

Eye-movement Control in the Visual World Paradigm

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The Visual World Paradigm

- Invented by Cooper in 1974
- During the experiment, the setup participants see several images and hear related linguistic input, while their eye movements are being recorded.
- Cooper's assumption:
Eye movements to the object that currently undergoes linguistic processing are automatic.

Main issues

- Cooper's assumption has not been tested directly.
- Presence of a certain task in the experiment affects the attention allocation and thus eye movements of participants.

Goals

- Figure out whether participants can fully control their eye movements or not if the task requires them to.
- Compare the number and the duration of fixations on the target objects when there is a task to control eye movements and when there is no task.
- The main goal is to test Cooper's assumption experimentally.

Experiment with two conditions

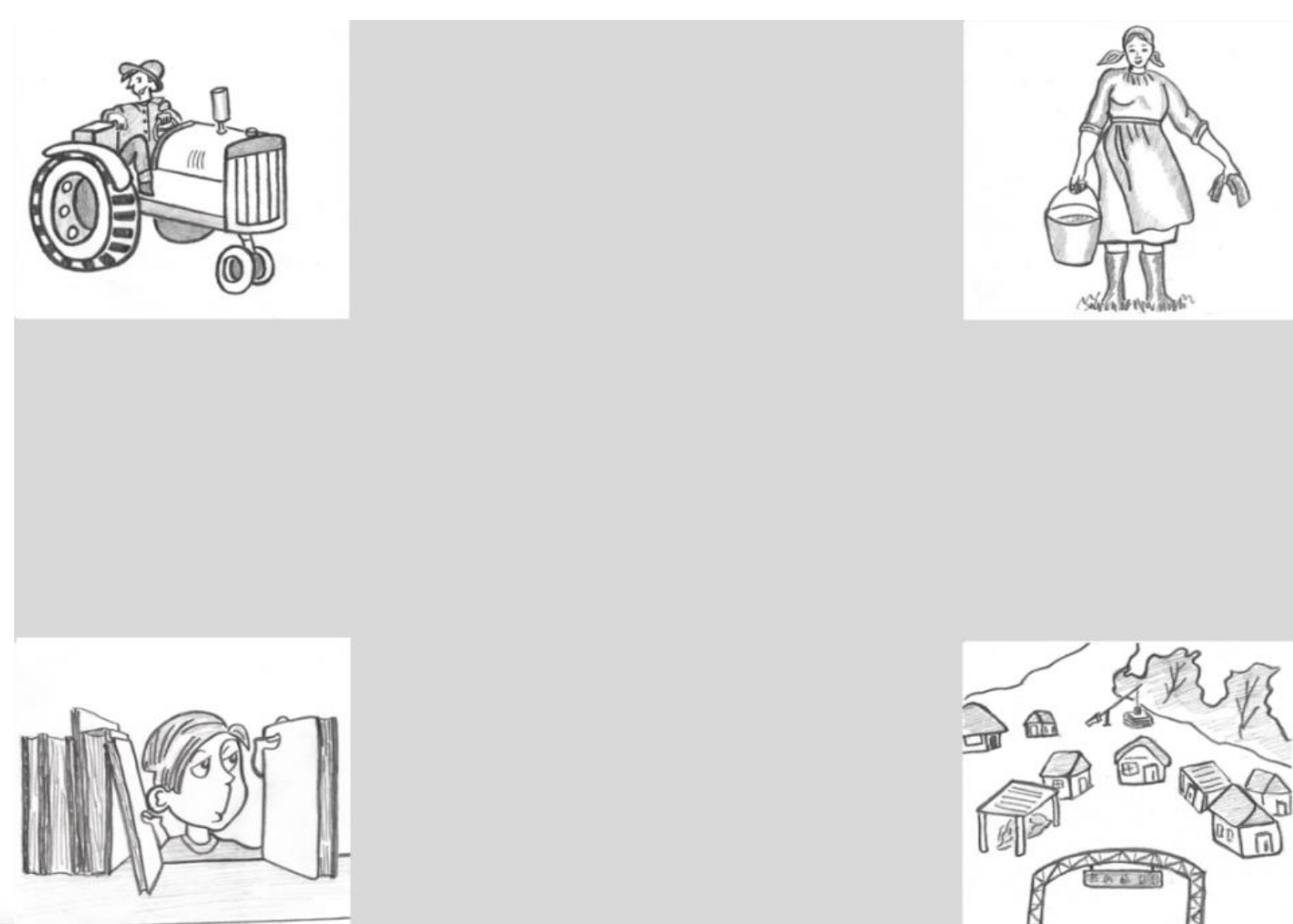
1. Condition 1 – experimental condition
 - Participants have to control the movements of their eyes: not look at the object that is currently being named.
2. Condition 2 – control condition (reference condition)
 - Participants have to look at the screen and listen to the stories.

