

Behavioral Genetics and the Social Psychology of Physical Characteristics

Todd R. Davies
Prepared for
Psychology 212: "Social Psychology"
Stanford University

June 8, 1987

The nature-nurture debate is surely among the oldest in behavioral science. The last decade in particular has been a period of intense investigation aimed at apportioning the responsibility for behavior among hereditary and environmental components. Very recently the results of eight years of twin research at the University of Minnesota have made headline news, even though these results have, for the most part, not yet appeared in the journals. The thrust of the reports on this study, and other similar ones on twins and adoptees that have appeared in the last ten years, is that the personality similarities that have been observed to hold between identical twins who have been reared apart (and between adoptees and their biological parents) establish with certainty that much of complex human behavior is determined genetically.

What exactly it means to say that "heredity has a greater influence on one's personality and behavior than either one's upbringing or the most crushing social pressure" (Lang, 1987) is not a subject that gets treated in the popular accounts of this work. Reading this research uncritically has led not just those who have reported on it but also the most towering figures of science to conclude that many aspects of people that we might seek

3 wow!

to modify through some social process—things like intelligence, criminal tendencies, and anti-social behavior—might be better handled by attending to genetic differences, and that inequalities among people are at every level a natural, biologically determined condition. No less a scientist than the Nobel laureate David Baltimore was recently quoted as saying, “You can no longer simply assume equality when you are able to easily demonstrate subtle differences between people at the genetic level” (Lang, 1987).

The purpose of this paper is to suggest that a body of literature within social psychology offers a clarifying perspective on the results of these behavioral genetic studies, and that when the studies are examined in this light it can be seen, not just that there are some limits to the inferences that can be drawn, but that, at least in their present form, they really provide no support at all for the conclusion that nature is more important than nurture in determining complex human behavior. The relevant social psychology literature concerns how personality and behavioral variables, in many cases the same ones under study in behavioral genetics, are affected by the social response to one’s physical characteristics. What this literature shows is that, to a surprising degree, the behavior patterns we exhibit are the result of a self-image and expectations others have of us that respond in turn to physical aspects of our being that we *know* are genetically determined—things like our sex, race, height, physique, and facial features. Unlike the twin and adoption studies, which are necessarily observational, these results are based on controlled experiments. The experimental data support an interactionist position that it is hopeless to try to separate the genetic and experiential determinants of behavior because the environment one experiences is partly determined by one’s genetic (physical) makeup. Part of the enthusiasm for the recent Minnesota twin study results is due to the fact that many of the data collected were for twins reared apart from birth or an early age. Studying twins reared apart is often considered methodologically “cleaner” than the more usual method of contrasting monozygotic (identical, or MZ) twins reared together with dizygotic (fraternal, or DZ) twins reared together. When twins are reared together, their physical similarity may cause their parents, teachers, and friends to treat them similarly due to the power of analogical inference, but when identical twins are reared apart, it is argued, there is no reason to expect the response they get from the environment to be any more similar than those

of fraternal twins or other children reared apart. Thus the one crucial assumption that is often challenged in studies of twins reared together, that MZ twins are not more likely to develop similarly than are DZ twins just because their parents treat them alike, is assumed to be guaranteed not to be violated in the case of twins reared apart, and so it is assumed that environmental similarities that bear on development will be no greater for MZ twins reared apart than for control subjects also reared apart. What the social psychology literature shows, quite plainly, is that this assumption is false. Physical similarity leads to more similar treatment from others, and this, as will be reviewed herein, has an important influence on personality.

It seems especially pertinent to review this evidence in light of the fact that so few in the behavioral genetics community seem to be aware of it and its relevance to their enterprise. The most prominent researchers continue to make misleading statements, like

“The evidence is so compelling that it is hard to understand how people could *not* believe in the strong influence of genetics on behavior” (David Lykken quoted in Lang, 1987),

and,

“Some people had built their careers on the assumption that heredity was not a key player in human behavior—they just could not separate scientific fact from political dogma” (Sarnoff Mednick quoted in Lang, 1987).

One completely aware of the mediating role of social conditions would say it differently. It is perfectly consistent with all of the twin and adoption studies done to date that what really happens is that genetics determines what we look like, how big we are, and so forth; that these characteristics make us subject to stereotypes, constrain our social options, and help form our self-images; and that these social and personal responses, which may vary across cultures and times, help to determine how we behave. This is very different from the direct inference that behavior is coded for in the genes—it causes us to focus on a different set of concerns, and seriously questions E. O. Wilson’s dictum that “Genes hold the culture on a leash” (Wilson, 1975).

This is amazing, isn't it?

Another reason for reviewing the social psychology evidence is that it bears on the person-situation debate. David Rowe (1987) has recently called for a merging of personality and behavioral genetics research to shore up the person side of the debate. The literature reviewed herein may indicate that personality researchers should proceed with caution in getting married to the genetic tradition. The message of this paper is not that environmentalism is right and that geneticism is wrong, but rather that the question is no more settled by this new evidence than it was before and that the issue is just a whole lot more complicated than most behavioral geneticists, sociobiologists, and the people who report these results appear to realize.

Some Conceptual Analysis

If two identical twins, reared apart, were both six feet five and weighed over 200 pounds in high school, we would not be surprised if they both turned out to be football players, and we would not infer that a preference for football playing was coded for in their genes. Rather, we would assume that since football is a sport that rewards size and strength, these twins were both drawn to it because they had the requisite physical characteristics. In this instance, it is not hard to see how a given behavior (football playing) can arise from the interaction of physical characteristics (size and strength) and an environment (American high schools) in which this behavior is encouraged of those with these physical characteristics. With other aspects of personality, it may be less clear how things we know are coded for genetically can interact with the environment to produce a behavior. One trait in humans that is often cited as highly heritable is that of person orientation, or extroversion. Increasing familiarity with the literature in personality and social psychology, together with some reflection, may make us quite unconfident in the "true" genetic character of this trait, however. William Sheldon's body typology, despite its limitations as a predictive theory of personality, did at least make it possible to correlate fairly closely the variables of physique and the extent to which people seek out others (Nordby & Hall, 1974). Armed with this and further evidence for the influence of physique on social behavior (Hood, 1963), one might begin to construct a story for how extroversion could be closely correlated with ge-

netic similarity. Roughly, one might say that a stronger, larger physique relative to those around one gives the individual a greater sense of self-confidence, and makes one less likely to withdraw due to domination by others, hence leading to greater extroversion. The difference between this perspective and the simple genetic version is that the view that extroversion is a genetic trait might lead us to conclude that genetic selection for this trait would lead to a greater percentage of extroverts in a society, whereas the interactionist position would predict that, since extroversion depends on physical characteristics *relative* to others, the amount of extroversion would stay more constant. A rather small, slightly built person who could be quite introverted in Western society might be quite extroverted in a society of pygmies. Furthermore, if other physical variables besides physique and height (attractiveness, say, or complexion) also influence extroversion through this social process, then these would compound the probability of similarity in extroversion in MZ twins since the twins share such a high percentage of physical characteristics. What is important in this example analysis is not the particular evidence in this case, but rather insights into the general effect that evidence from social psychology can have on our confidence in the heritability of a trait. The more physical dimensions are shown to be responded to differentially in a social setting, and the more behaviors these differential treatments can be shown to affect, the less we should be impressed that twin and adoption studies establish the heritability of traits beyond those already agreed to be genetically determined.

