REPLY TO COMMENTARIES ON RACIAL DIFFERENCES INTELLIGENCE

Richard Lynn
University of Ulster, Coleraine, Northern Ireland

The seven commentators on my two papers on racial differences in intelligence split about equally into the four (Eysenck, Miller, Weiss and Lehrl, Frank and Papp) who accepted the thesis in general terms and elaborated or suggested modifications to a number of points, and the three (Deary, Juhel and Vancata) who were unsympathetic to the papers and raised various objections. Before answering the commentaries it may be useful to summarize the eight principal points made in my two papers.

My two papers on racial differences in intelligence were concerned to set out the evidence on a worldwide basis and to advance a theory to explain how the differences have evolved. The papers argued eight principal points.

1. In relation to a mean IQ of approximately 100 (and standard deviation of 15) for Caucasoids in Europe, North America and Australasia, Mongoloids typically obtain mean IQs in the range of 97-110, south east Asians 80-95, Amerindians 70-90, Negroids 65-81, and Negroid-Caucasoid hybrids 81-94.

2. The three major races show the same differences in reaction times as they do in intelligence, suggesting a neurological basis to the differences.

3. The mean IQs of the races are also associated with their achievements in the development of civilization during the last 5,000 years.

4. Mongoloids and Amerindians have a different pattern of intelligence from Caucasoids and Negroids, consisting of strong visuospatial abilities and weak verbal abilities.

5. The consistency of the races' levels and patterns of intelligence, found in a variety of geographical locations and over 5,000 years of history,

cannot be explained in environmental terms. Therefore we have to infer the presence of genetic differences.

6. Racial differences in intelligence are associated with differences in living standards. This is best explained by the theory of genotype-environment correlation, which states that peoples construct their own environment in accordance with their genetic capabilities. A genetically intelligent people will make a superior environment.

7. If racial differences in intelligence have a genetic basis, some explanation is required for how the differences have arisen. Two possibilities were considered: (a) that the cold environments of Eurasia acted as a selection pressure on the Caucasoids and Mongoloids for enhanced intelligence necessary to solve the problems of hunting, tool and weapon making, and keeping warm; (b) among Caucasoids and Mongoloids mutant alleles may have appeared for enhanced intelligence and a shift towards a high visuospatial – low verbal profile in the Mongoloids, and these alleles spread through the populations because they conferred a selection advantage.

8. Where populations experience selection pressure for increased intelligence, they have typically responded by evolving larger brains which have afforded the necessary enhanced problem solving, information processing and learning capacities. The same thing has apparently happened in the evolution of the human races, where brain sizes are greater in Mongoloids and decrease in the other races in accordance with their mean IQs.

Most of these points have been taken up by the commentators. I shall discuss first the points made by the four sympathetic commentators.

One of the problems for the environmentalist is to provide an environmental explanation for the existence of racial differences in intelligence. The best that many environmentalists can come up with is that blacks in the United States are a minority and suffer discrimination from whites, and that this lowers their intelligence: a theory which ignores the fact that orientals and Jews are also minorities who typically perform better on intelligence tests and at least as well in achieved socioeconomic status as whites.

Even less persuasive is the thesis that because blacks' great great grandfathers were slaves this has in some way caused them to have lower IQ's today. A much more convincing suggestion is made by Eysenck to the

effect that nutrition may be a more important variable affecting intelligence that has generally bee supposed. I agree that nutrition is the most likely environmental factor contributing to racial differences in intelligence. It is probably true that the races who obtain lower mean IQ's also have poorer nutrition and that this has some adverse effect on their intelligence. Nevertheless, there is the problem of why some races are able to provide better nutrition for their children than others. In the United States the per capita income has been about double that in Britain for several decades, e.g. 6324 U.S. dollars in the U.S. as compared with 3677 U.S. dollars in Britain in 1975 (United Nations, 1978). The average income of blacks in the United States is about two thirds that of whites (Borjas, 1986). Thus, the average incomes of American blacks is higher than that of British whites, and much higher than that of Hong Kong Chinese (1975 per capita income = 1740 U.S. dollars). How is it therefore that American blacks with good incomes could fail to feed their children well? If that is indeed the case, which is not demonstrated, the answer would probably be that they do not apply their intelligence to the problem. This is frequently the case in Africa, where there are widespread taboos on eating eggs, vegetables, insects and fungus (e.g. mushrooms) and these foods are not eaten although they are widely available (Newman, 1980).

