

Eye tracking patterns of an autistic child before and after a multiple-exemplar training to follow the direction of the adult gaze

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INTRODUCTION

The use of eyetracker to identify unusual looking tracking patterns in individuals with autism has traditionally been used for diagnostic purposes. Research employing the eyetracker to investigate changes in this pattern throughout a learning process has not yet been documented. The objective of the present study was to examine changes in the gaze orientation of an autistic child (Max) during a joint attention teaching, in which the participant should follow the gaze of a sample (profile face directed to an object at your left or right). For this, Max should point or name to which comparison (of animal, fruit or vehicle) the sample was looking after given the instruction "what is he seeing? ".

METHOD

A multiple-exemplar training with differential reinforcement was performed, gradually increasing the number of comparisons around the face that was positioned in the center of the computer screen.

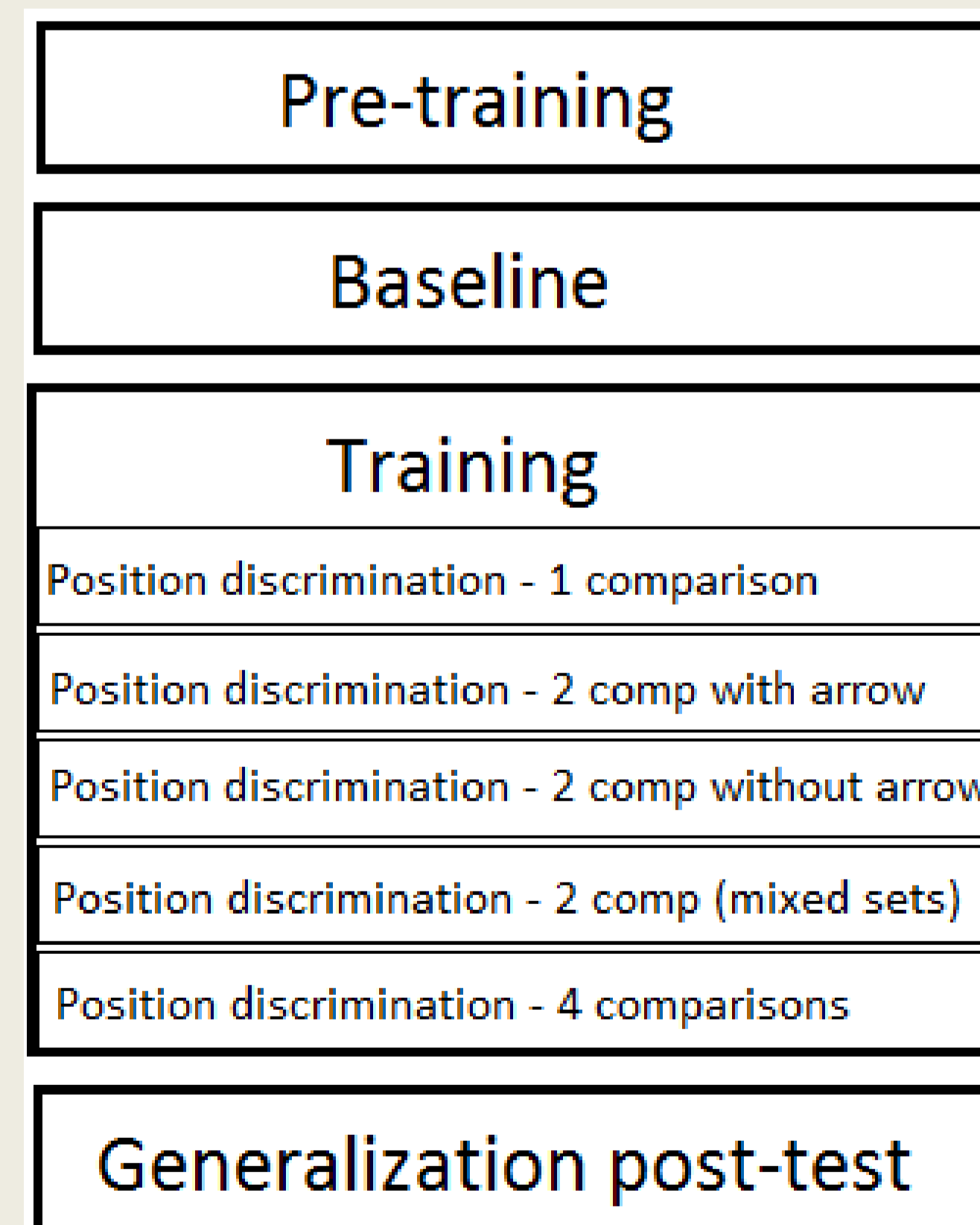


Figure 1. Procedure phases

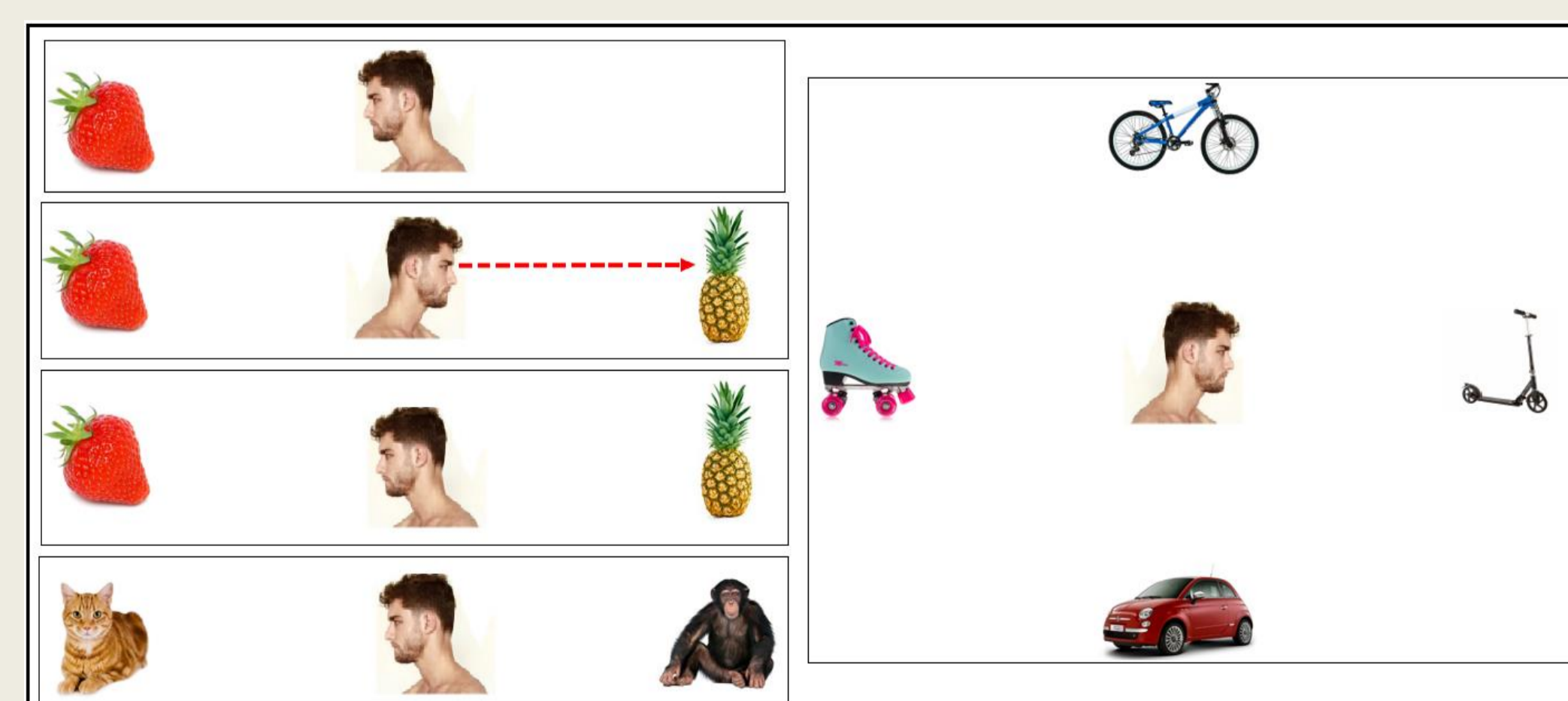


Figure 2. Representation of the trials presented to the participant in each phase. Left panel – teaching blocks. Right panel – last teaching block (similar to baseline blocks, with different comparisons)