Not sure this really follows

A curious case in which a claim for genetic determination of a personality trait has been made is that of Mark Snyder's work on self-monitoring. He and Steve Gangestad recently proposed genetic encoding as a mechanism for generating discrete personality classes, and used self-monitoring as an example of a variable that appears, from their analyses, to be dichotomous rather than smoothly continuous (Gangestad & Snyder, 1985). There are several problems with their arguments. They are attempting to motivate, largely for an audience in personality psychology, the view that some personality variables may have a discrete character. But even granting that some trait dimensions may show clustering around different points, it does not follow that the trait is coded for genetically. It could arise, for example, from conditions in the environment that respond to physical variables, many of which seem to be distributed in clusters. Specifically, their

explanation for the etiology of self-monitoring is the following:

“Although class determination cannot be so simple as to be traceable to a single Mendelian gene, it is possible that it corresponds to a threshold character or an epistatic configuration of alleles at independently segregating sites. A second possibility is that the class variable corresponds to distinct behavioral strategies acquired by children (perhaps at some critical age) in response to parenting styles, peer pressures, sibling relationships, or in a combination of these and environmental events. Adoption of one of two strategies may be sensitive to a threshold on some specific environmental parameter, such as amount of attention received from caretakers. More specifically, perhaps children who received little attention from their caretakers adopt a strategy designed to gain the attention and regard of others—a high self-monitoring strategy. Finally, the specific etiology may involve a combination of environmental and genetic factors. Perhaps adoption of one of two strategies is sensitive to a threshold on a specific environmental parameter, but the threshold varies across individuals and is largely genetically determined” (Gangestad & Snyder, 1985).

Gangestad and Snyder go on to cite a twin study (Dworkin, 1978) that showed smaller variance on self-monitoring among MZ than among DZ twins, and conclude that the first explanation, placing most of the responsibility on genetics, is probably the closest to being right. But each of the explanations they propose has the character that there are these separable components, a genetic one involving the encoding of some threshold, and an environmental one involving how much attention one receives; and the only difference between the explanations seems to be the relative importance of these components. Nowhere is mentioned the possibility that the components may not be independent, that far from there being some allele configuration encoding one of a few possible thresholds for self-monitoring, genes just encode physical characteristics, and that these are mediated by a social response to produce the trait. Self-monitoring bears many similarities to Machiavellianism, which has been shown to be affected by physical attractiveness (Singer, 1964), and once one begins to think in terms of pos-

sible social explanations, the thought that the self-monitoring behavior is coded for in some genetic configuration begins to sound ludicrous. For one thing, the sheer informational complexity in coding for such a complex behavior pattern conditioned on some environmental inputs makes the genetic view implausible, as much so as the sociobiologists' idea that genes are willing agents of their own preservation who "scheme and plan" (Stephen Jay Gould, opposing the selfish gene tenet, quoted in Lang, 1987). Occam's razor dictates that the simpler explanation, that genes code for physical characteristics that interact with the environment (and help to determine it), and that at least the more complex forms of behavior are a response to this partially genetically-determined environment, should be preferred to the idea that genes contain a program that dictates complex behaviors in response to such a wide variety of contingencies as those faced by human beings in their everyday lives. It is particularly surprising that the possible effects of physical characteristics on an environment that produces self-monitoring would not be mentioned even once in a paper co-authored by Mark Snyder, since he is in other capacities the leader among experimentalists who have demonstrated that the differential treatment received according to physical characteristics can lead to self-fulfilling stereotypes and "behavioral confirmation" (Snyder, Tanke, & Berscheid, 1977). It would be interesting to know whether this apparent ignoring of his own work is the result of oversight or of insight.

Good point.

Because the communities of behavioral genetics and social psychology are quite distinct, researchers in the two fields seldom cite each other. Nonetheless, the relevance of research in the social psychology of physical characteristics to inferences drawn from twin and adoption studies seems to argue for a review of both literatures, to see what traits and behaviors are being studied in both fields and how the fields might relate. The survey herein emphasizes work done in the last ten years, in both fields, and begins with studies from behavioral genetics.

Studies of Behavioral Heritability

The primary methods used in studying behavioral genetics involve collecting data from twins and adoptees. In the case of adoptees, the adopted

children are usually compared with their biological and adoptive parents (and, sometimes, their biological and adoptive siblings). Twin studies usually compare MZ and DZ twins, reared together or apart. Heritability estimates are usually squared correlation coefficients (proportion of variance explained by the common genetic background), though sometimes the comparisons are given in terms of strict correlation. Of the two types of twin studies, ones in which the subjects were reared together are more common since the study of twins reared apart requires a great deal of effort in locating enough subjects. In linear models, the variance is usually apportioned between a genetic component G, a component CE representing the environmental influences common to the related persons being compared, and a component SE of "specific within-family environmental influences such as differential treatment of sibs, birth order, idiosyncratic effects as well as error variance due to unreliability of measurement" (Henderson, 1982). What follows is a survey of the major studies that have been done over the last ten years on inheritance of personal traits and intelligence. More complete overviews of the methodology and theory of behavioral genetics may be found in Henderson (1982), Fuller & Thompson (1978), Vandenberg (1968), McLearn & DeFries (1973), Nance (1978), and Gedda, Parisi, & Nance (1981).

Twins—Reared Together

A study of humor preferences by Wilson, Rust, & Kasriel (1977) concluded that the environmental components were more important than the genetic for determining appreciation of most kinds of humor, with the exception of aggressive humor. Other studies have found larger effects attributed to the genetic component for other traits. For example, Eaves, Martin, & Eysenck (1977) concluded that a genetic component is operative in the trait of impulsiveness, and Rushton, Fulker, Neale, Blizard, & Eysenck (1984) attributed 50 per cent of the variance in measures of altruism to genetic effects, with CE and SE values of 0 and 50 per cent, respectively. A twin study on same-sex infants found a statistically higher similarity among MZ than DZ twins for three of a set of nine temperamental variables¹ at two

¹The variables were activity level, rhythmicity, approach-withdrawl, adaptability, intensity, threshold, mood, distractability, and attention span/persistence.

months, and for all of the variables at nine months (Torgersen & Kringlen, 1979). Other studies that have concluded that higher similarity holds for MZ than for DZ twins include that of Matheny, Wilson, Dolan, & Krantz (1982), which found higher degrees of intrapair similarity from mothers' ratings of aspects of emotionality and sociability over the first six years of life; along the same lines a study by Matthews et. al. (1984) that correlated the extent of self-reported Type A (coronary prone) behaviors in adult MZ and DZ twins and concluded there is further evidence for heritability of emotionality; and work by Clifford, Murray, & Fulker (1984) that argued that while hereditary effects are outweighed by environmental ones in determining obsessional behavior, liability to neurotic breakdown is influenced by hereditarily determined personality characteristics.

