THE EVOLUTION OF RACIAL DIFFERENCES IN INTELLIGENCE

Richard Lynn
University of Ulster, Coleraine, Northern Ireland

Hominids first evolved in tropical and subtropical latitudes, most probably reaching *sapiens* status in the highlands of East Africa. From this ancestral population some groups migrated north into Eurasia and evolved there into the Caucasoids and Mongoloids. Colonizing temperate and cold environments, they encountered the cognitively demanding problems of survival in cold winters. These problems consisted principally of securing a food supply by hunting large animals and of keeping warm in winter by making fires, clothing and shelters. Survival in these difficult conditions acted as a selection pressure favoring enhanced intelligence and explains why the Caucasoids and the Mongoloids are the races which have evolved the highest intelligence.

In a previous paper the world literature on racial differences in intelligence was reviewed (Lynn, 1991). It was shown that the Caucasoid peoples of North America, Britain, Continental Europe and Australasia obtain mean IQs of around 100. Mongoloid peoples in East Asia and in North America typically obtain mean IQs a little higher in the range of 101-108. They are also characterized by strong visuospatial abilities and weaker verbal abilities. The same pattern is found in the Amerindians, but the level of their intelligence is lower with a mean of about 90.

Negroid peoples are generally considered to have a mean IQ of approximately 85, but this is only true of those in the United States and Britain. African Negroids have a mean IQ in the region of 70. American and British Negroids are more properly considered as Negroid – Caucasoid hybrids, and hybridization has evidently raised their intelligence levels to about midway between the two parent races. The South East Asian races consisting of Micronesians, Melanesians, Polynesians, Maoris and Australian Aborigines typically have mean IQs in the range of 80-90.

These differences in intelligence test performance are corroborated by racial differences in the building of civilization. Only the Mongoloids and the Caucasians have built civilizations and all the discoveries and inventions from early metal working to the contemporary scientific

advances have been made by these two races. The consistency of the racial differences in intelligence test performance and contributions to civilization suggests that they have a genetic basis, as argued in detail by Jensen (1972, 1973, 1980). This conclusion is reinforced by the results of differences in reaction times between the three major races of Negroids, Caucasoids and Mongoloids. Reaction times provide a measure of the neurological efficiency of the brain in the analysis and processing of simple stimuli, and reaction times show the same progression of ability from Negroids to Caucasoids to Mongoloids as has been shown by intelligence tests. These results confirm the conclusion that the racial differences are neurologically and genetically based. If this is the case, the racial differences must have evolved in accordance with the general principles of natural selection which determine evolutionary development. The purpose of this paper is to present a general theory of the processes through which the racial differences in intelligence have evolved.

1. General Principles of the Evolution of Intelligence

The general principles governing the evolution of intelligence have been established by Jerison (1973). He has shown that from time to time populations have moved into new niches which have entailed increased cognitive demands for survival. When this has occurred the populations have responded by evolving larger brains in relation to body size, i.e. larger "encephalisation quotients". Larger brains have the capacity for greater intelligence and have enabled the populations to deal with the cognitive demands of the new niche.

There have been four major occasions in which the occupation of new niches led to the development of larger brains and, by inference, greater intelligence. The first was the evolution of mammals approximately 220 million years ago. These discovered the nocturnal niche in which they slept during the day and foraged at night and they developed larger brains to deal with the integration of visual, auditory and olfactory information. The second was the evolution of the birds approximately 160 million years ago. In this case the problems of pair bonding and co-operative feeding of the young in nests required the development of greater intelligence and larger brains. The third was the evolution of primates approximately 60 million years ago. They became diurnal, occupied a tree living niche and developed as social animals and to deal with the problems of the new niche they again developed larger brains.

Each of these evolutionary increases in brain size has been accompanied by an increase in intelligence. For instance birds can learn by the process of sensory preconditioning, i.e. they can form an association

between two neutral stimuli, whereas this cannot be done by reptiles or fish. Only primates can master oddity problems, where the correct choice is the odd object among three, and one trial learning sets, where the correct choice varies from day to day (Razran, 1971). Chimpanzees can achieve "insight", as Kohler (1925) called it, into the use of sticks to retrieve bananas out of reach of the hands, an ability not present in lower mammals.

The fourth major jump in brain size and intelligence led directly to the evolution of *Homo sapiens*. The primates evolved as tree living animals and by around 15 million years ago some of them had developed into several species of apes. Around 12 million years ago this niche started to deteriorate in sub-Saharan Africa as the climate became drier and much of the forest was replaced by brushwood and grasslands. The result was that some of the apes found themselves in open grasslands and this acted as a new niche which required greater intelligence for survival. By about 5 million years ago they evolved into the Australopithecines with upright posture and a greater encephalisation quotient.

During the last two or more million years hominids evolved through stages equivalent to the Australopithecines, *Homo habilis*, *Homo erectus* and finally into *Homo sapiens*. During this evolution the size of the brain increased from approximately 500 cc to 1400 cc. The selection pressures for this increase in brain size were probably that these evolving hominids occupied a new niche as tool makers and users and as highly co-operative social animals (Alexander, 1989).

About one million years ago *Homo erectus* populations or their equivalents were present in Africa, Europe and Asia and during the last million years one or more of these populations evolved into *Homo sapiens*. There are two theories of the final stage of hominid evolution from *Homo erectus* to *Homo sapiens*. These are the multi-regional and the single origin theories. The multi-regional theory states that the *Homo erectus* populations in Africa and Eurasia evolved in parallel into *Homo sapiens* over the course of approximately the last half million years (Wolpoff, 1989). The single origin theory states that the evolution from *Homo erectus* to *Homo sapiens* probably took place in the highlands of East Africa, and that some *Homo sapiens* populations then migrated into Eurasia and replaced the *Homo erectus* and Neanderthal peoples (Stringer and Andrews, 1988). According to this theory *Homo sapiens* populations were established in southwest Asia, in the region of present day Israel and Lebanon, by about 92,000 years ago and from there further groups migrated throughout the world. By 60-40,000 years ago they were established in northeast Asia (Jorde, 1985), and by 40-30,000 years ago they were in Europe and Australasia (Mellars

and Stringer, 1989), evolving and adapting all the time.

