Laterality and the practice of rhythmic gymnastics

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Introduction
People usually prefer to use one side of the body more than the other (laterality). Some choose the right side, others the left and yet others can use both. A certain percentage may present cross laterality i.e. that although they are defined as right handed or left handed, they use the other eye, hand, foot or ear, for certain tasks. Some authors consider that this latter group may be characterized by abnormal posture, retarded reaction time, a higher energy cost for everyday tasks and possible learning problems both motor and with reading. The question could be asked as to whether these problems of learning and motor coordination could affect the success of rhythmic gymnasts (RG) limiting their ability to attain a high level of performance. The purpose of this study was to find out if the prevalence of cross laterality was lower at higher levels of RG sports performance.

Methods
The subjects in this study were 81 girls from 3 RG groups of different levels and with ages between 6 and 16. The groups: 1) non-competitive (N), 2) regional competitors (RC) and 3) national competitors (NC), comprised 30, 32 and 19 girls respectively. Once the parents and participating girls had been duly informed they agreed to carry out the programmed evaluations. They were given: a) a complete optometric examination where their refractive, binocular and ocular motor status were assessed to make sure that all had normal ocular parameters; b) a test of everyday laterality of the hand, foot, sight, both long distance and close up, and hearing; c) a test of sports laterality, d) a test of hand-eye coordination and visual and motor reaction time in sports events.

An anamnesis was taken and the optometric evaluations were carried out by 8 optometrists and one of the directors of the study at 9 stations. The tests and instruments used for this evaluation were: A) Keystone (static visual abilities at different distances; simultaneous vision, vertical and horizontal phoria; fusion; monocular visual acuity (VA); and stereopsis. The norms of the Pacific Sports Visual Performance Profile (PSVPP) were followed. B) VA in close up binocular and monocular vision (reading at 40 cm distance with VA values of 0.1 to 1.0; C) Cover test for binocular status and motor fusional ability (phoria; tropia); D) Stereopsis in close up (3D). E) Motility of the extra-ocular muscles (fixation, following and saccades); F) Retinoscopy with fringe retinoscopy, skiascopic rulers and optotype of fixation in long distance vision. Laterality was assessed with simple tests: for the hand, throwing a ball, hitting with a hammer, cutting with scissors, writing and erasing, unscrewing a bottle top, for the foot: hopscotch, kicking a ball, climbing stairs, treading on a doll; for the ear: listening through a wall, listening to a watch, listening for clapping; for the eye: triangulation, a tube, a mirror, a box with a hole in it. For RG sports laterality ribbons, hoops, clubs and balls were used. Sensory and motor visual reaction time (RT) was also assessed with a reaction plus; and hand-eye coordination with Wayne’s 9:61 saccadic fixator.

Results
Data were analysed using the SPSS program (v 10.0). Age, weekly hours of practice, and years of practice for the different groups were respectively: N = 8.3 ± 2.3; 2.1 ± 0.6; 3.0 ± 1.9; RC = 12.2 ± 1.9; 6.0 ± 0.9; 6.1 ± 2.2; NC = 12.3 ± 1.8; 16.9 ± 3.3; 6.3 ± 1.9. To contrast the hypotheses of the study, a series of contingency tables were elaborated to check the dependence or independence of the variables calculating the Sigma value (Phi, Cramer’s V, contingency coefficient). The contrasted values: a) competition level and cross sports laterality, b) competition level and sports laterality, c) hand-eye coordination and sports laterality and d) reaction time and sports laterality, were between 0.62 and 0.13, all greater than 0.05 which indicates that the factors were proved to be independent of each other.

Conclusion
Based on the results obtained it can be concluded that: 1) there was a higher proportion of right handed girls in the 3 groups studied (similar to the general population); 2) laterality was similar in daily life and in sports; 3) no statistically significant relation was observed between the laterality of the sample and their hand-eye coordination; 4) nor was a relation observed between laterality and RT; and 5) in our sample, laterality was shown to be independent of the level of competition, so that we can conclude that cross laterality was not shown to be a limiting factor of performance in RG in the gymnasts studied.

References
Guitart de Anza (2001). Vive (4) and (5).