The Psychology of Human Relationships, Attitudes and Beliefs

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It has been suggested by one authority that psychology is the "trained incapacity to deal with problems of the human mind." Since he was a sociologist (albeit a distinguished one) I do not take his definition too seriously, though still admitting it does hold a grain of truth. The most usual definition among psychologists is simply "The Scientific Study of the behavior of man and lower animals." However, this definition is seldom adhered to very closely, either in principle or in practice.

In fact, in the late nineteenth century, when psychology got its start as an independent discipline, there were at least four views about the subject matter of psychology. For Wundt, (formally its founder), it was the experimental study of consciousness. For Freud, it was largely the clinical study of the unconscious. For Pavlov, it was physiological study of reflexes - especially so-called "higher reflexes." Darwin, who had a strong amateur interest in psychology, appears to have defined it as the study of adaptive behavioral characters. Perhaps all all of these are correct. We certainly cannot leave out mind -- whether conscious or unconscious; on the other hand, we cannot study mind directly but most do so through analysis of observables -- whether these be records of nerve impulses or changes in some sequence of acts as, for example, those involved in a rat pressing a bar to get a food reward. And,finally, we cannot ignore the fact that both mind and behavior can be (and perhaps should always be) viewed from the standpoint of their adaptiveness -- that is, the bearing they have on the survival of individuals and of groups and on the capacity of those to perpetuate themselves over successive generations. In fact, it is this aspect of behavior that is to me the most important and also, the one most frequently ignored by main-line psychologists. This is a theme which I shall develop through this essay.

Bearing in mind the tentative definition of psychology given above, let us next consider psychology in relation to society.

Psychology and Society

Especially since the advent of American Behaviorism, psychologists have had a passion for being ultra scientific. This has resulted in wholesale attempts to purge the discipline of all mentalistic terms and references. B.F. Skinner has been a strong and influential advocate of this position. Now one cannot but admire the ingenuity and skill with which he has put forward his programme. But equally, one must also be struck by the tendency for problems to become trivialized when they are stated in the austere terminology of Skinnerian psychology. Thus it strains the credulity of many to be asked to accept the idea that all the complexities of human behaviour will eventually be solved by observing pigeons pecking a key in a Skinner box. It may be, of course, that this will come about. Certainly, in other sciences, the well-controlled study of relatively simple phenomena have often yielded fundamental laws of immense power of generality. But I myself am not convinced that in psychology such laws will be discovered in the near future; and, in my more pessimistic moments, I have the feeling that they are elusive in principle. Be this as it may, there is an onus on psychology -- and all other disciplines concerned with human beings -- to continue to seek solutions to the problems of human beings and to put forward whichever seem best even if they are only very provisional.

I will therefore turn to a consideration of a couple of major problems now facing mankind and attempt to show some of the psychological dimensions they entail. These two problems are crowding and the allocation of resources. They are clearly related to each other, since, as population density increases, resources commensurately decrease and competition for them becomes more severe.

Crowding and density

It is an obvious fact that any breeding population, left unchecked, will increase at an exponential rate, provided that birth rate exceeds death ($b - d = r > 0$). Thus, as two biologists (Wilson and Bossert, 1971) have dramatically expressed it, "all populations allowed indefinite exponential growth will eventually contain more organisms than there are atoms in the visible universe and whose combined bulk will be expanding outward at the speed of light." This of course, does not happen; and the reason that it does not happen is that b and d are not independent of population size (N). Thus instead of population growth following the exponential $\frac{DN}{dt} = rN$, it follows the logistic (or Verhulst-Pearl) equation:

$\frac{dN}{dt} = r \left(\frac{K-N}{K}\right) N$ where K is a parameter expressing the relation between r and N. The two curves are shown in Figure 1.