This paradox of the failure of Negroids to use readily available foods is best explained in terms of genotype–environment correlation theory. This states that peoples with genetically high intelligence will provide a better environment for their children, and hence maximize their children's intelligence, than people with poor intelligence. Eysenck has usefully drawn attention to the increasing evidence that the provision of adequate nutrition for their children is probably the major environmental process by which intelligent people optimize the intelligence potential for their children.

Two interesting questions are raised by Weiss. Firstly, he presents his theory that there are three genotypes for intelligence corresponding to IQs of 94, 112 and 130. These three genotypes can be identified from the analysis of information processing tasks such as reaction times which show the presence of the three distinct groups. He argues that the normal curve for intelligence is an artefact arising partly from environmental effects blurring the distinctiveness of the three groups and partly simply from the way the scales are constructed to give a normal distribution. Furthermore, Weiss suggests that the mutant for the IQ of 130 appeared in the ancestral Caucasoid-Mongoloid population in Eurasia, possibly about 40,000 years ago, and never penetrated the Negroids or Australian Aborigines, who

therefore lack the high IQ allele. The implication of this theory is that the standard deviation for intelligence should be lower in Negroids and Australian Aborigines than in Caucasoids and Mongoloids. It is well known that in the United States the standard deviation is lower in blacks as compared with whites, e.g. Jensen and Reynolds (1982) in their analysis of the WISC-R standardization data report standard deviations for the full scale IQ of 14.08 in whites and 12.75 in blacks. Owen (1989) also reports a somewhat lower standard deviation in blacks than in whites in South Africa. This interesting theory deserves further examination.

The second question raised by Weiss is why there are still so many unintelligent people around. Intelligence is such an important attribute that people with the allele for low IQ should have been bred out of the population many generations ago. His answer to this problem is that a population needs a range of intelligence to ensure social stability. All human societies are hierarchical with a small number of leaders, some middle management and a large number of workers. So long as the workers are less intelligent than the middle managers and the leaders, they will know their place and social order will be maintained.

A possible problem with this ingenious proposal is that it appears to be a group selection theory in so far as groups with a range of intelligence will have a more stable social order than those where everyone has high intelligence. Group selection theories are not viewed favorably by geneticists because the unit which either reproduces or fails to reproduce is the individual. So the problem is why individuals with low intelligence have survived in spite of the selection pressures against them, of which poor nutrition and high mortality are probably among the most important.

The problem of why low intelligence alleles have survived for so long is also raised by Miller. His solution is that high intelligence may have a cost because a large brain is more expensive to maintain than a small brain. This is especially the case in the tropics because a large brain generates more heat. This heat is more difficult to dissipate in the tropics, whereas it is an advantage in cold climates. This could have been a secondary mechanism for the evolution of larger brains among those living in cold climates.

The problem of the continued survival of low intelligence alleles remains a puzzle. The answer may be simply that it takes a long time to breed out disadvantageous alleles and those for low intelligence have not yet been eliminated. Now that welfare states have been established in all economically developed countries to provide incomes and health care for the unintelligent, they are likely to be with us for the foreseeable future.

An interesting discussion of the problem of the magnitude of the differences in mean IQs between the races is presented by Lehrl, Frank and Papp. They start by pointing out that the IQ means are only rough and ready measures of biological intelligence because they are affected by a variety of environmental factors. Furthermore, IQs are not wholly satisfactory measuring instruments. Strictly speaking, IQs are an ordinal scale, i.e. a scale which puts individuals or groups in a rank order, but where the differences between the ranks are not of equal size so that we cannot say that an individual with an IQ of 140 is twice as intelligent as an individual with an IQ of 70. The most satisfactory type of measuring instrument for scientific purposes is a ratio or absolute scale, i.e. a scale which has a true zero and where the units of measurement are equal intervals throughout the entire scale. Inches are a ratio or absolute scale because there is a true zero, the difference between 2 and 3 inches is the same as the difference between 10 and 11 inches, and 8 inches are twice as long as 4 inches.

