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A Study of the Qualitative Changes of Population

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Chapter I

Individual Differences and Their Causes

Historically the study of population shows three successive stages: - the economical, the biological and the eugenic. Thomas Robert Malthus represents the first (13, 80, 125), Herbert Spencer, the second (121), and Sir Francis Galton, the third (66, etc.). In the light of modern sociology, an inquiry into the problem of population is, therefore, a three-fold process; it is concerned with the qualitative changes of population as well as the quantitative changes and the relation between the quantitative changes and the production of food. It is the first aspect that we propose to examine in this thesis. We shall see how individuals differ from each other, what are the causes of individual differences, and through these differences how the qualitative changes of population take place; and finally how these changes affect the established condition of society.

Part I Individual Differences

One is a Japanese, a Chinese, an Englishman, an American, a negro more by his physical appearances than anything else; he is tall, short or medium; fat or thin; black-haired, brown-haired, etc., etc. Anthropometrical

measurement can signalize definitely at least five hundred traits. Bertillonage consists of eleven precise measurements besides the record of the chromatic and morphological characters. That men are physically different is hence easily seen. In regard to mental qualities, however, we have been more at sea. "All men are created equal" has been and is still a prevailing notion. Even Charles Darwin used to entertain the idea that human endowments are about equal before he read Galton's celebrated work on "Heredity genius". But through the development of modern psychology, the fallacy of this notion has been proved beyond doubt. Psychologists nowadays have generally recognized the fact that the original natures of individual men and women are not exact duplicates, that men learn differently and improvements differ with different individuals. Man is therefore individual through and through, mentally, morally as well as physically. The fact of individual differences has been established.

A qualitative study of population thus begins with the fundamental assumption that men are different from each other. It is through these differences that changes of human quality are possible.

In the eugenic and psychological literature, "character" and "trait" are used interchangeably to designate different aspects of human quality. Human quality is therefore a composite of many traits. Traits as such are only a working concept, a logical product; they have a genetic background and bear a sociological significance. They are measurable only in so far as they are expressible, and expressible only when they are functional. Scientific analysis has revealed the almost insurmountable difficulty in separating the functionality of traits from their structural aspects. The best way to get out of this difficulty is devised by Thorndike who defined trait as "one whose varying conditions in man can be measured on one scale." Perhaps this definition leaves out of account the potentiality dormant in the structure of the traits, but this is as far as inductive methods can carry us. We are certainly warranted in inferring the nature of one's potentiality from its efficacy and one's capacity from one's achievement, inasmuch as they only are measurable. Our question is whether the calculus of mental science has been perfected to such a degree as to render it capable of gauging all the functional aspects of traits in existence, thus determining man's individuality and his place in nature.

So far as the individual differences are concerned, it is a rule that among individuals, traits alike in kind show very unlike distribution in degree. Those who are mathematically inclined look for the individual differences not only in kind, but also in degree, thus giving rise to a system of mental measurements. Subjected to measurement, the traits not only become more pronounced, but also give concrete evidences of individual differences.

In the scale of precision, anthropometrical measurements certainly come first. Mental measurements are less accurate and more arbitrary for the very fact that they are dealing with something infinitely more abstract than physical structures. Yet through the ingenious effort of Binet and his followers on the one hand and the advancement of statistical theory on the other, human capacity can be measured with a degree of precision which is already astonishing. Traits discrete and continuous are all now subject to quantitative treatment; we measure not only memory, courage, efficiency, quickness, inventiveness, but even those phenomena which elude altogether direct measurement in terms of amount, such as wickedness, piety, faithfulness, and what not. It may be safely predicted that in the course of a few years, psychological tests may be developed to such a degree of

perfection as to cover the entire range of human nature in so far as it bears a sociological significance.

It is important to bear in mind, however, that all methods of mental tests, the most universal of which are the Binet and the Point Scale, are as yet extremely crude; they indicate the degree of human intelligence only in a rough way. But comparing the initial effort of Galton and his predecessors with the present methods, the progress made in this department of mathematics is already a marvel and gives every indication of further improvement. (153)

It remains for us to give some concrete evidence of individual differences. In general, the educational researches have furnished the most instructive and illuminating examples of the individual differences of mental traits. The study in this field was primarily a quest for a norm of the intelligence of school children, but has since split into channels of different interests until at present there are specializations within specialization, of which some are of the minutest detail that one can hardly see their general bearing to the central theme. So far as the pedagogical results are concerned, however, three distinct branches can be recognized: the measurement of intelligence in general,

the study of the exceptionally bright children, and that of the subnormals, While none of these forms a separate entity, yet each has its own technique and mode of research. Their results though supplementary to each other as a whole, are significant only in accordance with the purpose of the investigators.

The survey of the school children's intelligence in general shows that its distribution take a bell-shape (124 p. 78). Groszmaun whose study on the exceptional child is still the best of its kind has a different estimation (47 p.8). He pointed out that of all the children of school age in the United States there are about 75 to 90 per cent suffering some defect or ailment, 50 per cent pseudo-atypical, 18 per cent atypical, 5 per cent subnormal and 2 per cent abnormal. Other studies by Yerkes, Goddard, Holmes and a host of others in France and England have shown more or less similar results. In fine,no matter what trait of the individual be chosen and measured, the fact of individual differences is always shown in the result. If one takes the simplest traits, to eliminate the most chances for confusion, one finds the condition every time. Whether it be speed of tapping, or marking off A's on a printed sheet of capitals, or in giving a reaction to some stimulus, or in

making association between ideas, or memorizing various things, or drawing figures, or naming the opposite words, or discrimination of lifted weights, or success in any of hundreds of other mental tests, the conclusion always is the same.