The dispute between the two theories is not yet resolved. In Europe there seems little doubt that *Homo erectus* evolved into the Neanderthals and that these were replaced by fully modern peoples (*Homo sapiens sapiens*) around 40-35,000 years ago (Mellars, 1989) in accordance with the single origin theory. But in east Asia there is more evidence for continuity. Some Mongoloid morphological features such as the Inca skull bone were present in *Homo erectus* populations in China about half a million years ago (Liu, 1985) and intermediate forms have been found in east Asia, suggesting a gradual transition from *Homo erectus* to *Homo sapiens* (Pope, 1988). The multi-regional theory is certainly still tenable for evolution in the far east.

For our present purposes it is not crucial which of these two theories is correct. The central thesis of our argument is that either through a multi-regional or single origin process the *Homo sapiens* peoples in Eurasia had to adapt to the problems of survival in cold temperate and sub-arctic environments, while those in Africa evolved in tropical, sub-tropical or warm temperate environments. The thesis to be advanced is that the Caucasoid and Mongoloid peoples who evolved in Eurasia came to occupy a new niche which exerted selection pressure for improved intelligence to deal with the problems of survival in the cold northern latitudes. The thesis is an application to the problem of racial differences in intelligence in man of Jerison's principle that the cognitive demands of a new niche have been the selection pressure for increases in intelligence throughout evolutionary history.

2. Tropical and Subtropical Hominids as Plant Eaters

Primates evolved rapidly following the extinction of the dinosaurs. They lived on plant foods and those which evolved into monkeys and apes remained largely plant eaters, supplemented to some extent with insects. A few primates, most notably baboons and chimpanzees, sometimes kill small mammals for food, but meat has never become more than a small part of their diet (Strum, 1981).

The Australopithecines continued to live largely on plant foods. This can be determined from the wear of their teeth which shows that they subsisted largely on a diet of leaves and fruits (Grine and Kay, 1988). Probably they also ate tubers, nuts, grass seeds and insects (Isaac, 1978; Parker and Gibson, 1979). As the Australopithecines were replaced by *Homo erectus,* and those of the latter that lived in tropical and subtropical Africa appear to have continued to primarily as plant eaters (Stahl, 1989). There was no compelling reason for them to switch their diet to meat.

Temperatures in Sub-Saharan Africa vary between 20-25°C with little seasonal variation throughout the year except for the extreme south where the climate is warm temperate. As many as 129 plant foods are available throughout the year (Peters, O'Brien and Box, 1984) consisting of berries, fruits, bulbs and tubers during the wet season and shoots and leaves during the dry season, and insects such as ants and termites are also available (Stahl, 1984). The belief that early African hominids hunted medium-sized and large herbivores has been called into question in recent anthropological writings by Binford (1985), who has shown that the accumulations of bones of large herbivores at hominid sites bear carnivore teeth marks on which stone cut marks made by hominids are superimposed. This suggests that the large animals were hunted and killed principally by lions and leopards and that early hominids scavenged the bones, which they broke up to extract the marrow. Blumenschine (1989) also argues that early African hominids were scavengers rather than hunters. The lions and leopards were unable to extract the brains from the cranium or marrow from large bones, and it is these parts which are found predominantly at hominid sites, suggesting scavenging of those parts which lions and leopards were unable to get at.

The conclusion that people in tropical and subtropical latitudes were never greatly reliant for their food supply on the hunting of animals for meat is supported by observations on contemporary hunter gatherers. Many non-cultivating populations living in tropical and subtropical environments subsist largely on plant foods of which numerous species are available throughout the year (Lee, 1968; Tooby and de Vore, 1987). Contemporary Pygmies and Bushmen eat from 60 to 110 plant foods and these constitute around 70-85 per cent of their diet (Stahl, 1984). Australian Aborigines in the western desert obtain 70-80 per cent of their food from plants and most of the remainder from eggs and insects. They have no well developed group hunting techniques (Gould, 1969). The Gadio people in New Guinea obtain 96 per cent of their food from plants and only 4 per cent from meat (Dornstreich, 1973). The ready availability of plant foods throughout the year, together with insects and eggs, meant that people in tropical and subtropical Africa never had to rely on meat for their food supply and did not come under strong selection pressure to develop the cognitive skills required to hunt large animals.

The life style of present day !Kung bushmen in the Kalahari desert provides a useful insight into the relative ease of securing food supplies for hunter gatherer peoples in tropical latitudes. As described by Lee (1968), women go gathering plant foods about one day in three, and men go on hunting expeditions for about one week in three. This is sufficient

to provide food for the whole group, including infants, children and the old. The rest of the time can be spent relaxing about the camp. For these peoples the problems of obtaining food supplies are neither time consuming nor cognitively demanding.

3. Cold Climates as a Selection Pressure for Increased Intelligence

The primates evolved in tropical and subtropical climates. They have never been able to cope with temperate environments because, being plant eaters, they can find nothing to eat during the winter and spring when plant foods are unavailable. They find cold temperatures a problem, and cold periods in global fluctuations of world temperature have put them under selection pressure for increased intelligence in order to survive. One of these occurred about 54-52 million years ago during the mid-Eocene, when the primates showed an accelerated increase of brain size, followed by a period of slower growth after the return of warmer conditions (Pickford, 1988). It can be inferred that during this period the global cooling exerted selection pressure on primates for an increase in intelligence.

The mid-Miocene, approximately 16 million years ago, was a warm period and two species of hominoids (Pliopithecus and Dryopithecus) migrated into Eurasia. They survived until the cooling which took place at the end of the Miocene, about 14 million years ago, and then they went extinct, except in tropical south east Asia where they evolved into the Orangutans (Pickford, 1986). These hominoids could survive in tropical and subtropical climates but they were evidently not sufficiently intelligent to survive in the more demanding temperate and cold environments of Eurasia.