To overcome the weak status of the IQ as a measuring instrument, Lehrl, Frank and Papp transform the mean IQs of the races into short term memory storage capacities (bits). This measure has an absolute zero and provides a ratio (absolute) scale. On this scale the mean capacity of Mongoloids is three times as great as that of Negroids, and consequently Mongoloids have much greater problem solving capacities. This analysis makes a valuable contribution to the problem of the measurement of the IQ and of the orders of magnitude of the abilities differentiating the races.

The problem of the nature of the selection pressures in the colder regions which operated to increase the intelligence of the Caucasoid and Mongoloid peoples is addressed by Miller. In my paper I suggested that the principal selection pressures were the cognitive problems involved in hunting large animals and in keeping warm. Miller suggests the operation of two further factors, namely the need to store food for future use and the adoption of a sedentary rather than a nomadic life style. These are important points which deserve further elaboration. Food supplies in the cold latitudes were highly seasonal. Berries and nuts could have been available for a short period in the autumn and it would have been useful to store them for future use. This would have required foresight. Meat on the hoof was also highly seasonal because herds of reindeer, moose and the like migrate annually over long distances. There would have been short periods of abundant supply as the migrating herds approached the humans' base camp and long periods when there were no animals within hunting range. The same applies to migrating salmon which are plentiful and relatively easy to spear for a short period each year when they return

to the rivers to spawn.

This seasonality in the availability of food supplies would have forced early Caucasoids and Mongoloids to develop forward planning abilities and the skills required for food storage, as Miller suggests. Meat is particularly difficult to store for long periods. In the winter it could have been stored in ice houses. Meat can also be stored if it is cut into thin slices and dried. However, this is a tricky operation because dried slices of meat can easily turn toxic and this could have taken its toll on the less intelligent.

A further problem entailed with seasonality of food supplies in the northern latitudes would have been that of predicting the annual appearance of the migrating herds of animals and fish. The movements of migrating animals are consistent and could be predicted by peoples who developed a knowledge of the calendar obtained from astronomical observations. Early men with this knowledge would be ready for the appearance of the herds and able to take full advantage of them. These problems of catching migrating animals would have put early Mongoloids and Caucasoids under further selection pressure for enhanced intelligence and foresight.

Miller argues that a further effect of the necessity to store food for future use, to develop more sophisticated weapons for hunting large animals, and to keep warm in winter was to force early Caucasoids and Mongoloids into sedentary life ways. Many groups took up permanent residence in caves such as those near Beijing and in the valley of the Dordogne, and others built dwellings mainly from mammoth bones and skins. Once permanent residences were established new possibilities for developing improved and more varied tools and for food storage were opened up.

Miller's proposal that this set of problems would have put early Caucasoids and Mongoloids under selection pressure to develop greater intelligence and foresight raises the question of the relationship of intelligence to the capacity for forward planning and delay of gratification. The relationship of these capacities to intelligence has not been well worked out and it may be that certain non-cognitive traits of this kind were enhanced in the Caucasoid and Mongoloid peoples. The possible existence of racial differences in these traits is an important problem for future work.

I turn now to the three commentators who were unsympathetic to my treatment of the problem of racial differences in intelligence. Juhel gives the standard environmentalist approach to this question. He begins by reminding us that many genetically determined traits have greater

variation within races than between races (e.g. height). The essential point, however, is that there is a smaller number of traits where there is considerable variation between races, e.g. pigmentation, type of hair, facial characteristics, etc. Intelligence may well belong to this group of characteristics.

Secondly, Juhel questions the validity of the intelligence test data for the different racial populations as measures of genetic differences and suggests that an interactionist position should be adapted. I think this right and I tried to make this point by discussing the application of genotype – environment correlation (interaction) theory to the problems of racial differences in intelligence. The point is an important one and deserves elaboration in a little more detail. We should think of racial differences in intelligence as arising through two mechanisms. Firstly, through direct genetic transmission of differences in brain size and probably in the efficiency of neurological processing capacity revealed in the reaction time differences. Secondly, through the capacity of more intelligent peoples to provide a better environment for their children, as a result of which their children's intelligence is nurtured to a higher level. The task of working out the contributions of these two processes to racial differences in intelligence still needs to be addressed.