The distribution of different traits in one person and the distribution of the same trait among the mass, however, have not been definitely worked out. Since the time of Quetelet, we have been acquainted with the conception of the"average man" (51) from which we derived the notion that most measurable traits like the height of Scottish soldiers distribute themselves according to the law of integral probability. Thorndike, however, in his educational work measured nearly one hundred traits and found that most of them have a different way of distribution (128). Some are mono-modal, some bimodal, and others multi-modal. The curves plotted sometimes look like the Mt. Fuchiyama, sometimes like a range of the Western Rockies, sometimes like a Thibetan tableland. Skews of various kinds and degrees are found and they differ in every imaginable way. But even that can hardly prove that the law of probability is not working, -- for the cases he measured are often not more than one hundred, and the number of traits taken into consideration

is comparatively few; the divergence of results is then due more to the paucity of data, than the aberration of the law of probability at work. Ignoring the much talked about "types", if we consider the world population as a whole and all the human traits -- which are certainly many times more than 2500, -- in totality, the qualitative and quantitative distribution of traits among the mass will be very likely in the form of a Gaussian curve, although it needs further proof.

Part II. Causes of Individual Differences

The perplexing problem in regard to the causes of individual differences has been approached differently by different investigators. Some go on with the assumption that hereditary forces alone are responsible for one's success or failure in life. Others think that environments counta great deal for the existence of social strata. Then there are those who stand in the middle. Oddly enough irreconciliables and compromisers make their appearances even in the field of scientific research; and yet most of them can find a sufficient amount of data to defend the position which they happen to take. What is then the relative influence of nature and nurture? A cursory review of some of the investigations will reveal where lies the adumbration of truth.

The matter of terminology, however, deserves some attention before our review begins. It seems that for the sake of clarity there is a tendency in the field of eugenic literature to avoid the term "nature and nurture" and use the more familiar words "heredity" and "environment" in its place. Frederick Adam Woods has defined "heredity" as "all that is contained in the original fertilized cell from which all subsequent cells are by cell-divisions produced," which is perhaps one of the best definitions for this word. Environment naturally means all those non-hereditary influences.(152)

To separate hereditary influence from environmental and vice versa in order to weigh the importance of each has perhaps drained off one best part of human ingenuity in the last two decades. One method is to compare the mentality of different races. Its logical background is plain enough. Although anthropologists do not agree as to which is the best criterion for the classification of men, yet there are lines of demarcation which most scientists have taken for granted. The fact that the black is darker than the white and the white is paler than the yellow is sufficient for race distinctions. Hence if one of them is inferior to the other in one respect, superior in another, and perhaps equal in a third, the reason for

these differences will be more likely generic rather than temporal. The intensity of the differnces thereby found will measure the influence of heredity with a degree of approximate accuracy. It is therefore only natural to find mental testers nowadays busying themselves in balancing the weight of one racial mentality against that of another. Owing to the geographical propinquity of the black and the white in America, comparative studies of these two races have been more often than any others of a similar nature. From the time of Galton, the data have been accumulated year after year. Modern investigators like Thorndike, Woodworth, Mayo, Bache, Smith, Stetson, MacDonald, Ferguson, Pyle, and a number of other psychologists as well as anthropologists have made valuable contributions in this field (36). The general conclusion is that the white is superior to the black in higher mental process but inferior in sensory acuity. The merit of these investigations needs no discussion here. Suffice it to say that pure color line is probably a cause of individual differences and the very fact that one belongs to a certain race would set up a limit upon his maximum and minimum achievement.

Another way to measure the hereditary force is to correlate the traits of the parents with those of children,

and those between siblings or twins. Here we have literarily thousands of investigations ranging from anatomist to applied psychologist. Their results are divergent both in kind and degree; the explanations for them are sometimes diametrically opposite. The main features of these studies, however, are altogether summarized in Galton's two laws: the Law of Filial Regression and the Law of Ancestral Inheritance (41). These two laws have been corrected and confirmed by subsequent investigations of the Biometrican school as well as other independent investigators (100). The general proposition at which they have arrived is that human characters whether mental or physical are transmissible, and the intensity of the resemblance between parents and children is anywhere between .25 and .50. The obvious corollary here to be drawn is then that every individual's achievement is to a considerable extent limited by what his parents have been able to achieve. Hence the son of an eminent man has a greater chance to be eminent than the average man of his race; on the other hand, the son of a submediocrite is more likely to be a submediocrite too, unless he is a sport which is statistically exceptional.

Investigations concerning the influence of environment have been less systematic, although the data are just

as abundant, due perhaps to the intricacy, the complexity and hence the immeasurability of some of the environmental forces. Two lines of research, however, which have already yielded a considerable amount of remarkable results, promise definitely to bear evidence to the wieght of environmental forces. They are related to climatology and dietetics.

The condition of the air in which one lives has been recognized as a factor in efficiency since the seventeenth century. The medical profession especially has exploited this question in a very thorough manner. One of the earliest systematic investigators, G. E. Dexter has found that there is a considerable effect of seasonal changes on mental functions (27). Recently, Huntington (57, 58), Hollingworth (55) and other applied psychologists (55) have all found that temperature, humidity, and atmospheric movements are closely related to the efficiency of mental work. The conclusion accordingly is that given the same heredity, only those who are surrounded with the best atmospheric conditions have a chance to realize their maximum capacity.

The dietetic influence on human efficiency is evidently just as great as the climatic, if not more. Recent publications by Professor F. G. Benedict (6a) are worth mentioning here. They show that the efficiency of mental

functions is reduced to a remarkable extent under restricted nutrition, hence argue weightily for the fact that dietetic conditions are an important factor in determining the differences of individual achievements.