The only hominid species to overcome the problems of survival in the cold temperate climates of Eurasia were *Homo erectus* and *Homo sapiens*. The problems of overwintering would have been considerable even during warm periods such as the present, but during the periodic glaciations these problems would have been much more formidable. Most of the last 80,000 years has been colder than today. During the main Würm glaciation of approximately 24-10,000 years ago winter temperatures in Europe and north east Asia fell by 5-15°C. The terrain became cold grasslands and tundra with only a few trees in sheltered river valleys and the environment was broadly similar to that of present day Alaska (Nilsson, 1983). Survival in these conditions would have called for greater intelligence than was required in the tropical and sub-tropical climates of sub-Saharan Africa.

4. Cognitive demands in Northern latitudes

The problems of survival in the northern latitudes of Eurasia would have resided in the cold winters and consisted principally of obtaining food and keeping warm. Unlike the tropics and subtropics, plant foods were seasonal and not available for many months during the winter and spring. People therefore became wholly reliant on hunting large herbivores such as mammoth, horse and reindeer to secure their food supply.

It was shown by Lee (1968) that among contemporary hunter gatherers the proportions of foods obtained by hunting and by gathering varies according to latitude. Peoples in tropical and sub tropical latitudes are largely gatherers, while peoples in temperate environments rely more on hunting. Peoples in arctic and subarctic environments rely almost exclusively on hunting, together with fishing, and do so of necessity because plant foods are unavailable except for berries in the summer and autumn.

The effective hunting of large herbivores would have presented cognitive problems. Large herbivores can run fast and are virtually impossible to catch simply by chasing after them. It is particularly difficult to hunt them in open grasslands such as were present in Northern Eurasia, where there is good visibility for several thousand yards and the herbivores have ample warning of approaching predators. Hunting in open grasslands is more difficult than hunting in the woodlands of the tropics and sub tropics where there is plenty of cover for hunters to hide in. The only way of hunting animals in open grasslands was to make use of natural traps into which the animals could be driven. One of the commonest traps was the narrow ravine where some of the beasts would stumble and could be speared by members of the group waiting in ambush. In addition, the herbivores could be surrounded and driven over cliffs, into bogs or into the loops of rivers (Geist, 1978; Mellars, 1989).

For effective hunting of large herbivores people would have needed to manufacture a variety of tools from stone, wood and bone for making spearheads and for cutting. When these peoples had killed a large herbivore they would have had to skin and butcher it into pieces of a size that could be carried back to the base camp. For this it was necessary to manufacture a variety of sophisticated cutting and skinning tools.

The second principal set of problems encountered in the northern latitudes would have centered round keeping warm. People had to solve the problems of making fires, clothes and shelters. Fire was used by hominids at a *Homo erectus* level of evolution in sub-Saharan Africa as early as 1.4 million years ago and in China and Europe about half a million years ago (Goudsblom, 1986), but it must have been much easier to

acquire fire in Africa than in Eurasia. In Africa there would have been spontaneous bush fires from which hominids could take ignited branches, carry them back to camp and get a domestic fire started. In the colder parts of Eurasia during the glaciations there would have been no spontaneous bush fires. People would have had to make fires by friction or percussion in a terrain where there was little wood. Probably dry grass had to be stored in caves for use as tinder and the main fuel would have been dung, animal fat and bones. The problems of starting fires and keeping them burning would have been considerably more difficult in Eurasia than in Africa. In addition clothing and shelters were unnecessary in sub-Saharan Africa but were made in Europe during the main Würm glaciation. Needles were manufactured from bone for sewing together animal skins and shelters were constructed from large bones and skins (Geist, 1978; Mellars, 1989).

The problems of hunting, butchering and skinning large herbivores and of making clothing would have required the construction of a greater variety and sophistication of tools than were needed in tropical and subtropical environments. This has been confirmed by Torrence (1983) who has demonstrated an association between latitude and the number and complexity of tools used by contemporary hunter gatherers. He found that peoples in tropical and subtropical latitudes have between 10 and 20 different tools, whereas those in the northern latitudes have between 25 and 60. Furthermore, northern peoples made more complex tools involving the assembly of components, such as hafting a sharp piece of bone onto the end of a spear and fixing a stone axe head onto a timber shaft.

The manufacture of sophisticated tools and making fires, clothing and shelters would have been cognitively demanding. Those groups which could not succeed would have died out, leaving those with alleles for higher intelligence as the survivors. Through this process the Caucasoid and Mongoloid peoples of Eurasia would have evolved higher average intelligence levels than the Negroids exposed to a less cognitively demanding environment in sub-Saharan Africa.

5. Enhancement of General, Verbal and Visuospatial intelligence in Caucasoids and Mongoloids

Survival in the cold winters of Eurasia would surely have required an increase in all the three major components of intelligence, namely general, verbal and visuospatial ability. General intelligence, the general ability present in all cognitive tasks, would have been needed to deal with all the new problems encountered in the cold northern environments such as

building shelters and fires, making clothes and manufacturing more efficient tools for killing, butchering and skinning large animals. Improved verbal abilities would have been needed for better communication in discussions of how to solve these problems, for planning future activities and for transmitting cultural knowledge and skills to children. Improved visuospatial abilities would have been needed for planning and executing group hunting strategies, for accurate aiming of spears and missiles and for the manufacture of more sophisticated tools and weapons from stone, bone and wood. Fathers would have shown sons how to chip flints to produce good cutting tools, make spears with sharp points and so forth, and these skills would have been conveyed largely by watching and imitation, much as craft skills are learned today by apprentices watching skilled craftsmen, rather than by verbal explanations. Hunting and tool making would have been undertaken principally by males and this would be why it has virtually always been found that the visuospatial abilities are stronger in males than in females (Lynn and Petersen, 1986).

We saw in the data set out in the previous paper that general, verbal and visuospatial abilities are all higher in the Caucasoid peoples as compared with Negroids. The magnitude of the Caucasoid advantage is about the same for all three abilities, namely about 30 IQ points for the Negroid-Caucasoid comparison and about 15 IQ points for the difference between Caucasoids and Negroid-Caucasoid hybrids in the United States and Britain. It is true that Jensen and his co-workers have found that the differences are slightly less for the verbal abilities than for general intelligence and the visuospatial, but this differential is quite subtle. The broad pattern is for a 30 IQ point rise in all three abilities, suggesting that all three abilities came under selection pressure for enhancement to about the same extent.