With regard to the racial differences in reaction times, Juhel seems to accept that reaction times are related to intelligence although he raises other possibilities such as that differences in attention or arousal might be responsible for the correlations almost invariably found between reaction times and IQs. A full discussion of these alternatives is given by Jensen (1982) who argues against attentional and other factors. The principal argument against the attention hypothesis for the race differences data is probably that there are no consistent racial differences in movement times. Failures of attention should produce slower movement times as well as slower decision times, yet the data show that the races mainly differ in the speed of decision making. Most of the inter-group differences in decision times are statistically significant and we have invariably found that decision times are correlated with intelligence in this set of cross national studies. Full details are given in the articles cited in the first paper.

So far as racial differences in the development of civilization are concerned, Juhel agrees that these exist but considers that they can be explained in purely cultural terms. Yet the Negroid and Australian Aborigine peoples have never made any of the significant discoveries which constitute civilization. They never invented the concepts of a written language or arithmetic, building in stone, the construction of a legal system and so forth, set out in detail by Baker (1974). These discoveries

require intelligence, and the failure of the Negroid and Aborigine peoples to make them is consistent with their low levels of intelligence.

So far as the racial differences in brain size are concerned, Juhel's overall correlation of .14 is misleading low because it includes the early studies based on teachers' assessments and university degree results which would have had poor reliability. The correlation of .35 between IQ and brain size obtained by Willerman is a more reliable figure, and this should be corrected upwards to allow for the less than perfect reliability of the measures and for the restriction of range in this sample of university students. These correlations would give a true correlation of around .43. Nevertheless, I agree that the correlation remains relatively modest and therefore we must conclude that the increase in brain size in Caucasoids and Mongoloids is probably not the only the neurophysiological factor responsible for their greater intelligence. Some other neurophysiological factors are probably also involved. One of the most promising recent findings concerning the neurophysiological basis of intelligence is the discovery that people with higher IQs have a lower glucose metabolic rate in the brain (Haier, Siegel, Nuechterlein, Hazlett, Wu, Paek, Browning, and Buchsbaum, 1988). This is the kind of factor which needs to be examined for racial differences in the neurophysiology of intelligence.

The paper by Vancata is written from a biological and evolutionary perspective. His main point is that it would be desirable to look more closely at the microevolutionary environments in which different peoples have evolved and try to relate these to the specific cognitive abilities which have evolved in response to the environmental demands. This is a worthwhile enterprise. I have tried to make some progress in this direction by going beyond the concept of global intelligence and documenting the strong visuospatial abilities of the Amerindians and Mongoloids. Others have also made a start on this question. Jensen and Reynolds (1982) have shown that Negroids in the United States have relatively strong memory abilities, and this has also been found by Owen (1989) in South Africa. No theory of how these relatively strong memory abilities might have evolved has been advanced. A somewhat similar finding was obtained by Kearins (1976) in a study of the cognitive abilities of Australian Aborigines. Kearins found that the Aborigines have stronger visual memory abilities than Caucasoids and suggested that these could have evolved because of the need to make fine visual discriminations in a desert environment. In some cases it may be that a particular people have strong specific or primary abilities because advantageous mutants have occurred. In other cases the selection pressure of survival in particular environments may have altered allele frequencies to produce strong

primary abilities. Vancata is correct in pointing out that this is an important area for future thought and work.

Vancata makes two principal points regarding the evolution of intelligence. Firstly, he says that high intelligence could not have been selected for because the nature of intelligence is very complex. I do not think the complexity of a characteristic prevents it being selected for. Flying is very complex, but it evolved in the birds because it conferred a survival advantage. Shifting from cold bloodedness to warm bloodedness is a complex change, but it took place when warm blooded mammals evolved from cold blooded reptiles. Vancata says that intelligence could not have conferred a survival advantage but this is difficult to accept. The brain of *Homo sapiens* is about three times as large as that of the apes from which it evolved and this evolutionary development could only have taken place if intelligence conferred a survival advantage. In addition intelligence possesses the genetic characteristic of dominance. This is shown by inbreeding depressing, i.e. breeding by closely related individuals such as cousins, which produces a reduction in the intelligence of the children (Bashi, 1977; Jensen, 1983; Agrawal, Sinha and Jensen, 1984). It is a well known theorem in genetics that the frequency of dominant alleles increases for characteristics subject to directional selection (Fisher, 1930; Plomin, 1987). Hence the presence of inbreeding depression for intelligence indicates that it has been selected for during the evolution of the Hominids.