The literature is replete with examples of proposed statistical models (see for example that of Heath & Eaves, 1985, on how to resolve the effects of genetic and environmental factors on mate selection), in addition to the ones employed in the above list of studies, in which the genetic component is identified with that component of behavioral concordance that is associated with similar gene structure. But as is argued above, this is misleading because similar gene structure can influence how similar the twins are treated, and nothing has been found in the present survey of these studies to refute the claim that in fact *all* of the increment in personality similarity in MZ twins over that of DZ twins is due to greater similarity in their environments induced by physical characteristics. Since the equal environments assumption is so crucial to the method of studying twins reared together, and since an awareness of some ways in which it can be violated has been more prevalent with these studies than in the reared-apart condition, there have been some attempts to justify the assumption in the literature, but there is evidence on both sides of the equal environments assumption for twins reared together, the balance of which seems to weigh against it. Steven Vandenberg (1984) showed that similarity along some personality dimensions was not correlated with how "close" the twins were perceived to be; however, an inspection of his questionnaire reveals that none of the items tested-for included similar physical characteristics. Scarr & Carter-Saltzman (1979), on the other hand, did study the effects of physical similarity on cognitive test scores and found evidence for what they call "a negligible amount of bias in perceived and physical similar-

This is a 3-page paragraph. It would be easier on the reader if you broke the argument down into smaller units.

ity creating greater cognitive similarity among MZ twins.” They did not find significant correlations between physical appearance similarity ratings and cognitive scores in DZ twins, when zygosity (true genetic similarity) was adjusted for, but there was some indication that DZ twins who misperceived themselves to be MZ twins (these misperceivers tended to be of more similar zygosity than other DZ twins) were more likely to exhibit positive correlations of cognitive scores with physical similarity. These data, taken alone, seem to say that true zygosity is a better predictor of personality similarity than is perceived physical similarity. But other data throw a wrinkle into this conclusion. The studies of twins reared apart (see next subsection) show that several personality scores for MZ twins reared apart are more highly correlated than those for MZ twins reared together, one explanation for which is that, living in the same family, identical twins exhibit some tendency to distinguish themselves from each other, so that the lack of correlation between perceived similarity and cognitive ability for MZ twins reared together may reflect that what would be a positive correlation is squashed by the element of pressure towards distinctiveness. From the fact that this one dimension does not respond particularly well to the perceived similarity within the classes MZ and DZ, it does not follow that the difference in personality between the classes is not primarily due to differences in *their* perceived similarity. None of these studies addresses this. In fact, the tendency for perceived zygosity to influence personality similarity may indicate that between, though not within, the two classes the difference in scores on this variable is due to the difference in physical (as measured by perceived) similarity. In any case, a potentially more powerful study done by Horn, Matthews, & Rosenman (1981) lends strong support to the hypothesis that physical appearance differences, and not differences in zygosity, are responsible for personality differences in similarity between MZ and DZ twins. They applied analysis of bloodgroup differences as a measure of zygosity in DZ twins and found, for 18 California Personality Inventory (CPI) scales and value orientation, an “absence of any correlation between personality and genetic similarity (as judged by bloodgroup data), coupled with a significant correlation between personality and physical appearance²,” which “may mean that the personalities of MZ twins are

This seems like a point you really ought to want to highlight.

²Physical traits: height, eye color, hair color, hair type, baldness, site of baldness,

more alike than the personalities of DZ twins for nongenetic reasons.” The researchers point out that there was one of the personality variables (extroversion) that showed a tendency (though not significant) towards positive correlation with bloodgroup data (0.100, compared with 0.254 and 0.212 for the difference in CPI and value orientation scores, respectively, with difference in physical traits, $p < .05$)³, and of course cognitive ability, if it had been measured, might also have shown such a tendency. Nonetheless, the researchers seem quite justified in saying, “These results point to what may be a problem in the application of the twin method to the study of personality.” In addition, they cite a similar result reported in Carter-Saltzman & Scarr-Salapatek (1975) reporting “that neither cognitive nor personality measures were consistently related to bloodgroup differences in their sample of DZ twins” (Horn, Matthews, & Rosenman, 1981). The researchers also point out that the fact that their measures “concentrated on various aspects of the head and face may have been responsible for the emergence of the significant correlation between physical appearance and personality,” whereas the Scarr & Carter-Saltzman (1979) study used physical measures like height, weight, and stature, and yes-no questions asking whether the twins looked alike, dressed alike, and were frequently mistaken for each other. Horn et. al. report picking “traits that, in our judgment, are used frequently in everyday life to distinguish individuals from one another,” so it may be that the failure to significantly relate physical appearance similarity and cognitive similarity in the later Scarr & Carter-Saltzman was due to their not identifying the right measure of physical similarity that accounts for the difference in cognitive scores. On balance, the presence of significant results in the Horn et. al. study, as opposed to the absence of disconfirming evidence on environmental similarity in the later Scarr & Carter-Saltzman data, together with the absence of confirming evidence in the earlier Carter-Saltzman & Scarr-Salapatek data, tips the scales against the equal environments assumption and in favor of the hypothesis that personality similarities result from physical appearance similarities. In the words of Horn et. al., “if physical traits determine a person’s social-stimulus value for others, and thereby exert some control over social learning ex-

handedness

³The CPI-bloodgroup correlation was -0.045. For value orientation and bloodgroup it was 0.010. And for extroversion and physical traits it was 0.014

Would want results for phenetic differences measured from nuclear + mitochondrial DNA

periences, it seems reasonable to question the appropriateness of basing heritability estimates on comparisons of MZ and DZ twins."

Twins—Reared (or Living) Apart

The Minnesota study of twins reared apart began in 1979, and has been the first of its kind in the United States in 40 years, partly due to the exotic nature of this research, and perhaps partly due to the sensitive nature of the topic. Preliminary reports and results from the study already were indicating high heritability for personality traits, including very complex behaviors and preferences (Holden, 1980; Lykken, 1982). A slightly different type of study, "of twins who, though reared together, have subsequently lived apart for a period of at least 5 years," was initially described in Gedda & Brenci (1983) prior to the release of any results. The other major ongoing study of twins reared apart is in Finland, the results of which have confirmed research in the reared-together paradigm that the environment outweighs genetic factors in determining neuroticism (Koskenvuo, Langinvainio, Kaprio, & Sarna, 1984), and that MZ twins reared apart are more similar in some traits than are twins reared together (Langinvainio, Kaprio, Koskenvuo, & Lonnqvist, 1984). The most important result in these studies was that the heritability estimates were quite low compared to previous studies of extroversion and neuroticism by Shields (1962). The researchers curiously speculate that "the environmental source of variance may be greater in Finland" (Langinvainio et. al., 1984).

Data have been coming out of the Minnesota project gradually over the last eight years, e.g., McGue, Bouchard, Lykken, & Feuer, 1984, which presents evidence for a significant correlation between MZ twins for speed-of-response as an information processing ability. Many of the data that have been reported in the popular press are anecdotal, so a more complete appraisal of the study will not be possible until it is fully documented.

