INDIVIDUAL AND GROUP DIFFERENCES

Individual differences are primary; group differences are secondary. The individual is the biological and societal unit that develops, that learns, that thinks, that wants, that feels, that acts. The group is a collection of individuals—sometimes just that, sometimes with a structure of its own.

The individual members of any species, such as humans, have a great many characteristics in common; indeed, judged against the varied forms of life on this earth one might deem them virtually indistinguishable. Yet from a viewpoint within the human species, we see them as differing in an array of biological and psychological characteristics, and these differences are often of intense social, personal, and economic interest to us.

On the basis of such individual variation, individuals may be classified in numerous ways and for various purposes into subgroups. A particular human may be placed simultaneously into groups according to age, sex, occupation, ancestry, religious preference, marital status, home ownership, political party affiliation, sexual orientation, television viewing habits, taste in soft drinks, and any number of other criteria. These classifications can be said to be secondary in the sense that they derive from already-existing characteristics of the individual; that someone may choose to classify an individual into one or another category does not in itself change that individual in any way whatsoever—although, of course, the individual’s or others’ reactions to this act of classification may have such an effect.

When we classify individuals into different categories according to any of the preceding attributes, we can observe or measure the individuals on some other trait of interest and see whether there is any average difference in this trait between the individuals in different categories. If there is, we may well want to ask further questions: Why is this so? Is it equally true for different subdivisions within the category? Does it hold over variations in age, place, and time?

A trait that has often been considered in this way is intelligence, as measured by typical IQ or similar tests. For example, members of the U.S. standardization sample for the 1981 revision of the Wechsler Adult Intelligence Scale, classified in various ways, had the IQ means and standard deviations given in Table 9.1.

Several points may be noted. First, each of the 1,880 individuals in the sample is multiply classified according to sex, race, residence, and occupation. Each individual contributes to the averages of whatever categories he or she is classified in; the act of classifying does not affect the IQ score of the classified individual. A given person who has (say) an IQ score of 107 has that score whether he or she happens to be a black urban male skilled worker or a white female professional who lives in the country.

Second, there are differences between the mean IQs of people in different groups. Sometimes these are small such as a couple of IQ points (sex, residence), and sometimes the differences are larger (15 IQ points for race, 22 points between professionals and unskilled workers).
TABLE 9.1. Some Subgroup Means and Standard Deviations for Full-Scale IQ for the WAIS-R Standardization Sample

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>940</td>
<td>100.9</td>
<td>15.3</td>
</tr>
<tr>
<td>Female</td>
<td>940</td>
<td>98.7</td>
<td>14.9</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1664</td>
<td>101.4</td>
<td>14.7</td>
</tr>
<tr>
<td>Black</td>
<td>192</td>
<td>86.9</td>
<td>13.0</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1421</td>
<td>100.3</td>
<td>15.2</td>
</tr>
<tr>
<td>Rural</td>
<td>459</td>
<td>98.4</td>
<td>14.8</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional and technical</td>
<td>206</td>
<td>111.0</td>
<td>13.4</td>
</tr>
<tr>
<td>White-collar</td>
<td>409</td>
<td>104.1</td>
<td>12.6</td>
</tr>
<tr>
<td>Skilled worker</td>
<td>213</td>
<td>99.5</td>
<td>12.6</td>
</tr>
<tr>
<td>Semiskilled</td>
<td>404</td>
<td>93.1</td>
<td>14.2</td>
</tr>
<tr>
<td>Unskilled</td>
<td>68</td>
<td>89.1</td>
<td>15.2</td>
</tr>
</tbody>
</table>

Note: Subgroups omitted — race “Other,” occupation “Not in labor force.”
Source: Data from Reynolds, Chastain, Kaufman, & McLean (1987).

Nevertheless, even if group differences properly play second fiddle to individual differences, and even though they are often badly misinterpreted, average differences between groups remain an object of legitimate scientific and popular interest. A better understanding of group differences, what they do and do not mean, can contribute to a saner attitude toward members of groups other than one’s own. A study of group differences can also offer clues to important questions in human evolutionary and social history or shed light on mechanisms of individual development. Finally, anyone who aspires to change group differences (e.g., in academic or occupational achievement) is surely well advised to understand their causes.

This chapter will look at some of the evidence and issues relevant to group differences in intelligence, considering in turn the four categories listed in Table 9.1: sex or gender, race or ancestry, rural–urban residence, and occupation. As we shall see, not all group differences are alike.

Male–Female Differences in Intelligence

The quick summary is that there are no consistent and dependable male–female differences in general intelligence as measured by standard IQ tests. One reason for this is that a lack of sex bias is often a criterion in the construction of such tests. Items that tend on average to favor males are balanced by items that tend on average to favor females. The important point, however, is that this is relatively easy to do. Many items of both sorts can be found among tasks generally agreed upon as tapping some aspect of intellectual abilities. Even in an age before such item balancing was customary, overall sex differences on intelligence tests tended to be trivial (Terman, 1916).

Certain specific varieties of cognitive performance do, however, consistently show sex differences. Males, for example, on average obtain higher scores for mental rotation items, which require the testee to judge how an object would look if it were rotated in space. One meta-analysis of studies with such tests estimated the average male–female difference to be .9 SD, the equivalent of 13.5 points on an IQ-type scale (Masters & Sanders, 1993). On the other hand, females tend to have an advantage on verbal tests involving the fluent production of words belonging to a category, such as synonyms. Skill in
mathematics goes both ways. Girls tend to be superior during the early school years, when the computational aspects of the subject predominate; boys later, when the inferential aspects do (Hyde, Fennema, & Lamon, 1990).

Mathematical ability also supplies a good illustration of one important aspect of group differences: the effect that a modest difference between two groups in means and standard deviations can have on proportions at the extremes. Hedges and Nowell (1995) analyzed sex differences in mental abilities in six large nationally representative samples of U.S. high school students and young adults tested between 1960 and 1992. One of the areas measured in all six studies was mathematical abilities. Males, at these ages, averaged slightly higher in mathematical skills, but the differences in means were small: .03 to .26 standard deviations across the different studies. Males were also slightly more variable: the male standard deviations were 2 to 12% larger. The combination of these apparently modest differences resulted, however, in nearly twice as many males as females among the top 5% of scorers. At higher levels of mathematical talent there can be an even greater disproportion. One study found 13 boys for every girl in a sample estimated to include roughly the top .01% of the ability distribution (Benbow & Stanley, 1983).