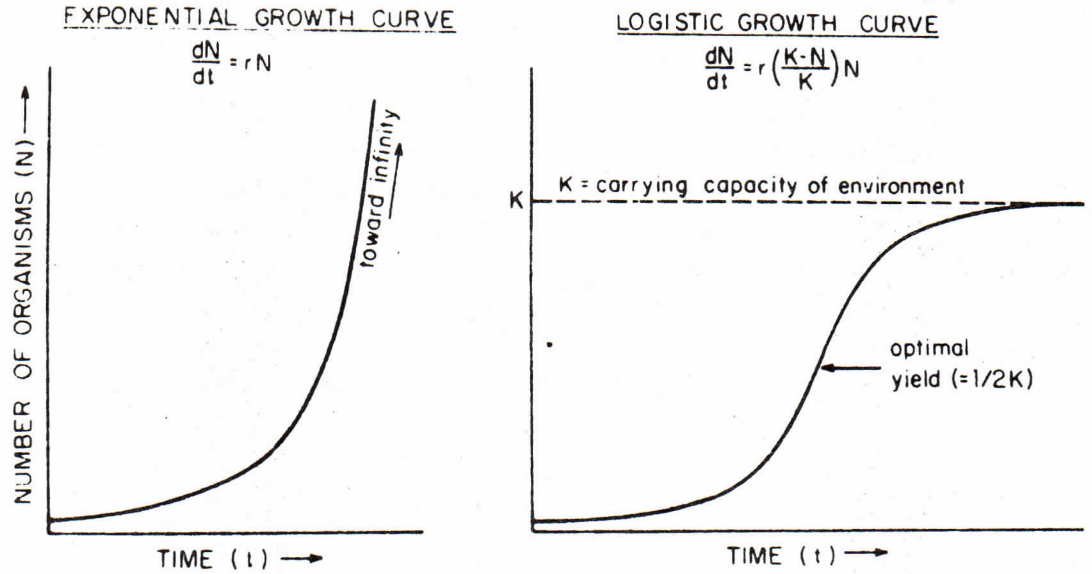

Figure 1: Two elementary forms of population increase.

K defines the carrying-capacity of the population. What is of interest to the demographer and to the population biologist is the exact nature and dimensions of K -- that is to say, the actual factors that alter birth and death rates as population density changes. Many of these are physical such as dwindling resources; others are biological, such as the spread of disease; still others are psychological or behavioural and it is on these that I would like to focus.

In the first place, it must be emphasized that the term crowding is a relative one. A group of twelve laboratory rats piled on top of each other in a cage may look crowded to us. But they may not be by any exact criterion. On the other hand, only two wild rats in the same cage may be extremely crowded by the same criterion. Obviously, the same uncertainties apply in the case of human beings. Consequently, it is perhaps best to avoid the term "crowding" and aim instead at examining empirically the behavioral changes relating to r that occur when density reaches a certain level. Or, putting the matter another way, we can ask: what behavioural mechanisms are involved in maintaining population density at an optimal level? This is a perfectly sensible question if we realize that birth rate -- the parameter labeled so abstractly as "b" - is, in fact, a measure of the outcome, not merely of some physico-chemical process, but of a whole series of complex behavioral events from courtship, through to caretaking. Let us now consider a few examples of such mechanisms in the world of lower animals.

Territory

In some animals, population density is controlled by territorial exclusion. Thus competition occurs for a finite amount of space and only those individuals who achieve ownership have access to mates. This is a simple behavioral strategy used by many species. One of the best examples is afforded by the Red Grouse of Scotland as described by Wynne-Edwards.

Direct competition between males for a place to live on the moor takes place annually starting in late August. Quite suddenly, at a certain critical period, males commence, a territorial dawn display which they continue daily (weather permitting) until exact territorial boundaries are hammered out. After this, pair-formation begins though it is not finally consolidated until the following spring. During this time, the newly defined "vagrant" class of birds suffers heavy mortality from predators, disease and lack of access to food. The situation over one year approximates the figures shown in Table I.

August stock	37 old birds	63 recruits
	100	
Autumn territory contest	37 established (all ages)	63 surplus (all ages)
Winter mortality	7 die	56 die
	30 survivors	7 fill gaps
Spring stock	7 substitutes	
	37 breeders	(0 surplus)
August stock	37 old birds	63 recruits
	100	

Table 1: Average recruitment and loss in a red grouse population. (Wynne-Edwards, 1968)

Thus, by a purely behavioral mechanism, population density is kept at a level suitable to the resources at hand. It should be emphasized that the competition itself is largely ritualized and does no direct damage to any of the birds involved. It is more like a cricket match than a battle though the ultimate consequences for the losers are still severe. The "haves" are separated from the "have-nots" but largely by virtue of characters having to do with social skills.

Dominance

In other animals, we find sometimes similar and sometimes different behavioral mechanisms at work. For example, in laboratory mice, it appears that success in mating is governed largely by dominance and aggressiveness. When two males are put in competition for a female, the more dominant invariably sires the largest number of litters as indicated by presence of marker genes in the offspring population. Here, the competition is physical and usually damaging to the loser. However, it is doubtful if the laboratory situation is like the real world and, in nature, wild mice tend to split off into local populations between which there is minimal hostility.