It is apparent that the intelligence of the Mongoloids evolved somewhat differently. The Mongoloid peoples have slightly higher general intelligence than the Caucasoids, markedly higher visuospatial abilities and somewhat weaker verbal abilities, and we must now consider how this pattern of abilities could have evolved. The reason that Mongoloids have more highly developed general intelligence than Caucasoids can be attributed to the colder winters they experienced and hence the stronger selection pressure for increased intelligence. Mid-winter temperatures in north east Asia are colder than in Europe, particularly inland in the area around Lake Baikal where the classical Mongoloids evolved. In the main Würm glaciation the temperatures were some 5-15°C colder than today (Nilsson, 1983). These cold periods were particularly severe for the Mongoloids because the Himalayas iced up and acted as a southern

barrier, so that the Mongoloids were trapped in a cold pocket between the Himalayas on the south and the arctic Chersky mountains on the north. It was in response to this severe cold that the Mongoloids evolved their distinctive morphological cold adaptations to reduce heat loss, such as the shortening of the limbs, the flattening of the nose into the face, the thick black hair, the reduction of the beard in males because moist exhaled air in very low temperatures freezes on the beard and then freezes the face; and the epicanthic fold, a thickening and extension of the eyelid near the nose which serves to reduce reflected glare from snow and ice (Coon, 1962; Krantz, 1980). These morphological adaptions are most pronounced among the classical Mongoloids, particularly the Buriats and the Tungus who lived in the coldest region of inland eastern Eurasia. They are less pronounced among the southern Chinese and among the Ainu, the original inhabitants of Japan for whom the climate was more maritime and therefore less severe.

If the selection pressures for enhanced intelligence acted on the Mongoloids uniformly for general intelligence, verbal and visuospatial abilities, as it apparently did for the Caucasoids, then all three abilities should be elevated in the Mongoloids above those of Caucasoids. Yet the evidence shows that this is not the case and that the Mongoloids have evolved a different pattern of abilities consisting of strong visuospatial and weak verbal ability. The most probable explanation for the evolution of this pattern is that one or more mutations for it occurred in the Mongoloids which did not occur in the Caucasoids.

A possible hypothesis is that mutations occurred in Mongoloids which shifted the balance of the verbal and visuospatial abilities in favor of the visuospatial. The hypothesis posits that there is a negative association between the verbal and visuospatial abilities which arises because the more cerebral cortex is devoted to one the less is available for the other. This implies that it should be possible to demonstrate that the verbal and visuospatial abilities are negatively correlated. It has been shown that, when general intelligence is controlled for, this is the case (Lynn, 1987). Vernon (1990) has produced further evidence in favor of the hypothesis although he considers that the negative correlations arise from a statistical artefact. In my own opinion this is incorrect and the negative relationship is a genuine one (Lynn, 1990a).

If this hypothesis is correct, the mutants for the enhancement of the visuospatial abilities at the expense of the verbal would have spread in the Mongoloids because they conferred a survival advantage. This in turn must mean that although increased verbal and visuospatial abilities were both advantageous for survival in the cold environments of Eurasia, the

visuospatial abilities must have been that bit more important. It is not difficult to understand why this would have been so. It would have been because of the crucial role of strong visuospatial abilities for making sophisticated tools and weapons and for the planning and execution of group hunting strategies. Good verbal abilities were not quite so important and were worth sacrificing for a gain in the crucial visuospatial abilities.

6. Evolution of Intelligence in South East Asians and Indians

The south east Asian races evolved either from *Homo erectus* populations which were present in this region about 1 million years ago (Jones, 1989) or alternatively, according to the single origin theory, by migration of *Homo sapiens* populations across India, into south east Asia, through the Indonesian archipelago and thence into Australia and the Pacific Islands. Whichever of these two theories is correct, these peoples would have spent some time in temperate Asian environments before they migrated eastward. This would have exerted some selection pressure for enhanced intelligence, but the duration of their exposure to cold winters would have been relatively short as compared with the experience of the Caucasoids and Mongoloids. By the time the main Würm glaciation came on, about 24,000 years ago, these peoples were settled in the tropical Pacific Islands and in Australia. Hence their intelligence levels were raised a little above those of the Negroids but not to the high level of the Caucasoids and Mongoloids.

The Indian Caucasoids had a longer period of exposure to the cold winters of northern India, which were significantly colder during the main Würm glaciation than they are today. This explains why Indians invariably obtain higher intelligence levels than Negroids, whether they are in India or South Africa, where their mean IQs are around 85 or in Britain where their mean IQs are around 95, as shown in our review.

7. The Amerindians

It is well known that the Amerindians originated from peoples who crossed the Bering Straits and made their way southward into the Americas. Amerindian artifacts have been dated at 30,000 years ago in California (Bada, Schroeder and Carter, 1974), at 32,000 years ago in north east Brazil (Guidon and Delibrias, 1986) and at 33,000 years ago at Monte Verde in Chile (Dillehay and Collins, 1988). It must have taken several thousand years for these peoples to have found their way from Alaska to south America. The Bering land bridge was open a number of times during successive glaciations between approximately 80 - 25,000 years ago, and some consider it possible that the first American peoples

made the crossing on foot sometime during this period, perhaps as early as 42 - 36,000 years ago, allowing 3,000 years or so for some of them to make their way down to south America.

If this chronology is correct, there must have been an archaic Mongoloid people in north east Asia around 60 - 50,000 years ago. Some of these must have migrated north east into Kamchatka and the Chersky Peninsula to make the crossing of the Bering straits by around 42 - 36,000 years ago. Other archaic Mongoloid peoples remained in north east Asia. The common origin of these two races is known from a number of genetic similarities such as blood groups. For instance, the Rhesus negative allele is rare and the Diego blood group unique to these two races and they both have similar coarse and straight black hair, shovel incisor teeth and the Inca bone (Krantz, 1980).

