?**

Those two tests test different things. The minimal experiment, which should be run first, is intended to make sure that there is no bug in the experiment, the procedure runs smoothly and all the instructions are clear. Recruiting participants even for pilot studies can be time-consuming and expensive and some bugs can easily be discovered without participants on a very short version of the experiment.

### **What should I do, if my testing differs from the specifications listed in the lab specification? For example, if I would have to test some participants' left eye.**

In this case, you must document every aspect that differs from those specifications within this [documentation sheet](#) (which you must download first before completing it locally), and state it within the [MultiplEYE metadata documentation form](#) (see [Section 12.2](#)).

### **What should I do if the distance to the screen cannot be changed in my lab?**

In this case, you should 1) mention it within the pre-registration form ,2) document every aspect that differs from those lab specifications within this [documentation sheet](#) (which you must download first before completing it locally), and 3) state it within the [MultiplEYE Metadata Documentation Form](#) (see [Section 12.2](#)).

### **The experiment images do not fill our entire screen. There are black bars around the images. Do I need new images?**

No. It is intended that the image will not fill the entire screen but fill exactly as much space on every screen in every lab that follows our size restrictions. If your screen is very small, the images might fill the entire screen. If it is rather large, there will be a lot of black around the images. If you'd like to check you can manually measure the image size which should be 37x28 cm.

## 12 Data (pre-)processing

The data you collect during the collection phase for the core data collection will go through a preprocessing pipeline. MultiplEYE provides a pre-processing team that is responsible for your data's preprocessing. The different stages of the data preprocessing, which we include in our pipeline, can be viewed within our [Data Management Plan](#) (see Section 1).

As a data collector, your role involves providing the **results folder** that contains the eye movement data for each participant to the preprocessing team. It is essential to verify that the results folder encompasses **all participant data** and includes the **necessary file formats**. Since the initial data format produced by each device varies, there could be differences in file formats within the participant data. **Please, make sure to provide the following formats:**

For instance, for an EyeLink eye tracker, the participant data must contain all corresponding [.edf files](#) (non-human readable format), whereas for Tobii eye-trackers, there should be [.tsv files](#) (human readable format). Our data preprocessing team can therefore ensure that all



data will be processed in a standardized manner and made compatible with the subsequent stages of our processing pipeline.

Once you've submitted your data, we work on creating the parsed files and will check on the data's consistency and accuracy. We then provide feedback to you as the data collector, highlighting any anomalies or irregularities that may have arisen during the process.

All steps of the pipeline will be documented and the data of Stage 1 until 4 will be published, so (re)users of the data can reproduce the pipeline and/or use already processed data in any format from any stage.

## 12.1 Data quality checks

Data quality criteria and checks are defined by our pre-processing team and can be viewed [here](#).

\*\*\* \*\* TBD \*\*\* \*\*

The following data quality checks are built into the data preprocessing and are performed during the different phases of the process: ...

\*\*\* \*\* TBD \*\*\* \*\*

You as a data collector are responsible for the following calibration and validation checks performed when using your eye tracking device for the experiment: Calibration and validation checks must be performed 1) **at the start of the experiment**, 2) **before each text** and 3) a validation check is also performed **at the end of the recording**.

## 12.2 Metadata

To prepare your data for sharing, we request that all data collectors complete a Metadata Documentation Form, providing detailed information about your collected data, the methods and measures used, as well as about the location of data collection and its creators. Including this relevant metadata alongside your dataset will enhance its reusability. This metadata form is also integrated into the submission process for the MultipleYE database platform, where all data will be published and made available. The metadata provided within this form will greatly improve the searchability and filterability of the data for potential users.

You can find the MultipleYE Metadata Documentation Form on our website: <https://multipleye.eu/multipleye-metadata-form/>. Please fill out the form AFTER the collection of your data has been completed. The form will later be shared as a PDF along with the eye movement data when reusers access your dataset.



## 12.3 FAQs

### Can I run my own preprocessing pipeline?

Yes. On the MultipleYESTore the data will be stored in different formats. The raw data is always available for anyone to run their own preprocessing.

