VISME – Visual Microsaccades Explorer

Tasks

1. **Select Trial**
   The current trial does not contain any microsaccades. Select a participant and trial that contains more microsaccades (*Filter* settings tab).

   The following trial is a good example to explore multiple microsaccades within one trial / fixation: participant 013, trial 12.

2. **Change scanpath**
   Change the node size of the fixations in the stimulus view (*View* settings tab) such that they reflect the number of microsaccades of each fixation. You can also scale the size of all nodes. Use this feature to identify the fixation with most microsaccades.

3. **Explore trial**
   Verify the locations of microsaccades using the stimulus and timeline views (e.g. location within fixation, velocity, ...) using common panning and zooming.

   You can click on fixations in the timeline or stimulus view to see their location in the other view. Double click on the stimulus view will remove the selection.

   You can zoom with the mouse wheel over the stimulus and timeline view. Reset the views using *Ctrl+0* (stimulus view) and *Ctrl+Alt+0* (timeline view).

4. **Bar chart, scatterplot**
   Check the microsaccade properties of the current trial in the *Diagrams* settings tab by analyzing the scatterplots and bar charts in relation to the microsaccades' amplitudes, velocities, durations and start positions. For instance, you can have a look at the main sequence.

5. **Data plots**
   Inspect the microsaccade directions (*Data Plot* settings tab).

6. **Save parameter settings**
   Save current parameter settings for microsaccades and fixations to reuse them in a later task. Menu location: *File > Export Data > Currently Used Microsaccades Parameters* and *File > Export Data > Currently Used Fixation Parameters*.

7. **Change parameter settings for microsaccades**
   Change parameter settings for microsaccade detection (*Microsaccade Detection* settings tab) and apply them to the current trial using the button *Update Microsaccades for Current Trial*.

   Explore the influences by comparing the *data plots* and by *zooming* to interesting areas in the stimulus and timeline view (e.g. to location with many microsaccades). You can change the settings several times and recalculate microsaccades for comparison. You can save current parameter settings to reuse them later. Some recommendations for parameter changes:

   Disable *Ignore Time at Fixation Start*.

   Disable *Inter-saccadic Interval*.

   Change *Maximum Amplitude*.

   Compare to monocular microsaccade detection.

   Additionally, switch also to the right and left eye (*Filter* settings tab) and repeat changing parameters

   You can limit the exploration temporally by pressing *Alt* and selecting the area of interest with the mouse on the timeline. Activate the time limit in the *Filter* settings tab.

   Which changes do you notice? Do you think that different settings might influence assumptions made over microsaccade distributions for trials?

8. **Change direction setting for data plots**
   Change the direction of microsaccades for the data plots to analyze the relationship between neighboring fixations (*Data Plots* settings tab) that might be related to covert attention. For *Direction*, select *To Next Fixation*. Afterwards, you may change parameter settings as in the previous task.

9. **Change parameter settings for fixations**
   Apply the built-in fixation detection (*Fixation Detection* settings tab) to the current trial using the button *Update Fixations for Current Trial*. Disable *Use Fixations from Input File* first.

   Explore in the same way you did in the previous tasks (especially the stimulus view and data plots). You can also further change the parameters and / or adapt microsaccade parameter values. What do you notice?

10. **Reset parameter settings**
    Drop the previously saved files for microsaccade and fixation filter settings on the settings sections or the window title bar and update microsaccade and fixation detection for the current trial.

11. **Optional: repeat previous steps with another trial**
    You can choose another trial and repeat some of the previous tasks to analyze microsaccade distributions and the influence of different parameter values.

12. **Group mode**
    Switch to *group mode* (*Filter* settings tab) and visualize data for all participants and all trials (i.e. check all participants and trials) and press *Update*.

13. **Explore group mode**
    Now, all available data is used for the visualizations. Explore locations of microsaccades in the stimulus view and directions in the *Data Plot* settings tab. Also, check scatterplots and bar charts (*Diagrams* settings tab). Due to outliers, you might have to change the value range for x and y direction in order to see more details.

14. **Select participants**
    Select all trials of one participant and press *Update*. Afterwards select another participant and compare microsaccade directions (start with direction *Screen Coordinate System*). You can for example compare the participant with most microsaccades to one with only a few microsaccades. Have a look at some further participants. Additionally, compare directions for the left and right eye. Note that all relevant participants and trials have to be marked for the analysis.

    You can for instance compare participant 013 to participant 016, and / or 021.

15. **Location of microsaccades for participants**
    In order to analyze the locations of microsaccades in relation to the fixation center change in the *Data Plot* settings tab *Type* to *Movement in Relation to Fixation Center*. Compare the plots for multiple participants.

    You can for instance compare participant 013 to participant 018, and / or 020.

    After this task, change *Type* back to *Direction Counts*.

16. **Explore participants**
    Change microsaccade and / or fixation parameter settings similar to previously for single trials or reuse settings saved previously (*Microsaccade Detection* / *Fixation Detection* settings tab). Now, use the update function for all trials (this will take a moment, especially for binocular microsaccades detection). Explore different visualizations.

17. **Optional: Further data set exploration**
    Continue exploring the data set using our system for things you are interested in (using *Trial* or *Group Mode*). Continue changing parameter values and explore visualizations. You might gain some additional insights! Explain what you try to achieve. Your exploration may include our theory that microsaccades move towards the next fixation.