Nothing substantial has been found in the present literature search that addresses the question of the effects of physical similarity on environment similarity for twins reared apart. The one paper that is known to have been written on a related issue was that of Thomas Bouchard (1983), which employs a measure of dissimilarity of environments on twins reared apart and finds insignificant effects on intelligence quotient (IQ). But this work

looks at environmental similarity at a fairly superficial level; in particular it does not test for environmental similarities that might have arisen from similarities in physical characteristics of the twins, and as such appears to ignore the relevant alternative explanation of the data.

Adopted Children

Many of the studies of adoptees over the last ten years, as before, have been studies of intelligence. The results present a very mixed picture. On the one hand, there are studies like that of Scarr & Weinberg (1978), which concludes that genetic differences dominate the family environment in determining IQ, and of Scarr & Yee (1980), which concludes that IQ is highly heritable, but that achievement scores are not. Other studies indicate that IQ is more malleable than had been previously thought (Scarr & Weinberg, 1977) and that its heritability is only moderate (Horn, Loehlin, & Willerman, 1979). Still others, like the later Texas Adoption Study (Horn, 1983), have been very hesitant to say anything. In this latter case, the researcher concludes that IQ resemblance to biological parents is greater than to adoptive parents in adoptees, but that the effect decreases after age 10, despite other studies that say the trend is the opposite (more heritability) with age. A recent overview (Plomin & DeFries, 1981) concludes that recent data "point to less heritable influence on IQ than is indicated by the widely cited older data." Many of the overestimates may have been due to methodological flaws in the earlier studies, and of course there is the well-known scandal of doctored data in the work of Cyril Burt. The most ambitious study of cognitive ability and intelligence on adopted children in this decade has been the Colorado Adoption Study (Plomin & DeFries, 1983; Baker, DeFries, & Fulker, 1983).

A second strain of research in the literature on adoptees involves the study of antisocial behavior, alcoholism, and criminality. Evidence correlating antisocial behavior in adoptees separated at birth from their biological parents with that of the biological parents themselves appears in Cadoret (1978). Since antisocial behavior is highly correlated with alcohol consumption, it is worth investigating whether this is the cause. Cloninger, Bohman, & Sigvardson (1981) concluded that the most common type of susceptibility to alcoholism is not highly heritable, though the less common type is.

Cadore & Cain (1981) presented evidence that antisocial or mentally retarded biological parents predict adolescent antisocial behavior in adoptees, and in a similar vein Horn (1983) showed that, depending on whether alcoholism is present, criminality shows familial patterns. Evidence for the effect that a discontinuous mothering experience in infancy can have on antisocial behavior in adolescence (Cadoret & Cain, 1981) may suggest that antisocial parents could subject their children to a more harrowing adoption experience, and that this could account for the apparent heritability, but in any case there is important evidence that low physical attractiveness contributes to criminality (Bull, 1982). Despite this, Gabrielli & Mednick (1983) in their strong statement in favor of heritability of criminal tendencies, never mention the data on physical attractiveness in their paper as a possible explanation for their findings.

Adoption studies appear to be becoming more popular for the study of general personality. One argument in favor of this type of study is that it provides more conservative estimates of heritability than do twin studies. For example, Scarr, Webber, Weinberg, & Wittig (1981) assessed adoptees for extroversion and neuroticism, and concluded that "estimated heritabilities for the personality measures were much lower than those obtained in studies of identical and fraternal twins, which suggests that twin studies have exaggerated the degree of genetic variation in personality." Other studies have also found small correlations for personality in adopted children studies (e.g., that of Loehlin, Horn, & Willerman, 1981) and a preponderance of the variance in personality being due to within-family environmental or non-additive genetic (specific to the individual) differences (Loehlin, Willerman, & Horn, 1985), although the former study did find higher heritability ratings (e.g., for extroversion) for a well-measured subgroup.

In general, the objections to twin studies based on the effects of physical characteristics on the environment hold as well for adoptee studies, since physical appearance is partly the result of parental genes. But the more modest results achieved in adoptee studies make it less likely that they will be blown out of proportion in accounts that influence policy.

Social and Personality Consequences of Physical Characteristics

While the analysis presented thus far argues strongly for the possibility that the hereditary component identified in twin and adoption studies is really a component of environmental difference determined by physical characteristics, it does not detail the mechanisms by which physical characteristics can feed back on one's behavior in response to a social environment. Just what physical variables can affect, and how, is the subject of much research in social psychology to which we now turn.

Physical Attractiveness

A good deal of literature has established that physical attractiveness is responded to differentially in a social setting, and that it can affect one's behavior and success at various endeavors. Overviews of the attractiveness literature can be found in Adams (1977), who explores the relations of attractiveness to stereotyping, social exchange, personality patterns, and social behavior; Kalick (1978), who reviews the evidence that an attractive appearance has pervasive advantages in life; Cash (1981), who provides an annotated bibliography of the subject; Hjørland (1982), who is critical of much of the work; Snyder, Tanke, & Berscheid (1977) who claim that the literature supports the assertion that "attractive persons are perceived to have virtually every character trait that is socially desirable to the perceiver"; and Berscheid & Walster (1974), who enumerate the benefits of attractiveness thusly: "Physically attractive people, for example, were perceived to be more sexually warm and responsive, sensitive, kind, interesting, strong, poised, modest, sociable, and outgoing than persons of lesser physical attractiveness" (quoted in Snyder, Tanke, & Berscheid, 1977).

The effects of attractiveness apparently begin in infancy. Hildebrandt & Fitzgerald (1983) show how it may affect bonding in the earliest years. Work with older children also shows its importance. David Zakin (1983) gave third and eighth graders pictures and descriptions of other children, and found that attractiveness was more important for friendship choices than athletic ability or sociability in both sexes and age groups. That the

effect may abate somewhat once children get to know each other is supported by Krantz, Friedberg, & Andrews (1985), who found a moderate relationship between objective attractiveness and popularity in third and fifth graders. Data from Felson & Bohrnstedt (1979) also ran somewhat counter to that of Zakin, indicating that in grades six through eight, perceptions of athletic and academic ability "affect those of physical attractiveness but not vice versa," but they offer that "the role of the relative ambiguity of stimuli associated with physical attractiveness compared to ability is advanced as an explanation of the findings," and acknowledge that "the bulk of experimental research has supported the position that physical attractiveness is important in impression formation." Comments on this work can be found in Campbell (1979). There is evidence that some teachers discriminate against unattractive children in grading (Felson, 1980).

A number of studies have demonstrated the effects of both objective and self-rated attractiveness on attitudes. For example, Abbott & Sebastian (1981) correlated both self- and observer- ratings of attractiveness with success expectations in undergraduate women. Cash & Smith (1982) showed that objective attractiveness is related to self-perceived androgyny, internality, success expectancies, lower anxiety, and depression among males. At least two recent studies have established that attractive women can induce shyness in others. Bernstein, Stephenson, Snyder, & Wicklund (1983) found that males were less likely to approach attractive females unless another reason for affiliative behavior could be found, and Alain (1985) found that female subjects asked for help significantly less from a fictitiously paired attractive (vs. unattractive) female co-worker. The former paper also mentions that people tend to discount physical attractiveness as a cause of social behavior.