## 13 Data Documentation

As outlined within our [Data Management Plan](#), you are asked to provide a full documentation of your research data. This data documentation will be shared along with the eye movement data on the repository and will be a part of the MultipleYE data collection. You, therefore, prepare the following documentation (note: there are some standardized versions of documents provided by MultipleYE which are linked within the following):

1. Documentation about any deviations, i.e. the completion of the [stimulus deviations form\(s\)](#), the [experimenter session documentation sheet](#) (which consists of the documentation of ALL sessions)
2. A metadata form giving detailed information about the data collection, the used methods and measures and so on [use this form: <https://multipleye.eu/multipleye-metadata-form/>]
3. Documents containing any additional information or material used within the experiment (for example, metadata for used stimuli, exception: do not reproduce or publish any reading stimuli due to copyright regulations)

Guidelines regarding file formatting and versioning can be found in our data management plan. We expect these guidelines to be followed.

The following documents and documentations will be provided by MultipleYE:

4. A codebook providing detailed variable description
5. A document (e.g., txt file) providing information about the data processing provided by the preprocessing team

## 13.1 FAQs

## 14 Data quality review

### 14.1 Data upload

The eye-tracking data is hosted in a private and secure drive, which can be accessed with a password. You should have received the link and password to the folder of your dataset after the pre-registration.



Once your data collection is finalized, upload the output files (replace the complete “data” folder in the experiment files) to your data upload folder and notify the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

Important: Make sure to keep a local copy at all times.

Additionally, please complete [the Data Collection Metadata Form](#) to provide detailed information about your data collection. The metadata form will accompany the eye-tracking data when published in the repository and is essential for ensuring the data’s reusability. When you have completed the form, please also upload the form to your data upload folder.

## 14.1 FAQs

**My password doesn’t work. What should I do?**

Contact the experiment team ([multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch)).

## 15 Data sharing and publication policy

The data collected for MultiPEYE will be openly shared for reuse. This entails making all eye-tracking data and other pertinent information, gathered for the corpus, publicly accessible and discoverable via the [research data center \(RDC\) at the Leibniz Institute for Psychology \(ZPID\)](#), with storage in the open-source repository, PsychArchives (please refer to our [Data Sharing Policy](#) (Data Policy Agreement), to which you, as a MultiPEYE contributor, have agreed).

The data will be published in different formats at every stage of the preprocessing pipeline. Once the data has been reviewed and no corrections are necessary, we will grant approval for your data to be shared through the aforementioned RDC and repository. To maintain standardized processes, our team will handle the submission of your data to the RDC, ensuring its findability and searchability within the MultiPEYESTore database. Upon publication through the RDC, your data will be automatically archived on PsychArchives, with the repository providing DOIs and appropriate citations for your data. As the data collector, you will consistently be recognized as the author.

## 15.1 FAQs

**I do not want to share my data for public use (because I might be afraid that the data will be used for commercial purposes). What should I do?**

As stated in our [Data Management Plan](#) and data policy agreement, we adhere to the FAIR and Open Science principles which include enabling (unrestricted) access to the data and enhancing its reuse potential. The MultiPEYE project is here to foster research and replication across the globe by offering a high degree of transparency and reproducibility. Also, we do not believe that there will be any other reuse inquiries than reuse for scientific purposes.



**I am concerned that the data I collected and will be sharing through the MultiplEYESTore will primarily credit the MultiplEYE project. How can my team and I be properly acknowledged as the creators?**

As previously outlined in our data policy agreement, you, as the data collector, remain the creator and 'owner' of the data you collect. The MultiplEYE project provides all necessary resources, including stimuli, experiment presentation, data preprocessing, and more, to facilitate data collection. Our agreement and cooperation are thus seen as an exchange of resources. Although your data will be shared through our data collection platform, you and your team members (whom you would have named in the MultiplEYE metadata documentation form) will be duly recognized as authors and receive appropriate citation from the PsychArchives repository.

**Can I share and publish my data somewhere other than the above-mentioned RDC and repository?**

If you intend to independently share or publish your data outside the MultiplEYE collection, you have the freedom to do so. We only request a corresponding reference to the MultiplEYE data collection. Please see our [Data Sharing Policy](#) for further details.

## 16 Timeline

For the main MultiplEYE data collection publication, we will include all datasets uploaded until **March 27, 2023** (as defined in the [Data Sharing Policy](#)). This is 6 months before the end of the MultiplEYE COST Action.