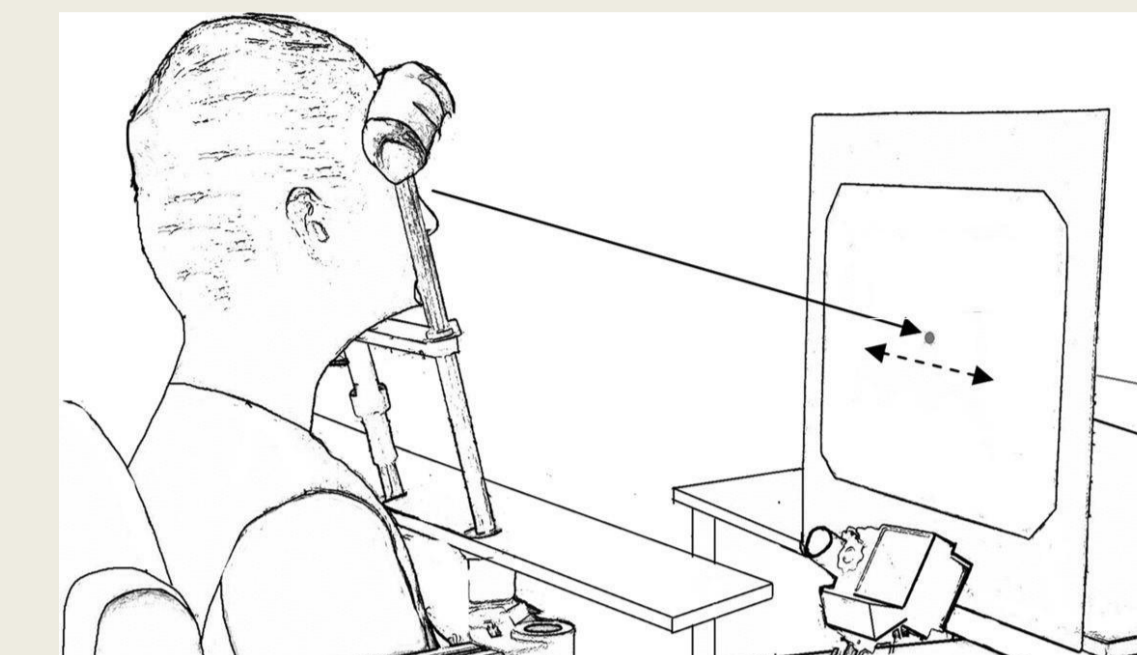


Figure 3. Representation of the experimental situation.

The ocular fixation records of the participant were submitted to the EyeMMV algorithm for fixation extraction, whose maximum spatial dispersion parameters were set at 2 degrees visual angle and minimum duration of 100ms. From this analysis, heat dispersion graphs were generated that illustrate the tracing pattern of both participants.

RESULTS

Max presented 0% of correct answers at the baseline and after completing the MET (14 sessions), responded 87.5% correct in the post-test.