Female receptivity

Another mechanism for population control is to be found in the Primate genus Papio -- the baboon. In the savanna -- living species, Papio anubis, the social unit is the troop containing, on the average, 30-50 individuals of varying age and sex distribution. Females tend to be quite promiscuous and at the start of estrus will present to and copulate with any interested male. It is a significant fact, however, that dominant males tend to mate only when the female shows maximal perineal swelling -- that is, at mid-cycle when actual ovulation occurs. Thus although all males are apparently permitted the pleasures of sex, only a few can achieve the glory of parenthood. This arrangement, however, is not universal among all baboons. Thus in the species P. hamadryas - the "Sacred" baboon -- a harem structure prevails, with most adult males having exclusive ownership of several females which he scrupulously herds. Since troops contain usually many more females than males, most adult males will have a harem, though some older or younger will not. This scheme might hardly seem conducive to regulation of population size except for two somewhat tenuous facts: first, initial pair-formation begins at least a year before any copulatory behavior occurs, and appears to be built more on a disposition of the male to act as a "mother" to the female rather than as a mate (Kummer, 1971). This non-sexual dimension may do much to curtail unlicenced reproductive activity; secondly, the fact that the males sexuality is focussed always on a small number of females may also act to reduce its strength. This is well-known to be so in other animals. For example, in rams, ejaculation latency increases sharply if the female is presented on five successive occasions. However, if a new female is introduced each time, ejaculation latency remains stable at a very low level. These data are shown in Figure 2. It is not inconceivable that the harem arrangement in P. hamadryas produces the same effect -- or, for that matter, the nuclear family structure of most human societies. Up to a point, familiarity breeds, but beyond that, it may breed contempt -- i.e., not breed.

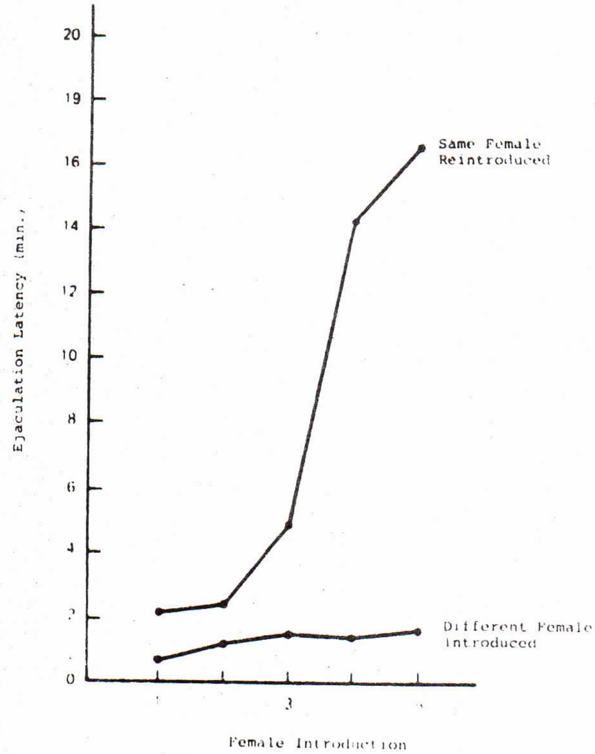

Figure 2: Average ejaculation latencies for rams (*Ovis aries*) sequentially reintroduced to the same female or introduced to different females. (from Beamer, Bermant and Clegg, 1969)

General stress

Mechanisms of the kind described above tend to keep many animal populations at a comfortable level. In some species, under some conditions, however, they do not occur and more traumatic measures are called for. The "suicidal" migrations of lemming populations to the sea represents one example. The same spectacular dispersals also occur in other animals. Likewise, it has been shown by a number of workers, both in the laboratory and in the field that, in the vole (Microtus agrestis), crowding beyond a certain point produces a drastic reduction of numbers. The proximate causes are not totally clear, but one worker -- Dennis Chitty -- concluded that they included the following:
a. Strife during the breeding season; b. a resultant increase in infant mortality; c. "physiological derangement" among both adults and surviving offspring; d. increased susceptibility to various mortality factors; e. reduced reproductive capacity. Of these, the last is perhaps the most interesting. We will now look at it in more detail.

In general, in laboratory situations where animals are forced to live at very high densities (e.g. 60 mice or rats per sq. ft.), a large amount of sexual pathology develops. Ovulation in females becomes inhibited, most males are excluded from mating by dominant males which set up private harems, asexuality, homosexuality and hyper-sexuality occur and, there is a marked disturbance of normal maternal behavior. Such findings -- though largely of a qualitative nature -- have been reported by a variety of workers (e.g. Calhoun, Kessler, Chitty, Christian, Southwick) and therefore are probably generally reliable. However, much more work needs to be done to specify more exactly the nature of these "pathologies" - particularly those that might apply in human populations living under what we might commonly think of as crowded conditions. I would like now to focus on one dimension which may be of special interest.