The studies reviewed previously showed that the profile of intelligence of the Amerindians is similar to that of the Mongoloids in so far as they have strong visuospatial and weak verbal abilities. The whole profile is lower than that of Mongoloids by around 1 standard deviation, so that their general intelligence stands at around 90 as compared with a Mongoloid mean of around 105. It appears as if some factor set the cognitive profile of strong visuospatial – weak verbal abilities in archaic Mongoloids, and that some subsequent selection pressure raised the whole profile in the Mongoloids, leaving that of the Amerindians at a lower level. The most probable explanation is that the distinctive profile became established among archaic Mongoloids during the first Wurm glaciation sometime in the period 60 - 40,000 years ago, or possibly in earlier glaciations over the course of half a million years if the multi-origin theory is correct. The reason that this cognitive profile became established was the paramount selective advantage of strong visuospatial abilities for survival in a severe periglacial environment.

The main Würm glaciation of approximately 24 - 10,000 years ago must have been the factor raising the cognitive abilities of the Mongoloids and leaving that of the Amerindians at a lower level. The Amerindians escaped exposure to the severe cold of the main Würm glaciation. Once they had crossed the Bering Straits and made their way down into the Americas they would have found life a good deal easier than their ancestors had been accustomed to in north east Asia. They would have found a number of herbivorous mammals such as mammoth, horse, antelope, sloth, armadillo and bison who were quite unused to being hunted by man. Normally predators and prey evolve together in that over the generations predators become more skilled at catching prey and prey become more skilled at evading predators. Through this process an

equilibrium is maintained and both predators and prey are fully taxed to survive. But the herbivorous animals of the Americas had no experience of predation by man and would have been easy game for the skilled hunters who had evolved for many thousands of years in the more difficult environment of north east Asia. So they would have found large numbers of inexperienced herbivores who were easy to catch and, in addition, as they moved southward they would have found that plant foods were more readily available. They ceased to rely exclusively on hunting for their food and adopted the easier life style of the hunter gatherer in which plant foods played a significant part in their diets (MacNeish, 1976; Hayden, 1981).

Thus in the new environment of the Americas survival would have been much easier. The Amerindians would have retained their elevated level of general intelligence, as compared with the Negroids, which their ancestors would have gained in north east Asia during the early Würm glaciations. They would also have retained their well developed visuospatial abilities. These enabled them to continue as effective hunters and there would have been no selection pressure to evolve any different pattern of abilities. However, the selection pressure for any further increase in these and other cognitive abilities would have been considerably relaxed. The cognitive abilities of the Amerindians have probably increased since they reached the Americas because intelligence has been a fitness characteristic for all human populations. But the rate of increase will have been relatively slow because of the relaxation of the selection pressures for enhanced intelligence acting on them. The history and the intelligence of the Amerindians suggests that the main Würm glaciation must have been the principal factor which raised the intelligence of the Caucasoid and Mongoloid peoples to its present level.

This conclusion enables us to answer a conundrum which has long perplexed anthropologists. The problem is this: the first *Homo sapiens* are currently thought by many theorists to have appeared in Africa around a quarter of a million years ago and to have been established in the Near East by 92,000 years ago. The species lived in small hunter gatherer bands until about 10,000 years ago, when some groups in the Middle East and Anatolia made the Neolithic transition to horticulture and eventually agriculture. This involved a transition to larger settled communities which planted food crops and kept domestic animals. This change of life style permitted larger concentrations of populations in towns and city states and allowed people to develop specialized skills. In particular, it became possible to support a small intelligentsia which was able to produce the early intellectual and technological advances such as the construction of

a written language, a system of arithmetic, the understanding of the regularities of the movements of the planets and so on.

This Neolithic revolution occurred in the Near East about 10,000 years ago, in northern China about 7,000 years ago and in Central America about 5,000 years ago. The problem which has puzzled anthropologists is why these advances should have occurred, presumably independently, in these three locations at about the same time. Why did they not occur two hundred thousand years ago in Africa, or sometime in the period 90,000-10,000 years ago in Eurasia? There were warm interglacial interludes during this period when people could in principle have made the transition to agricultural societies. But they didn't.

Different anthropologists have offered a variety of theories to explain this problem. The principal theories are population growth, increasing social complexity and climatic change. But none of these provides a satisfactory explanation for why the agricultural revolution did not occur at some earlier period during the last 200,000 years but had to await the end of the last Ice Age.

The answer proposed to this problem is that people were not sufficiently intelligent to pioneer these developments until they had been through the major selection pressure of the last Würm glaciation. This also explains why these advances were never made by the Negroids or the south east Asian races who escaped the rigors of the last glaciation. The Amerindians were in an intermediate position, exposed to some selection pressure for enhanced intelligence from cold, but not subjected to the full severity of the subarctic winters to which the Caucasoid and Mongoloid peoples were exposed.

8. Racial Differences in Brain Size

Throughout the course the evolution new species have from time to time evolved with larger brains or, more strictly, higher encephalisation quotients, to accommodate greater intelligence. These increases in brain size have occurred to deal with the problems of survival in new cognitively demanding riches. It has been argued that one of these occasions took place when hominids migrated from tropical and subtropical Africa into the temperate and cold environments of Eurasia. These migrants, who evolved into the Caucasoid and Mongoloid peoples, have invariably been found to have higher average intelligence levels than populations descended from those who remained in tropical and subtropical latitudes. The question to which we turn now is whether the Caucasoids and Mongoloids evolved larger brains to accommodate their greater intelligence, as had happened on previous occasions in the history of evolution.

In the last century and the early decades of the present century there were a number of claims that Caucasoids had larger average brain sizes than Negroids but in recent years it has come to be widely claimed that these studies have been discredited (Gould, 1981). Nevertheless, the figures given by Gould for brain size for the major races indicate that Mongoloid and Caucasoid brain sizes are larger than those of Amerindians, and these in turn are larger than those of Negroids. Gould's calculations are shown in Table 1. Data on racial differences in brain size have also been collated by Rushton (1989) whose results are given in Table 1. Finally, Beals, Smith and Dodd (1984) collected results from approximately 20,000 crania and classified them into geographical and climatic zones. They found the largest brain size in Mongoloids, followed in descending order by Caucasoids, Amerindians, south east Asians and Negroids. These results are also given in Table 1. Gould's cranial capacity estimates are given in cubic inches, while those of Beals et al and Rushton are given in cubic centimeters. The reason for Rushton's estimates being higher than those of Beals et al is that the latter made a 6 per cent reduction because the cranial capacities were estimated by filling the crania with shot, whereas Rushton has not made the adjustment. If this is allowed for, the two sets of readings are closely similar and are similar also to those given by Gould.