A number of studies have looked at the effects of physical attractiveness on interpersonal attraction itself. In addition to those cited above on children, Kleck, Richardson, & Ronald (1974) found effects of physical appearance cues on interpersonal attraction on children. Stroebe, Insko, Thompson, & Layton (1971) found effects on interpersonal attraction in adults. Green, Buchanan, & Heuer (1984) presented evidence that physical attractiveness is important in video dating choices, that both sexes prefer attractive partners. There has been a debate in the field about whether romantic attraction is monotonic in attractiveness of the other or whether

the matching hypothesis, that men and women of similar attractiveness are drawn to each other, might describe reality better. A new way of examining the matching hypothesis appears in Kalick & Hamilton (1986), who found that a computer simulation in which "subjects" were to seek to maximize the attractiveness of their mate produced a significant intracouple attractiveness correlation "in the upper range of those reported in actual studies of existing couples." As noted above, attractiveness can have a significant impact on success expectancies. Other literature seems to say that this may reflect reality all too well. Studies by Blouin et. al. (1982), Gilmore, Beehr, & Love (1986), and Cash & Kilcullen (1985) demonstrate that attractiveness can have an important impact on employment decisions, even under controlled experimental conditions in which resumes and pictures are shuffled. Dickey-Bryant, Lautenschlager, Mendoza, & Abrahams (1986) suggest that their data on the long term effects (and an absence of short-term effects) of attractiveness on performance at a military service academy show that "organizations can foster stereotypes". The effects of attractiveness on a number of other variables have been explored, including which political party one is perceived as belonging to (Johnson, 1985), personality style (Krebs & Adinolfi, 1975), Machiavellianism (Singer, 1964), marriage (Murstein, 1972), and ability to induce opinion change (Mills & Aronson, 1965).

Other Physical Variables

Besides attractiveness, many other physical variables have been studied to determine what effects they may have on personality, behavior, and one's image with others. Some studies have looked at the effects of multiple variables, e.g. Harrison, Gison, & Hiorns (1976), who found significant levels of assortativity in marriage for stature, weight, and other bodily dimensions, in addition to IQ, and also that length of courtship and distance of residences were inconsequential as predictors of marriage in Oxfordshire villages. Mazur, Mazur, & Keating (1984) found relationships between facial appearance, height, athletic physique, and social mobility at West Point.

Other studies have focused more narrowly on the effects of a variable. For instance, Bosse et. al. (1976) found that subjects showed some pref-

erence for people with healthy skin in evaluations of social and erotic attractiveness, status in work settings, and intelligence. Hirokane & Yoshida (1984) did experiments that pointed to the face (in males) and the voice (in females) as the most dominant cues in impression formation. Some especially interesting work by Paulhus & Martin (1986) showed correlations between minor physical anomalies⁴ and clumsiness, emotionality, extroversion, masculinity, femininity, and Type A personality in adults. The possible explanations they offer in the discussion are exclusively biological (genetic and congenital), yet as they point out it is "only the overall count of MPA's, not any individual anomaly" that is predictive of personality. This leads Paulhus & Martin to prefer a congenital explanation rather than one in terms of genetic markers. In other words, they hypothesize that factors influencing development during pregnancy (like exposure to synthetic hormones) and other embryological events are what affect temperament. In either case, the true cause of temperamental differences in these subjects could be an environment and self-concept that respond to the MPA's, whether they themselves are genetic or congenital. The researchers do not discuss this possibility. A series of papers in the late 1950s dealt with the effects on behavior of yet another variable with genetic causes, namely ages of maturation (Jones, 1957; Jones & Mussen, 1958; Mussen & Jones, 1957; 1958).

Several researchers have investigated the effects of gross physical characteristics (height, weight, and physique) on personality, assessments by others, and behavior. For example, Monnelly, Hartl, & Elderkin (1983) found that femininity of body type (gynemorph) was a strong predictor of alcoholism in males, and that parental alcoholism entered only in the secondary regression analysis. A more directly social study was done by Litman, Powell, & Stewart (1983) who found that small differences in body build lead to large differences in attributions by others, so that stereotypes are what they call "fine grained". Other, earlier work on physique includes that of Hood (1963) and, of course, William Seldon (Nordby & Hall, 1974).

⁴The 17 standard MPA's of the head, face, hands, and feet are asymmetrical ears, soft and pliable ears, malformed ears, attached earlobes, ocular hypertelorism (widely spaced eyes), low-seated ears, multiple hair whorls, atypical head circumference, single palmar creases, webbed toes, large 1-2 toe gap, furrowed tongue, smooth-rough tongue, epicanthus, curved fifth finger, long third toe, and steeped palate.

That gross physical characteristics can have an effect on others' judgments at an early age was demonstrated by White, Mauro, & Spindler (1985), who found that Canadian preschoolers are primed to notice differences in body-weight type, and to use it as a dimension to categorize peers. Some effects of physical variables on self-concept were demonstrated by Pang, Mizokawa, Morishima, & Olstad (1985), who found that Japanese-American children show self-concept sensitivity for flat noses and small stature. "It is suggested," they write, "that Japanese-American subjects demonstrated an unhappiness with a part of themselves that could have ramifications in their careers and personal development." Earlier studies on the effects of height on social judgments, and vice versa, include those of Koulack & Tuthill (1972), Dannenmaier & Thumin (1964), and Feldman (1971).

Self-Image and Self-Perception

In addition to studies that investigate direct effects of physical variables on behavior, a good deal of work has been done on the breakdown between the effects of objectively measured physical characteristics on one's self-image with respect to them (e.g., self-perception and body images), and the effects of self-image and self-concept on behavior. The literature seems to speak with one voice on the latter topic, with evidence pointing toward the importance of having a positive self-image with regard to physical characteristics. Richard Robertiello (1976) relates evidence that having a poor body image can lead to seeking objectively attractive mates. On the positive side, Gerhard Vagt (1979) presented evidence that considering one's self attractive improves social adjustment and lessens overall problems for ninth graders. A more sweeping statement has been made by Larry Tucker (1984), whose statistical analyses indicated that "male personality is partly a function of the body build perceived as self, the image viewed as ideal, and whether a discrepancy exists between the figures perceived as self and ideal."