The complete experiment implementation will be ready from June 2024.

Every dataset will be available on the MultiplEYESTore as soon as it receives approval for sharing.

## 17 Checklist for experiment preparation

To facilitate the experiment preparation for new languages, we provide a [checklist](#).

## 18 Help and contact

For any questions that are not addressed in this document, please contact [multipleye@cl.uzh.ch](mailto:multipleye@cl.uzh.ch). We will answer or re-direct your question to the corresponding team members.

### 18.1 List of documents & resources



Description	URL
COST website	<a href="https://www.cost.eu/actions/CA21131/">https://www.cost.eu/actions/CA21131/</a>
MultiplEYE website	<a href="https://multipleye.eu/">https://multipleye.eu/</a>
Experiment code	<a href="https://github.com/MultiplEYE-COST/wg1-experiment-implementation">https://github.com/MultiplEYE-COST/wg1-experiment-implementation</a>
Experiment materials	<a href="https://drive.switch.ch/index.php/s/s8MNXSyym5D4mF7?path=%2F">https://drive.switch.ch/index.php/s/s8MNXSyym5D4mF7?path=%2F</a>
Preprocessing package	<a href="https://github.com/aeye-lab/pymovements">https://github.com/aeye-lab/pymovements</a>
Data Management Plan	<a href="https://doi.org/10.23668/psycharchives.14081">https://doi.org/10.23668/psycharchives.14081</a>
Data Sharing Policy	<a href="https://doi.org/10.23668/psycharchives.14137">https://doi.org/10.23668/psycharchives.14137</a>
Experiment Preparation Checklist	<a href="https://docs.google.com/document/d/1GiS85vkaHzvDirEGtmxE CfPdDwp2AQ6xnDjz9qCprh8/edit?usp=sharing">https://docs.google.com/document/d/1GiS85vkaHzvDirEGtmxE CfPdDwp2AQ6xnDjz9qCprh8/edit?usp=sharing</a>
Experimenter Script (Eye-Tracking)	<a href="https://docs.google.com/document/d/1fMb3Z75wRkeidi3hn0jgW MaKC0HgYfhXXQRg45ioiRI/edit?usp=sharing">https://docs.google.com/document/d/1fMb3Z75wRkeidi3hn0jgW MaKC0HgYfhXXQRg45ioiRI/edit?usp=sharing</a>
Experimenter Script (Psychometric Tests)	<a href="https://docs.google.com/document/d/118Yh66S1nBySV-3 Ywk UKOUjEEyQjcbY5hgcvVnn4Go/edit?usp=sharing">https://docs.google.com/document/d/118Yh66S1nBySV-3 Ywk UKOUjEEyQjcbY5hgcvVnn4Go/edit?usp=sharing</a>
Lab Registration Form	<a href="https://multipleye.eu/multipleye-pre-registration-form/">https://multipleye.eu/multipleye-pre-registration-form/</a>
Stimulus Deviation Documentation Form	<a href="https://multipleye.eu/multipleye-stimulus-deviation-documentation-form/">https://multipleye.eu/multipleye-stimulus-deviation-documentation-form/</a>
Experiment Session Documentation Sheet (template for print, for real-time documentation during experiment)	<a href="https://multipleye.eu/wp-content/uploads/2024/05/Template_Exp erimenter_Session_Documentation_Sheet_PrintVersion_v03.pdf">https://multipleye.eu/wp-content/uploads/2024/05/Template_Exp erimenter_Session_Documentation_Sheet_PrintVersion_v03.pdf</a>
Experiment Session Documentation Form (digital version required for submission of documentation)	<a href="https://drive.switch.ch/index.php/apps/onlyoffice/s/i9ecUhd8ygc RDMg?fileId=7466840556">https://drive.switch.ch/index.php/apps/onlyoffice/s/i9ecUhd8ygc RDMg?fileId=7466840556</a>
Data Collection Metadata Form	<a href="https://multipleye.eu/multipleye-metadata-form/">https://multipleye.eu/multipleye-metadata-form/</a>
Main contact point	<a href="mailto:multipleye@cl.uzh.ch">multipleye@cl.uzh.ch</a>