

### DIFFERENCES BETWEEN EYE-HAND AND EYE-FOOT COORDINATION IN NORMAL HETEROPHORIC AND **ESOPHORIC PERSON**





## **Background and objectives**

Hand-eye and foot-eye coordination is used in sports, optometry and neuroscience to measure the coordinated control of eye movement with hand or foot movement and guide reaching and grasping. In this work we want to integrate this parameter in an optometric examination. This will help us to verify the integration of vision at the parietal level in two particular case types: esophoric and normal heterophoric population. Our goal is to measure coordination this parameter to 40 cm at near and 6.56 feet to middle distance, looking for differences in the type of heterophoria in a young university population.

#### Materials and methods

The materials used were a Wayne Saccadic Fixator (WSF) (Photo 1) and basic equipment for a complete visual examination. Refractively, we corrected the correction using a philosophy of maximum plus for best visual acuity. We measured eye-hand and eye-foot coordination to 40 cm and 2 m randomly with the patient standing and pressing light on the WSF to 40cm and with a remote (photo 2) control at 2m. The subjects were asked to push as many lights as posible in one minute using their preferred hand. for people with esophoria against exophoria and orthophoria conditions. The measures were made with and without auditory stimulus.

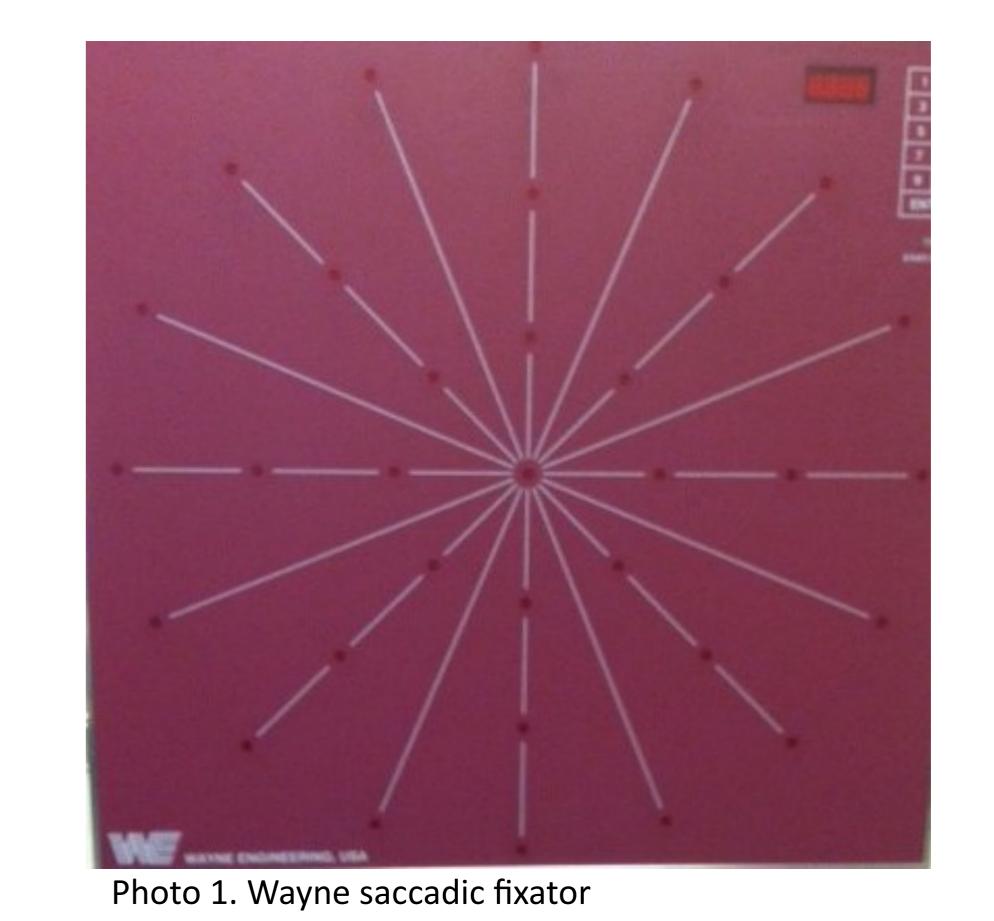
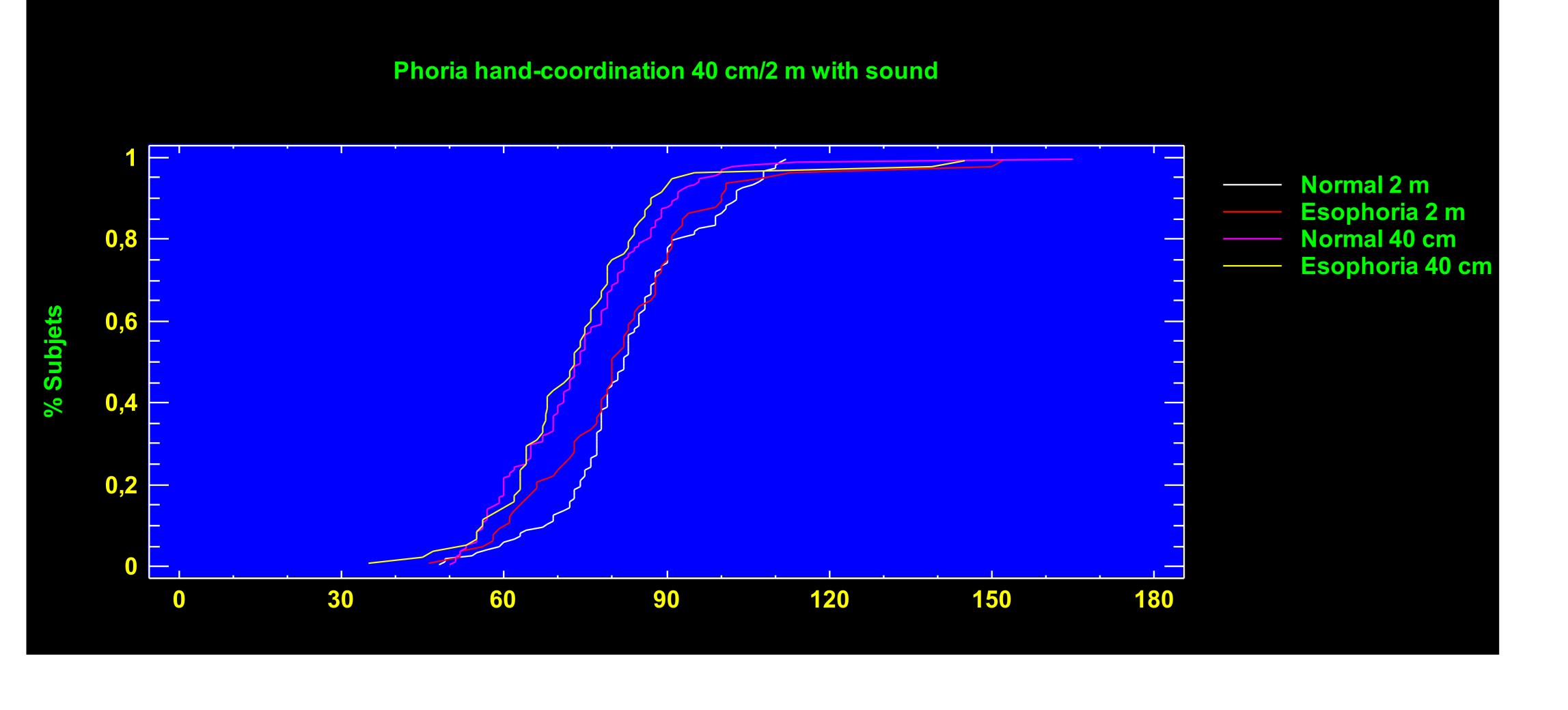