Thus far it must have been made clear that both heredity and environment have their spheres of activity in making up what an individual is. The one determines the upper and lower limit of one's achievement, the other determines at what point one is to adjust himself within these limits. The best environment can not call forth any achievement from an individual beyond his upper limit, and the best heredity does not guarantee that one's maximum capacity can always be realized. The combined action of hereditary and environmental forces make the individual differences much greater than if there were only one of them. Given equal hereditary endowments two men are bound to differ from each other, because they are bound to be brought up in different environments, as they cannot occupy the same space at the same time. On the other hand, even if we could transform the variegated natural environments into a unified artificial environment, individual differences would still persist because parents and ancestors differ from each other. Individuality therefore is a resultant of its possessor's heredity and

environment. Measured on a social scale, it should be considered as a result of four or five different possible combinations of these two forces. The best endowed with the best environment will naturally yield the greatest amount of achievement, while the worst endowed with the worst environment will have the poorest show. Then we might have a well-endowed, handicapped by an extreme unfavorable environment; the best he could do under that circumstances would be only the expression of his endowment on the lowest level, although comparatively he might still be the champion of his crowd. On the other hand, the worst endowed might be born in extremely favorable circumstances; he would then have a chance to realize whatever is within him, and be less of a handicap to society, than were he put in a worse environment. Extreme cases like these may be exceedingly few, yet they serve to illustrate how these two forces work with or against each other.

Artificial environments are combinations and mixtures of natural environmental forces through the function of human intelligence. Whatever arguments the ultra-eugenists may advance to emphasize the importance of hereity, it is evident that unless our artificial environment is regulated in such a way that it is equally favorable to everybody, not every one can do his best. As long as not

everybody can be at the tip-top of his condition, soceity cannot afford to stop reconstruction of environmental forces. In appraising the relative importance of heredity and environment, therefore, it is necessary to bear in mind that the existing social system, such as we have today, always tends to maximize instead of minimize individual differences.

There is no doubt that so far as absolute achievement is concerned, heredity is of more importance. The study on twins by Galton (40), Thorndike (131), and recently by the American Genetic Association (35, 141, etc.) have all shown the predominance of hereditary force. But, it must be remembered, that in all these cases, the differences are measured in terms of capacity, not in terms of achievement. Absolute achievement is the realization of one's maximum capacity, which rarely happens under the present social system.

Most investigators on "Nature vs Nurture" have failed to differentiate absolute achievement from relative achievement on the one hand, and qualitative differences from quantitative differences on the other. Yet they are as important as the method and unit of measurement if the results are to be taken to show the relative influence of heredity and environment. Identical twins may have been

proved to have the same upper limit so far as their capacity is concerned; but in terms of relative achievement one might double that of the other on account of the different opportunities they had. The non-identical twins may be qualitatively different from each other as any other two individuals, still the quantitative measurement of their achievement may be about the same owing to their equality of opportunity. It is therefore simply silly to argue that environment plays no part in shaping one's achievement such as the Biometrical school has so dogmatically insisted. They fail entirely to notice the above differences.

Chapter II

Qualitative Changes of Population

Part I Some à priori Principles

The quality of population must be at any time either improving or stationary or deteriorating. Granting the individual differences so far proved and taking hypothetically at the present moment the Ganssion curve for the normal distribution of the intelligence of man we can derive the following formula for a qualitative analysis of population (78).

Clearly man may be qualitatively classified into three groups: A, the supermediocrites representing the upper 25 per cent on the intelligence scale; B, the mediocrites representing the middle 50 per cent; and C, the submediocrites representing the lower 25 per cent.

Then assuming that quantitatively those three classes remain in the same ratio, we may conceive that:

1. there is a hereditary tendency for the race to improve, or

2. through the change of environment, the quality of man is made to improve; or

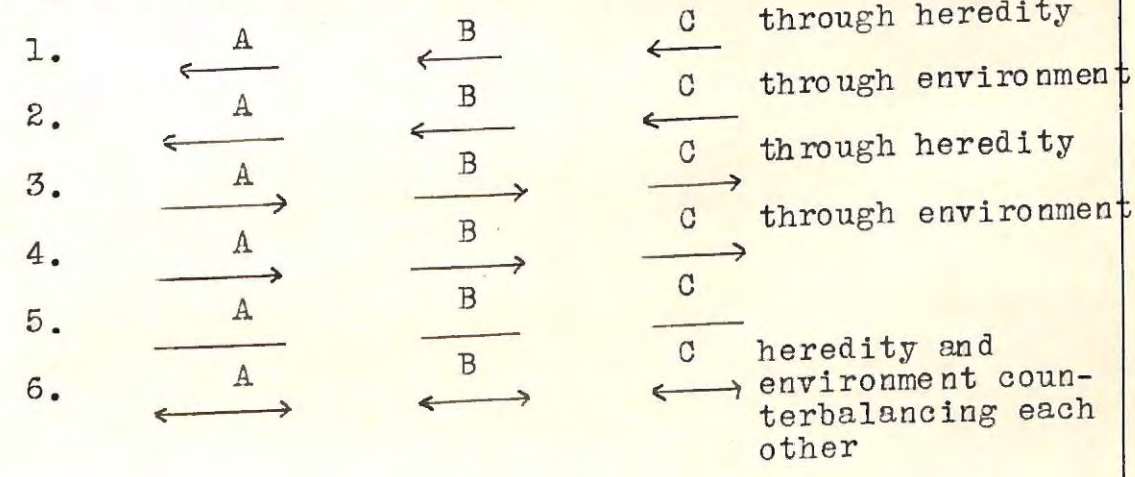
3. on the contrary, there is a hereditary tendency

for the human quality to degenerate, or

4. through the change of environment, the quality is made to degenerate; and

5. thirdly there is a hereditary tendency for the quality of population to remain the same generation after generation, or

6. lastly, changes of quality due to hereditary force are counterbalanced by a corresponding environmental change so that the quality is made the same generation after generation; hence (78 pp. 61-72).