Hedges and Nowell’s analysis included several different abilities and found mean differences in both directions (girls averaged higher for reading, perceptual speed, and memory; boys for science, spatial ability, and mechanical reasoning). However, the difference in variability was in the same direction across all the areas: variability tended to be greater for boys. This meant that in areas where boys had higher means, boys substantially outnumbered girls at the top, and for areas where boys had lower means, boys substantially outnumbered girls at the bottom. For the other alternatives, the effects of means and variabilities tended to cancel, and the proportions of boys and girls were not very different.

The reasons why average sex differences in special abilities exist are still controversial. Some authors have suggested that biological differences, such as the effect of sex hormones on brain differentiation, may be responsible. Others have emphasized differences in the socialization experiences of boys and girls. An instructive glimpse of the range of such viewpoints can be found in the various commentaries to an article by Benbow (1988) on sex differences in mathematical talent.

In assessing such divergencies of viewpoint, one should keep in mind that we are not necessarily in an either–or situation here: nature and nurture can work in parallel. Socialization practices may track biological realities, and behavior can lead to biological changes. A great deal of careful empirical research will be required before the causes of sex differences in cognitive skills are well understood. Paradoxically, one reason the problem is difficult is that there are only two sexes. This means that there are a great many variables, biological and social, all correlated with the observed sex difference and with each other, making it all too easy to conclude erroneously that a given variable is a cause of an observed sex difference when it is only a correlate.

**IQ Differences in Groups Defined by Ancestry**

An even more contentious difference in average IQ test scores emerges when individuals are sorted into groups according to their ancestry—so-called racial or ethnic differences. In most of the studies to be discussed, racial classification is based on self-identification, and thus the sorting by ancestry is approximate at best.

Table 9.2 provides an illustration of observed differences in average test performance for U.S. subgroups of differing racial–ethnic ancestry. The table is based on a nationwide survey conducted in the

<table>
<thead>
<tr>
<th>Group</th>
<th>Verbal Test</th>
<th>Nonverbal Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Americans</td>
<td>102</td>
<td>102</td>
</tr>
<tr>
<td>African Americans</td>
<td>85.5</td>
<td>85.9</td>
</tr>
<tr>
<td>Asian Americans</td>
<td>98.2</td>
<td>101.5</td>
</tr>
<tr>
<td>Native Americans</td>
<td>88.9</td>
<td>95.0</td>
</tr>
</tbody>
</table>

*Note: European-American mean set to 102 (see Flynn, 1984). The SD used (set to 15) was the unweighted mean for the three minority groups because the European-American SD was restricted by test ceiling.*

*Source: Data rescaled from means in Coleman et al. (1996, Supplemental Appendix).*
mid-1960s under the auspices of the U.S. Office of Education and popularly known as the "Coleman Report" (Coleman et al., 1966). It includes a wider range of ethnic groups than most such studies. Although the report is careful to avoid describing the tests as "intelligence tests," their content was much like that of typical group-administered IQ tests; in Table 9.2 the report's scores have been converted to an IQ scale for comparability to Table 9.1 and other values given in this chapter.

As is typically found in such data, the differences between Americans of predominantly European ancestry and predominantly African ancestry are substantial — here, the equivalent of 16 or 17 IQ points, a little over a standard deviation. Americans of Asian ancestry, although a group subjected historically to much discrimination and prejudice in the United States, scored nearly as high as Americans of European ancestry — particularly on the nonverbal test. The scores of the Native Americans were intermediate and were again higher on the nonverbal test.

In the following sections, we consider the three minority groups in turn using as a point of reference the European American majority.

**African Americans.** An average difference on the order of one standard deviation between U.S. individuals of predominantly European ancestry (Whites) and predominantly African ancestry (Blacks) has been evident ever since the advent of mass intelligence testing (Shuey, 1966; Osborne & McGurk, 1982). The scores of military draftees in three wars — World War I, World War II, and Vietnam — showed average differences between Blacks and Whites of one to one-and-a-half standard deviations (summarized in Loehlin, Lindzey, & Spuhler, 1975). Furthermore, the Black–White differences show up at an early age — well before the time of school entry. Three samples tested with the Stanford–Binet test showed IQ differences of the order of one standard deviation between Black and White 3-year-olds (Montie & Fagan, 1988; Peoples, Fagan, & Drotar, 1995). Of course, it should be remembered that these are differences in averages and that individual Blacks and Whites at all ages vary almost as widely as do individuals in the population at large (and that describing them as Blacks and Whites is a decided oversimplification).

Although a substantial average difference between U.S. Blacks and Whites in cognitive test performance has persisted for many years, there is evidence to suggest that in recent decades it may have shrunk somewhat. Hedges and Nowell (1998) carried out a meta-analysis based on six national studies. The trend for 12th graders in these 6 studies over the 27 years from 1965 to 1992 was for the average Black–White difference to decrease from about 1.2 to about .8 standard deviations.

Hedges and Nowell also found the variability in the African-American samples to be somewhat smaller. The standard deviations for Blacks averaged about 89% of those for Whites with no obvious increasing or decreasing trend over time. The combination of a lower mean and reduced standard deviation for African Americans had major consequences at the upper extreme: Among Blacks a much smaller fraction scored at a level that would place them in the top 5% overall. Across the different studies, scorers at this level were relatively 8 to 20 times more frequent among Whites than Blacks, and, given that the population contains fewer Blacks to begin with, the absolute numerical discrepancies are much greater than this. Of course, so far this is simply descriptive, not explanatory.

Finally, the differences between Americans of predominantly African and predominantly European ancestry are not uniform across all the subtests of IQ tests but appear to follow what has been referred to as the *Spearman hypothesis*, namely, that the difference is greater the more highly the subtests are correlated with *g* — the general factor representing what the various cognitive skills involved in IQ tests have in common (Jensen, 1985). Tests of verbal comprehension or spatial ability, for example, tend to show larger Black–White differences than do tests of memory or perceptual speed and accuracy and also tend to correlate more highly with overall IQ and load more highly on the general factor. The *Spearman effect* appears to show up early. It has been reported in the data of 3-year-olds (Peoples et al., 1995). It should be emphasized that observation of the Spearman effect at the level of empirical measurement does not necessarily imply any particular cause (such as a genetic origin). A variety of views on this point may be found among the commentators on Jensen's article (see Jensen, 1985). The controversial issue of possible genetic and
environmental contribution to U.S. group differences will be discussed later.

**ASIAN AMERICANS.** There is some dispute as to whether Asian Americans obtain higher average scores on IQ tests than European Americans or score at about the same level. Richard Lynn has estimated that the IQs of Asians in their native countries average around 106 but that those of Asian Americans might be a little lower (Lynn, 1991). In contrast, James Flynn has argued that many studies that have compared the test scores of various Asian-American samples with U.S. norms have involved an artifact, namely, they have failed to allow for the prevailing upward creep of IQ test performance over time (the so-called “Flynn effect”; Flynn 1984, 1996). When the results from studies using just Asian-American samples were adjusted for this effect and combined with those from studies in which both groups were simultaneously measured on the same tests, Flynn found little overall IQ difference between European and Asian Americans—perhaps a couple of IQ points in favor of European Americans (Flynn, 1991).