The Evolution of Racial Difference in Intelligence

Region	Climate	Race	Beals et al	Rushton	Gould
Asia	Temperate – cold	Mongoloid	1415 (51)	1448	87
Europe	Temperate – cold	Caucasoid	1362 (35)	1408	87
American	Hot	Amerindian	1345 (58)	–	86
South W Africa	Hot	Negroids	1268 (85)	1334	83

TABLE 1: Racial Differences in brain size in cubic centimeters (Beals et al and Rushton) and cubic inches (Gould). Standard deviations given in brackets.

A further large scale study which confirms that Caucasoids have larger average brain size than Negroids has been carried out by Broman, Nichols, Shaughnessy and Kennedy (1987). They have examined and followed up approximately 17,000 Caucasoid and 19,000 Negroid children from conception to the age of 7 years in the United States. At the age 7 there was the usual gap of approximately 15 IQ points between the two groups. The head circumferences of the two groups have been calculated from the published data and are 50.9 (sd 1.6) for Negroids and 51.7 (sd 1.6) for Caucasoids. This difference is statistically highly significant and provides an approximate measure of differences in brain size, since head circumference and brain size are correlated at about 0.8 (Brandt, 1978).

The Negroid children were slightly taller than the Caucasoid, suggesting that possible differences in nutrition are not likely to be responsible for the differences in head size. The magnitude of the difference, amounting to approximately half a standard deviation, is rather less than the difference of approaching two standard deviations in the Beals et al data. This may be partly because American Negroids are hybrids and partly because Negroids mature more quickly than Caucasoids (Rushton, 1988, 1989).

Examining the data set out in Table 1 as a whole, it is evident that the disparity in brain size between Mongoloids and Caucasoids is about half the disparity between Caucasoids and Negroids (40 cc as compared with 74 cc in the Rushton's data and 53 cc as against 14 cc in the Beals et al data). This broadly parallels the intelligence test results where the Mongoloid – Caucasoid disparity is typically around one quarter to one half a standard deviation, whereas the Caucasoid – Negroid disparity is approximately two standard deviations.

Considered in terms of standard deviation units, the Negroid-Caucasoid disparities in brain size and in mean IQs are approximately the same, i.e. about 2 sds. The Mongoloid-Caucasoid disparity is slightly greater in brain size than in mean IQs.

The data on racial differences in brain size show a striking similarity to the differences in intelligence. The races fall into the same rank order with Mongoloids highest on both brain size and intelligence, followed in descending order by Caucasoids, Amerindians, south east Asians and Negroids.

TABLE 2
Summary of Studies on Head Size and Intelligence

Reference	Sample	Correlation
Pearson	4,500 British school children	r – .11
Pearson (1906)	1,000 British university students	r – .10
Pearl (1906)	935 Bavarian soldiers	r – .14
Murdock & Sullivan (1923)	600 American children	r – .14
Reed & Mulligan (1923)	449 University students	r – .08
Sommerville (1924)	105 University students	r – .10
Schreider (1968)	326 French farmers	r – .23
Susanne & Sporoq (1973)	2,071 Belgian conscripts	r – .13
Weinberg et al (1974)	334 American boys	r – 35
Broman et al (1975)	26,760 American children	r – .14
Passingham (1979)	415 British adults	r – .14
Henneberg et al (1985)	302 Polish students	r – .14
Lynn (1990b)	310 Irish school children	r. – 18
Bogaert & Rushton (1989)	216 Canadian university students	r – .18
Rushton (1990)	284 Canadian university students	r – .20
Willerman (1989)	40 American university students	r – .35

9. Brain Size and Intelligence in Man

Although brain size relative to body size correlates with intelligence across species, there has been a marked reluctance among anthropologists to admit that brain size is related to intelligence in man.

For instance, Beals, Smith and Dodd (1984) in their paper citing racial differences in brain size in man write of the association between brain size and intelligence that "no convincing case for such associations has ever been presented". Similarly "there is even more evidence accumulating against a direct relationship between cranial capacity and intellectual capacity" (Henneberg, 1984); and "there is really no evidence to show that brain size is positively correlated with intelligence" (Latham, 1974).

In spite of these assertions, there is in fact quite solid evidence for a positive association between brain size and intelligence in *Homo sapiens*. A search of the literature has turned up 16 studies on the question. In most of these, head circumference has been taken as an approximate measure of brain size. The results are tabulated in Table 2. It will be seen that the studies obtained a positive correlation between head size and intelligence and in all cases the correlations are statistically significant. The correlations are certainly quite low, but this could be partly because head circumference is not a perfect measure of brain size and intelligence tests are not perfect measures of intelligence. It is possible to correct the correlations for these unreliabilities. The effect of this, assuming that head circumference correlates 0.8 with brain size (Brandt, 1978) and that intelligence tests have a reliability of 0.9, is to increase the correlations by around 20 per cent. However, perhaps the most interesting study is that by Willerman, Shultz, Rutledge and Bigler (1989) in which brain volume was measured by magnetic resonance scanning in 40 university students and a correlation of 0.35 obtained between brain volume and intelligence. This result, together with the consistent trend in the studies summarized in Table 2, puts it beyond dispute that brain size and intelligence are positively correlated in man.

10. Conclusion

The argument is now complete. Brain size is positively correlated with intelligence in man, and the races show consistent differences in both brain size and intelligence. These differences appear to have arisen because the Caucasoids and the Mongoloids colonized a new and cognitively demanding niche when they migrated into the temperate and cold environments of Europe and Asia. In these harsh environments the less intelligent failed to survive, and this left the Caucasoids and the Mongoloids as the two most intelligent races and the only two races that

have made any significant contribution to the development of civilization. The evolution of racial differences in intelligence in man has followed the same principle that has operated throughout evolutionary history, namely adaptation to a new and cognitively demanding niche.