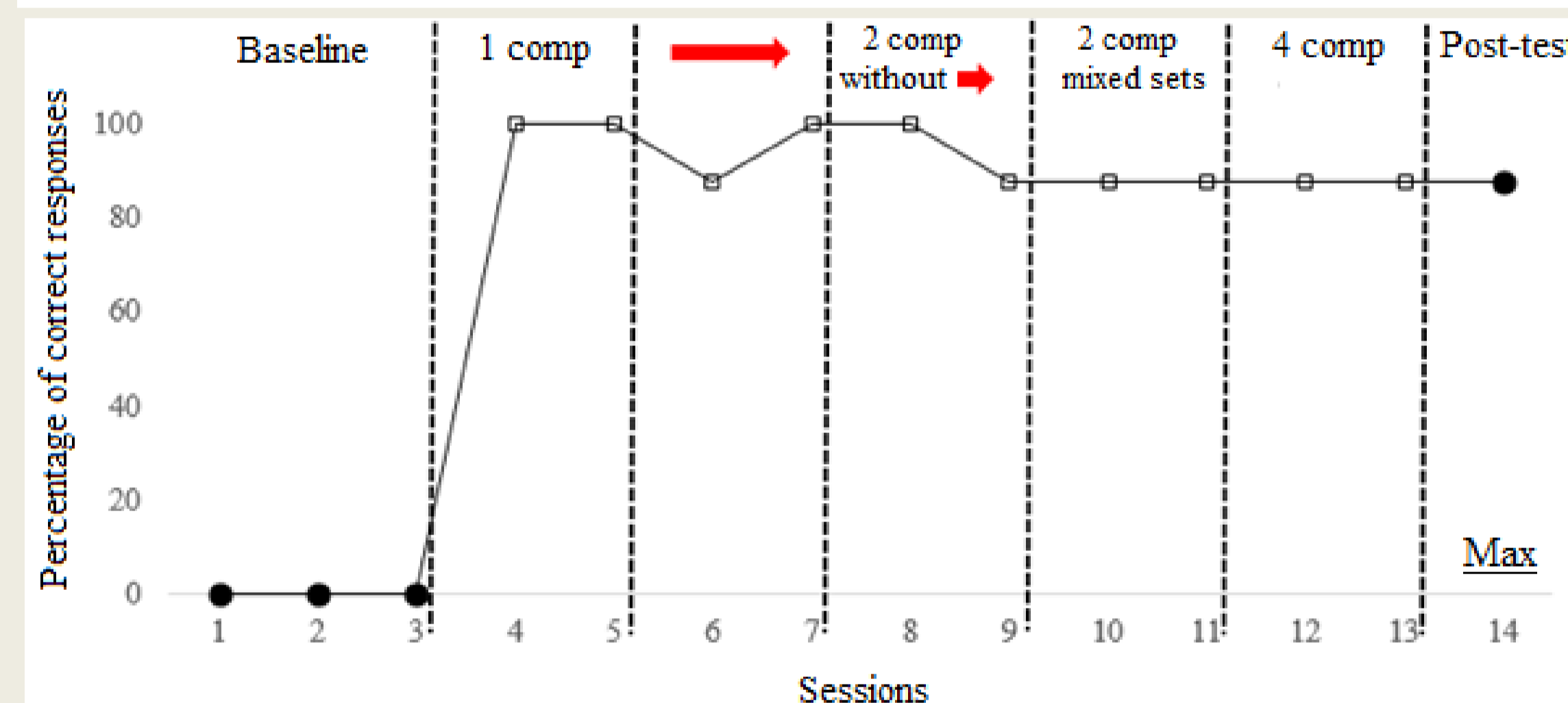


Figure 4. Percent of correct answers from Max to baseline, teaching, and post-test generalization.

The results of the eye-tracking equipment indicated differences in the number of records for each of the stimuli in the post-test compared to the baseline. The Mann Whitney test indicated statistically significant decreases in the mean records of gaze for the comparison stimuli that appeared above the model ($p < 0.05$) and for the sample ($p < 0.01$). In addition, it indicated a statistically significant increase in the mean records for the correct comparison stimuli ($p < 0.05$).