I was a little surprised to find Vancata agreeing with Henneberg that there is no correlation between brain size and intelligence in Man. Henneberg himself has found a statistically significant correlation of .14 among Polish students, and this underestimates the true correlation because of the restriction of range of ability in the sample. The sixteen studies summarised in Table 2 of my second paper constitute overwhelming evidence in favour of a positive association between brain size and intelligence, and the reluctance of evolutionary biologists like Henneberg and Vancata to accept the existence of this positive association is curious.

I agree with Vancata that the dispute between the two rival theories of human evolution, i.e. the multi-regional theory and the single origin theory, is by no means settled. I have no wish to take sides in this dispute and I do not think it makes any significant difference to my theory of the evolution of racial differences in intelligence which of them is right. The multi-regional theory states that the races became differentiated about one million years ago and evolved in parallel, whereas the single origin theory states that the races evolved during the last 100,000 years. The multi-regional theory gives the races more time to develop differently and

therefore makes differences more probable. In fact, it is inconceivable that peoples who evolved in isolation over one million years and in whom brain sizes increased by around thirty percent in parallel, would have ended up with precisely the same intelligence. The single origin theory allows the races about 100,000 years to evolve differences in intelligence and this also is quite feasible. I believe therefore that either theory is compatible with the evolution of racial differences in intelligence and we can leave evolutionary biologists to fight this battle out between themselves.

Deary concentrates his observations mainly on the racial differences in reaction times. He argues that the correlation between reaction times and IQs are only around 0.2 and that this is so low that reaction times cannot be regarded as an index of the neurological substrate of intelligence. This is hardly a fair summary of the studies which have been done on this issue. It is true that some studies have reported correlations of around 0.2, but others have reported substantially higher correlations. Frearson and Eysenck (1986) obtained a correlation between the Progressive Matrices and Odd Man Out reaction times of 0.62. Jensen and Reed (1990) propose quite properly that this needs correction for attenuation, and they estimate the true correlation as 0.72. Even if the low correlation of 0.2 is accepted, reaction time speeds still appear to be picking up a neurological efficiency component of intelligence and the existence of racial differences in this component points to a neurological factor underlying the intelligence differences.

Deary's argument that whatever the racial differences in reaction times had turned out to be would carry little weight for the genetic or environmental explanations for racial differences in intelligence is surely incorrect. If Negroids had turned out to have faster or equal reaction times to Caucasoids or Mongoloids, the genetic theory would have been quite seriously damaged. The result would have indicated that in this neurological component of intelligence there are no racial differences, and this would have undermined the genetic explanation for the IQ differences.

I do not think Deary's (like Juhel's) discussion of the reaction time results takes sufficient cognizance of the fast movement times of the Negroid children. These tend to rule out malnutrition, lack of cognitive stimulation, poor attention, low motivation or whatever other environmental conditions may be advanced by people like Mackintosh and Howe for slow decision times and low IQs of Negroid children. In evaluating the data on this question it is important to look at the evidence as a whole.

In his comments on the cold stress theory of the evolution of

enhanced intelligence in Caucasoids and Mongoloids, Deary suggests that hot arid environments would have been as cognitively demanding as the cold environments of Eurasia. This suggestion does not stand up to examination. In the first place, none of the major races evolved in hot arid environments although some minor races were pushed into them in quite recent times which would not have been long enough to bring about genetic changes in intelligence. The Australian Aborigines lived principally in fertile river valleys until Europeans drove them into the hot arid environment of central Australia during the last couple of hundred years (Kirk and Thorne, 1976). Secondly, anthropologists' accounts of peoples living in hot arid regions suggest that these are not particularly cognitively demanding. The only major problem is obtaining water. When water supplies are found the remaining problem of securing food supplies is reasonably straightforward. Australian Aborigines in the hot arid deserts are able to find plant, insect and egg foods throughout the year (Gould, 1969). The same is true of the !Kung bushmen of the Kalahari desert, where the active adult population need only spend two or three days a week to collect sufficient food for the whole group, including children and the elderly (Howell, 1979). These peoples do not encounter the acute scarcity of food during the winters which confronted the Caucasoids and Mongoloids when they migrated into the temperate latitudes, let alone the problems of keeping warm. The refutation of this point shows just how difficult it is to construct a credible alternative theory to explain the evolution of enhanced intelligence in the Caucasoids and Mongoloids as a result of the cognitive demands of survival in cold winters.