Prenatal stress

It is well known that genetically male rats and other animals only develop a normal male phenotype by virtue of testicular androgen production during the perinatal period. If deprived of androgen by injection of anti-androgen compounds or by castration, male rats show, at adulthood, a reduction in male copulatory behavior and the exhibition of female lordotic patterns. They are, in other words, feminized. Now there is more than one source of androgen. Besides the testes, the cortex of the adrenal gland also secretes not only small amounts of androgen but also large amounts of the androgen-like but much weaker compound androstenedione. One investigator (Ward, 1972), in consideration of these facts, speculated that if the production of androstenedione were heightened during the period of sexual differentiation, it would then inhibit the action of androgen at the relevant receptor sites. The result should be a reduction of masculinity in males. An obvious way of arranging such a biochemical situation is by stressing mothers during pregnancy, since stress produces a large output of adrenal corticosteroids. Stress was imposed by means of severe restraint plus intense light. Results in the male offspring were clear-cut. Of the prenatally stressed males tested, only 26% attempted to copulate with estrus females compared to 73% in a control group. When all rats were castrated, the experimental animals showed four times as many lordotic (i.e. female) responses as controls and allowed themselves to be mounted by other males much more often.

Thus it seems that prenatal stress can drastically lower reproductive efficiency -- essentially by way of feminizing male sexual behavior. It is not known whether virilization of females can occur by an analagous process, but this is not intrinsically unlikely. Can maternal stress be produced by crowding? An affirmative answer has been given to this question experimentally by Keeley (1962) at Yale. Consequently, we have a fairly well defined mechanism for population regulation at least for one group of animals. Whether it is relevant to human societies is, of course, another matter. But it is not beyond the bounds of possibility.

I will now turn to consider a second major problem with which human society must deal, namely, the allocation of resources.

Allocation of resources

An important consequence of crowding is that it puts resources in short supply. I have already aluded to this above. This means, in turn, that there is likely to be competition for these resources and that some successful individuals will, by some means or other, obtain more than other individuals and hence be more likely to survive and reproduce. In human populations, we find a clear stratification in respect to conventional indices of success, for example, occupational and social status and income. However, what we know rather little about are the factors which are responsible for high success and the relation of such factors (and success itself) to biological fitness.

In the case of lower animals, Wynne-Edwards gives us a general idea. He says: "social selection ... depends not just on the sharpness of the teeth or the color of the scales but on the total effect which gives the eye its sparkle and spells confidence in action." What is the equivalent in human beings to the "sparkle of the eye" to which Wynne-Edwards refers? This is the problem I wish briefly to explore.

In the first place, it is clear that if we divide a human population into categories according to socioeconomic classes -- we find a clear relation between class rank and intelligence. One example of such data is shown in Table 2 (Waller, 1971). This is a typical result and has been found by many investigators in many parts of the world. Thus IQ does relate, in a general way, to success in human groups.

Social Class of Father	Fathers		Sons by Social Class of Fathers		Sons	
	No.	$\bar{X}$ ± s.e.	No.	$\bar{X}$ ± s.e.	No.	$\bar{X}$ ± s.e.
I	1	(140)	1	(127)	7	114.43 ± 4.46
II	19	113.53 ± 2.62	26	109.04 ± 2.34	29	112.14 ± 2.34
III	43	105.56 ± 1.65	54	104.81 ± 1.72	67	105.99 ± 1.71
IV	53	93.57 ± 1.89	66	101.20 ± 1.88	58	96.87 ± 1.83
V	15	81.00 ± 4.44	26	90.88 ± 3.35	12	88.00 ± 3.84
Total sample	131	99.30 ± 1.44	173	103.06 ± 1.16	173	103.06 ± 1.16

* Social class (SES) divided according to the Hollingshead (1958) rating, a composite of occupational level and educational attainment.

Table 2: The relationship between IQ test score and social class in two generations. (from Waller, 1971)

Is intelligence as measured by IQ tests heritable? We cannot at present answer this question very precisely. Heritability is simply the proportion of the total variation in a population that is produced by genetic factors. Estimates ranging from zero up to almost 0.9 have been put forward by different authorities. An example of the kinds of data on which such estimates are based is shown in Figure 3 from Erlenmeyer-Kimling and Jarvik (1963). This summarizes 53 studies of IQ resemblance in individuals of different degree of genetic relationship. Note that, although the variation between studies is often considerable, in general, the closer the relation the stronger the resemblance. This fact might be explained environmentally, of course, except for two types of critical data. One has to do with identical twins reared apart and the other with resemblances of foster-children to their natural as opposed to their foster-parents.