There is, however, a difference between IQ subtests primarily measuring visuo-spatial skills and those primarily measuring verbal skills. Asian Americans (and Asians in Asia) tend to do relatively better on visuo-spatial tests than on verbal tests. Such differences have, for example, been obtained between Americans of Japanese ancestry and of European ancestry in Hawaii, where they have been found to be stable across two generations despite major changes in the degree of acculturation to American ways (Nagoshi & Johnson, 1987).

There is also a large difference in how effectively Asian Americans and European Americans convert their cognitive skills into professional and occupational achievement (Weyl, 1969). Flynn estimated that Asian Americans tend to achieve at a level characteristic of European Americans with IQs 10 to 20 points higher. This is partly because a greater proportion of Asian Americans who are qualified for higher education in fact undertake it and partly due to their being able to succeed at lower ability levels by working harder (Flynn, 1991).

**NATIVE AMERICANS.** This term refers to groups such as the Inuit (Eskimos) and peoples of various American Indian tribal origins (Hopi, Cheyenne, Iroquois, etc.). They are Native Americans in the sense of having been in the Western Hemisphere much longer than European or African Americans, although they themselves are believed to have come to North America from Asia some tens of thousands of years ago.

Numerous studies measuring cognitive abilities among Native Americans peoples have been reported over the last three-quarters of a century; a review may be found in McShane and Berry (1988). Many of these studies were flawed by the problems involved in giving standardized tests to groups with differing cultural and linguistic backgrounds and varying degrees of acculturation to Western ways.

Nevertheless, a few general conclusions seem warranted. On the whole, Native Americans tend to perform comparably to European Americans on nonverbal tests—particularly those with a visuo-spatial emphasis. Lynn (1991) listed 14 studies conducted with Native Americans between 1952 and 1984, mostly using Wechsler IQ tests, from which he computed an average IQ score for visuo-spatial performance. These IQs ranged from 91 to 105 across the different studies—7 of the 14 studies yielded average visuo-spatial IQs of 100 or better.

Typically, Native American groups obtain lower verbal IQs. In many of the earlier studies, this was confounded with the fact that the tests were given in English, and English was a second language for the group concerned. However, Lynn restricted his tabulation to groups for which English was the first language, and it still showed verbal IQs averaging some 20 points below visuo-spatial ones.

One factor depressing verbal relative to nonverbal performance may be hearing loss resulting from middle-ear infections in infancy and early childhood for which Native American populations appear to be at a high risk. Several studies have shown an association between a history of middle-ear infections and lower verbal IQs in individuals from Native American populations (summarized in McShane & Berry, 1998). But the same advantage of nonverbal over verbal skills is characteristic of Asian Americans, with whom Native Americans share common ancestry. Thus, one might also consider genetic factors resulting from shared evolution in the distant past. For the present, any such explanation.
remains speculative. However, direct genetic research could support or refute this hypothesis in the future as genes related to a verbal–spatial difference are identified in both groups and shown to be the same or different in frequency in the two groups.

RURAL–URBAN DIFFERENCES IN IQ

A generation or two ago, average U.S. rural–urban IQ differences were substantial, averaging about 6.5 IQ points (Terman & Merrill, 1937). In more recent years, the difference declined to about 2 IQ points (e.g., Table 9.1). The urban–rural difference is now so small that recent IQ test standardizations have not even bothered to stratify their samples by this variable. The most obvious explanations for this trend are the changes that have taken place in the environment. Rural and urban populations are much less different in their experiences than once was the case. Rural children nowadays are bused to consolidated schools rather than having to walk to a one-room schoolhouse, both urban and rural populations can watch the same television programs and read the same books and magazines, and improved roads and transportation have greatly decreased rural isolation. Farming itself is much more a high-technology enterprise than it once was. But at the same time there has also been much rural–urban migration, which is a process that can change IQ differences without changing IQs and which would need to be considered in a complete account. For example, the proportion of the U.S. male work force involved in farming decreased from 42% in 1900 to 25% in 1930 to 4% in 1970 (Featherman & Hauser, 1978).

OCCUPATIONAL DIFFERENCES IN IQ

As noted in Table 9.1, different categories of occupations have different average levels of IQ, although, again, there is a wide range of IQs within occupational groups, and thus occupation is not a good predictor of the IQs of individuals. Occupational level is often combined with other related measures such as education and income in a broad variable of socioeconomic status (SES). Considered as a continuous variable, SES falls outside the scope of this chapter, although in categorical form, as in comparisons among defined social classes, it could qualify.

Nowhere is the distinction between cause, effect, and mere correlation more important than when considering the relationship of occupation (or other SES-related categories) and IQ. Among adults, a person’s IQ may be an important reason why he or she is in a given occupation. Occupations vary widely in the extent of abstract reasoning and problem solving they demand. Furthermore, some occupations, such as the professions, may require lengthy educational programs for entry into them, and success in these programs may require substantial cognitive skills. Even to be admitted to the educational programs may depend on performance on IQ-related tests. Thus, an individual’s IQ may be a cause of his or her occupation (although rarely the sole cause—aspirations and interests do matter). On the other side, it has been suggested that the IQ test score of an adult may also be to some extent an effect of his or her occupation. Authors such as Kohn and Schooler (1983) have emphasized the role of complex jobs in sustaining or enhancing the intellectual competence of those who occupy them.

It is when we come to the children whose parents occupy different positions in the social structure that the ground becomes most treacherous. It is obvious that a parent’s occupation, income, and education have substantial effects on the environment in which a child grows up. It has seemed obvious to some that the reason that children with parents of higher social status tend to have higher IQs than do children of parents of lower social status is because of the differences in the environments that the parents provide for their children. But in fact favorable environments may be correlated with, not causal to, childrens’ IQs. Children could tend to resemble their parents in IQ because of the genes parents transmit to their children, not because of the environments the parents supply. An intermediate view is that, although in childhood there is a causal effect of family environment on childrens’ IQs, this effect is fairly modest in size. Furthermore, it is transitory and tends to dissipate as children grow older; thus, by the time the children reach adulthood, the effect of family environment has dropped virtually to zero, and family resemblance depends almost entirely on the genes that parents and their children share (see, e.g., McGue, Bouchard, Iacono, & Lykken, 1993).
GENES AND ENVIRONMENTS IN INDIVIDUAL AND GROUP DIFFERENCES

It is a truism that both genes and environmental factors influence the development of cognitive skills in individuals and that they are so deeply intertwined in their effects that, for any given individual, it would be virtually hopeless to try to untangle them. But all is not lost. The methods of behavior genetics permit the estimation of the extent to which genetic and environmental variation contribute to the observed differences among individuals in a population for a given trait. Moreover, these methods permit the environmental contribution to be broken down into two parts: the environment that is shared by family members, and the environment that is idiosyncratic to individuals. This latter breakdown is of particular interest in the present context because among those things that family members usually have in common are their ethnic identity, their rural or urban status, and the occupation of the parents.

