Tablet-based Visual Acuity Test

Prior to the experiment, we administered a visual acuity test to all participants that was built into the Android application used for the current experimental design. The test was programmed in accordance with the structure of the Freiburg Visual Acuity Test (Bach, 2007). In the current test, a Landlot C was employed in order to estimate the smallest visible optotype (i.e., letter or figure) by a subject. This entailed that the letter “C” was first presented in one of eight possible directions at a scale that was clearly visible to the naked eye (i.e., 65% of the screen size). The participants were then asked to indicate which direction the opening in the letter C was facing by pressing one of the eight possible directions displayed in a circle, round the area where the Landlot C was displayed. Once having chosen a direction, a new trial with a new optotype was displayed. There were a total of 18 forced choice trials per eye (each eye was tested separately). These 18 trials were comprised of three sets of 5 normal and 1 easier optotypes. After the first trial, the rule for the following 17 trials was either 75% smaller or 133% larger (i.e., 1/0.75) compared with the previous shown optotype. However, the optotype was never larger than 65% of the screen size. The rationale for choosing larger or smaller optotypes was that the aim of the software was to find a level where 56.25% of the chosen directions are correct. This level is calculated by adjusting for by random chance (50%) and chance (50%) of the guessing rate (i.e., 1/8 = 12.5%), resulting in 56.25%. That is, every new trial was either scaled up or down in comparison with the last trial, in relation to the correctness/incorrectness of the previous choice and in comparison with the 56.25% level.

Usually, as in the case of the Snellen or LogMAR acuity test, distance between the chart/tablet and the participant is taken into account, but the current software was programmed so as to take into account the relative size of the tablet screen. Furthermore, the current software transformed the results by raising them to the power of four in order to
better differences for all other than incredibly bad visual acuity. This meant that each participant received a value between 0 and 1 for each eye. The value 0 indicated that the participant could not see the letter “C” (i.e., make the right choice), 56.25% of the time, even though it was displayed at 65% of the screen size. The value 1 meant that the participant could discern an infinitely small C and make the right choice of direction. Nevertheless, all participants were instructed to stand in a position where they viewed the tablet at 50 cm from their face in order to collect comparable results between subjects.