The effects of physical variables on self-perception and self-image are somewhat less clear, although the evidence points to some definite effects. Marie Lawson (1980) found that second, fourth, and sixth graders held strong body-type stereotypes, but did not apply them to classmates or their own self-esteem. Explanations offered included the youth of the sam-

ple (stereotypes increased with age in this study) and familiarity with classmates. The literature on the relation between objective and self-ratings of attractiveness and self-image points to a positive relationship, with some hedges. Rand & Hall (1983) found high accuracy of self-ratings of attractiveness for females, but low for males. Pittenger & Baskett (1984) found a significant positive correlation between self and observer attractiveness ratings, but they failed to find a significant correlation between self-concept scores (using the Tennessee Self-Concept Scale) and the attractiveness ratings by others, and "only a limited relationship between self-concept and self-perception". The failure to find significant relationships can in general be misleading if the effect size expected in the first place was not large enough to result in significance for the amount of testing done. There are other, more affirmative conclusions on the question of whether objective attractiveness and self-image are importantly related. One comes from work by Zakin, Blyth, & Simmons (1984), whose evidence indicated that attractive pubertal girls exhibit lower self-esteem during development "because their self-image is more intimately connected with their physical appearance" than is that of less attractive girls. More generally, Richard Felson (1985) studied students of both sexes in fourth through eighth grades and found that "reflected appraisals of peers are an important source of self-appraisals of physical attractiveness." Another study that demonstrates the effects of a manipulation of appearance on self-perception and self-image is that of Kellerman & Laird (1982), who found that eyeglass wearing, in a random assignment and controlled test, increased self-ratings of stability, scholarliness, and competence, indicating that aspects of appearance especially associated with particular traits may have some influence on self-perception of those traits.

It is worth emphasizing that explaining behavioral choices and personality as effects of the social response to one's appearance does not require showing that subjects be aware of the differential effects on their environment caused by their physical characteristics, or even that these differences show up in self-image or self-concept scores. To the extent that behavior is affected by what one is encouraged to do (or discouraged from doing) as a result of one's appearance, it need not be the case that self-concept scores differ among subjects who are differentially affected on this basis. Nonetheless, the evidence that does exist, and that has been reviewed above, for

a positive chain from physical variables, through self-image, to behavior, gives some credence to this mechanism for explaining some of the effects of physical characteristics. The mechanism is often proposed as an explanation in the literature. For instance, Lina Zahr (1985) found a high (0.48) correlation between objective attractiveness and school performance (GPAs) in Lebanese school children, and concluded that this may reflect greater self-esteem on the part of attractive children.

Self-Fulfilling Prophecies and Behavioral Confirmation

Related to evidence about the mediating role of self-image and self-perception in determining behavior are the hypotheses of self-fulfilling prophecies and behavioral confirmation as mechanisms by which physical characteristics can feed back on behavior. Early work on the self-fulfilling prophecy appeared in Merton (1948). Much of the work in the last decade has been done by Mark Snyder and his colleagues, who have in particular applied the idea of self-fulfilling prophecies and behavioral confirmation to attractiveness and its effects (Snyder, Tanke, & Berscheid, 1977; Tanke, 1977). Snyder, Tanke, & Berscheid showed that subjects who were perceived to be attractive in a controlled experiment came to act more friendly and in a more likable manner. Carlos Sluzki (1976) found the "Latin lover" stereotype to be "a model of the self-fulfilling prophecy". In particular, he postulates the following ingredients that go into producing Latin lovers:

"(a) The 'neutral' face-to-face distance for Latins is similar to the 'seductive' face-to-face distance of non-Latins. (b) Non-Latins do not detect the influence of their own cultural stereotype, the Latin lover, in their perception of the other's behavior. (c) If the non-Latin chooses to contribute his/her share of seductive behavior, he/she will label that performance as a 'response' to the message attributed to the Latin. (d) The Latin, in turn, is forced by the pressures of his own cultural stereotypes to respond to a seductive advance with more seductive behavior; he labels his own behavior as a 'response' to uncalled-for behavior on the part of the non-Latin" (Sluzki, 1976).

Similarly, the self-fulfilling nature of sex differences in behavior is explored in Zanna (1975).

Some more recent work has been done to support the hypothesis that stereotypes can be self-fulfilling through a process of behavioral confirmation. For instance, Richard Lerner (1982) reported studies indicating that "children and adolescents may promote their own development as a consequence of their characteristics of physical and behavioral individuality," and that "these characteristics allow people to promote differential reactions in their relationships with others (e.g., parents, teachers, or peers); these reactions feed back, thus affecting further development." His studies "focused on characteristics of physical individuality, such as body type and physical attractiveness, and on characteristics of behavioral individuality, such as behavioral style or temperament." A few years later, Buse & Pawlik (1984) showed that among 19 to 24 year old military recruits, subject's reports of their self-attributed personality traits were influenced by their beliefs in a typology that associates their physique with these traits. These data, of course, could also have appeared under the "Self-Image and Self-Perception" subsection since they indicate how self-perceptions can come about as a result of physical characteristics, but the data also say that how strongly one has come to believe in the typology is important in determining how likely it is that one's self-perceptions conform to it. The work on behavioral confirmation and self-fulfilling prophecies generally gives one a finer grained understanding of how physical variables can affect behavior than does work that just relates these variables to self-perception and self-image, because it focuses on the interchange between the person and the situation. That this interchange is more complicated than was perhaps first envisioned by those working in this area is something that is now broadly acknowledged, and the more recent consensus seems to be that a moderate position on behavioral confirmation, taking into account that expectations are held by both the person in question and those with whom he or she interacts, is more appropriate.⁵

⁵This was pointed out to me by Elizabeth Newton.

Problems in Inferring Heritability

The reviews of behavioral genetics and of the social psychology of physical characteristics given herein allows us to identify some serious and quite general problems that twin and adoption researchers must face before they can make any strong claims about the heritability of complex behavior patterns. The major problems are described below.

Influence of Physical Characteristics on Environment

Genetic causes of behavior and effects of the environment that respond to physical characteristics are confounded in all but a few of the twin and adoption studies reported over the last ten years. The exceptions to this are studies comparing the predictiveness, for personality, of bloodgroup data and genetic similarity with that of physical appearance similarity. Overall, this latter group of studies, if anything, support the explanation in terms of physical appearance and characteristics rather than a genetic one, but one would hardly guess it by reading the claims coming out of the twin studies, since in these it is apparently taken for granted that the increment in correlation of traits from DZ to MZ twins is due (especially in the case of twins reared apart) *entirely* to the genetic causes of personality traits. Seldom if ever is the genetic cause of a behavior assumed only to be relative to a given culture, or the result of inducing a similar environment, or the result of prejudice, stereotyping, self-fulfilling prophecies, or the constraining influence that one's physical characteristics have on one's options.

The review of the social psychological evidence reveals a large number of established, causal relations between physical characteristics and personality traits. This, together with the facts that MZ twins are more likely to be similar on each of these physical variables than are DZ twins, and that adopted children are more likely to be similar to their biological parents than to their adoptive parents on these dimensions, leads one to the possibility that in fact all of the increment in personality similarity in these studies is the result of the greater physical similarity creating a more similar self-view, social context, and options. If each of the physical variables can be shown individually to contribute to behavior, as indeed they each have, then the compounding effect of having *all* of them be similar in MZ twins

could lead to such similarity in social interaction that it would be surprising if very similar interests, personality, and behavior did *not* emerge in the twins. The same argument can be made, to a lesser extent, for adoptees and their biological parents, but since the estimates for heritability in adoption studies are substantially lower than in twin studies (Scarr, Webber, Weinberg, & Wittig, 1981), there is less similarity difference to explain between adoptees and their biological versus their adoptive parents. The higher heritability estimates in twin studies could be the result of physical characteristics having an interactive, super-additive effect on development, so that the expected personality similarity, when two physical characteristics that are attended to as a pair are both shared, would be greater than just the sum of the expected similarity increments from each characteristic alone. In any case, the empirical result stands, that adoption studies provide the more conservative estimates of heritability.

