

Interrelationships between Different Functional Asymmetries in Bulgarian Right-, Mixed-, and Left-Handers

G. Karev

*Institute of Experimental Morphology and Anthropology with Museum,
Bulgarian Academy of Sciences, Sofia*

A suggestion exists that the left types of Arm folding and Hand clasping witness for a latent left-handedness. In the light of our previous investigations, if this were true, the majority of the Bulgarian population would be latently left-handed, which is not the case. As far as none of the lateralized preferences Arm folding and Hand clasping showed interrelation with handedness, the suggestion that the left types of these preferences are symptoms of any hidden left-handedness should be categorically rejected.

Highly significant interdependences are established between handedness and footedness, handedness and eyedness and footedness and eyedness. Bearing in mind our previous findings that each of these asymmetries depends very much on the CIFS (Cumulative index of familial sinistrality), it could be hypothesized that functional cerebral asymmetry is under strong genetic influence and that the separate functional asymmetries are partial demonstrations of much more generalized and genetically controlled cerebral mechanisms.

Key words: folding, clasping, handedness, footedness, eyedness.

Introduction

It was found in our previous study, performed on 2100 healthy Bulgarians that the left types of the lateralized preferences Arm folding and Hand clasping prevail in males, in females and in both sexes jointly, all the three mentioned differences being highly significant [5]. The aim of the present study was to establish the presence or the lack of interdependence between the handedness and the two lateralized preferences and, on the other hand, between the three examined functional asymmetries: handedness, footedness and eyedness.

Material and Methods

A sample of 870 apparently healthy secondary school students was studied. The sample comprised 264 right-, 246 mixed- and 360 left-handers, each handedness

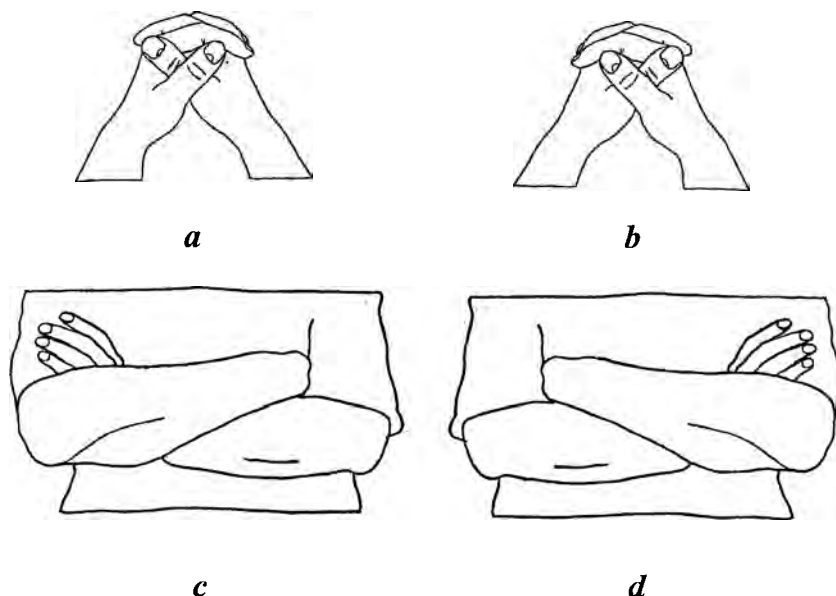


Fig.1. Hand claspings (top): left type, (a), and right type, (b). Arm folding (bottom): right type, (c), and left type, (d)

category including equal numbers of males and females. Handedness of each person was determined accordingly to *Chapman* and *Chapman* [1], footedness in accordance with *Chapman et al.* [2] and eyedness as described by *Gur and Gur* [4] and *Gorinia and Egenter* [3]. Lateralized preferences Arm folding and Hand claspings were examined using the procedures of *Wiener* [8], *Legube* [6] and *Legube and Martinez-Fuentes* [7], as it is shown in Fig. 1.

Results

Relationships between handedness and the lateralized preferences were looked for using three (handedness categories) X two (types of each preference) contingency tables. The results of these evaluations (Arm folding, males: $\chi^2 = 2.414$, d.f. = 2, $p < 0.5$; females: $\chi^2 = 5.2$, d.f. = 2, $p < 0.1$ and Hand claspings, males: $\chi^2 = .39$, d.f. = 2, $p < .9$; females: $\chi^2 = .66$, d.f. = 2, $p < .75$) showed categorically the lack of interdependence between handedness and the two lateralized preferences in both sexes.

Further, the sample was distributed in a 3 (handedness categories) X 3 (footedness categories) contingency table. The χ^2 — testing revealed a strong connection between the two examined lateralities ($\chi^2 = 422.59$, d.f. = 4, $N = 870$, $p < .001$). Similarly, the simultaneous distribution of the sample on the three handedness and the two eyedness categories revealed a strong interrelation between these two lateralities ($\chi^2 = 127.01$, d.f. = 2, $N = 870$, $p < .001$). And, finally, such a strong connection was established between footedness and eyedness ($\chi^2 = 100.97$, d.f. = 2, $N = 870$, $p < .001$).

Discussion

A suggestion exists that the left types of Arm folding and Hand clasping witness for a latent left-handedness. Our previous results [5] showing a considerable prevalence of the left types of these preferences in Bulgarians gave an evidence against the mentioned suggestion. If the latter were true, the majority of the Bulgarian population would be latently left-handed; evidently, such is not the case. The results of the present study give evidences in the same direction. As far as none of the lateralized preferences Arm folding and Hand clasping showed interrelation with handedness, the suggestion that the left types of these preferences are symptoms of any hidden left-handedness should be categorically rejected.

Highly significant interdependences are established between handedness and footedness, handedness and eyedness and footedness and eyedness. Bearing in mind our previous findings that each of these asymmetries depends very much on the CIFS (Cumulative index of familial sinistrality), it could be hypothesized that functional cerebral asymmetry is under strong genetic influence and the separate functional asymmetries are partial demonstrations of much more generalized and genetically controlled cerebral mechanisms.

Conclusion

Our results show that the suggestion that left types of the lateral preferences witness for a hidden left handedness should be categorically rejected. Handedness, footedness and eyedness are significantly interrelated, probably due to a general genetic determination.

References

1. Chapman, L. J., J. P. Chapman. The measurement of handedness. — *Brain and Cognition*, **6**, 1987, 175-183.
2. Chapman, J. P., L. J. Chapman, J. J. Allen. The measurement of foot preference. — *Neuropsychologia*, **25**, 1987, 579-584.
3. Gorinia, I., D. Egenter. Intermanual coordination in relation to handedness, familial sinistrality and lateral preferences. — *Cortex*, **36**, 2000, 1-18.
4. Gur, R. E., R. C. Gur. Sex differences in the relations among handedness, sighting-dominance and eye-acuity. — *Neuropsychologia*, **15**, 1977, 585-590.
5. Karav, G. B. Arm folding, hand clasping and dermatoglyphic asymmetry in Bulgarians. — *Anthrop. Anz.*, **51**, 1993, 69-76.
6. Legeube, A. Hand clasping: etude anthropologique and genetique. — *Bull. Soc. Roy. Belge Anthropol. Prehistor.*, **78**, 1967, 81-107.
7. Legeube, A., A. Martinez-Fuentes. Etude genetique du mode de croisement des bras. — *Acta Genet. Med. Gemellol.*, **20**, 1971, 267-283.
8. Wiener, A. S. Observations on the manner of clasping the hands and folding the arms. — *Amer. Natur.*, **66**, 1932, 365-370.