

## Supplementary Materials of Figure 4(B)

### Wireless EEG system for neurofeedback training

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#### Description of visual training tasks (VT):

- 1) The training program, based on low-contrast discrimination of low-spatial frequency sinusoidal gratings (2 cpd) and high-temporal frequencies (15 reversals/s), vertically flicking in external noise region, had experimental requirements as the above-described task.
  - 2) The next training program with high-contrast discrimination of high spatial frequency sinusoidal gratings (10 cpd), vertically flicking in external noise region with contrast levels of 3% and 6% of defined contrast threshold in previous psychophysics paradigm [1], was used to increase parvocellular type activity. The other parameters of the task and the child's requirements were the same as the previous training task.
  - 3) The training program, which required direction discrimination of coherent vertical motion [1], stimulated the magnocellular function. Coherent vertical motion of white dots in randomly moving elements with a size of 0.1 deg within a circle (diameter 20 deg) appeared on a black screen at a viewing distance of 57 cm for 200 ms. The velocity of the moving dots was 4.4 deg/s. The coherent motion threshold was 50% of the randomly moving dots. The ITI was 1.5-2.5 sec. The instructions were a press of button with a left hand for the upwards dots movement and a press of a different button with the right hand when the stimulus moves downwards.
  - 4) The velocity discrimination training program induced changes in the MT/V5 brain area [1]. Two pair circular stimuli with radial moving white dots' elements from center to periphery of optical flow (a diameter of 10 deg) appeared sequentially one after other on a screen. Each stimulus pair's first item was always with a constant slow speed (4.5 deg/s). The second item in the pair of stimuli had a speed of the flow (5.0 deg/s) close to that of the first stimulus (4.5 deg/s) or with a higher (5.5 deg/s). The first item appeared for 300 ms, and after 500 ms, the second item in the stimulus pair appeared for 300 ms at a viewing distance of 57 cm. The ITI was 1.5-3.5 sec. The instruction was to press a key with the right hand when the pair's speed was slow or another key with a left hand when the second stimulus in the pair had a higher speed than the first stimulus's constant speed.
  - 5) The visual-spatial attentional training task with high peripheral processing demands was to search and track either color change or color preservation of a square in a cue [1]. The cue was a black frame for 300 ms in either left or right visual field on a white screen, before the square color array (each with size 3 x 3 deg). A color square has appeared in the cue for 200 ms horizontally or vertically in an arranged color-array of four squares. The cue remained on the screen during the presentation of the color-array. The child had to compare the square color in the cue with the previous one presented in it on the screen at a viewing distance of 57 cm from the child. The adjacent squares in the array changed their colors in every presentation. The ITI was 1.5-2.5 sec. The child pressed a key on a computer keyboard with a left hand when two consecutive colors in the cue were the same, and with the right hand - when they were different. The number of correct answers and the reaction time was reported in the training programs with 40 trials in each condition and task.
- Thresholds of parameters and program designs were described in previous works [1].

1. Dushanova, J.; Lalova, Y.; Kalonkina, A. chapter "Protocol for Visual Intervention of Developmental Dyslexia". Book: *Advances in Medicine and Biology*, Leon V. Berhardt (Editor), 2022/3/4, Vol 196, pp. 177-199, Publisher Nova Science Publishers, Inc. Hauppauge, New York, ISSN 978-1-68507-704-4