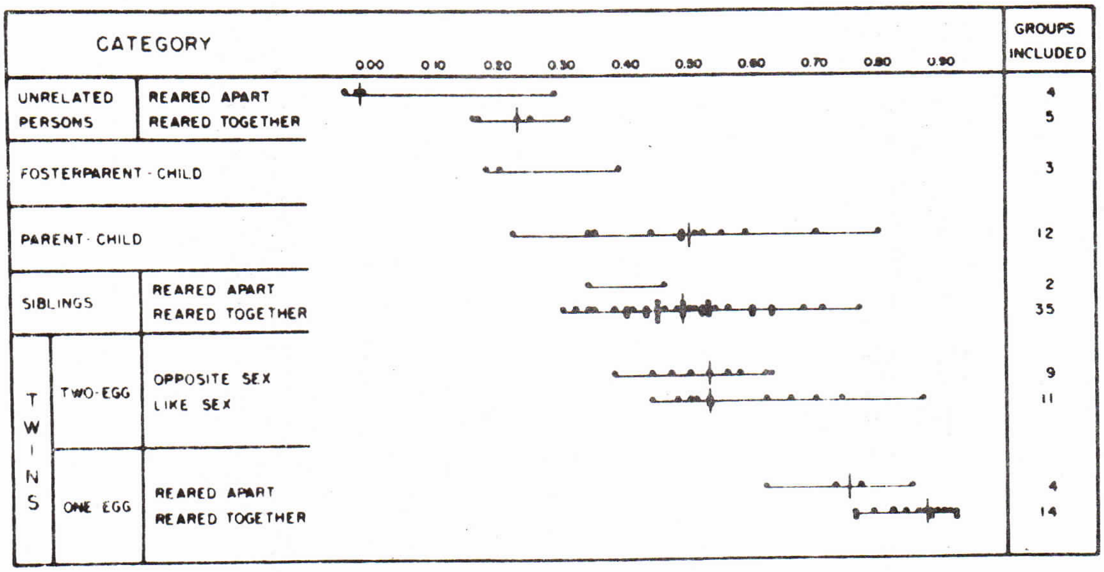

Figure 3: Correlation coefficients for "intelligence" test scores from 53 studies. (from Erlenmeyer-Kimling and Jarvik, 1963)

A summary of the results of four studies done on the former group is shown in Figure 4 from Jensen (1972). This shows the distribution of IQ differences between members of identical twin pairs reared in different homes. Note that it resembles half a normal curve distribution and has a mean of 6 IQ points and a standard deviation of 4.74. This means that

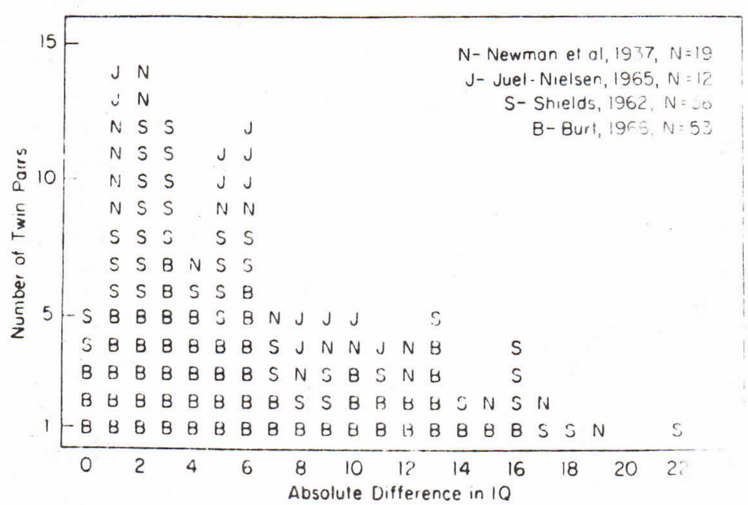

Figure 4: Distribution of IQ differneces between monozygotic twins reared apart. (from Jensen, 1972)

IQ can be shifted by environmental factors within a range of almost 30 points -- a fact to which I will return in a moment. From the twin data, we can estimate heritability. This turns out to be 85% as shown in Table 3. Clearly, this is one of the high estimates.