Assuming again that qualitatively the different classes remain the same generation after generation, we may conceive that:

7. the quality of population may be improved by a faster multiplication of the upper class; or

8. a slower multiplication of the lower class; or

9. contrariwise, the quality of population may be degenerated through a slower multiplication of the upper class; or

10. a faster multiplication of the lower class; and

11. thirdly, the quality of population remains unaffected since only the mediocrites multiply more quickly; or

12. slowly; hence: -

7.	A	B	C
	3A	2B	1C
8.	A	B	C
	1A	1B	½C
9.	A	B	C
	½A	1B	1C
10.	A	B	C
	1A	2B	3C
11.	A	B	C
	1A	2B	1C
12.	A	B	C
	1A	½B	1C

According to the above formula, it is evident, then, that mere numerical change of population does not necessarily indicate a corresponding qualitative change; and an increasing population may affect its quality in both

directions, or not at all.

It is also manifest that the declining birth rate of a certain portion of population may or may not affect the quality of man unless the quality of the population in general in relation to that particular portion has been definitely determined.

In order to determine the tendency of the qualitative changes of population on the basis of the above twelve principles, it is necessary to find out the general trend of the hereditary tendency, the effect of environment on the human quality and the rate of multiplication of different classes.

As our knowledge about heredity is still too much limited to throw any light on the inherent tendency of evolution, so we are not sure whether social evolution will be accompanied by social progress; consequently we have to leave principles 1, 3, 5 and 6 in doubt.

On the other hand, we have learned from our study on causes of individual differences in the last chapter that not all individuals at the present generation are placed in such an environment that they can do their best; so it is reasonable for us to surmise that by a readjustment of environmental forces, so that every individual human being on the globe can utilize their endowments at their best,

the efficiency of achievement of population would then be made to improve. But this will involve a discussion of the social system, hence much conjecture and speculation; for our immediate concern, we have again to leave principles 2 and 4 to a later chapter.

This leads us to the effects of differential death rate and differential birth rate on the quality of population; to which we shall now address ourselves.

Part II Tendency of Qualitative Changes

The crowning achievement of the Biometrician shool which Karl Pearson cherishes is that it has successfully proved that "natural selection" is till going on among mankind. The problem concerning us here is then whether this selective tendency is positive or negative; or in other words,whether human quality is improved or degenerated or unaffected by this selection. The direction of this tendency may be tested by a twofold process.

1. Of all those who are born what are the traits and the relative numbers of those who have a chance to reach maturity?

2. Of all those who reach maturity what are the traits and relative numbers of those who marry and reproduce themselves?

The first test will tell us what has been the tendency, and the second test will tell us what will be the tendency in the next generation. The tendency is not fixed; it can be made to change at every turn. It is here that the hope of eugenists lies.

Test I. Of all those who are born what are the traits and the relative numbers of those who have a chance to reach maturity?

> Rule 1. Supplosing that the birth rate is even among different classes; the following condition will be true: those classes which suffer most from infant mortality will have less chance to reproduce themselves; consequently, if the average quality of those classes belongs to "A", it shows a negative tendency (Principle 9 or 10); if "B", the quality is unaffected (Principle 12); and if "C", the tendency will be positive (Principle 7 or 8).

Early in 1895 Professor Pearson demonstrated the law of chances of death and determined that of 1000 births, the mortality of infancy is 246 centering about the third month of the baby's post-natal life: the mortality of childhood is 46 centering about the sixth year: and the mortality of youth 51 centering about 22 years. In other

words, out of 1000 births in the population, from 292 to 343 will not reach maturity; the immature mortality is hence relatively fixed, a heavier immature mortality of one group or class will mean a lighter immature mortality of other groups (85).

Six years later in cooperation with Miss Mary Berton, Pearson published his first paper on the"Inheritance of the Duration of Life and on the Intensity of Natural Selection" (100, Vol. I, pp. 50-90). In this paper they concluded that "the inheritance of life between parent and offspring is found statistically to be about one-third of the average inheritance of physical characters in Man". While attributing a certain percentage of deaths to enviromental forces, Berton and Pearson set 50-80 per cent of the deaths as due to some inborn constitutional weakness which the victims inherited from their parents. The natural inference here is then that about 50-80 per cent immature mortiality is due to inherent weakness.

Still later, examining a series of data of infant mortality in Preston, Rochdale, and other countries in England, Pearson reached the definite conclusion that parental health is fifty per cent more important than parental occupation or breast feeding, and that all four (maternal health, paternal health, parental occupation and

breast feeding) are immensely more important than the employment of women (87). By a series of regression tables, he illustrated:

1. Increasing delicacy of mother marks increasing delicacy of daughter;

2. Delicate fathers have more dead sons.

And finally, by a new mathematical method, which he called "Variate Difference Correlation Method" he treated the data of registered births in England and Wales, and demonstrated that for both sexes a heavy death-rate in one year of life means a markedly lower death rate in the same group in the following year of life, and that "a heavy mortality leaves behind a stronger population" (100, Vol. X, pp. 488-506).

Three propositions may be inferred from this series of investigations:

1. A certain portion of those who have been born must die before maturity.

2. Those who survive are in general stronger than those who die.

3. A heavy infant mortality is associated with delicate parental health.

It is surprising however to contrast these conclusions with Dr. Newsholmes (145) report on infant mortality

in which he found twelve influences affecting infant mortality, only two of them biological, namely: (1) the age of mother at marraiage and (2) the number of still births; among the seven definite causes of infant mortality which he set out, none of them is related to the health of the parents. Another statistician, Dr. Reid, thinks that the main causes of infant mortality are the ignorance of mother and bad housing conditions; these conclusions have been confirmed by an American authority who declared that more than half of the infants deaths could be prevented by adequate measures of relief, a result quite inconsistent with the numerical value of Pearson's selective death rate, which according to his later calculation is 60 per cent and hence also more than half (145,, 90).