Behavior genetic methods rely on the comparison of groups sharing varying degrees of genetic and environmental resemblance. The most widely used procedures are the comparison of identical and fraternal twins and the study of adoptive families. Other designs, such as the comparison of full-, half-, and step-siblings in step-families, the study of identical twins reared apart, and the studies of the families of identical twins, are also sometimes used. These methods have been extensively applied to IQ (and to a lesser extent to specialized cognitive abilities). The conclusions for populations in the United States and Western Europe may be quite briefly summarized; for the detailed evidence see textbooks and reviews such as those of Plomin, DeFries, McLearn, and Rutter (1997); McGue et al. (1993); McCartney, Harris, and Bernieri (1990); Neisser et al. (1996), and the sources they cite. Note that the conclusions depend on age.

1. Among young children, say aged 3 or 4 years, all three factors — genes, shared environment, and individual environment — contribute in roughly equal degrees to individual IQ differences.

2. As children grow older, the genes increase in importance in explaining individual differences in IQ, and the role of shared family environment decreases.

3. By adulthood, the genes are responsible for something like one half to three quarters of IQ differences among individuals, and the effects of the person’s childhood family environment have dwindled to near zero.

4. Measures of specific cognitive skills such as verbal and spatial ability, which are correlated with each other and with IQ, show a similar but quantitatively weaker pattern. Their distinctive aspects (after partialing out general ability) may show separate genetic or shared environmental influences, or both.

These statements are about individual differences. To what extent are the genes and environment responsible for group differences in IQ?

First, it should be emphasized that because genes are important contributors to individual differences does not automatically mean that genes will be important contributors to group differences. It is logically possible for environmental factors to be wholly responsible for group differences on a trait for which individual variation is mostly genetic. Height is highly heritable, but if one were to take two groups of children randomly and give members of one group hormone treatments enhancing growth and members of the other group hormone treatments retarding growth, one would produce an average height difference between the two groups that would be entirely environmental in origin.

One should, of course, not leap to the conclusion that because a group difference could be entirely environmental, it therefore is entirely environmental. That remains an empirical question. Moreover, the answer need not always be the same across groups or characteristics. For example, rural–urban IQ differences may turn out to be largely environmental, whereas occupational differences may prove to have a substantial genetic component, or differences between Americans of Asian and European ancestry may not have the same basis as differences between Americans of African and European ancestry.

Given that no flat answer will do for every case, what evidence is available for the relative roles of genes and environments in the various kinds of group differences that have been described in this chapter?

This question will be discussed quite briefly for differences associated with sex, urban–rural, and socioeconomic groupings, and then differences due to ancestry will be considered at somewhat greater length.
Sex Differences: Genetic or Environmental?

There is a simple, correct answer here, and that answer is "mostly genetic." Except for the occasional developmental mess-up, mammalian maleness or femaleness results from the presence or absence of a genetic region on the Y chromosome—a difference that leads to a series of hormonal events shaping biological and behavioral development in the male or female direction (for a review, see Collaer and Hines, 1995). However, the interesting question for most people is not the original source of the difference but how the process works out. Are the observed male–female differences in the patterning of abilities a fairly immediate consequence of brain differentiation under the influence of hormones or an indirect consequence of hormone-influenced primary and secondary sex characteristics (genitalia, body size and shape, etc.) whose effects on cognitive development are via the assignment of individuals to the gender statuses Male and Female and the environmental consequences to which this leads?

In any event, the genes involved in this process appear not to be those that account for individual variation in general intelligence. As noted previously, the sexes do not differ much, if at all, on average levels of IQ, although individuals within each sex vary widely, in part for genetic reasons. The reasons for the observed gender differences in specific cognitive skills remain controversial.

Rural–Urban Differences: Genetic or Environmental?

As noted earlier, because the U.S. rural–urban IQ gap has changed substantially over the course of a few decades, it seems likely that changes in the environment are chiefly responsible. Unfortunately, this does not pin down which environmental changes these are because rural–urban environmental differences in the United States have decreased in many ways during the period in question. If the genes have played any role in urban–rural IQ differences, possible mechanisms to be considered would be (a) selective migration, if the individuals moving to the cities were on average higher in IQ than those who remained behind, and (b) a greater degree of inbreeding in isolated rural communities, because inbreeding tends to lower IQs (e.g., Agrawal, Sinha, & Jensen, 1984). Both of these processes could change rapidly over time and thus be consistent with effects that occur within a generation or two.

Occupational Differences: Genetic or Environmental?

Here there is good reason to believe that the observed average IQ differences in the United States are at least partly genetic. The underlying mechanism is occupational mobility based on cognitive skill. Individuals with higher IQs, other things being equal, are more likely to be able to satisfy the educational requirements for entering higher status occupations and (to the extent that these occupations do in fact require high levels of cognitive skill) more likely to perform well in them. If IQ differences lead (to some extent) to different jobs, and reflect (to some extent) different genes, one expects occupational mobility to lead to average genetic differences between the individuals in different occupations. This argument has been particularly emphasized by Herrnstein (1973; Herrnstein & Murray, 1994). Clearly, this is not a matter of direct genetic inheritance of occupation; it is a matter of the inheritance of genes that influence the development of cognitive skills—skills that in turn affect an individual's occupational outcomes. In a differently organized society—for example, one stratified along caste lines—the story could be different. Whether a group difference is genetic may depend on environmental conditions as well as on genes.

To what extent are the genes involved in occupational IQ differences? Many factors affect occupational success, and cognitive skill is only one of them. A Norwegian study based on some 1,000 twin pairs tested in connection with compulsory military service estimated that about 43% of the differences in occupational level among males born in the era since World War II reflected the genes (Tamb, Sundet, Magnus, & Berg, 1989). The genes accounted for somewhat larger proportions of differences in education (about 51%) and IQ (about 66%). A recent U.S. study based on full and half siblings yielded roughly comparable figures: 42% for income, 68% for education, and 64% for IQ (Rowe, Vesterdal, & Rodgers, 1999). The authors concluded that genes and shared family environment both contribute significantly to the association between IQ and SES-related variables among individuals in
the United States with the genes carrying somewhat more weight.