Source	σ	σ^2	% Variance
Heredity	13.83	191.25	85
Environment	4.74	22.50	10
Test Error	3.35	11.25	5
Total (Phenotypes)	15.00	225.00	100

Table 3: Components of variance in IQ's estimated from monozygotic twins reared apart.

The other critical data are from studies of adopted children. Figure 5 shows the combined results of two of these bearing on the resemblance of the adoptees with their natural as against their foster-parents. Again, it seems clear that environment is not producing as much similarity as genes. Another study of this kind by Burks (1928) provided sufficient data to yield an approximate estimate of heritability. This turned out to be around 0.75.

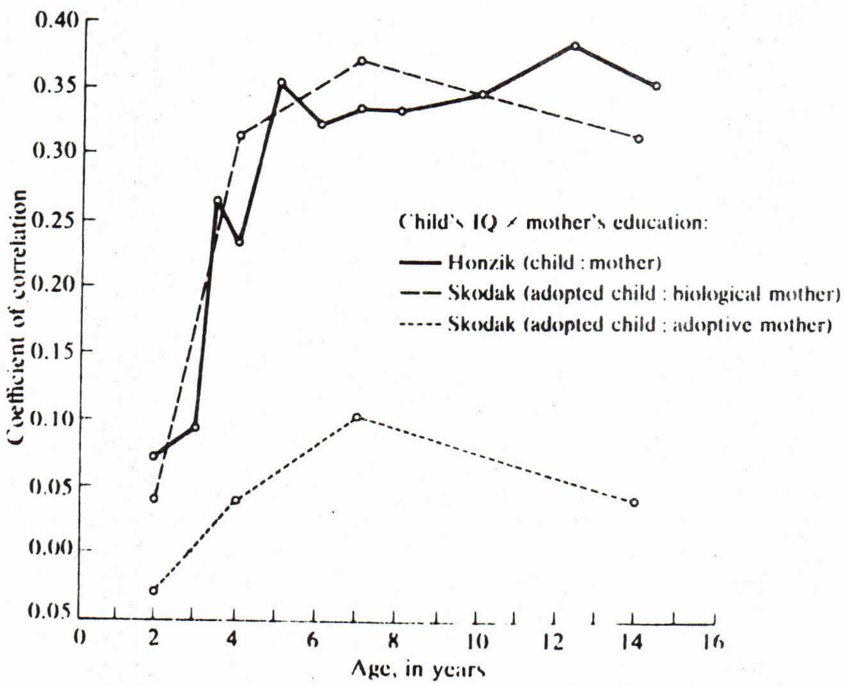

Figure 5: Resemblance between adopted children and natural, as compared with adoptive mothers.

A few comments are in order: first, it should be emphasized that both the twin and the adoption studies have been subjected to criticism. They are by no means models of scientific design. Consequently, we must regard as somewhat provisional the heritability estimates derived from them.

Secondly, a high heritability estimate does not mean that IQ score cannot be shifted upward or downward. Some concrete data bearing on this point are shown in Figure 6. This shows the improvement in IQ (over 20 points) that can be effected in young children by intensive training procedures. The author of this paper concluded that such results pointed to the all-importance of environment. However, what he failed to notice in his own tables is that even though the mean performance of the experimental group has shifted upward, the rank order of the children comprising it remains almost completely invariant across the three testings. Those who are relatively high in rank at the beginning are low at the end.