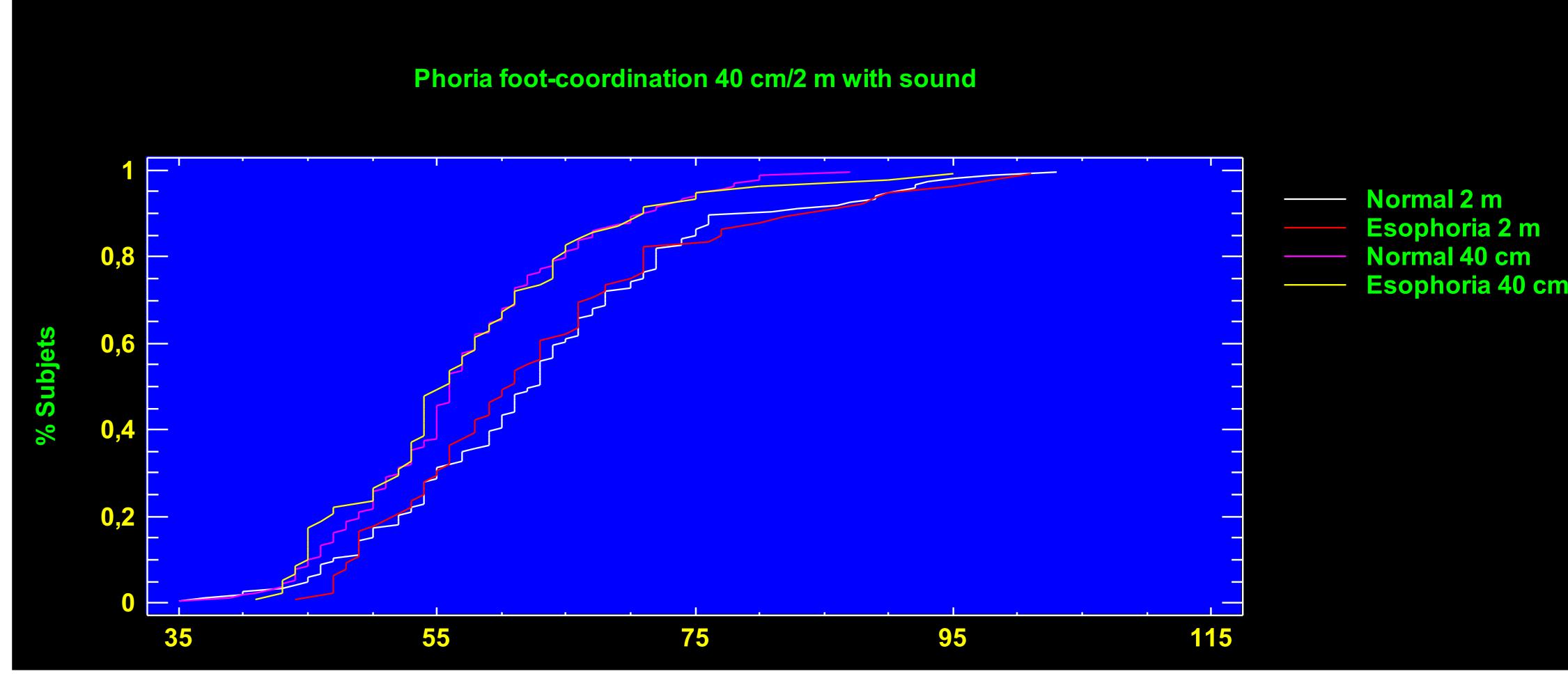


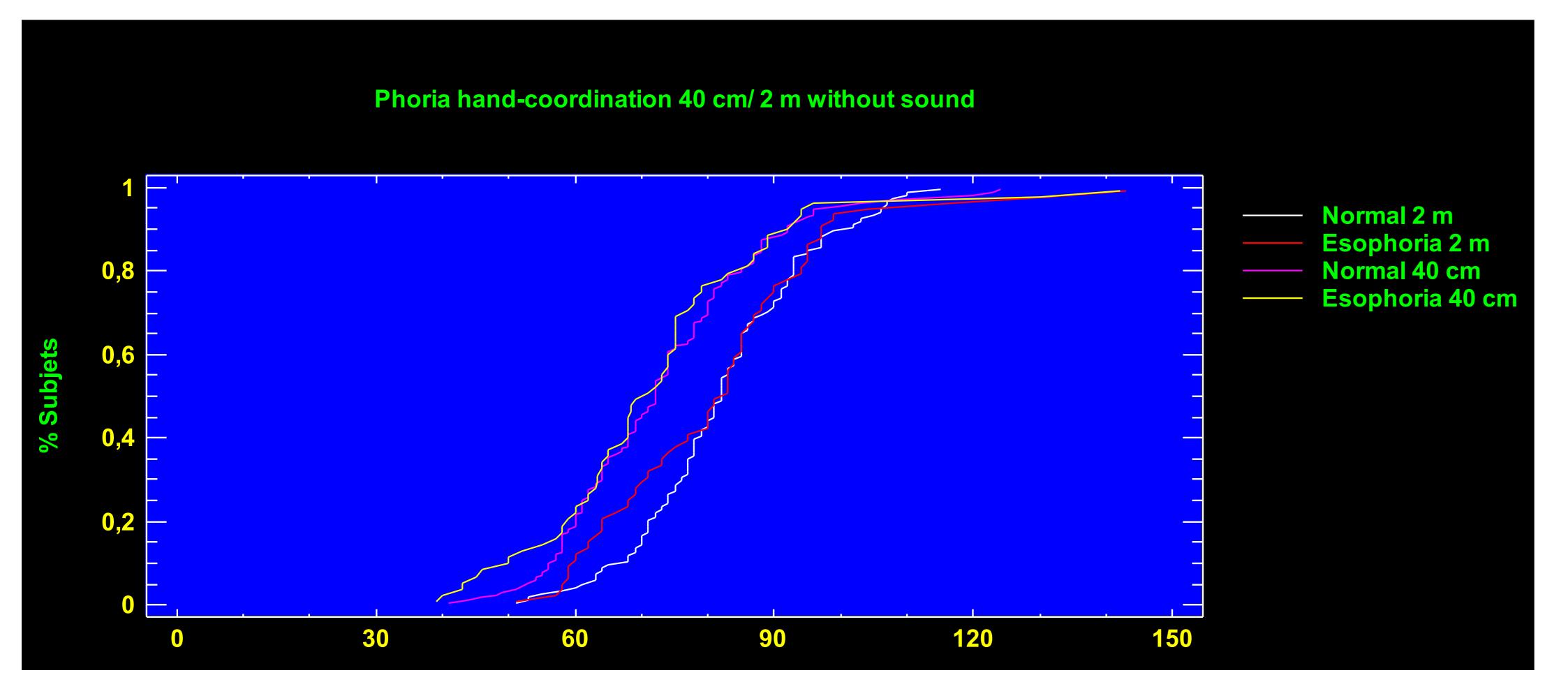
Photo 2. Remote control for 40 cm and 2 m