Thus it is likely that IQ differences between U.S. occupations are partially genetic, although far from completely so. Individual differences in IQ within occupations remain large, and much of that variation is genetic. Occupation remains a weak predictor, at best, of an individual’s IQ or of an individual’s genes.

**Racial and Ethnic Differences: Genetic or Environmental?**

It is fairly safe to conclude that at least some of the average IQ differences among U.S. groups whose ancestry differs are environmental in origin. At least among children, family environments are known to affect IQ, and different U.S. racial–ethnic groups tend to differ in many family environmental variables (e.g., Brooks-Gunn, Klebanov, & Duncan, 1996). But different U.S. racial–ethnic groups also differ in the frequencies of various genes. Do these genetic differences contribute to the observed differences in level or patterning of cognitive skills among these groups? And if they do, is this a substantial or a trivial contribution?

These questions have vexed Americans – academicians and laymen alike – for many years. Perhaps the two main foci of this debate in recent decades were Jensen’s long article in the *Harvard Educational Review* (Jensen, 1969), “How Much Can We Boost IQ and Scholastic Achievement?” and Herrnstein and Murray’s (1994) book *The Bell Curve*. Interestingly, neither of these works focused primarily on group differences, and neither made a strong claim that there is a genetic component to U.S. racial–ethnic differences. However, both brought down the wrath of their critics by saying that there might be such a component and that this possibility deserved scientific investigation.

**GROUP DIFFERENCES IN WHAT INTELLIGENCE IS?** One way of rendering any simple approach moot is the claim that various U.S. subgroups differ in fundamental ways in their approach to intellectual tasks and that these differences make it inappropriate to compare their performance in schools or on standard IQ tests. Boykin (1986) suggested, for example, that the African-American subculture differs from the U.S. majority culture along such dimensions as spirituality, harmony, verve, expressive individualism, communalism, and so on, and that these differences are the reasons U.S. Blacks tend to do badly in schools and on tests. One might argue that with friends like this, who needs enemies? What racist is going to object to the notion that U.S. Blacks may be better suited for life in a tribal community than for success in a modern Western technological society? Nevertheless, it is a possibility to be considered, and there have been some studies addressed to this point. Of course, the issue is not whether such subcultural differences exist but whether they have substantial effects on IQ.

An obvious first question is to ask whether intelligence is the same thing in different U.S. racial–ethnic groups. One kind of evidence concerns the factor structure of cognitive skill measures: Is it the same across groups? That is, though means may differ, do the test interrelationships remain the same? DeFries et al. (1974) compared the factor structure of a battery of 15 cognitive tests for samples of individuals in Hawaii with predominantly Japanese or predominantly European ancestry. They found the same four factors in both groups with nearly identical factor loadings. A recent study of nearly 270,000 young U.S. adults who took the Air Force Officer Qualifying Test between 1981 and 1993 compared the factor structure of its 16 subtests for subgroups self-identified as White, Black, Hispanic, Asian American, and Native American (Carretta & Ree, 1995). The subgroup sizes varied from 212,238 for Whites to 2,551 for Native Americans. The factor structure and the factor loadings proved to be nearly identical across the groups.

Another approach looks at differences in performance on IQ tests at the level of individual items. Are the patterns of item difficulty – which items are easy, which are hard – the same in different racial–ethnic groups? Jensen (1980, Chapter 11) reviewed a considerable amount of evidence suggesting that at least for U.S. Blacks and Whites the rank order of item difficulties on standard tests is highly correlated across groups and that item × race interactions are nonexistent or small. Where such differences do appear, they can typically be reduced or eliminated by taking overall level of performance into account. That is, item difficulties for Black and White children performing at the same level – for example, a comparison of Black schoolchildren with
White children a year or two younger – are even more similar than for Black and White children of the same chronological age.

A related approach is to see whether the interrelationships among variables related to developmental outcomes such as ability or achievement are different in different racial or ethnic groups. One such study (Rowe, Vazsonyi, & Flannery, 1994) compared covariance matrices for several different U.S. racial-ethnic subgroups in seven samples. Each sample permitted the comparison of two to four of the following groups: African Americans, Hispanic Americans, Asian Americans, European Americans. Comparisons were based on covariance matrices among 6 to 11 variables per study, including measures of family, home, and peer environments, and child outcome variables such as test scores, delinquency, and school grades. The result was that the covariance matrices did not differ significantly across racial-ethnic groups. The authors suggested that this is evidence that the developmental processes are basically similar for individuals in all of the groups and that differences in outcome depend on differences in input. They drew no conclusion as to whether these differences in input might be genetic, environmental, or both.

If we conclude, then, that (approximately) the same thing is being measured by intelligence tests in different U.S. racial-ethnic subgroups and that what is measured relates in (approximately) the same way to other measures of childhood environments and outcomes, we still must ask whether the observed group differences on this trait are due to differences in the distributions of genes in the different groups, or to differences in the distributions of one or more environmental factors (possibly prenatal, or if postnatal, relatively early, prior to 3 years of age for United States Blacks and Whites, anyway).

Several different kinds of evidence bear on this issue. Studies of interracial adoptions and of race mixture provide perhaps the most direct evidence.

ADOPTION STUDIES OF RACIAL-ETHNIC GROUP DIFFERENCES. When infants of one racial group are reared by parents of another, if the children tend to display the characteristics of the adopting group, it is prima facie evidence for postnatal environmental effects, and if they tend to display the characteristics of the group from which they came, it is prima facie evidence for the genes or prenatal effects.

There have been several interracial adoption studies. One study involved children of differing ancestries adopted into White homes in Minnesota (Scarr & Weinberg, 1976; Weinberg, Scarr, & Waldman, 1992; Waldman, Weinberg, & Scarr, 1996). A smaller study compared Black and interracial children adopted into White and Black homes (Moore, 1986). Two studies examined Korean and Southeast Asian infants adopted into U.S. homes, and a small study examined Korean infants adopted into homes in Belgium.