Methodology

- Equipment:
Desktop eye tracker “Eyelink 1000+”.
Eye movements of the subjects were recorded at a frequency of 1000 Hz.
- 40 participants in each condition
- Materials:
 - 64 stories, 3-4 sentences each
 - Questions on understanding the stories
 - An example of a story and illustrations for it:

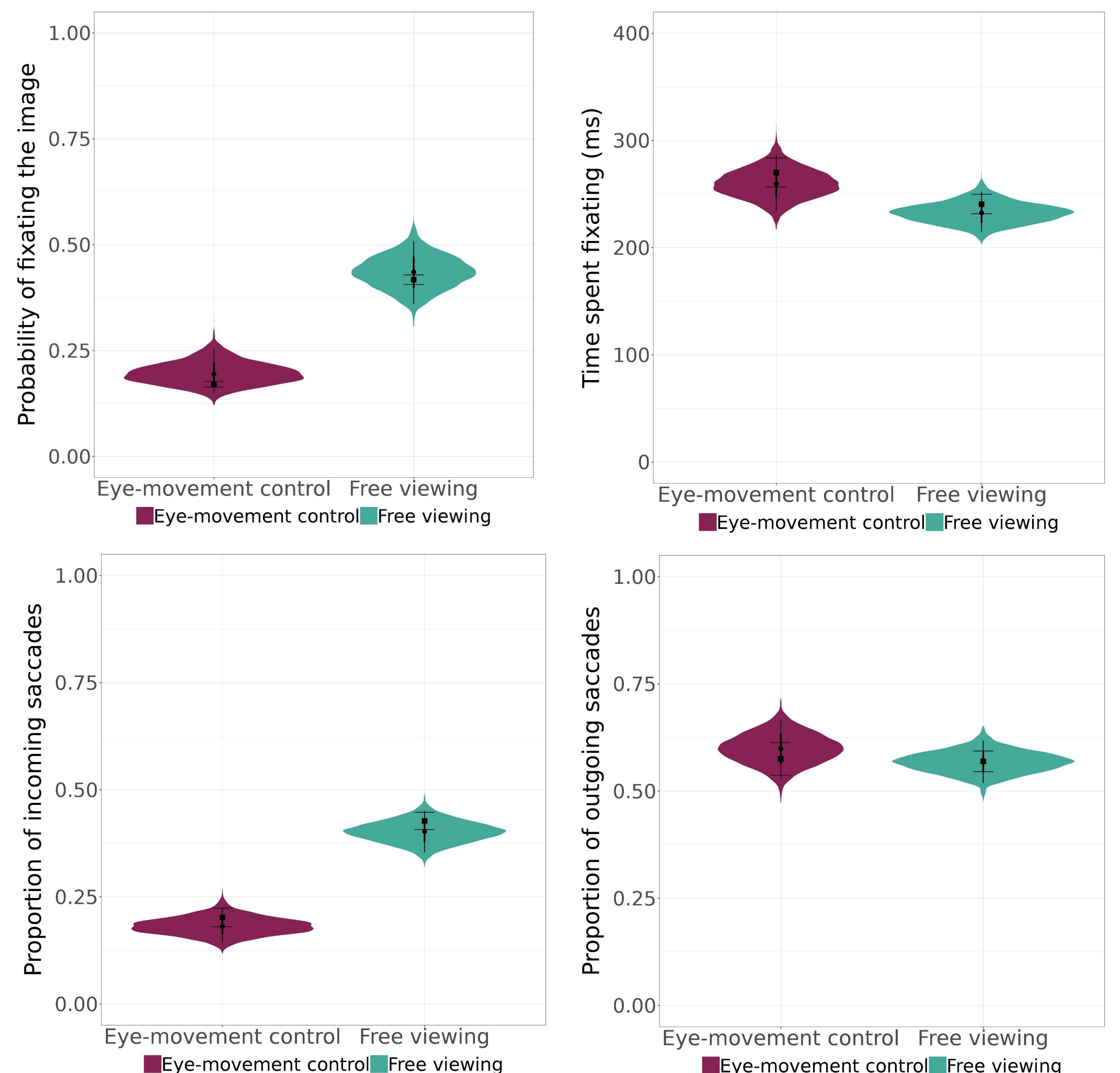
Once on a collective farm a tractor driver fell in love with a milkmaid and gave her red carnations. But she married a librarian who gave her books. Nobody knows why the milkmaid married the librarian.

 - Question after the story:
Did the milkmaid marry the librarian, because he gave her red carnations?
 - 4 to 9 annotated nouns per story
 - 128 unique nouns
 - 255 occurrences per experiment
 - Average duration of a noun — 630 (SD = 118) ms



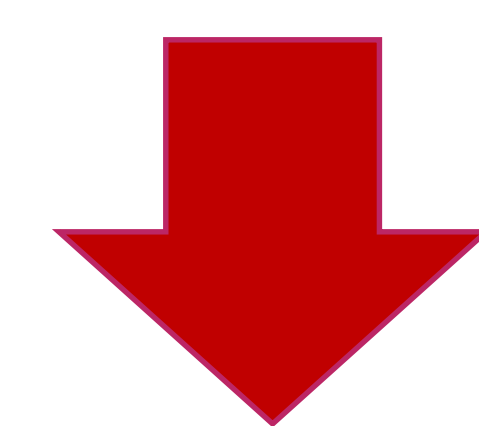
Results

- The probability that there will be at least one fixation on the target image is reduced in the condition of controlling eye movements - there its estimate is 20%, in the condition of free examination - 44%.
- The probability that there will be at least one fixation on the target image decreases in the course of the experiment, especially in the condition of controlling eye movements.
- There is no difference in the duration of fixations.
- In the condition of control of eye movements there are fewer incoming saccades (there is an estimate of 18%, in the condition of free examination 40%)
- There is no difference in the proportion of outgoing saccades.
- The average correctness of the answers to the questions:
Eye movement control - 0.81 (SD = 0.40)
Free viewing - 0.85 (SD = 0.35)



Conclusion

- Participants turned out to be unable to fully control their eye movements in the condition 1 → the desire of the participants to look at the target object is automatic and can not be completely suppressed.
- More fixations in the condition 2 → it is more convenient for the participants to correlate the audio material with the corresponding visual information.



Cooper's postulate about natural eye movements is confirmed: a person always automatically looks at the target object of the word.