How would adoption studies have to be modified to control for physical appearance similarity in measuring personality similarity? One way would be to regress personality similarity on both genetic (bloodgroup) similarity and physical similarity and to see which has predictive power. This would be the analogue in the adoptee domain of the Horn, Matthews, & Rosenman (1981) study on DZ twins, which found no significant correlations between bloodgroup differences and any of the personality scores they measured, and significant correlations between physical trait differences and all personality variable differences except extroversion. The prediction would be that a similar result would hold for adoptees. Although this method seems to have the potential to disprove the geneticist position, it would be very difficult for it to have the opposite effect, that of soundly establishing geneticism for complex behavior patterns. The reasons are (1) that higher correlations between bloodgroup and personality than between physical traits and personality could just reflect the effects of physical characteristics more likely to be similar in cases of high genetic similarity but not included in the physical trait measures, and (2) that an exhaustive circumscription of physical traits that might affect personality is very hard to elicit. A partial list of the physical characteristics with some genetic basis that might interact with and affect the environment includes sex (the one variable usually controlled for in twin and adoption studies), race, physique, maturation (early/late), stature, strength, saliva secretion, tear flow, over-

indeed

all physical attractiveness, eyesight, hearing ability, agility, circadian cycles, genetic defects, brain dominance (cerebral, lateral, ocular), sense of smell, ethnic group, sense of taste, fertility, voice characteristics, skin tone, complexion, hormone levels, menstrual cycle, metabolic characteristics, specific appearance characteristics (eye color, hair color, musculature, minor physical anomalies, and a long list of facial and other features), and posture. Of course, there is a lot of overlap in the information contained in these variables, but it seems reasonable to hypothesize that facial features, for instance, could individually have additive effects, and that sets of them could have interactive effects, in addition to an effect for the gestalt of overall attractiveness.

Embeddedness in a Shared Culture

A geneticist might argue that the complaint about the confounding effects of genetic encoding and feedback from physical characteristics is really just one of terminology. For whether the impact of genetics on behavior is direct or indirect, the argument might go, the fact of its presence does not change. If the dispute is indeed just one of terminology, it still seems nonetheless to be one of substance. In the indirect account, in which physical characteristics affect the self and its environment, the effects of genetic similarity arise for behavior only because the one factor that is not being manipulated in almost any of these studies—namely, the culture in which the subjects live—has uniformities in the way physical characteristics are responded to. When one begins to consider the fact that cultures can change, and that personality traits (like the “football player” personality mentioned earlier) might arise in one culture and not another, it begins to look like the dispute is not just over terminology, but that the two positions are not indistinguishable in their *consequences*, and that a serious effort on the part of responsible twin and adoption researchers to deal with it is imperative. The problem with the twin and adoption studies done thus far is that one can always tell a non-geneticist story to explain the results, and yet that story never gets told in this literature, or even considered. Changing the culture to deal with the undesirable behavior that arises in some people might not be an easy way to go about it, but it may be infinitely superior to the alternative, which is to assume that the culture is fixed and that

Good
Discussion

genetic manipulation is the answer to society's ills.

Need for Incremental Support

What the geneticists have failed to show is that the personality similarities that arise in genetically related persons are any greater than we would expect them to be from the fact that they share physical characteristics with known personality consequences *that are independent of genetic similarity*, that is, that have been shown to have effects under controlled, experimental conditions. What do we learn about the genetic causes of criminal tendencies from an adoption study (Gabielli & Mednick, 1983) that shows some correlation on this trait for adoptees and their biological parents, when other studies have already established that low physical attractiveness can lead to criminal behavior (Bull, 1982), and that antisocial behavior is also highly correlated with mental illnesses with probable genetic causes (Cadoret, 1978)? The answer, in the absence of a complicated statistical analysis that takes all the physical variables and their interactions that have been shown to affect criminality and shows what incremental evidence for heritability results from a given study, is apparently that we learn nothing. It is not that the correlative data for specific physical traits and criminality completely disprove the hypothesis that criminal behavior could be genetically caused in a manner independent of the environmental response to the physical characteristics, because the physical characteristics and the criminality could come in a package that would be validated across cultures and different environmental responses. Rather, the point is that the whole situation just seems much more complicated when all the data from social and personality psychology must be taken into account.

For completeness, two additional classes of problems for inferring heritability from adoption and twin studies are described briefly below. One involves unique aspects of the twin situation, and the other involves biases in data collection in twin and adoptee studies. These have less relation to the problems posed by the social psychology data, but remain as obstacles in the path of behavioral genetics.

Could this ever
be done in a
satisfactory
manner?

Aspects of the Twin Situation

A study by Cattell, Schmidt, Klein, & Schuerger (1980) applying multiple abstract variance analysis (MAVA) concluded that the method "exposes a possible fallacy in the assumption of the twin method [reared together] that within-family threptic variance for sibs is the same as for twins." A few studies have established systematic differences between MZ and DZ twins that could affect comparisons of the two classes. For instance, Shimizu & Endo (1983) found that twins experience forced conversion to right-handedness more often than singletons, and that the effect is greater for MZ than for DZ twins. William H. James (1983) hypothesizes "that in some pairs of monzygotic twins, the biological insult occasioning the split [of the zyogote] may also cause a reversal of predetermined handedness," but "that this cannot happen if the split occurs before the ovum itself has acquired laterality." Kendler & Holm (1985) discuss attempts to correct for the greater prevalence of diseases among DZ than among MZ twins.

Biases in Data Collection

Lykken, Tellegen, & DeRubeis (1978) note that:

"Studies of adult same-sex twins which rely upon volunteer subjects typically consist of about two-thirds female and two-thirds monozygotic (MZ) pairs. Because of this recruitment bias, the male and dizygotic (DZ) twins in such studies will be less representative of their respective populations and will show smaller between-pair variance on many traits than will the comparison samples of female and MZ twins. This reduction in between-pair variance results in underestimation of the true intraclass correlation in the populations of DZ twins and in overestimation of the true heritability of the trait under study."

They suggest money payments to overcome the bias. Walker & Emory (1985) claim that interpretive bias and the use of correlation coefficients rather than mean group comparisons has resulted in an underestimate of the environmental component in determining IQ scores. Joseph Horn (1985) gives a response to this article, much of which is an attack on one

of his studies. Willerman et. al. (1980) looked for evidence of examiner effects that would “influence family correlations in adoption studies of intelligence,” but found no clear bias.