The Minnesota study by Scarr and her colleagues included several groups of children of differing ancestries adopted into White middle-class homes plus biological children of the adoptive parents. The children were given IQ tests in childhood at an average age of 7 years and tested again 10 years later in late adolescence. The average IQs, corrected for norm shifts ("Flynn effect") are given in Table 9.3 for several relevant groups: adoptees with one African-American and one European-American parent, adoptees with two African-American parents, adoptees with two European-American parents, adoptees of Asian or Native American parentage, and biological offspring of the adoptive parents. Some of these groups were quite small, but the results appear consistent with the following generalization: Rearing in an advantaged home has a positive effect during childhood, but this largely fades away by late adolescence. The means at the time

<table>
<thead>
<tr>
<th>Adoptees' Parentage</th>
<th>Number of Children</th>
<th>Original Study</th>
<th>10 Years Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black–Black</td>
<td>21</td>
<td>91.4</td>
<td>83.7</td>
</tr>
<tr>
<td>Black–White</td>
<td>55</td>
<td>105.4</td>
<td>93.2</td>
</tr>
<tr>
<td>White–White</td>
<td>16</td>
<td>111.5</td>
<td>101.5</td>
</tr>
<tr>
<td>Asian or Indian</td>
<td>12</td>
<td>96.1</td>
<td>91.2</td>
</tr>
<tr>
<td>Birth children</td>
<td>101</td>
<td>110.5</td>
<td>105.5</td>
</tr>
</tbody>
</table>

Note: All means adjusted for norm shifts over time ("Flynn-corrected"). Black–White refers to adoptee with one Black and one White biological parent, etc.

Source: Data from Waldman, Weinberg, & Scarr (1996).
of follow-up are about what one would expect to see for children in these groups growing up in their own homes in the United States (Lynn, 1994). (The Asian–Indian group is perhaps a bit on the low side, but the numbers are small.) This result is consistent with the typical finding from behavior genetics that shared family environmental effects on IQ are appreciable in childhood but decline to low levels by adulthood.

That this result occurs despite all the children’s being socioeconomically advantaged – reared in good homes with caring parents, attending good schools, and so on – makes variables of the latter sort less plausible for explaining the average IQ differences among corresponding groups in the U.S. population. This leaves genetic, prenatal environmental, and preadoptive environmental explanations.

Unfortunately, these are to some degree confounded in these data: the White adoptees had fewer and more favorable preadoptive placements than the Black groups, and the Asian–Indian adoptees had more and worse ones. The last were placed in the adoptive homes quite late (average age of 5 years); the other groups were placed at earlier and more comparable ages (average age of 1½ years). The children with one Black and one White biological parent (designated Black–White in the table) had somewhat more favorable conditions in a number of preadoptive variables than did the group with both biological parents black (Black–Black). Thus, the Minnesota data, although consistent with a genetic or prenatal explanation of the group differences, fall short of decisively demonstrating this to be the case.

A second adoption study, which obtained rather different results, compared 26 Black–Black and 20 Black–White children adopted into Black or White adoptive homes (Moore, 1986). All children were placed in their adoptive home by the age of 2 years and were given a standard IQ test (WISC) at ages 7 to 10. The Black–Black and Black–White children adopted into White homes can be compared with the corresponding groups in the Minnesota transracial study. After mean IQs are adjusted for age of norms, the mean was 108.7 for 9 Black–Black children adopted into White homes and 107.2 for 14 Black–White children similarly adopted compared with the corresponding 91.4 and 105.4 obtained at the original testing in Minnesota. The samples in the Moore study are quite small, of course, but as the data stand, the Black–Black group is substantially higher in average IQ than the corresponding Minnesota group, and there is no evidence of a difference in IQ between the Black–Black and the Black–White children.

The Moore study also allowed comparison between Black and Black–White children growing up in White and Black adoptive homes. Here there was a substantial difference in favor of the White adoptive homes. The Black children adopted into Black homes averaged 15 IQ points below the Black children adopted into White homes, and the biracial children adopted into Black homes averaged 11 points below the biracial children adopted into White homes.

The absence of a difference between Black and biracial children and the presence of a difference between Black and White adoptive homes suggest postnatal environmental causes rather than differences in the genes or prenatal environments. However, these causes do not appear to be a difference of a gross socioeconomic sort. All three sets of adoptive parents were predominantly middle class. The adoptive mothers’ education averaged 15.1 years in Minnesota and 16.0 years in each of the groups in the Moore study. The fathers’ education averaged 16.9, 17.3, and 15.6 years, respectively. Moore found differences in mother–child interaction styles in the Black and White adoptive homes that she believed might have been responsible for the IQ differences. However, given the smallness of the samples and the inconsistencies with the Minnesota findings, one would want to see a replication of the basic results before making too many inferences about them.

The three studies of Asian adoptees found that, despite often adverse preadoption experiences, these groups did relatively well on IQ tests in childhood. The largest study (Winick, Meyer, & Harris, 1975) was based on 141 Korean girls who had been adopted as infants or toddlers into U.S. homes and were currently of elementary school age (grades 1 to 8). For 111 of these children, IQ tests were available from school records. The average IQ was 107 – presumably somewhat inflated by norm shifts. Given the varying and unspecified IQ tests involved, a precise adjustment cannot be made, but if we assume that the typical test norms were 10- to 15 years old, this figure should be adjusted downward about 4 IQ points. Even with that, these children appeared
to be showing quite satisfactory cognitive development.

A smaller study investigated 25 preschool-age children born in Southeast Asia and adopted into U.S. homes (Clark & Hanisee, 1982). All children were placed in their adoptive homes before the age of 3 years (average age 11 months) and were tested with the Peabody Picture Vocabulary Test at ages averaging somewhat under 4 years. The mean obtained IQ was 120, which would adjust to about 116 if one allows for norm changes. At these ages, we would expect family environment to have a considerable effect on children's IQs. These adoptive families, like those in the Minnesota and Moore studies, were middle to upper-middle class. Parents' years of education are not given, but it is stated that both parents typically had college degrees. Characteristic occupations for fathers are given as engineers, ministers and teachers—the same three occupations named as typical for adoptive fathers in the Minnesota study.

A third adoption study of Asians involved a small group of 19 Korean children adopted by families in Belgium (Frydman & Lynn, 1989). The average age of adoption was about 1 1/2 years. The children were tested with a French version of the WISC at an average age of 10 years. They obtained a mean IQ of 119 norm-corrected to about 110. An interesting feature of this study was that these Belgian-reared Asian children showed the same superiority of visuospatial over verbal skills discussed earlier in connection with Asian and Asian-American children reared by their own parents (in this study, mean performance IQ exceeded mean verbal IQ by about 13 points). Because of the small size of the sample and the fact that one cannot absolutely rule out some French language handicap owing to early exposure to Korean, one cannot put too much weight on these particular results. Nevertheless, this is the sort of outcome one would expect to find if there is a genetic component to the different patterning of verbal and visuospatial abilities in Asians and Europeans.

The basic idea is simple: Individuals, all considered African Americans, vary widely in the proportion of their genes that came from European ancestors. If (a) there is an appreciable difference between Europeans and Africans in the frequencies of genes influencing intelligence, favoring Europeans, and if (b) the genes affecting intelligence act in a straightforward additive fashion, and if (c) the genes derived from African and European ancestors are reasonably representative of their ancestral gene pools, then African Americans who have more genes derived from European ancestors should score higher on measures of intelligence than African Americans who have fewer genes derived from European ancestors.