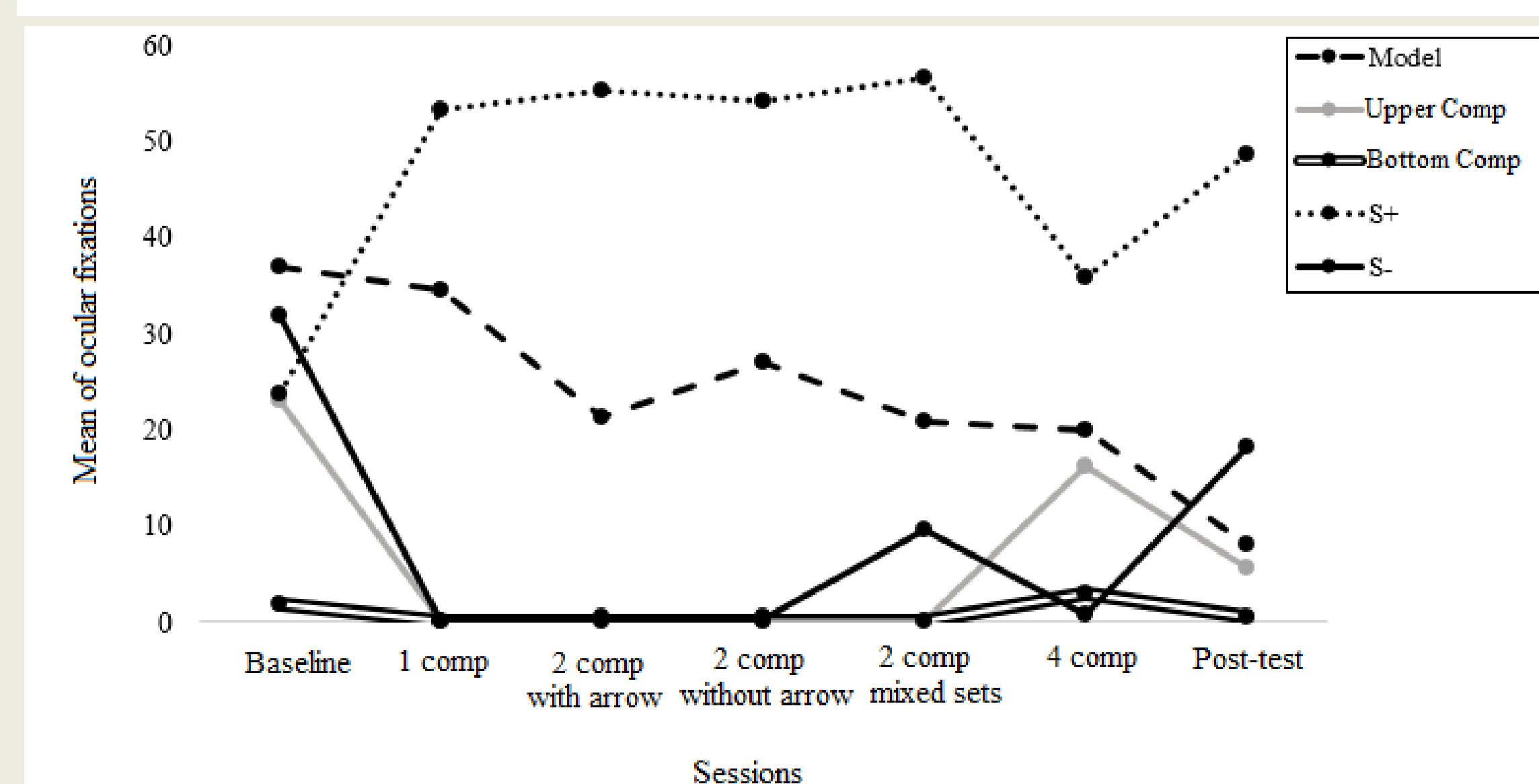


Figure 4. Mean ocular fixations of Max for each of the onscreen stimuli (Model, Top Comparison, Bottom Comparison, Correct Comparison - S+, Incorrect Comparison - S-) in all test and teaching sessions.