While this discrepancy made our analysis more difficult, it also furnishes a clue for our attention to another factor generally associated with premature death, especially infant mortality: that is, the economical status.

George Newman has shown the relation between the size of the tenement and the rate of infant mortality in a carefully compiled table, and concluded that"the smaller the tenement, namely, the more overcrowded the family, the higher is the death rate from all causes ...."(79a,p.183).

G.S. Smith and J.E. Purvis later on drew the same conclusion, that the more people there are to the acre, the higher the death rate among infants. Thus Dr. Reid is at least partially right, that bad housing condition is, if not the ultimate cuase of infant mortality, a constant associated factor with it. Among various other authorities including the Biometrician school,. though discordant with each other as to the ultimate causes of infant mortality, there is a general agreement that infant mortality is higher among the poor than among the well-to-do.

So we have two constant factors attending infant mortality; that is, the physically delicate and economically unsuccessful classes suffer most from infant mortality. Our next question is then how is the quality of these classes compared with that of the average population? Those who are physically weak may be intellectually strong and those who are economically unsuccessful may be qualitatively superior. In the popular mind, a gentleman is more delicate than a lower class workman, and genius does not run in families. Here we are right at the heart of the contention between the eugenists and euthenists. Shall we maintain the theory of "Irrepressible Genius" or shall we support the theory of "Intellectual Egalitarianism"? Or, to quote Pearson, "Do the physically and mentally inferior

get lower wages and tend to drift toward the cheaper and dirtier type of house, or does the house make the occupants physically and mentally inferior hence suffer a heavier infant mortality?"(87) As this question is so tremendously important and is the key to the solution of many social problems, therefore it deserves treatment at length.

Up to this time we have had dozens of investigations along this line (70, 154, etc.) The results obtained justify a further and more elaborate research. There is every indication that social workers are advancing in this direction. Some of the important results are:

1. F. Umberto Safiotti, of Milan, on 378 pupils of four elementary schools divided into (a) Professional, (b) Upper Commercial, (c) Lower Commercial, (d) Trades people, (e) Artisan, (f) Servants.

2. Decroly and Degend on the pupils of a school in Brussels.

3. Morle on 30 children from one of the poorest and an equal number from a wealthy school in Paris.

4. Teacher's in Breslan on pupils in the Volkschule and in the Vorschule.

5. Y. and R. Weintrole on about 210 children of several nationalities.

6. Miss A.C. Strong on school of Columbus, S.C.

7. Yerkes and Anderson on 108 school children in Cambridge (Mass.).

8. Bridge and Cole on 301 children attending two schools, one is a good residential and the other in a poor factory district of Columbus, Ohio.

9. A. W. Kornhauser on the economic standing of parents and the intelligence of their children, wealth being measured by the possession of telephone.

The results agree in showing that the upper class children are the most intelligent.. Thus according to Safiotti, the indices of intelligence of children of the upper three classes average 49, while the average of the lower three classes is 41. In the Brussel investigation, the children at a school attended by the children of the rich "were on the average a year and a half superior to the standard of their age in intelligence"; in the Breslau investigation" ten year old boys in a poorer school were equal only to nine year old in the rich school"; in the Columbus investigation the offspring of the professional class were found to be nearly half a year superior in intelligence to the children of travelling salesmen. The children of managers of business enterprizes were six months older intellectually than the children of the

clerks; the children of skilled laborers were nine months older intellectually than those of unskilled laborers. Miss Strong found that none of the Mill children was above his age level, but 10 per cent of the city children were; and less than 6 per cent of the city children, but 18 per cent of the Mill children, were retarded at least one year. Yerkes and Anderson's results indicated that at and above the age of six years, the "favored" children did from a quarter to a third better in the tests than the "unfavored" children. And finally, A. W. Kornhauser correlated the intelligence of school children with the possession of telephone by their parents and he found the correlation coefficient to be.6. (154, 70)

It goes without saying that the reliability of these results much depends upon the nature of the tests, and as we have pointed out in other connections that all the methods of psychological tests are at the present stage of their development crude; the Binet test, which is used by almost every one of the above investigators with the exception of Yerkes and Anderson, is especially defective in that it does not employ any norm and hence the problem of comparability such as Yerkes insisted on is entirely neglected. But with due allowance for the personal equation, careless observations, inaccurate methodology and other

sources of error, it is still inconveivable that all these results should have been so biased as to contradict actual conditions. We are forced to conclude, though only tentatively, that there are very considerable differences in the natural intelligence of children, depending on the social and economic status of their parents. This, however, does not mean that there is a gap between the intelligence of one class and that of another; for the curves of distribution overlap. Nor would these differences be so great, had it not been for the fact that the children of those economically unsuccessful classes, in addition to their feebler inheritance, have to work in bad atmospheric conditions, dirty air and ill-regulated temperature, and are not so well-fed as the children of the other classes.

For all these and taking conditions as such, our first test is now half through. We have found that the immature mortality is heavier among those economically unsuccessful and physically weaker classes, and these classes have been proved also intellectually inferior and therefore belong to our "c" group. The selective tendency is therefore positive so far as the infant mortality is concerned.

The above analysis however is true only insofar as the birth rate is even among different classes. As there is also a differential birth rate in addition to the

differential death rate, Rule I will not hold true more than theoretically, and for actual consideration we have to devise another rule to test the qualitative changes:

Rule II. If there are differential birth rates as well as differential death rates, then the net fertility of a class will determine the chances of its reproduction. If the superfertile class belongs to A, it shows a positive tendency; if C, negative; if B, the quality of the population is unaffected. (Same principles as Rule I).