References

Alexander, R.D.
1989 *Evolution of the human psyche*. In P. Mellors and C. Stringer (eds) The Human Revolution. Edinburgh: University of Edinburgh Press.

Bada, J.L., Schroeder, R.A., and Cater, G.F.
1974 New evidence for the antiquity of man in North America deduced from aspartic and recemization. *Science*, 184, 791-793.

Beals, K.L., Smith, C.L., and Dodd, S.M.
1984 Brain size, cranial morphology, climate and time machines. *Current Anthropology*. 25, 301-330.

Binford, L.R.
1985 Human ancestors: changing views of their behavior. *Journal of Anthropological Archaeology*, 4, 292-327.

Blumenschine, R.J.
1989) Man the scavenger. *Archaeology*. July, 26-32.

Bogaert, A.F. and Rushton, J.P.
1989 Sexuality delinquency and r/k reproductive strategies: data from a Canadian sample. *Personality and Individual Differences* 10, 1071-1077.

Brandt, T
1978 Growth Dynamics of Low Birth weight infants with emphasis on the perinatal period. In: *Human Growth* vol. 2 ed. F. Falkner and J.M. Tanner, pp 557-617. New York: Plenum Press.

Broman, S.H., Nichols, P.L. and Kennedy W.A.
1975 *Preschool IQ*, New York: J. Wiley.

Broman, S, Nichols, P.L. Shaughnessy, P. and Kennedy W.
1987 *Retardation in Young Children*. Hillsdale, New Jersey: Lawrence Erlbaum.

Coon, C. S.
1962 *The Origin of Races*. New York, Knopf.

Dillehay, T.D. and Collins, M.B.,
1988 Early cultural evidence from Monte Verde in Chile. *Nature*. 332, 150-152.

Dornstreich, M.D.
1973 Food habits of early man balance between hunting and gathering. *Science*. 179,306.

Geist. V.
1978 *Life Strategies. Human Evolution and Environmental Design*. New York: Springer-Verlag.

Goudsblom, J.
1986 The human monopoly on the use of fire: its origins and conditions. *Human Evolution*. 6, 517-523.
Gould, R. A,.
1969 Subsistence behaviour among the Western desert Aborigines of Australia, *Oceania*, 39, 253-27-4.
Gould, S. J.
1981 *The Mismeasure of Man*, New York, Norton.
Grine, F.E. and Kay, R.F.
1988 Early hominid diets from quantative image analysis of dental microwear. *Nature*. 333, 765-768.
Guidon, N. and Delibrias, G.
1986 Carbon-14 dates point to man in the Americas 32,000 years ago. *Nature*. 321, 769.
Hayden, B.
1981 Subsistence of Modern Hunter-Gathers. In R.O.S. Harding and G. Telela (eds) *Omnivorous Primates*. New York: Columbia Univ. Press.
Henneberg, M.
1984 Comment on Beals Dodd and Smith *Current Anthropology*.25, 321-322.
Henneberg, M. Budnik, A., Pazacka, M. and Puch, A.E.
1985 Head size, body size and intelligence: introspecific correlations in Homo sapiens. *Homo*. 36, 207-218.
Isaac, G.
1978 The food-sharing behavior of protohuman hominids. *Scientific American*. 238, 90-109.
Jerison, H.
1973 *Evolution of the brain and intelligence*. New York, Academic Press.
Jones, R.
1989 East of Wallace's line: issues and problems in the colonisation of the Australian continent. In P. Mellars and C. Stringer (eds) *The Human Revolution*. Edinburgh, Edinburgh University Press.
Jorde, L. B.
1985 Human genetic distance studies. *Annual Review of Anthropology*. 14, 343-373.
Krantz, G.S.
1980 *Climatic Races and Descent Groups*. North Quincy, Mass: Christopher.
Lathan, M.C.
1974 Protein-calorie malnutrition in children and its relation to psychological development and behavior. *Physiological Reviews*. 54, 541-565.
Lee, R.B.
1968 What hunters do for a living. In *Man the Hunter*. In R.B. Lee and I. Devore (eds), Chicago, Aldine Press.
Lewin, R.
1984 Man the scavenger. *Science*, 224, 861-2.

Linn, M.C. and Petersen, A.C.
1986 A meta analysis of gender differences in spatial ability: implications for mathematics and science achievement. In J.S. Hyde and M.C. Linn (eds) *The Psychology of Gender*. Baltimore: Johns Hopkins University Press.

Liu, Ze Chun
1985 Sequence of sediments at locality 1 in Zhoukoudian and correlation with loess stratigraphy in Northern China. *Quaternary Research* 23. 139-153.

Lynn, R.
1987 The intelligence of the Mongoloids: a psychometric, evolutionary and neurological theory. *Personality and Individual Differences*. 8, 813-844.

Lynn, R.
1990a Negative correlations between verbal and visuospatial abilities: statistical artifact or empirical relationship? *Personality and Individual Differences*. 11, 755-756.

Lynn, R.
1990b The role of nutrition in secular increases in intelligence. *Personality and Individual Differences*. 11, 273-285.
1991 Race differences in intelligence: a global perspective. *Mankind Quarterly*.

MacNeish, R.S.
1976 Early man in the New World. *American Scientist*, 64, 316-327.

Mellars, P.
1989 Technological changes in the middle-upper palaeolithic transition: economic, social and cultural perspectives. In P. Mellars and C. Stringer (eds) *The Human Evolution*. Edinburgh, Edinburgh University Press.

Mellars, P. and Stringer, C.
1989 *The Human Revolution*. Edinburgh, Edinburgh University Press.

Murdock, J. and Sullivan, L.R.
1923 A contribution to the study of mental and physical measurements in normal school children. *American Physical Education Review*, 28, 209-330.

Nilsson, T
1983 *The Pleistocene*, London, D. Reidel.

