THE MORPHOLOGIC ASPECT OF INTELLIGENCE. NO. 45, AUGUST, 1921

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THE MORPHOLOGIC ASPECT OF INTELLIGENCE

The problem of the correlation between bodily and mental traits has attracted the attention of educators, psychologists, physicians and sociologists during the last few decades.

For a great many years the problem has been laid merely on hypothesis and studied empirically; but only in recent years, namely after the introduction of the mental tests, has it been possible to approach the same with rational methods and to put it on a scientific basis.

In the matter of correlation with intelligence it must be admitted however that, while in the study of the tests for physical and motor capacity, different investigators have reported satisfactory and usually rather concordant results, the so-called anthropometric tests are still the subject of discrepancies and controversies.

Of course today we possess better scales for measuring intelligence; but the use of less accurate scales for intelligence on which former investigators had to rely alone does not justify the contrasting results obtained in the study of correlation between intelligence and anthropometric traits, such as height, weight, skull diameter, cephalic index, etc.

If we take height for instance, we find that Kline [1] reports that boys in public schools are taller than boys in truant schools. Smedley [2] reports that boys in the schools for incorrigibles and truants are shorter than normal boys, and that bright children are taller than dull children. These conclusions of Smedley's agree with those of Sack,[3] Gratianoff,[4] Porter,[5] Mac Donald,[6] De Busk [7] and others; while West [8] found the opposite to be true and Gilbert [9] failed to find any definite correlation between height and mental ability.

Again if we take weight, we find that Porter,[5] Smedley [2] and De Busk [7] reported that bright children are heavier than dull children of the same age; while for West [8] and Gilbert [9] the reverse is true.

The same conflicting reports were given by investigators who studied cephalic index, lung capacity, facial measurements, color of eyes, etc.

No wonder the results are so diverse. A single anthropometric measurement cannot constitute the characteristic of such a complex mental trait as intelligence, to which so many factors contribute.

Moreover height, weight, and cephalic index are traits much more constant than intelligence in the different races.

I cannot enter here in the discussion of Boas' views regarding the instability of the cephalic index. Probably Boas' contention has a scientific basis, if we consider that there is a certain correlation between the cephalic index and the morphologic type of the individual; therefore a modification of the cephalic index as a consequence of the transformation of the morphologic types produced by environmental factors through generations may be expected.

In the matter of height it may be said that, aside from external factors (environmental, social, political), an ethnic group tends to keep its average stature.

If we make a study of the population of the globe, we find people having tall, medium and short stature scattered all over from the very tall (m. 1.999) to the very short (m. 1.209) pygmies of Central Africa, not speaking of the pathological statures which are found beyond these extremes.

Now to admit that there exists a constant, definite correlation of height-intelligence would mean that all the people having a short stature, such as Lapps, Eskimos, Japanese, Hottentots, Negritos, Senois, etc. are not intelligent; and that people having tall stature such as Curds, Malays, Patagonians, Dinkas, inhabitants of some islands of the Pacific, etc. are intelligent, if we put them together, regardless of their respective race.

Everyone can see how absurd such an assumption would be, as any ethnic group includes in its community intelligent and unintelligent individuals. Of course if races could be kept pure, a physical trait such as height or weight may have a significance amongst the individuals of the same ethnic group; but nowadays with the continuous intermixture of races and with the great difficulty in differentiating the stocks from which the individuals spring, in cosmopolitan countries, one would do injustice to all the short individuals who originate from races having short statures, by regarding them less intelligent than the tall individuals of the same community, who owe their tall stature to hereditary factors.

The same may be said when weight or cephalic index are considered in connection with intelligence.

MORPHOLOGIC TYPES

After this consideration, it is obvious that none of the anthropologic traits alone could solve the problem of correlation with intelligence. As I said above intelligence is a most complex trait, therefore, I believe that any physical trait in order to be a correlative of intelligence must be a compound one, namely it must be a trait made up of many elementary traits.

Starting from this point of view I have made an anthropologic study of groups of individuals, aiming at the research of the morphologic characteristics of the intelligent type. This study has led me to the introduction of the morphologic index, following the criterion of the morphologic types individualized by De Giovanni [10] and Viola [11] for clinical purposes.

Viola, starting from the anthropometric studies of Broca, Bouchard, Manouvrier, Benecke and especially of his teacher De Giovanni, the founder of the clinical anthropology, and following the lines traced by the "Biometrika" in the study of the problems of evolution, after a diligent anthropometric study of 400 subjects, formulated his "law of deformation of the ethnic type," which reads as follows: "Individuals having a small trunk tend to assume a longilinear body which corresponds to the phtisic habitus; individuals having a large trunk tend to assume a short body which corresponds to the apopleptic habitus; individuals having a normal trunk tend to maintain normal proportions of the body." The so-called phtisic and apopleptic habitus are old denominations used by the ancient physicians to designate respectively a long thin and a short broad physical constitution.

