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## Cognitive pattern and dermatoglyphic asymmetry

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### Abstract

Right-handed subjects were classified by the number of ridges on left and right fingertips as left-higher (L >) or right-higher (R >). As in previous studies, L > subjects of both sexes scored higher than R > subjects on tasks typically favouring females (feminine tasks). However, masculine characterization of tests did not relate consistently to direction of dermatoglyphic asymmetry. Instead, two verbally-presented reasoning tasks (inferences, math aptitude) were advantaged in R > subjects compared to L >. Since fingerprints are formed by the fourth fetal month, the data support suggestions that significant components of our cognitive pattern are programmed very early in life. © 2001 Elsevier Science Ltd. All rights reserved.

*Keywords:* Cognitive; Asymmetry; Sex differences; Dermatoglyphics; Fingerprints

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### 1. Introduction

It is well established that men and women differ in their patterns of cognitive strengths, with men, for example, excelling at certain spatial, and at math reasoning tests, for convenience designated as 'masculine' tasks. Women, in contrast, excel at certain verbal fluency, verbal memory and perceptual scanning ('feminine') tests (see Kimura, 1999 for review).

Previous research has also demonstrated a relation between the direction of asymmetry in number of ridges on the left and right fingertips, and cognitive pattern. Those persons with a higher count on the right hand (R >), the prevailing asymmetry in both men and women, had higher scores on 'masculine' tasks than groups with a left-higher count (L >), the minority pattern (Kimura and Carson, 1995). In contrast, the L > group performed better on 'feminine' tests. On 'neutral' tests, those that typically do not show sex differences, there was no significant effect of asymmetry.

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There were, however, some anomalies in the data which raised the question whether the terms masculine, feminine and neutral best described the association with finger-ridge asymmetry. First, a mental rotation test that yields a large and reliable difference in favour of men showed no effect of rightward asymmetry; whereas a test of math reasoning did show such effect. Second, of the two tests showing the largest effect of rightward asymmetry, one was a neutral test (inferences), that is, it did not and typically does not yield a sex difference. It appeared that two reasoning tasks, inferences and math aptitude, both showed the strongest positive association with rightward asymmetry.

The present study was an attempt to replicate and extend these findings. In addition to administering many of the tests used in the previous study, we added another female-favouring (feminine) task — verbal memory.

## 2. Methods

### 2.1. Subjects

We tested 19 L > women aged 21.0 (2.9), 19 L > men aged 21.7 (3.1), 23 R > women aged 21.1 (2.8), and 20 R > men aged 22.1 (3.4), making a total of 81 subjects.

#### 2.1.1. Selection procedure

Right-handed undergraduates only, whose first language was English, were solicited for this study at Simon Fraser University. All subjects were initially screened via fingerprinting. A table was set up in a well-trafficked area on campus, and paid volunteers were fingerprinted, and asked to provide name, telephone number and programme of study for future contact. This was also an occasion to check their writing hand, their sex, and to note if they were not Caucasian. To maintain homogeneity across subject groups, only Caucasian subjects (who were the majority) were asked to return for the next phase of the study.

The fingerprints for the thumb and little finger of each hand were examined and a count of the number of ridges was determined (see Kimura & Carson, 1995 for details of fingerprinting and counting). A difference between hands of two or more was considered asymmetric and the subject classified as either L >, R >, or no difference. Scoring of fingerprints was concurrent with the fingerprinting phase, which went on for several weeks, in order to obtain roughly equal and adequate numbers of men and women in each group.

Because there were, as always, fewer L > subjects, all were asked to return for the second phase of the study, and these subjects were then matched with R > subjects for sex and programme of study. Nearly all invited subjects returned for testing, which included cognitive tests, and also required the subject to leave a sample of saliva for later hormonal assay. (The assays will be the topic of a separate paper.) All subjects were paid for their participation.

### 2.2. Cognitive tests

The cognitive tests were categorized a priori, on the basis of the Kimura and Carson study. We retained the category 'feminine' tests, but not that of 'masculine' and 'neutral'. For the latter two categories, we substituted 'spatial', 'reasoning', and 'general intelligence' tests.