Parker, S.T. and Gibson, K.R.
1979 A developmental model of the evolution of language and intelligence in early hominids. *The Behavioral Brain Sciences*, 2, 367-408.

Passingham, R,E.
1979 Brain size and intelligence in man. *Brain, Behavior and Evolution*. 16, 253-270.

Pearl, R.
1906 On the correlation between intelligence and the size of the head.

Journal of Comparative Neurology and Psychology. 16, 189-199.

Pearson, K.
1906 On the relationship of intelligence to size and shape of head, and to other physical and mental characters. *Biometrika*, 5, 105-146.

Peters, C.R., O'Brien, E.M. and Box, E.O.
1984 Plant types and seasonality of wildplant foods, Tanzania to south western Africa. *Journal of Human Evolution*, 13, 397-414.

Pickford, M.
1986 Major events in primate paleontology: possible support for climatic forcing models of evolution. Antropologia Contemporarea, 9, 89-94
1988 The evolution of intelligence: a palaeontological perspective. In H.J. Jerison and I Jerison (eds) *Intelligence and Evolutionary Biology* Berlin, Springer-Verlag.

Pope, G. G.
1988 Recent advances in far eastern paleoanthropology *Annual Review of Anthropology*. 17, 43-77

Reed, R.W. and Mulligan, J.H.
1923 Relation of cranial capacity to intelligence *Journal of the Royal Anthropological Institute*, 53, 322-331.

Rushton, J. P.
1988 Race differences in behaviour: a review and evolutionary analysis. *Personality and Individual Differences*. 9, 1009-1024.
1989 The evolution of racial differences: a response to M. Lynn. *Journal of Research in Personality*, 23, 7-20.
1990 Race, brain size and intelligence: a rejoinder to Cain and Vanderwolf. *Personality and Individual Differences*, 11, 785-794.

Schreider, E.
1968 Quelques corrélations somatiques des tests mentaux *Homo*. 19, 38-43.

Sommerville, R.C.
1924 Physical, motor and sensory traits *Archives of Psychology*. 12, 1-108.

Stahl, A.B.
1984 Hominid dietary selection before fire *Current Anthropology*. 25, 151-168.

Stringer, C.B. and Andrews, P.
1988 Genetic and fossil evidence for the origin of modern humans *Science*, 239, 1263-1268.

Strum, S.C.
1981 Processes and products of change: baboon predatory behavior at Gilgil, Kenya. In R. Harding and G. Telela (eds) *Omnivorous Primates*. New York, Columbia University Press.

Susanne, C. and Sporoq, J.
1973 Etude de correlations existent entre des tests psychotechniques et des mensurations cephaliques *Bulletin Societé Royal Belge Anthropologie et*

Prehistorie. 84, 59-63.

Tooby, J. and Devore, I.
1987 The reconstruction of hominid behavioral evolution through strategic modelling. In W.G. Kinzey (ed) *The Evolution of Human Behavior: Primate Models* Albany (NY), State University of New York Press.

Torrence, R.
1983 Time budgeting and hunter-gatherer technology. In G. Bailey (ed) Hunter-Gatherer Economy in *Prehistory: A European Perspective* Cambridge, Cambridge University Press.

Vernon, P.A.
1990 The effect of holding g constant on the correlation between verbal and non verbal abilities: a count on Lynn's "The intelligence of the Mongoloids..." *Personality and Individual Differences*, 11, 751-754.

Weinberg, W.A., Dietz, S.G., Penick, E.C. and McAlister, W.H.
1974 Intelligence, reading achievement, physical size and social class. *Journal of Pediatrics*. 85, 482-489.

Willerman, L., Shultz, R. Rutledge, J. N. & Bigler, E.
1989 Magnetic resonance imaged brain structure and intelligence. Paper presented at the Annual Association, June 8-11, 1989.

Wolpoff, M. H.
1989 Multiregional evolution: the fossil alternative to Eden. In C. B. Stringer and P. Mellars (eds) *The Origins and Dispersals of Modern Humans*. Cambridge: Cambridge University Press.

The Philosophy of Nationalism

Charles C. Josey

An in-depth study of the problem of preserving family and national loyalties in the face of the demands for an internationalist ideology that have become dominant in recent decades.

CONTENTS

ISBN 0-941694-16-X
224 pages plus Preface and Foreword
Hardback – Price $25.00

Cliveden Press
P.O. Box 34070
N.W., Washington, D.C. 20043

RACE AND INTELLIGENCE AN ALTERNATIVE HYPOTHESIS

H. J. Eysenck
University of London

In principle I find Lynn's arguments very convincing, although the evidence is inevitably circumstantial and does not admit of conclusive experimental proof. Most of the alternative non-genetic arguments have been shown to be incapable of accounting for the observed differences, but of course there may be other alternatives not yet seriously considered. If I suggest one such argument it is more in the hope that it may lead to well-controlled empirical studies than that it will persuade readers in its present form, even though there is good evidence to support the major premise.

Lynn himself mentions malnutrition as a possible cause of IQ differences, only to dismiss it rather casually; this is odd in view of the use he has made of the argument himself in another connection (Lynn, 1990). He dismisses malnutrition on the basis that there are few differences in height between blacks and Caucasoids, but this makes the unwarranted assumption that malnutrition can be simply defined in terms of insufficiency of calories. The well-known Dutch famine experiment (Stein et al., 1972) is subject to the same criticism. There is considerable evidence that even apparently well-fed, middle class whites may suffer from specific vitamin and mineral deficiencies, that these may lower IQ score significantly, and that dietary supplementation may increase IQ markedly. Earlier studies from Harrell, Woodyard and Cates (1955), or more recently Benton and Roberts (1988) and Schoenthaler (1991) have reported along these lines, and a recent large-scale study by the Dietary Research Foundation, well-controlled and analyzed, has shown that responders to the supplementation, as compared with controls, showed an average increase in IQ of 11 points! This, and several relevant studies, has been published recently as a separate issue of Personality and Individual Differences (Eysenck & Eysenck, 1991).

If we assume that blacks in the US and in the UK have a less well-balanced diet than whites, and that African blacks have an even worse diet, then much or even all of the observed IQ difference may be due to