According to the volume of the trunk in relation to the other portions of the body, Viola differentiated three morphologic types, the microsplanchnic, the macrosplanchnic and the normosplanchnic.

Microsplanchnics are individuals possessing a small trunk so that the development of the limbs is in excess over it, that is the vertical diameters predominate over the horizontal diameters in the body as a whole and in its constituents, trunk, extremities and portions of the extremities.

Macrosplanchnics or *Megalosplanchnics* are individuals possessing a large trunk which is excessively developed in comparison with the limbs; that is the horizontal diameters are prominent in comparison

with the vertical diameters in the body as a whole and in its constituents, trunk, extremities and portions of the extremities.

Between these two opposite types are the *normosplanchnics* who represent individuals in which trunk and limbs show a harmonious development, in as much as neither one, when the numerical value of each is taken, predominates over the other; that is there exists a constant proportional relation between the horizontal and the vertical diameters of the body.

Of course it is difficult to draw a line of demarcation between the microsplanchnic and the normosplanchnic on one side, and between the macrosplanchnic and the normosplanchnic on the other. There is a great deal of overlapping. Viola among 400 subjects representing an ethnic group of Northern Italy found that 47.7% were normosplanchnic, 28% were megalosplanchnic and 24.3% were microsplanchnic. In making this classification he proceeds by finding the middle normal ethnic type and then calculates in degrees the deviations above and below the normal.

The limits in which this dissertation must be kept does not permit me to enter into the details of Viola's work. Students of Medicine and of Anthropology, who may be interested in it, are referred to the original publications given in the bibliography. My present problem is concerned with the ranking of groups of individuals when intelligence and morphologic aspect are taken as scales. Once we find a criterion for comparing the individuals of a given group, we will be able to rank them.

In order to put in a numerical form the morphologic characteristics of a group of individuals, one has to find the measure-value of the trunk and the measure-value of the limbs. The trunk, as Viola observes, contains the organs of the vegetative life, which represent the nutritional system. These organs fulfill a task different from the muscular and nervous systems and skeleton, which constitute the animal system or a system that mediates contact with the external world. These two systems show a certain degree of independence and even antagonism during the development; in the sense that they do not grow simultaneously, but in alternate phases; and the more an organism develops the animal system, the less it develops the vegetative system when considered in relation of their reciprocal dependence.

The difficult task confronted in this study is to find the value of the trunk, namely the volume of the abdominal and thoracic cavities.

Viola takes 11 measurements, namely:

1. *Height.*

2. *Length of sternum:* (A B)—from the jugular incisure to the point of insertion of the ensiform appendix.

3. *Length xipho-epigastric:* (B C)—from the point of insertion of the xiphoid appendix to the epigastric point. This point (C) is at the crossing of the middle vertical line of the trunk with the horizontal line passing through the lower margin of the tenth rib (Z W).

4. *Length epigastric-pubic:* (C D)—from the epigastric point to the upper margin of the pubis.

5. *Length of the lower extremities:* (V T)—from the upper margin of the pubic bone to the external malleous of the foot.

6. *Length of the upper extremities:* (R S)—from the margin of the acromion process to the wrist-joint while the arms hang down; (I have preferred the stiloid process of the radius as point of repere).

7. *Transverse thoracic diameter* or breadth diameter taken at the level of the 4th rib (E F).

8. *Antero-posterior thoracic diameter* or depth diameter taken also at the level of the 4th rib (M N).

9. *Transverse epigastric diameter* taken at the mid-point of the xipho-epigastric line (G H).

10. *Antero-posterior epigastric diameter* taken as the same level of the preceding diameter (P Q).

11. *Transverse pelvic diameter* taken between the iliac crestae at the point of the maximum breadth (I L).

(For the explanation of letters in parentheses see figure 1 and the annexed anthropometric blank.)

Viola has devised special instruments for the morphologic measurements, but one who is familiar with anthropometry can obtain practically the same results with a little more time and patience, by using an anthropometric tape, a chest depth caliper, a chest breadth caliper and a height stand.

For the treatment of the anthropometric data Viola proceeds in the following way:

He obtains a *thoracic index* or a *thoracic value* by multiplying the length of the sternum by the transverse thoracic diameter and by the antero-posterior thoracic diameter (AB × EF × MN). By multiplying the length xipho-epigastric by the transverse epigastric diameter and by the antero-posterior epigastric diameter he obtains the *index of the upper abdomen* (BC × GH × PQ). *The index of the lower abdomen* is obtained by multiplying the length pubo-epigastric by the transverse pelvic diameter and by the antero-posterior epigastric diameter (CD × IL × PQ), (the antero-posterior pelvic diameter is not taken).

Sum of the indices of the upper and lower abdomen gives the *total abdominal value.*

Sum of the thoracic value with the total abdominal value gives the *value of the trunk.*

The value of the limbs is obtained by adding the length of one of the upper limbs with that of one lower limb (RS+TV).