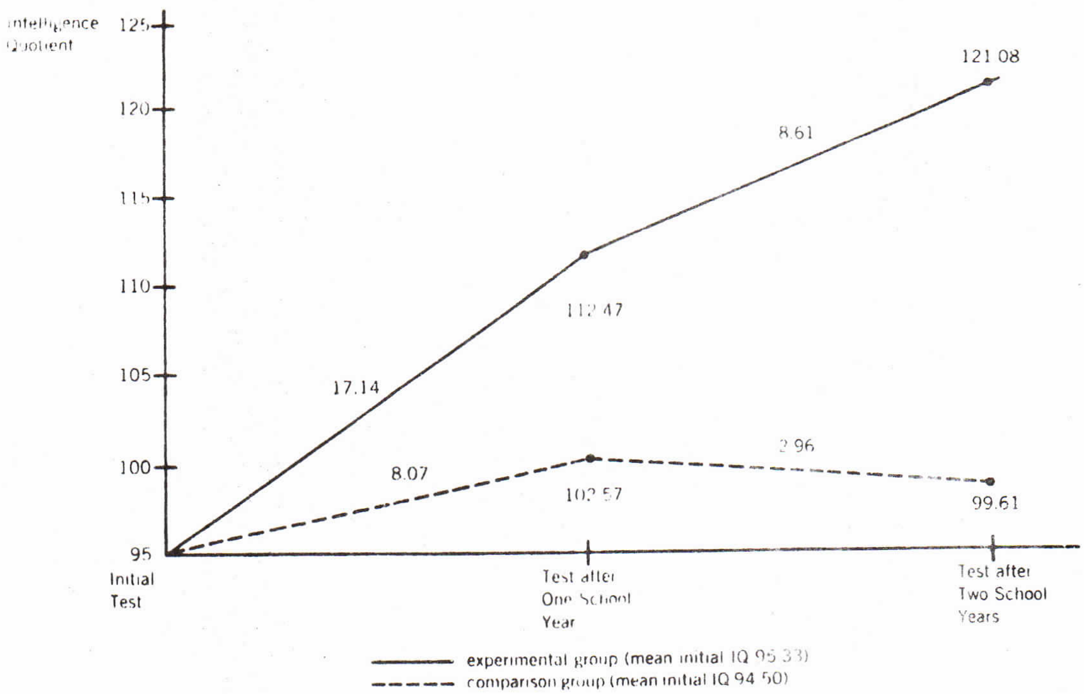

Figure 6: Gains in IQ following special training programme.

A third point is this: being raised in a good or upper-class environment is no guarantee that an individual will be as bright as his parents. The converse applies in the case of lower socio-economic groups. The data of Table 2 showed this clearly. It is a phenomenon called filial regression and is well known to geneticists from Galton on. But it is not so easily explained by any environmentalist point of view. What it produces in society, of course, is social mobility. Thus the low IQ offspring of upper-class parents sink and the high IQ of dull parents rise in the social scale. Genes are a much more liberal force than environmen[illegible]

A final point should be made. In spite of the relati[illegible] ch exists between average IQ and average amount of social succ[illegible] viduals, IQ is not a very good predictor, because of the great varia[illegible] IQ in each class. Thus if we estimate the degree of income inequali[illegible] between individuals with exactly the same IQ, we find only about 3% less inequality than in the whole of the American population.

But is socioeconomic success everything? From a biological and evolutionary standpoint clearly it is not. What is far more important is "fitness" -- that is, the capacity to reproduce viable offspring; in other words, to transmit one's genes. How do bright and dull individuals compare in respect to this dimension? The crude relationship between reproductive rate and IQ is shown in Figure 7 which summarizes the results of several studies. In general, what these data mean is that there is a small but significant eugenic trend representing the fact that the higher the IQ, the greater the intrinsic rate of natural increase. This may be due to physiological or cultural causes. But whatever the causes, the result is biological and that is what matters.

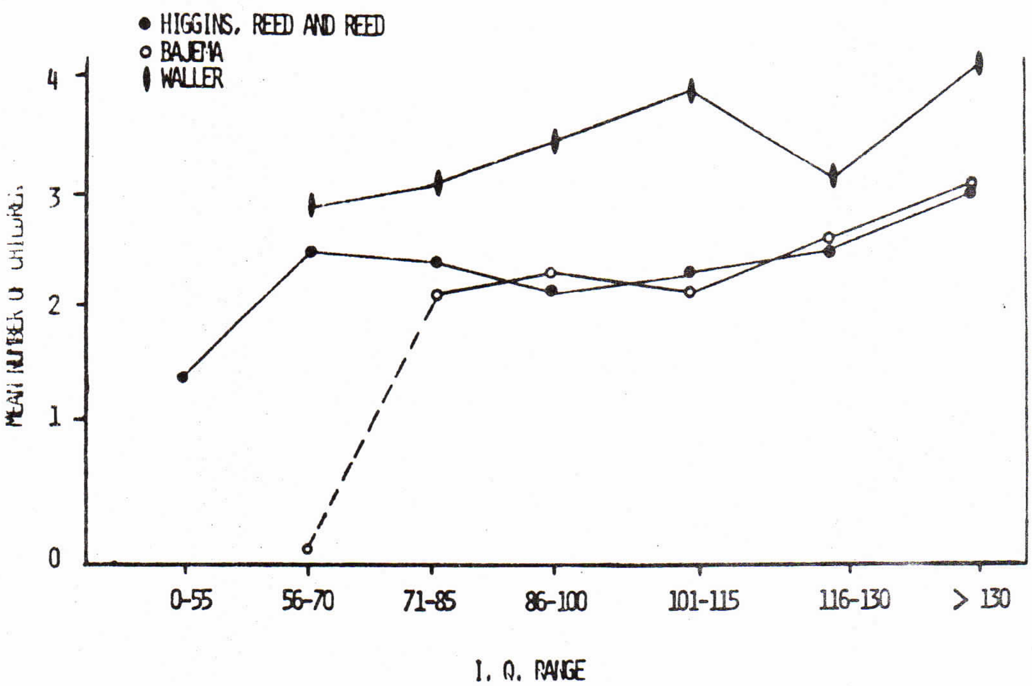

Figure 7: Relation of IQ to reproductive capacity, (three studies).

