

RESEARCH PROTOCOL (v. 2.1 - final)

ENVIRONMENT AND EQUIPMENT

The experimental facility is the home of the family of one of the participants in the session. Rather low control over the environment is expected, flexibility is required.

A laptop computer is equipped with a SMI RED250mobile eye tracker. Set the sampling rate of 250 Hz (maximum). Try to keep the light in the room a bit dim, in order to encourage the child to focus on the screen. A chair is positioned in front of the screen at an adequate distance for the eye tracker to capture the child's eye. The caregiver will sit on the chair and the child will sit on the caregiver's lap throughout all the experiment. The researchers position themselves out of the child's field of sight.

Equipment checklist:

- ☐ Scripts and forms
- ☐ Identification
- ☐ Computer remote or portable keyboard + extension cord
- ☐ Pens and notebooks
- ☐ Eye tracker case:
 - ☐ Laptop
 - ☐ Eye tracker + authentication USB key + magnets

Make sure the test is running correctly and it is fully charged before departing for the participants' home.

LIST OF EXPERIMENT STIMULI AND INTERSTIMULUS MATERIALS

The items are enlisted by order of appearance in the experiment.

Index	Code	Material
1	v1	Introduction video - Frederick, by Leo Lionni. No data recording.
2	c1	Calibration routine - Ladybug target, 5 points.
3	s1	Sinusoidal motion visual stimuli - Ladybug target. Eye tracking recording.
4	i1	Interstimulus video - The Very Hungry Caterpillar, by Eric Carle. No data recording.
5	c2	Calibration routine - Bee target, 5 points.
6	s2	Triangular motion visual stimuli - Bee target. Eye tracking recording.
7	i2	Interstimulus video - The Mixed-Up Chameleon, by Eric Carle. No data recording.

8	c3	Calibration routine - Snail target, 5 points.
9	s3	Step-Ramp pursuit visual stimuli - Snail target. Eye tracking recording.
10	i3	Interstimulus video - I See A Song, by Eric Carle. No data recording.
11	c4	Calibration routine - Butterfly target, 5 points.
12	s4	Visually guided saccades visual stimuli - Butterfly target. Eye tracking recording.

ROLES AND RESPONSIBILITIES

Lead researcher (Giampiero Dalai), research assistant (Frode Volden).

Lead researcher: Responsible for the preparation of the equipment, setup of the experimental procedure and stimuli on the eye tracker laptop, administration of informed consent forms, setup of the equipment in the participant's home environment, conduction of the experiment routine, tracking of timing, quick note taking only on paper.

Research assistant: Logistic support for moving team and equipment. The assistant is not asked to take notes or carry out any operation. He will report orally his general impressions at the end of the experiment sessions. He can answer questions about the context around the experiment if asked by the participants' caregivers.

PROCEDURE

The experiment will consist of four different phases:

1. Introduction and setup

The researchers introduce themselves at the moment of arrival to the experiment facility.

The researchers administer to the caregiver a recap of the experimental procedure and an informed consent form. The researchers will note down some basic information about the child (age in months, sex, any suspect of vision problems) in order to profile the child in an anonymous way. The researchers will answer any caregiver's question prior to the experiment start.

The researchers set up the equipment, placing the laptop computer on an appropriate surface, a chair in front of it. The researchers ask the caregiver to sit in a comfortable position with the child in his/her lap, in front of the display monitor and facing directly it. The researchers check if the eye tracker tracks the child's eyes correctly. The caregiver should not interfere with the child's vision of the screen.

In the meantime, a video (v1) will be streamed on the display monitor, in order to start to capture the child's attention.

2. Calibration

When the caregiver feels that he/she and the child are ready to start, an automated calibration routine (c1) is shown on the display monitor, consisting of a moving pointer accompanied by sounds, which the child should be attracted enough to follow it with his/her gaze. If the eye tracking algorithm considers the calibration adequate (<0.5 degrees of tracking slip) the experiment software will start streaming the sequence of visual stimuli.

After this first calibration routine, further calibration routines (c2, c3, c4) are executed before each visual stimuli.

3. Visualization

A series of videos is shown on the screen. Some of the images are actual stimuli materials (s1, s2, s3, s4), others are inter-stimulus materials with the aim of keeping the child entertained and during which the eye tracker does not record data (i1, i2, i3).

4. Conclusion

When the series of images/videos is over, a message is displayed on the display monitor and the test is ended. The researchers then wrap up the experiment, greet the caregiver and leave the experiment facility.

TIMELINE

Approximate duration	Procedure		
15 min	Introduction and setup		
12 - 13 min (It can vary and even last longer depending on the child's interest in the visual materials)	1 min	c1	Calibration
	31 s	s1	Sinusoidal motion
	2 min	i1	Interstimulus video
	1 min	c2	Calibration
	31 s	s2	Triangular motion
	2 min	i2	Interstimulus video
	1 min	c3	Calibration
	20 to 40 s	s3	Step-Ramp pursuit
	2 min	i3	Interstimulus video
	1 min	c4	Calibration
	30 to 60 s	s4	Visually guided saccades

DATA ANALYSIS

The sampling rate of 250 Hz of the SMI RED250mobile eye tracker allows to collect data of four eye parameters: fixations, saccades, blinks and pupil dilation. The data collected on the child participating in the study will be inspected visually in order to understand if the measurement worked throughout all the experiment and/or at which point the child lost interest, if there was data loss due to calibration issues or large head movements of the child. The analysis is aimed just to detect problems with the procedure and highlight possible improvements for it. The data will be compared between the participants, in order to understand if the data was consistent across experiments. No judgement will be made on the child's performance.