In the French war budget of 1911 (66), it was found that from 1000 women between the ages of 15 and 50, in different districts of Paris, the number of yearly births was as follows (66, p. 139):

Very poor	108
Poor	99
Well-to-do	72
Very prosperous	65
Rich	53
Very rich	35

J. Bertillon has brought together in a similar way data from a number of cities, showing the following birth rate (66 p. 140):

	Berlin	Vienna	London
Very poor	157	200	147
Poor	129	164	140
Comfortable quarters	114	155	107
Very comfortable	96	153	107
Rich	63	107	87
Very rich	47	81	63

A more comprehensive study by David Heron on the relation of fertility in man to his social status, and on the changes in that relation which have taken place shows similar results. He measured wealth by the possession of servants and found (54):

	Birth rate
10 domestic servants for 100 families	34.97
10-20 " " " " "	38.32
20-30 " " " " "	25.99
30-40 " " " " "	25.83
40-60 " " " " "	25.11
Over 60 " " " " "	18.24

Clearly then, the lower classes are reproducing themselves faster than the higher classes, so far as the birth rate is concerned. But how far are these differential birth rates counterbalanced by infant and child mortality, as it has been an established fact that the larger the size of the family, the heavier the infant mortality?

Recasting Heron's data, Pearson found the net increase of each class to be : (66 p.142)

1 ----------16.56

2 ----------13.89

3 ----------11.43

4 ----------13.81

5 ---------- 10.29

6 ----------5.79

and concluded that in London "the inhabitants of the poorest quarters -- over a million in number -- are reproducing themselves at a much greater rate than the more well-to-do." (106)

The net fertility of different classes has also been calculated by A. O. Powys and the results are:

	Net fertility
Industrial Class	5.502
Professional Class	3.862
Commercial Class	3.784
Pastoral, Agricultural and Mining	3.142
Domestic	1.945

Powys has also considered his data from a different angle. After Pearson's law of the selective death rate, he tried to find the percentage of married people of different classes that have a chance to produce half the

children of the next generation. The results are:

	Percentage
Professional	22.58
Domestic	23.12
Commercial	23.30
Industrial	25.11
Agricultural, Pastoral and Mining	27.37
All	25.07

Hence the net increase of the professional is not so fast as the other classes. If this class can be taken as intellectually above the average, the selective tendency, so far as those places where the data are taken are concerned, is negative. (Principle 9 or 10).

A still grimmer conclusion is that reached by David Heron who, in the concluding paragraph of his research on "The Relation of Fertility in Man to Social Status" said: "A higher fertility is shown under at any rate the present social condition of a large city to be very markedly correlated with most undesirable social factors." (54)

Test II. Of all those who reach maturity, what are the traits and the relative numbers of those who marry and reproduce themselves?

Our first test has led us to the tentative conclusion that judging from the statistics of past years, there are more mature persons recruited from the economically unfavorable classes nowadays in spite of a heavier infant mortality in these classes, and there is every indication that the descendents of these classes are qualitatively inferior to the average population. But as we have pointed out above that the selective tendency is by no means fixed and that it can be controlled at every turn, so a negative tendency at present does not necessarily involve the same tendency in the next generation. There are at least three possible directions to which this tendency may turn. They are:

1. That, though the present generation is recruited more from the economically unsuccessful of the previous generation, only the abler part of these recruits get a chance to marry and reproduce themselves, while the majority of them owing to their economical incompetency are unable to marry, hence will die childless.

2. That those descendents from the more competent part of the previous generation all get married and reproduce themselves for the next generation.

3. That the above two cases are exactly reversed.

Actual conditions of course seldom follow any rigid theoretical formula; they are in most cases an incongruous combination of two or three possibilities. But from them we can derive a third rule to test the qualitative change of population.

> Rule III. The marriage rate determines for each class the chance to reproduce themselves for the next generation:if it were preponderant in Class A, it would show a positive tendency; if C, a negative tendency; if in B, the quality in general would be unaffected. (Principles 7, 8, 9, 10, 11, 12).

"The first effect of the recent feministic movement" says Mr. John Martin, "is that half the college women graduates do not marry at all." (75, p. 124)

We have at least a dozen statistical proofs to support this statement. The status of Wellesley graduates in 1912 indicated that 49 per cent of the graduating members in the class of 1879-1888 got married. Mt. Holyoke's figure of married graduates continually decreases from 85 per cent to 50.0 per cent within fifty years (1842-1892). Bryn Mawr College, between 1888 and 1900 graduated 376 girls, of whom only 165 or 43.9 per cent had married up to January 1, 1913. Robert J. Sprague found that 47 per cent of the Vassar College graduates

between 1867 and 1892 remained celibate. The marriages of Iowa State College women graduates decreased from 95.8 between 1871-1881 to 69 per cent between 1902-1906. H. J. Bankes found in the Syracuse alumni record that the percentage of married women graduates decreased steadily in the last decade, while Wisconsin census returns showed that the average marriage rate of its women graduates was not more than 45 per cent. (66, 8, 12, 63).

The figure of the marriage rate on the male side shows the same tendency, although it is not as bad as for the other sex. C. B. Davenport, looking at the record of his own classmates at Harvard, found in 1909 that among 328 original members, there were 287 surviving of whom nearly a third had never married (66, p. 246). H.J. Bankers figure of Syracuse men graduates also showed that the percentage of married was only 73 (4). The class lists of Harvard and Yale have recently been studied by J. E. Phillips (107) who finds that in the period 1851-1890 74 per cent of the Harvard graduates and 74 per cent of the Yale graduates had been married.