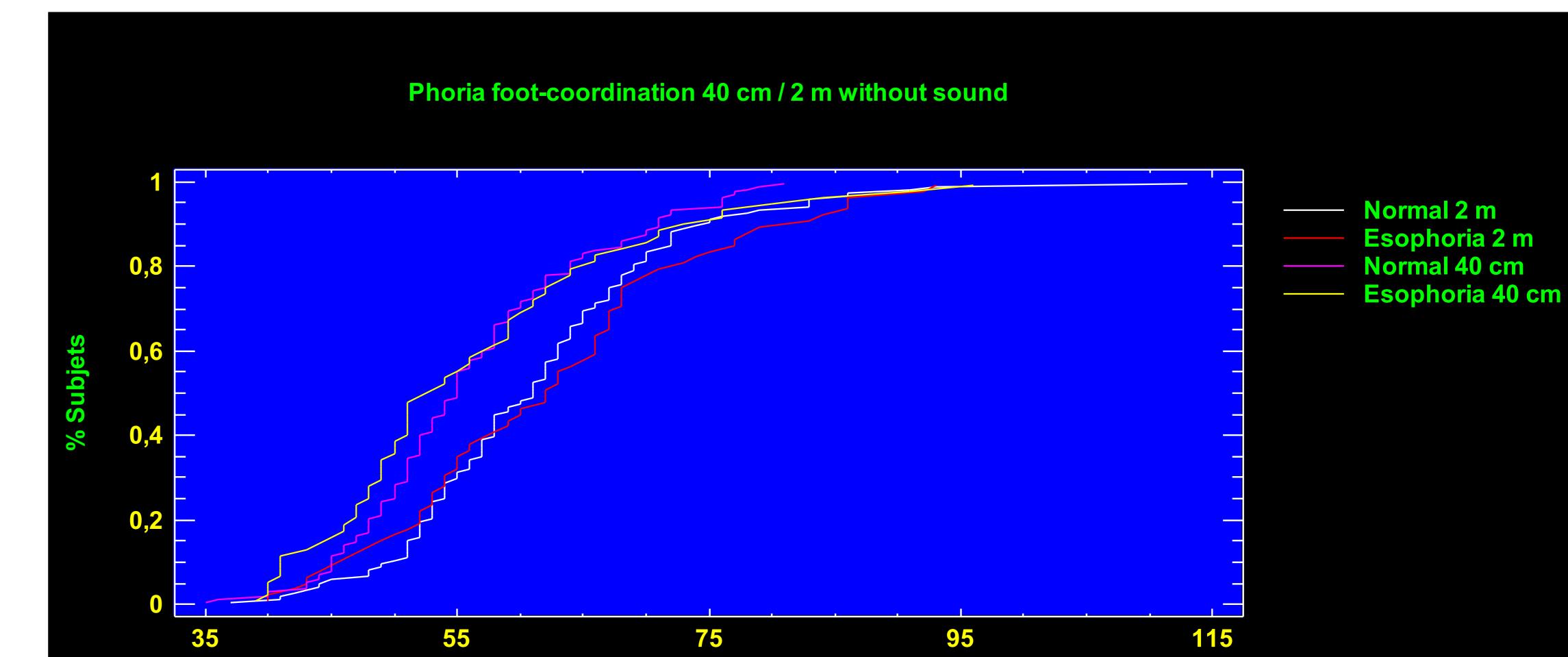
#### Results

This was a population of 100 college students mean age of 22.44 ± 2.10 years (19 to 27 years) with 0.54 standardized bias and standardized kurtosis of -1.53. The average refractive error was -1.49 ± 2.43 D in the spherical component for visual acuity 1.18 ± 0.21. In normal heterophoria (ortho and exophoric conditions) at 2m, the hand-eye coordination was: 82.78 ± 13.49 pulse per minute (ppm) with sound and 74.38 ± 15.24 ppm at 40cm (F = 23.28 for p = 0.00001) and without sound at 2m it was 82.24 ± 12.99 ppm versus 73.00 ± 15.23 ppm at 40cm (F = 28.98 p = 0.00001). In subjects with esophoria: with sound was 81.39 ± 18.31 ppm at 2m and 73.42 ± 16.98 ppm at 40 cm (F = 6.89 p = 0.009) and without sound it was 80.78 ± 16.83 ppm vs 71.46 ± 18.11 ppm at 40cm (F = 9.68 p = 0.002). For eye-foot coordination, measured with WSF, and with sound in normal heterophoria it was: 63.01 ± 13.11 ppm at 40cm (F = 18.28 for p = 0.00001) and without sound 61.45 ± 11.35 ppm vs. 56.18 ± 9.58 ppm (F = 17.48 p = 0.00001). For esophoria with sound, it was 63.06 ± 13.25 ppm at 40cm (F = 7.95 to p = 0.005) and without sound, 62.23 ± 12.79 ppm versus 56.06 ± 12.49 ppm (F = 8.08 to p = 0.005).









# Conclusions

The results obtained indicated that regardless of phoria a result of higher in pulses per minute was found for 2m vs. 40cm. We didn't find meaningful differences with phoria because this visual condition needs to be measured in a bigger sample and perhaps more difficulty in task.