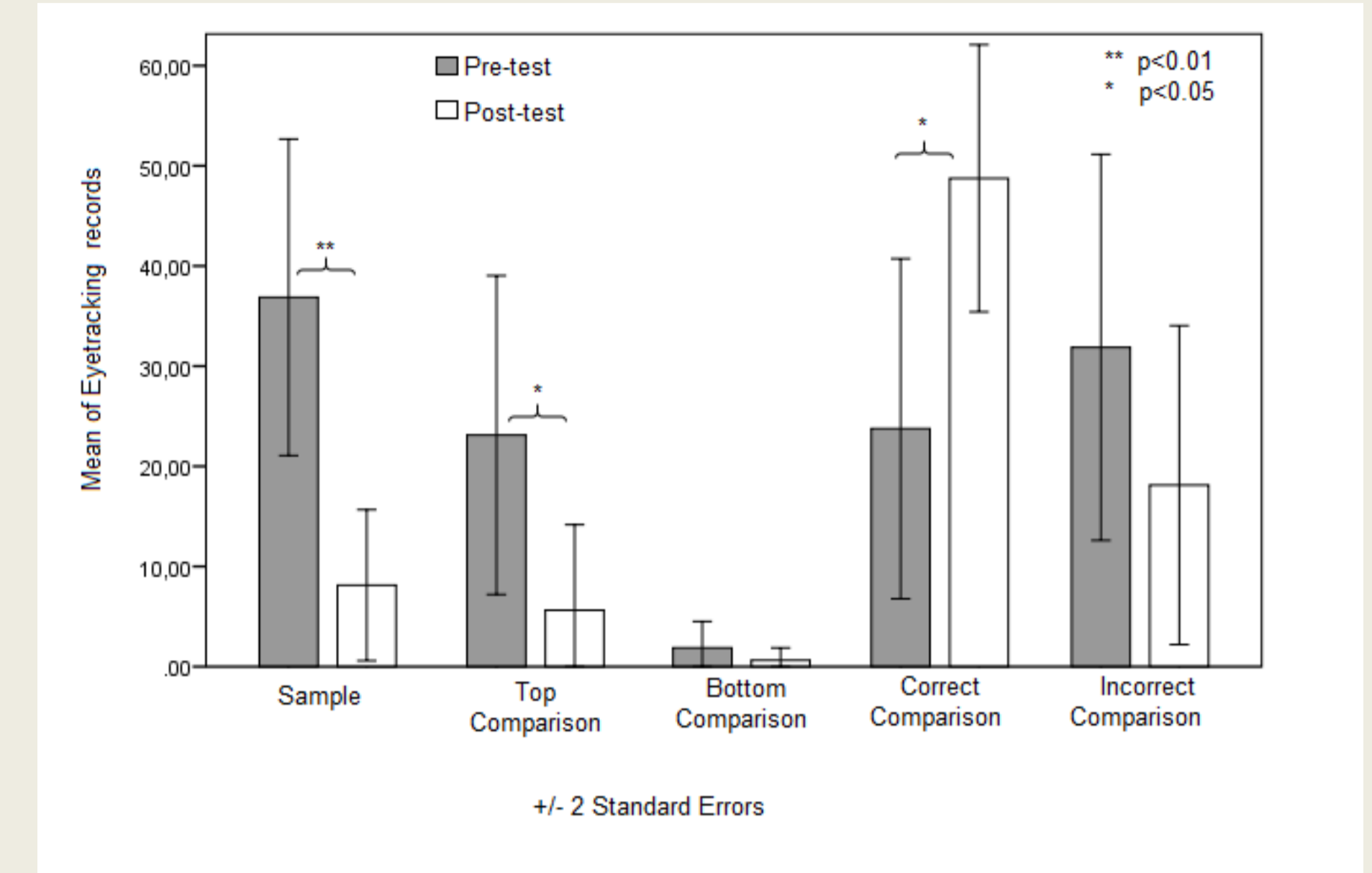


Figure 5. Mean of eye tracker records for each of the stimuli presented on the screen, in baseline and post-test sessions.