But as there is always a portion of the adult population which remains single, hence there would be no reason for the public to get alarmed at the declining marriage rate of the highly educated class, if it were only follow-

ing the current tendency. According to W. B. Bailey (3) the percentage of persons 15 years of age or over of continental U.S.A. who remained single was as indicated below:

Single Persons in the United States by Ages and Sex

Ages 15 and Over

	Male	Female
1890	41.7 per cent	31.8 per cent
1900	40.2 "	31.2 "
1910	38.7 "	29.7 "

The above table show several tendencies; but on the whole, the general tendency for both male and female to remain single is decreasing. Compared with the above table, therefore, the marriage rate of college women is running contrary to the general tendency. According to Miss M. R. Smith's calculation (119) the average age at which college women marry is 26.3. The celibacy of woman in general at this age, according to Bailey, is between 20.7 per cent and 22.6 per cent, while that of college woman graduates, according to the various investigations cited above, is between 30 per cent and 50 per cent. The contrast is brought out still more clearly by Thorndike who found that "45 per cent of college women marry before

the age of 40", but "90 per cent of all U.S.A. women marry before 40". (63, p. 106)

These figures, however, cannot be taken too seriously; nor are they so appalling as to justify the cry of eugenistic and ultra-nationalistic writers, when we analyze them a step further. In 1910 the collegiate women population was only .22 per cent of the total woman population in the United States; hence they constitute less than one per cent of the A class on our intelligence scale; and certainly the change of composition within this one per cent, though significant enough to challenge our attention, should not be taken as representative of the whole class. Miss M.R. Smith has compared the average marriage age of collegiate and non-collegiate women and she found the following (119):

	Average Age of Marriage
College women	26.3
Their sisters	24.2
Their cousins	24.7
Their friends	24.2

It is clear then that the majority of the A Class woman -- for we assume that the sisters, cousins and friends of the college woman are in the same class as the college women -- marry about two years earlier. Naturally

and concurrently the percentage of celibates will also be not so great as among the college women.

Recent investigations seem to show, too, that the celibacy of the college women graduates is only a matter of course, or in other words, an operation of natural selection. The following incident serves to illustrate this point:

A young woman of Wisconsin was asked why college women graduates do not marry; the following was her answer:(147):

"You ask me why half of the Wisconsin girls don't marry. I think it is because they never could have married, educated or not educated, ...a lot of the most attractive girls don't get to the seniors. The freshman class always has the prettiest girls." What is implied here is evident and certainly needs no exposition.

While the marriage rates of women are not of such a suicidal character as deserving the sensational discussion prevailing nowadays, those of the other sex are in almost the same condition. The maximum unmarried rate among the male college graduates, so far as we know, is 33.3 per cent, but the general percentage of single males is 38.7 per cent up to 1910. It is true that the age distribution should be considered here and the single males between 15 and 30 years of age should not be included for comparison with the college graduates, nevertheless it

shows on the whole that the extent of the celibated intellectual male class could not be very much larger than the average. Besides, there is another side of the question, that is, the male college attendants in the United States up to 1910 were only .46 per cent of the total population, thus constituting hardly two per cent of the A class on our intelligence scale. So here again what is typical of a part should not be taken to characterize the whole. A. O. Powys has computed the marriage rates of different classes in N. S. Wales which are as the following:

	Marriages per 1000 Adults
Professional	32.81
Domestic	15.72
Commercial	29.46
Industrial	40.46
Agricultural and Mining	18.18

The marriage rates of the professional class as shown here then are just about the average. According to our third rule, therefore the qualitative changes for the next generation are not towards a decidedly negative direction.

However, when the question of marriage rate is considered together with that of fertility, we are liable

to feel lost once more. For although there is about an average number of marriages taking place among the intellectual class, it is at the same time true that their marriage takes place considerably later than that among the other classes. As late marriage is generally associated with subfertility, the equal chance for this class to reproduce themselves is evidently thus overbalanced. Here is then a pragmatic question which deserves the foremost attention of every sociologist right now: if the age differences of marriage tends to upset the direct relationship between the marriage rate and the reproductive rate in such a way that the submediocrites have a greater chance to reproduce themselves for the next generation, in what way shall we direct our social control in order to minimize this effect to a negligible degree? This obviously can be accomplished by two different measures: (1) To urge the upper class to marry earlier so as to compete with the other classes for the fertility of reproduction; (2) To check the reproductive rate of the lower classes, or if possible, eliminate altogether those in the lowest strata by segregation. Which of these is more conductive to the weal and welfare of society will be considered in the next chapter.

It needs to be emphasized that the analysis of the

qualitative change of population in this whole chapter is exceedingly partial. The paucity of data prevent any broad generalization, and inconsistency of the unit of measurement in every case makes even this partial analysis hardly satisfactory. The question of qualitative change of population in general, therefore, has not been definitely answered. But the way to answer it has been laid out. What we need is a more refined method of taking the census, and a general survey of human intelligence by the most up-to-date mental tests.

Chapter III

Qualitative Improvement

Individual differences, differential birth rate, and differential death rate are the bases of qualitative changes of population. We are naturally led to contemplate the possibility of controlling these changes, or combating the natural tendency if it were detrimental to the existence of society. The value of this attempt has never been denied; but practical measures to be taken have encountered divergent opinions.

In the first place we have the difference between Positive Eugenics and Negative Eugenics. Negative Eugenics relates to the problem of preventing the natural and physical defectives from perpetuating their defects through propagation. Positive Eugenics relates to the problem of improving the mass of mankind by the selection of the superior in the process of reproduction.

In regard to the prosecution of Negative Eugenics there is already a consensus of opinion, except that the scope of the dysgenic class has not been clearly defined. But whatever the scope is, the feebleminded, the lunatics, the paupers, the criminals, the epileptics, and other

mental and physical defectives must go. The world is already too much crowded with population, the food quest is more and more pressing; thus if a portion of the world's population is bound to be weeded out, it is they. Formerly this"weeding-out" process was prosecuted by what Malthus called "positive checks", petty warfare, pestilence, famine, infant mortality, etc.,etc. But the world is now too civilized to allow this old "ape-and-tiger" evolutionary way of struggle for existence to operate any longer; it demands a positive intelligent measure to regulate the cosmic process, so that only the qualitatively superior, not a certain nation, nor a certain race, will be allowed to reproduce themselves.