Thus we can conclude that biological success like social success is to some extent associated with intellectual capacity. But the association is again imperfect. Consequently, if we are to specify more exactly the factors that make a "winner" we must look further.

To develop a preliminary strategy for approaching the problem we might commence by recognizing that any index of success must relate strongly to a capacity for solving problems connected with people or other organisms as opposed to problems connected with objects: in other words with social rather than with abstract intelligence. I have no doubt that the two may be modestly correlated and complement each other and that sometimes the solution of a problem may be effected as much by one as the other ability. I am reminded here of a satirical piece in a student newspaper regarding a physics examination question. The question concerned the estimation of the height of a building using a common barometer. The commentator pointed out many conventional and unconventional solutions to the problem. One of these, however, was a social solution and involved selling the barometer to the superintendant in exchange for the blueprints of the building. There are many roads to achievement and only some of them require abstract intelligence.

This notion is reinforced if we look at social groups other than human. Some of the lower primates, for example, are remarkably clever at solving problems presented to them by psychologists in laboratories. Yet as one psychologist pointed out (Harlow, 1954), it is curious that this capacity does not seem to be apparent in nature; and if it does not, we may fairly ask -- why is it there? I think that the solution to this paradox is given by the fact that intelligence in many primates is indeed manifested in their daily lives, but mainly in relation to their social relations. This was not at all obvious so long as the animals were observed in artificial settings such as zoos. Thus one of the first students of baboon behavior -- Sir Solly Zuckerman concluded from his observations of <u>Papio</u> <u>hamadryas</u> in the Regents Park Zoo that this species was a kind of archetype of Hobbesian man -- nasty, brutish and devoted only to sex and aggression. But later field studies have shown the remarkably delicate and subtle problem-solving that continually goes on in any baboon troop. Here we may view clearly the place of intelligence in a social unit and its bearing on fitness. Indeed, one might say that the welfare of a baboon and most of the other primates depends directly on the capacity to transmit, and interpret correctly, a wide range of social signals. Michael Chance has referred to this basic dimension as the "attention structure" of the social group. Both he and another primatologist -- Allison Jolly -- have further suggested that it may well represent the precursor of what we now regard as intelligence in human beings. Thus the complex of anatomical changes that occurred during the upper Pliocene and throughout the Pleistocene were perhaps more relevant to the development of social communication than merely to tool-use and the manipulation of objects. The same might well be said to be true in respect to the ontogeny of intelligence. The first problems confronting any young organism have to do more with other organisms rather than with things, and skill in dealing with the latter is probably built on skill dealing with the former. To my mind, these social problems basically involve altruism and aggression -- characters that ultimately govern the relationship between members of any social unit. Both unlimited altruism, or unlicenced aggression are, as it were, self-destructing. What a young organism must learn is how to guage the short - and long-term costs and benefits of each both from the standpoint of his own welfare and of that of [illegible] as a whole.

The optimal balance between altruistic and aggress[illegible] likely to vary between different societies and also between diff[illegible]ity levels in the same society. It seems clear, for example, t[illegible] the accompaniments of urban living may be a diminution of altr[illegible] an increase in aggression. Altruism is biologically valuable to an individual only if one of two conditions pertains: a the recipient is a kin and thus shares genes with the altruist; b the recipient is likely to reciprocate at some time in the future. In high density settings, neither of these is probable. This is also true of aggression. Hence we notethe urban phenomenon of the "passive by-stander" -- that is the individual who witholds the rendering of assistance to a person being robbed or assaulted (see Milgram, 1970). We have little precise information, however, beyond this kind of general observation. The problem is a large and important one and clearly open to exact experimental investigation.

Conclusion

I can conclude merely by emphasizing that two serious problems faced by mankind clearly have psychological aspects. Such checks on population density as territorial behavior, reproductive behavior, maternal anxiety and dominance fall directly within the purvue of the psychologists. The same applies to the matter of how intelligence, social ability and social success are related and how all of them bear on fitness. It is true that, so far, Psychology, as a discipline, has not focussed much on such problems in any very coherent way. But it is my hope that this situation will improve during the next few years.

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