It will be recalled that this is just what happened in the Minnesota transracial adoption study: African-American adoptees with one Black biological parental outscored African-American adoptees with two Black biological parents. But this was not the case in the Moore study. And several other studies involving race mixture have also reported a different outcome.

One of these is an early study by Witty and Jenkins (1936), who obtained information about the ancestry of African-American children of very high IQ. If there is a difference in the ancestral gene pools that is related to IQ, one would expect high-IQ African-American children to have a disproportionate share of European ancestry. However, they did not and were very similar to unselected African-American samples in this regard. Information about ancestry was obtained by interview in both cases.

Two studies have looked at blood-group genes in African-American samples—in both studies, these were twins who had been blood tested to determine their zygosity and for whom cognitive test scores were also available. One study (Loehlin, Vandenberg, & Osborne, 1973) asked whether genes that are more common among European Americans than among African Americans tended to be associated with high test performance in the African-American subsample. They were not in samples of 20 and 22 African-American twin pairs from Georgia and Kentucky (a total of 84 individuals). The second study (Scar, Pakstis, Katz, & Barker, 1977), done in Philadelphia, estimated the odds of European versus African ancestry for each African American in the sample and correlated these odds ratios with cognitive test scores. There were 72 African-American
twin pairs (144 individuals). Whether there were low correlations or no correlations between ancestry and test scores depends on what measure you look at: There was a correlation of about +.10 between estimated European ancestry and performance on Ravens' Progressive Matrices, a correlation of about -.12 for a memory measure, and approximately zero correlations for a couple of other tests and for the first principal component among the set of cognitive measures. The simplest conclusion is that no relationship at all has been demonstrated, and this was the conclusion of the authors. However, I mention the actual numbers for two reasons. First, the positive correlation is with a measure on which Blacks tend to do relatively poorly, and the negative correlation is for an ability on which they tend to do relatively well. It is plausible that European genes might be more helpful for the former than the latter. Second, the estimate of European ancestry, judging from the data the authors provided, has a reliability of about .19. This means that correlations of around .40 would be as high as one could expect even if the proportion of genes deriving from European ancestors was in fact perfectly correlated with cognitive skills in this population. Against this background, correlations like .10 and .12 — if real — are not so trivial. (In the Loehlin et al. data, the situation was even less appealing psychometrically; the estimated reliability of a measure of European ancestry for African-American individuals would have been zero. The authors did not take this approach but acknowledge that the power of the different one they chose might be quite limited.) Research using larger samples and better techniques for estimating ancestry is called for and quite feasible.

Finally, a study in Germany gave IQ tests to illegitimate children whose mothers were German but whose fathers were either Black or White soldiers from the Allied Occupation Forces stationed in Germany after World War II (Eyferth, 1961). The children were tested with a German version of the WISC at ages between 5 and 13 years. No average IQ difference was found between children with White and Black fathers. On the face of it, the presence of genes of African origin had no adverse effect on the IQs of the group of children who had Black fathers. Flynn (1980) concluded, on the basis of extensive analysis, that differential selection of various kinds could not plausibly explain this — that there most likely were substantial differences in the average IQs of the Black and White fathers involved but that these differences failed to make the average IQs of the two groups of children different, as one would expect them to do if there were a genetic contribution to the racial–ethnic group difference.

Interpretation of this study is complicated by the presence of a race x sex interaction. Among the boys, those with Black fathers averaged below those with White fathers; but among the girls it was the other way around — those with White fathers did worse. Looked at differently, the boys and girls with Black fathers were approximately equal in mean IQ (96 and 97, respectively). The boys and girls with White fathers were markedly unequal (101 and 93, respectively). These last two samples were fairly small (37 boys, 33 girls), and thus perhaps this 8-point difference is a statistical fluke. In some sense, it must be at least partly such. After all, the standardization population of this test consisted of children of German women whose mates had genes of European origin. The test does show a difference in IQ that tends to favor boys, but less — about 4 IQ points, judging from Eyferth's graphs. The samples of children with Black fathers are larger, 81 boys and 90 girls, and so should be somewhat more stable. But that leaves us with the question of why the offspring of the black fathers do not show the sex difference that the population seems to. Back to "more research is necessary."

The mothers of the biracial children in this study were all of predominantly European ancestry (German women). So, as it happens, were nearly all the mothers of the Black–White children in the Minnesota study (66 White mothers, 2 Black mothers). What happens if one compares Black–White children whose mothers are Black with Black–White children whose mothers are White? Willerman and his colleagues did just this, using the children of Black–White couples from a large collaborative study done under the auspices of the National Institutes of Mental Health (Willerman, Naylor, & Myrianthopoulos, 1970). At age 4, the average IQ of the children of 61 interracial couples whose mothers were White was 100.9. The average IQ of the children of 27 interracial couples whose mothers were Black was 93.7. Both values are presumably inflated owing to changing norms, but the difference
between them is of chief interest, and adjusting both will not affect it. That difference is about 7 IQ points, half a standard deviation, in favor of the children with White mothers. The two kinds of couples did not differ notably as to either mothers' or fathers' average level of education, nor had the children differed at birth in average birthweight, length at birth, or estimated duration of gestation. The children in both groups would have had, on average, about 40% genes of African origin and 60% genes of European origin (given typical estimates of about 20% European admixture among African Americans). Yet the ones whose mothers were White averaged about 7 IQ points higher than the ones whose mothers were Black. The two groups should be genetically equivalent (barring exotic effects from cytoplasmic inheritance or genetic imprinting), and thus the difference between them is presumably environmental in some form. It seems not to be due to any gross socioeconomic difference between the two kinds of couples, given their equivalence in educational level, nor is it due to the sort of prenatal factors that would affect birthweight or length of gestation. However, subtler prenatal or postnatal environmental effects are not excluded.

RACIAL–ETHNIC EFFECTS: CONCLUSIONS. Tentatively, the difference in patterning of abilities between Americans of Asian ancestry and Americans of European ancestry looks as though it may be at least partly genetic, based on its stability over acculturation, its presence in the one small adoption study in which it was assessed, and because Native Americans, who share common ancestry, show a similar pattern. But clearly, more and better evidence would be welcome, and some could easily be obtained (e.g., verbal-performance differences among U.S. Asian adoptees).

