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Variations in the Finger Length of the Human Hand

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Introduction

Although a great deal has been written concerning the occurrence of abnormalities of the hands and fingers, relatively few studies have been made to determine variations of the normal hand. The purpose of this study is to gather some valid statistics concerning the occurrence of variations in finger length within a segment of the general population. It is hoped that this study will serve as the beginning of a valid basis upon which a study of human inheritance can be built.

Because the interindividual difference in the pattern of finger length consists in the relationship between the index and ring fingers, this varying relation has been most often reported in the literature. Humphry (1861) observed that the middle finger is always longest, the little finger shortest, and the index finger longer than the ring finger. Ecker (1875) noted that a variation exists, and that the ring finger was sometimes equal to the index and in the greater percentage of cases longer. Mantegazza (1877), Gruning (1886), Baker (1888), Schultz (1926), and Koenner (1938) verified his study. Many noted that a relatively long index finger was found more frequently in females than in males. Wood-Jones (1920) considered the longer ring finger a simian trait, and the longer index finger a more human manifestation. George (1930) found a long ring finger more common in males, but a long index finger predominant in females. Phelps (1952) found similar results and presented a theory for sex-linked inheritance. Whitney (1942) assumed that the determination of finger length depended on multiple alleles. The number of hands of females measured in these studies ranged from 190 to 620. Methods depended on hand board (George) or pivot ruler measurements (Phelps) and pencil tracings.

Materials and Methods

The basis for this study consists of photographic prints made of both hands of 112 Grinnell College freshman women, of whom all but five belonged to the White race and nearly all were 17

or 18 years old. An attempt was made to improve the methods used for hand measurement in previous studies. An incomplete L-shaped box was constructed from plywood with a 20″ x 10 3/4″ base and a 20″ x 23 3/4″ back. A partition 10 3/4″ x 23″ divided the box in half. On each half of the base was placed a sheet of 8 1/2″ x 10″ Remington Rand sensitized paper for reproduction purposes. Above the sheets, under the partition, was a pane of window glass 10″ x 19″ upon which was painted a series of curved lines 1/2″ apart, to aid in comparing finger length at a casual glance. Above each half of the box at a height of 24″ was a shaded, clear 150 watt bulb, directed straight downward to eliminate any shadows or diffusion. The walls of the box were lined with dark crepe paper to prevent reflection of light. The subject's hands were spread flat, palm down on the glass, one in each half of the box. Then the paper was exposed to light for 5 seconds, recording both hands simultaneously. Data concerning hand injuries and fingernail shape was also recorded at that time. A great deal of continuous variation was found in all the characteristics noted. The paper was then developed and fixed. The prints were next measured in 1/16th's of inches. The length of each finger was determined by measuring a line constructed from the center of the finger tip to the center of the base of the finger. Two measurements of width were also made for each finger, and data was recorded concerning degree and direction of finger bending and fingernail shape and size. Data was subjected to statistical analysis by the Chi square method, a procedure suggested by Dr. Charles Haner of the Grinnell psychology department, to whom we are particularly indebted.

Analysis

The absolute length of each finger of each hand was recorded in graphical form. A graph was also made for each finger combining right and left hands. The graphs for right and left hands were similar although not identical. The range was slightly wider in the left hand for every finger but the fifth. The range of variation of finger length was about 1 inch for each finger, a measurement representing about 1/3 of the average total length. The greatest range was found in the index finger, which varied 1 1/16″. The other ranges were: middle finger, 14/16″; ring finger, 12/16″; and little finger, 15/16″. Almost all of the finger lengths actually fell within a very narrow range of about 6/16″ The average length for each finger was calculated to be 2.87″

for the index finger, 3.11″ for the middle finger, 2.89″ for the ring finger, and 2.28″ for the little finger. Average length of fingers of the right hand exceeded that of the left in every case except that of the ring finger. The opposite condition was reported by Steffens (1940). Median length for the index finger was 2 14/16″ as was the median length for the ring finger. Median for the middle finger was 3 2/16″; that for the little finger was 2 4/16″.

When each of the hands was analyzed concerning relative length of the second or index finger and the fourth or ring finger, it was found that in 52 cases, 23.2%, the difference between the two was less than 1/16″ and they were considered to be equal. In 74 cases representing 33% the second finger exceeded the fourth in length. In the remaining 98 cases, 43.8%, the fourth finger was longer than the second. In 39 cases out of 74 and 42 out of 98, that is, about 50%, the difference amounted to only 1/16″. In every other case it was greater. The probability is 90%-95% that this predominance of relatively long fourth fingers represents something more than chance occurrance. This relation between the length of the second and fourth fingers was found to be identical in right and left hands of 36 persons. In 37 the difference was only 1/16″; it was greater in the remaining 39 subjects.

Every finger was rated in terms of the median length for that finger determined in this study, as equal to, longer than, or shorter than median length, and this information was recorded in tabular form as an aid to the analysis of the pattern of relative finger lengths. The number of cases in which one finger in a hand rated longer than the other three was found to be 48. In 16 cases this finger was the fifth, in 13 cases the fourth, in 12 cases the second, and in 7 cases the third. There were 58 cases in which one finger rated shorter than the other three. Of these, 22 cases were the fifth, 21 cases the second, 11 cases the third, and only 4 the fourth. The total number of cases in which one finger was either relatively longer or shorter amounted to approximately 50% of the total cases studied. It has been shown statistically that the frequency with which this finger tends to be the second or the fifth is greater than can be expected by chance alone.

The number of cases in which any two fingers were rated longer than the other two was also recorded. This condition was found in about 20% of the hands. In 13 cases the second and third

fingers were relatively long; in 12 cases the fourth and fifth both rated longer than the second and third. In only 6 cases the third and fourth were long; in 5 cases the second and fifth were long; and also in 5 cases the second and fourth fingers were relatively long. There was only 1 case in which the third and fifth were rated longer in terms of median length than the second and fourth fingers. It would seem that since the second finger and the fifth finger tend to be either longer or shorter than the other three, that cases in which the second and fifth together are relatively long or short would be most numerous. Contrary to this, there is an obvious trend toward pairing of the second and third fingers and the fourth and fifth fingers regarding relative length. Supporting this fact, it was noted that there was a greater than expected number of cases in which the third finger exceeded median length and the second finger exceeded th fourth. And, similarly, there was a significantly larger than expected number of cases in which the fifth finger exceeded its median and the fourth finger was longer than the second.

Summary

It has become obvious in this study that there is a great deal of continuous variation in finger length within this segment of the general population. Nearly all fingers vary in length within a relatively narrow range. Right and left hands are not identical, but differences are slight and do not represent a trend. In the female hands studied, the hand in which the fourth finger exceeds the second finger in length is most common, contrary to the finds of Phelps (1952). The writers feel that the photographic technique which we used is just as accurate or more so than those used in previous studies. Through what we believe are improved methods in the analysis of finger length, this paper is intended to present a true picture of the occurrence of normal variations in a restricted segment of the population. Its further purpose is to be the initial paper of an extensive study which may give validity to future genetic study of human characteristics.

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