It is evident from the last paragraph of Deary's commentary that he prefers quantifiable experimental data to the less precisely quantified and often one off historical events which form much of the subject matter of biology. His dismissal of the evidence on racial differences in the construction of civilisations and of the theory of cold stress as the selection pressure responsible for the enhancement of intelligence in the Caucasoids and Mongoloids is reminiscent of Popper's rejection of the Darwinian theory of evolution as science on the grounds that it is not falsifiable. This is an unduly narrow view of science and the nature of scientific explanation. The data of a number of sciences consist of naturally occurring phenomena. Scientists in these disciplines construct theories to explain these, such as cosmologists who attempt to explain the origin of the universe as well as evolutionary biologists and anthropologists dealing with evolutionary history. Paleobiologists think it perfectly sensible to collect evidence and construct theories on how precisely crocodiles evolved some 200 million years ago (Tarsitano, Frey and Riess, 1989). This is a problem

in principle quite similar to the question of how the Caucasoids and Mongoloids came to evolve their higher intelligence, and both are well within the domain of science. I do not think Deary has adopted the biological perspective necessary for thinking about problems in evolutionary biology to which the problem of racial differences in intelligence belongs.

In spite of some differences between the data of evolutionary biology and the experimental sciences, both kinds of science entail the same basic processes of assembling data and constructing theories to explain them. As the data accumulate and the alternative theories are discussed, a consensus gradually emerges among those working on the problem. This process has occurred during the last quarter century with regard to the problem of the causes of racial differences in intelligence. The accumulating evidence has brought about a significant change from the virtually unchallenged environmentalism of the 1950s and 1960s. A survey of the views of 661 professionals with some expertise on this issue carried out by Snyderman and Rothman (1988) found that those who considered that racial differences in intelligence have some genetic basis outnumber environmentalists by approximately three to one. Environmentalists have become a diminishing band, increasingly isolated from the majority who have come to accept that the weight of the evidence points to a significant genetic determination of racial differences in intelligence.

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SOME COMMENTS ON LYNN'S THESIS BY AN ANTHROPOLOGIST

Roger Pearson
Institute for the Study of Man

Few should have any serious problem with Lynn's thesis that superior intelligence was a product of evolutionary selection. Likewise few would dispute the statement that man's hominid forebears evolved from hominoids in tropical or sub-tropical areas. Indeed, the distribution of primates was generally restricted to such areas until hominids began their successful attempt to populate more temperate latitudes.

It is also true that Pygmies in the equatorial forests of Africa can in a matter of hours secure sufficient food for several days, and that food-collecting and hunting in tropical forests does not pose significant difficulties at any time of the year. So friendly is the forest toward the Pygmies that they often refer to it as "their father." By contrast, many areas in the more northerly latitudes, especially during the period of the Fourth Ice Age, posed challenges that would tend to select, on a group basis, in favor of higher intelligence. In the course of evolution, man generally collaborates on a group basis, and even though mutations occur in individuals it is the phylogenetic continuum, the breeding group and the gene pool that transmits these mutations to future generations. Furthermore, because early men lived in small groups, the breeding circle was closely circumscribed both geographically and socially, so that evolution could proceed with surprising rapidity in a challenging environment. Indeed, evolution often proceeded by radical jumps when less competitive groups were eliminated *in toto* by environmental changes which occurred too rapidly to allow for selective adaptation, or were faced by overly-strong competition from rival groups or subspecies.

However, some of Lynn's critics have taken issue with his attempt to approach his thesis in conceptual terms which only take account of the major geographical macro-races. To some extent they will justifiably recoil from attempts to divide all the diverse peoples of today's world into just a few major racial groups, such as Caucasoid, Mongoloid, Negroid, Negrito, Australoid. Such Weberian typologies are certainly helpful in