African-American and European-American differences appear to be something else. The results of the Moore study, the Eyfether study, and Witty and Jenkins do not appear to be genetic, nor do the two bloodgroup studies, although they may not have much power. The Scarr study suggests a genetic difference, on its face, although there is some confounding of variables. Is there an alternative explanation for the difference between the Black–Black and Black–White groups in this study? Well, one possibility lies in the prenatal environment provided by Black and White biological mothers. The Black–Black group, of course, all had Black mothers. In the Black–White group, virtually all of the birth mothers were White (66 of 68). Willerman and his colleagues found that in interracial couples it made a difference whether the mother was Black or White: The children obtained higher IQs if she was White. They suspected that this difference was due to the postnatal environment, but it could, of course, have been in the prenatal one.

U.S. Black children in general have Black birth mothers, and U.S. White children have White ones. Could this be part of the reason that there is a difference in their average IQs? It would certainly be premature to give a simple yes answer to this question. The results of the Moore study are on their face opposed, but are somewhat equivocal, because race was correlated with treatment in that study – 70% of the biracial children were placed in the White adoptive homes. As in Minnesota, the birth mothers of the biracial children were mostly White (Moore, 1980/81). Overall, there is about a five-point average IQ difference in favor of the biracial children, which is consistent with (some) genetic or prenatal effect. However, within the two adoptive categories the difference between Black and biracial children vanishes, which is consistent with an entirely postnatal effect. Because of the confounding, neither inference can confidently be drawn. And of course the 6 and 14 biracial children in this study are precariously small groups from which to draw any sweeping inferences.

So we are left with the usual conclusion: More research is needed. First, this research needs to pin down the extent to which the environmental contribution to the Black–White IQ difference is prenatal or postnatal. Then it needs to isolate the particular mechanisms involved. In this process, genetic differences should not be completely ignored. It is quite conceivable, for example, that they might be involved in interaction with environmental factors in creating a particular group difference even when they do not seem to have main effects. In one possible scenario, genetic differences in mothers may lead to prenatal environmental differences for their children.

Note that our tentative conclusion assigns different bases to different U.S. racial–ethnic IQ differences. For a contrasting view that places
Molecular Genetics and Group Differences

Attempts are currently being made to identify individual genes contributing to variation in behavioral characteristics, including intelligence (Petrill, et al. 1996). Such efforts are still at an early stage, but if they are successful, as they may well be at some point, this could have important implications for the study of group differences. If one had an array of genes known to be related to general intelligence within the groups in question, one could simply ask: Do these genes differ in frequency between the groups? If the answer is yes, one would conclude that the group difference had at least some genetic component.

Whether such a finding would be of any importance in a practical sense would depend on the usual sorts of considerations: How much of a difference are we talking about? What do we know about the operation of the particular genes involved? Do we know how to intervene in their functioning? Would we want to? At present, of course, these are purely hypothetical questions. For a complex trait such as intelligence they are likely to remain in this status for some time. If and when they change from hypothetical to real, the relations between individual and group differences outlined in this chapter will continue to apply.

Group Differences, Individual Differences, and Ethical Dilemmas

It should be clear from the discussion so far that knowledge of an individual’s membership in sex, racial, or occupational categories is not generally a good basis for drawing conclusions concerning his or her intellectual skills. If you need to know about these, give the person an appropriate test. Yet weak associations can be the basis of considerable economic advantage if one is selecting a few candidates from among many applicants (e.g., Lubinski & Humphreys, 1996).

To sharpen the issues, consider the case of sex differences in mathematical ability discussed earlier. Recall that small differences between boys and girls in means and variances, at a level that would make gender virtually useless in estimating the mathematical ability of a typical individual, can lead to marked disproportion at the extremes – the ratio of 13 boys to 1 girl in the top .01% of talent was mentioned. Suppose that one were searching for individuals at this level of mathematical talent. One could cut one’s search costs roughly in half by a simple expedient: Only consider boys. From the standpoint of economy and efficiency, this strategy would have much to commend it. But is it fair to the girls (few though they may be) who would automatically be excluded under such a strategy although they in fact are qualified? Efficiency and fairness are both virtues, but here they are in conflict. People differ in the extent to which they value one over the other, and such differences provide dilemmas for social policy. These are real, not spurious, dilemmas. Scientists cannot solve them; they lie in the domain of ethics, law, and politics. (If this example does not persuade you, try substituting Whites and Blacks for boys and girls).

The relationship between individual and group differences can produce several such dilemmas. One is that if a test used for selection is fair at the individual level, it will be unfair at the group level (Schmidt & Hunter, 1974). It is assumed that the groups in question differ in their average scores on the test and that the measurement is less than perfect and better than random. “Fair at the individual level” means that the decision for every individual has as small an error as possible – averaging over all individuals – and is not biased by his or her group membership. “Unfair at the group level” means that the proportion of individuals selected from the two groups will not be the same as the proportion of individuals actually qualified in the two groups – more will be selected from the higher-scoring group. Most people value both individual and group fairness, but they differ in the relative importance they assign to the two. Hence, such matters produce policy dilemmas.

These are not dilemmas that this chapter can resolve, for they involve issues of ethics and politics rather than the facts science can yield. But such facts can often be relevant to the feasibility of proposed solutions, and thus research on individual and group differences remains vital in a responsible and responsive society. Readers who wish to pursue such issues further might find of interest a special issue of the journal Intelligence (Gottfredson, 1997) on intelligence and social policy and an issue of the
journal *Psychology, Public Policy, and Law* (Lubinski, 1996) dealing with the applications of research on individual differences.

**GENERAL CONCLUSIONS**

Group differences, though accounting for less human variation than individual differences, still deserve attention. Different kinds of group differences may have different explanations in terms of their genetic and environmental origins: The four kinds discussed in this chapter — sex differences, rural–urban differences, occupational differences, racial–ethnic differences — all look quite distinctive at the level of mechanism.

Average group differences, on the scale of those observed for IQ and specialized cognitive skills, have little predictive power for individuals. Knowledge of whether a person is male or female, is African-, Asian-, or European-American, lives in the city or the country, or has a particular occupation, only very slightly reduces our uncertainty concerning his or her IQ. Stereotyping, the assumption that the members of such categories are much more homogeneous than they are, is simply a mark of ignorance regarding the facts. If one needs to make a decision about a person that involves his or her intellectual abilities, one will obtain *vastly* more accurate results by assessing these directly than by relying on group averages — even though no assessment can reduce errors to zero.

But it is also the case that moderate differences between two groups in average level on a trait can lead to considerable disproportion at the extremes; differences in variance may offset or exacerbate such disproportions. Genuine ethical dilemmas can arise in such cases. No amount of knowledge of the facts can remove such dilemmas, which involve conflicts in values. Nevertheless, a grasp of the facts can clarify the problem and focus attention on the critical issues to be resolved.

**REFERENCES**