The justice of Negative Eugenics would be, perhaps more appreciated, if it were considered from still a different angle. The dysgenic class not only reproduces their kinds, but also multiplies themselves faster than the average class. With the exception of idiots, all of them possess a normal amount of sexual instinct; and to the alarm of the whole world, it was found that pauperism is associated with superfertility. The family of Jukes is a typical example (28). In barely 145 years (1740-1875) a "jolly hunter and fisher and hard drinker" furnished no less than 1200 descendents to society, of which

at least 233 were criminals excluding harlots and prostitutes. The families like Jues are many. The Narns, Zeroes, Dack, Ishmael, Sixties, Hickories, Hill folks are only those which have been investigated. If they were free to multiply, the veneer of modern civilization is certainly too thin to cover this hideous aspect of human deterioration.

Through the development of modern psychology and medical science the methods to restrict these classes are no longer impossible. Of course it will take time to get rid of all these classes which constitute no less than five per cent of the total world population; for even though we can segregate all of them now, yet through the function of the Law of Filial Regression, there would always be a portion of the dysgenic class recruited from the sound classes. The important point is that if the rate of multiplicstion of this class were decreasing instead of increasing, the quality of population would be signally improving and that is all we can possibly desire at the present moment. (Chap. II, Principles 9 and 10).

Aside from the segregation of the unfit, the policy to further the improvement of human quality has met with the antithesis between the strict eugenists on the one hand and the strict euthenists on the other. The

contention of these two schools began with Galton's publication of Hereditary Genius (39) and culminated at Ward's presentation of his "Applied Sociology"(138). The one held that genius not only runs in families but is also irrepressible, that the quantity of genius is elastic, viewing the fact that its number changes in the course of time and that the only way to improve human quality is to increase the rate of multiplication of this class; While the other maintains just the opposite point of view; that is, genius does not run in families; the quantity of genius at any time is fixed, and most of them have been held in check by the existing social system; and the only way to improve human quality is to plow the "neglected spot" and create a demand for geniuses, then they will come to market immediately. Thus Galton, apologizing for the social system, thought that no genius could be possibly thwarted by poverty or lack of opportunity. "For,"says Galton, "if a man is gifted with vast intellectual ability, eagerness to work and power of working, I cannot comprehend how such a man should be repressed." With equal certainty, Ward defended his theory of "Intellectual Equalitarianism" and he believed that by way of popularization of education and equalization of opportunity, the number of geniuses may be increased two hundred fold in a very short period.

Logically considered, both of these theories contain a partial truth, but not the whole truth. We believe that we have sufficiently proved that mental qualities are transmissible; and that much, even Ward admitted. So there is no question about Galton's main thesis, that is, genius tends to be hereditary. But the second contention that is,genius is irrepressible which Galton tried to prove, is certainly unproved all through. He first of all excluded all the repressed geniuses from his category of eminent men, and then proceeded to prove that there were no potential geniuses among the poverty class -- furnishing a typical example of drawing a negative conclusion from two positive premises. The instances which he took to support this proposition are still more fallacious. One of them is that "countries where there are fewer hindrances than in England, to a poor man rising in life, produce a much larger proportion of persons of culture, but not of what I call eminent man....." and the fact is, that in America before the year 1869 there had not been as many men in science, art and literature as in England. Genius at this time, of course, meant for Galton only scientists, artists and men of letters! It seems rather perplexing why Galton should insist on this point, as it is not at all essential to his main thesis; and the way he

proved it is nothing less than a complete failure.

Ward's plea for equal opportunity and universal education is sociologically necessary as well as fundamentally sound; for it is the only way to give every one a chance to do his best. The utilization of the maximum capacity of all the social constituents will not only increase the volume of social achievement, but also mitigate much unnecessary social misery, typical of an industrial aristocratic society. The doctrine that education can increase the quantity of genius two hundred times is, however, problematical; and his theory of "Intellectual Equalitarianism" is no more substantiated than Galton's "Irrepressibility of Genius". All one can conclude from Odin's statistical investigation on French men of letters which Ward quoted so much at length, is that there is an associated relation between the fertility of a community in men of letters on the one hand and city life, educational opportunity and social and economical success on the other; but instead of an associated relation Ward thought that there was a causal relation. Consequently an increasing opportunity, educational and economical, would mean for him a proportional increase of the quantity of genius!

In the previous chapter we quoted more than half a

dozen investigations on the intelligence of children correlated with the social and economical status of their parents, all of which show that the average intelligence of the children of those economically unsuccessful is inferior to the children of those more successful. These are at least a direct negation of "Intellectual Equalitarianism". As a matter of fact, it is not necessary for Ward to advance such a fanciful theory in order to justify his plea for equal educational opportunity, for the reason which we have once and again pointed out. Why Ward did so is perhaps more due to professional pride than scientific interest.

As for the furtherance of qualitative improvement by urging the talented men to marry early and rear more children, a thorough student will be skeptical about its final outcomes;for not only is the psychological attitude hard to alter and economical status difficult to break, but for the sake of quality,biological laws tell heavily against early marriage and superfertility. Ultimately he is at a loss to know why the decline of birth rates is a menace to civilization, since it tends to solve the problem of food, and since by means of Negative Eugenics the quality of population could not be possibly negatively affected.

Of course, there are the race questions -- the Anglo,

Saxon superiority, the yellow peril -- but here sentimentalists come in, and scientific students leave off for lack of reliable data.

To sum up: In this thesis, it is maintained that the fundamental study of social progress is a qualitative study of population; that individuals differ from each other both physically and mentally; that the causes of individual differences are partly hereditary and partly environmental, the former being slightly more important than the latter; that the quality of population changes through differential birth rates, differential death rates, and differential marriage rates; and finally that the qualitative improvement of population may be realized by segregation of the unfit, equalization of educational opportunity, but not necessarily an increasing rate of multiplication in general.

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