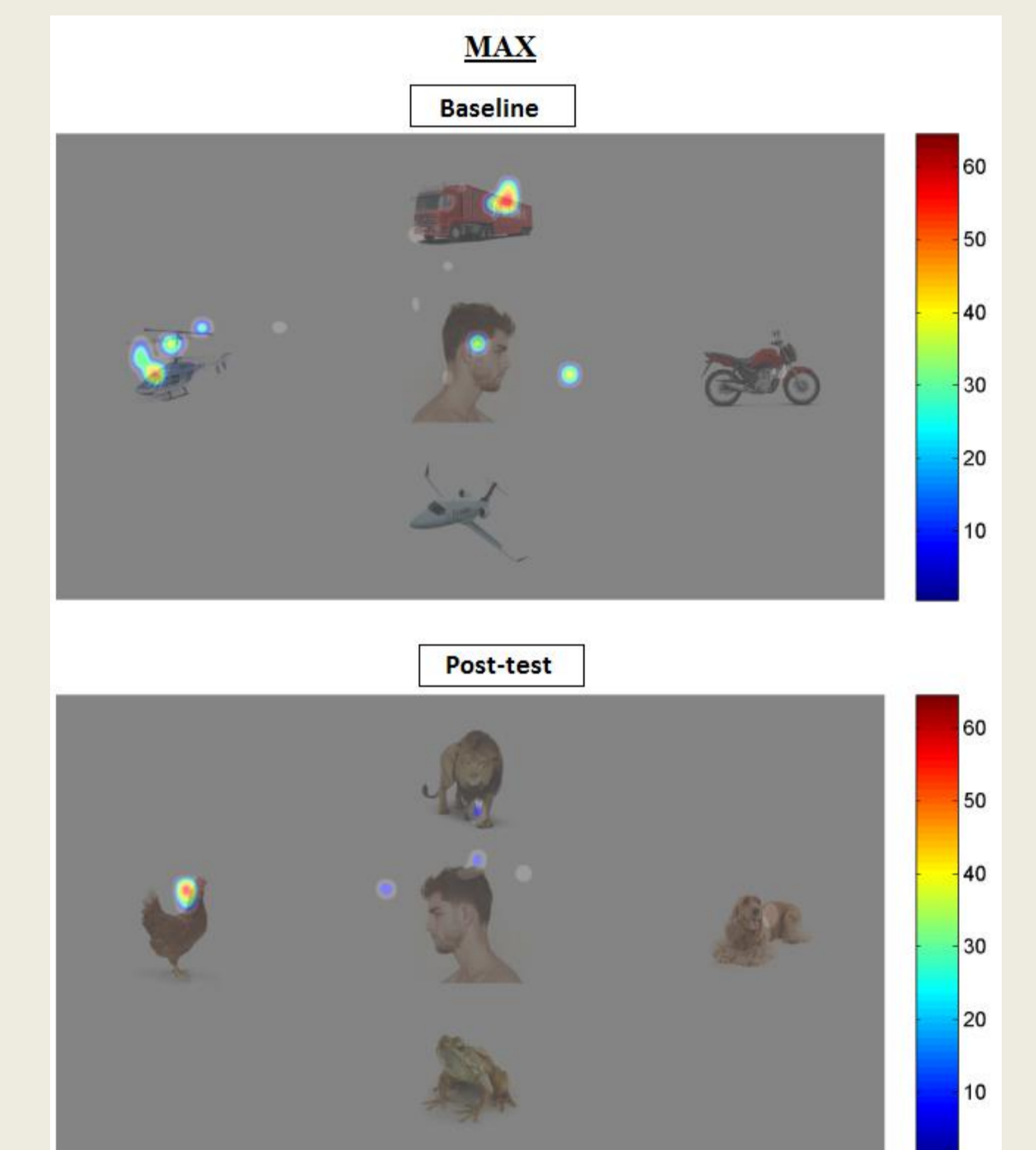


Figure 3. Screen trials of Max ocular fixation pattern at the Baseline and Post-test. The ruler next to it indicates the number of eye fixations occurrences (e.g., light blue – 25 occurrences, green – 35, yellow – 40, and so on)

DISCUSSION

The tendency to decrease the ocular fixations to the distractor stimuli and the sample were contingent on the increase of the observations to the correct comparison stimuli. It was possible to verify the change in the stimulus control of the participant's gaze following, after changes in the contingencies of reinforcement of the joint attention. Even more important, the results highlight the importance of S+ for establishing an adequate gaze tracking pattern.

REFERENCES

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