Concluding Assessment

The major points that come out of this review are the following:

1. Researchers in behavioral genetics have consistently emphasized the genetic explanations for their data, even when explanations that involve a more complicated story about how traits arise, and a simpler view of what can actually be encoded in the genes, are completely consistent with the data and are bolstered by evidence from social psychology that has shown physical characteristics to be effective causes of environmental change.
2. There is evidence from within the behavioral genetics literature itself (the Horn, Matthews, & Rosenman, 1981 study) that indicates that the explanation involving the effects of physical appearance is the correct one, although the data overall are inconclusive and there are other studies that show, less strongly, that apparent physical similarity, along other dimensions, is not the cause of personality similarity. On balance, the analysis herein tends to side with the first study.
3. Twin studies in particular overestimate the heritability of complex behavior patterns. Adoption studies may be more relevant, but they are harder to control (see the list of variables under the subsection entitled “Influence of Physical Characteristics on Environment” in the last section) and are subject to the same inferential problems.

At the very least, the data from the fields reviewed herein support a position of interactionism on the nature-nurture question, and to the extent that the real cause of “genetic” correlations is the way the environment and the self respond to physical characteristics, the proposal that might arise for policy would be very different from the genetic screening and manipulation that are being advocated by some in the wake of the newest twin research. Better approaches may be to take steps, such as those outlined

in Garcia (1984) to counter classroom discrimination, or as discussed in Durkin (1985), to use television as a counter-stereotyping device, or to apply psychology to lessen the negative influence that physical characteristics have on an individual's self-image.

The scientific points that arise from this analysis are particularly important to disseminate, because otherwise it will continue to be reported that those who oppose genetic explanations for complex behavior based on these studies have no recourse to science, are "unable to hold back the swelling tide of evidence for the importance of genes," and can only try to "fight back with words," and "lob political grenades" (Lang, 1987). The unusual public danger posed by misrepresentation on the part of behavioral geneticists and those who report their work makes it imperative that the sound, scientific objections to the work be heard loudly and clearly. This is not a question on which science can afford to stumble.

Acknowledgements

I would like to thank Mark Lepper, Amos Tversky, Elizabeth Newton, and Steven Sloman for helpful discussions of this paper.

References

- Abbott, A. R. & Sebastian, R. J. (1981). Physical Attractiveness and Expectations of Success. *Personality and Social Psychology Bulletin*, 7:481-486.
- Adams, G. R. (1977). Physical Attractiveness Research: Toward a Developmental Social Psychology of Beauty. *Human Development*, 20:217-239.
- Alain, M. (1985). Help-Seeking and Attractiveness in Cross-Sex Dyads. *Canadian Journal of Behavioural Science*, 17:271-275.
- Baker, L. A., DeFries, J. C., & Fulker, D. W. (1983). Longitudinal Stability of Cognitive Ability in the Colorado Adoption Project. *Child Development*, 54:290-297.
- Bernstein, W. M., Stephenson, B. O., Snyder, M. L., & Wicklund, R. A. (1983). Causal Ambiguity and Heterosexual Affiliation. *Journal of*

Total -
This is an interesting +
thoughtfully presented paper,
I don't know the
sweetest literature
well enough to evaluate
the specifics of your claims
but I thought your
analysis was
clear and
informative.
Hope you have
a productive
& enjoyable
Summer.

Experimental Social Psychology, 19:78-92.

Berscheid, E. & Walster, E. (1974). Physical Attractiveness. In Berkowitz, L. (Ed.) *Advances in Experimental Social Psychology* (Vol. 7). New York: Academic Press.

Blouin, D. et. al. (1982). Recruiter and Student Evaluation of Career Appearance. *Adolescence*, 17:821-830.

Bosse, K. et. al. (1976). Social Situation of Persons with Dermatoses as a Phenomenon of Interpersonal Perception. *Zeitschrift fur Psychosomatische Medizin und Psychoanalyse*, 22:3-61.

Bouchard, T. J. (1983). Do Environmental Similarities Explain the Similarity in Intelligence of Identical Twins Reared Apart? *Intelligence*, 7:175-184.

Bull, R. (1982). Physical Appearance and Criminality. *Current Psychological Reviews*, 2:269-282.

Buse, L. & Pawlik, K. (1984). Kretschmers Konstitutionstypologie als implizite Personlichkeitstheorie: Selbst-Attribuierungs-Effekte in Abhangigkeit vom Koperbau-Personlichkeits-Stereotyp. *Zeitschrift fur Differentielle und Diagnostische Psychologie*, 5:111-129.

Cadoret, R. J. (1978). Psychopathology in Adopted-Away Offspring of Biologic Parents with Antisocial Behavior. *Archives of General Psychiatry*, 35:176-184.

Cadoret, R. J. & Cain, C. (1981). Environmental and Genetic Factors in Predicting Adolescent Antisocial Behavior in Adoptees. *Psychiatric Journal of the University of Ottawa*, 6:220-225.

Campbell, R. T. (1979). The Relationship Between Children's Perceptions of Ability and Perceptions of Physical Attractiveness: Comment on Felson and Bohrnstedt's "Are the Good Beautiful or the Beautiful Good?" *Social Psychology Quarterly*, 42:393-398.

Carter-Saltzman, L. & Scarr-Salapatek, S. (1975). Blood Group, Behavioral, and Morphological Differences Among Dizygotic Twins. *Social Biology*, 22:372+.

Cash, T. F. (1981). Physical Attractiveness: An Annotated Bibliography of Theory and Research in the Behavioral Sciences. Listed in *Catalogue of Selected Documents in Psychology*, 11:M.S.2370.

Cash, T. F. & Kilcullen, R. N. (1985). The Aye of the Beholder: Susceptibility to Sexism and Beautyism in the Evaluation of Managerial Ap-

plicants. *Journal of Applied Social Psychology*, 15:591-605.

Cash, T. F. & Smith, E. (1982). Physical Attractiveness and Personality among American College Students. *Journal of Psychology*, 111:183-191.

Cattell, R. B., Schmidt, L. R., Klein, T. W., & Schuerger, J. M. (1980). Innate and Environmental Components of Personality Factors—Determined by the MAVA Method. *Zeitschrift fur Differentielle und Diagnostische Psychologie*, 1:275-289.

Clifford, C. A., Murray, R. M., & Fulker, D. W. (1984). Genetic and Environmental Influences on Obsessional Traits and Symptoms. *Psychological Medicine*, 14:791-800.

Cloninger, C. R., Bohman, M., & Sigvardson, S. (1981). Inheritance of Alcohol Abuse: Cross-Fostering Analysis of Adopted Men. *Archives of General Psychiatry*, 38:861-868.

Dannenmaier, W. D. & Thumin, F. J. (1964). Authority Status as a Factor in Perceptual Distortion of Size. *Journal of Social Psychology*, 63:361-365.

Dickey-Bryant, L., Lautenschlager, G. J., Mendoza, J. L., & Abrahams, N. (1986). Facial Attractiveness and Its Relation to Occupational Success. *Journal of Applied Psychology*, 71:16-19.

Durkin, K. (1985). Television and Sex-Role Acquisition III: Counter-Stereotyping. *British Journal of Social Psychology*, 24:211-222.

Dworkin, R. H. (1978). Genetic Influences on Cross-Situational Consistency. In Nance, W. E. (Ed.) *Twin Research: Psychology and Methodology* (pp. 59-56). New York: Alan R. Liss, Inc.

Eaves, L. J., Martin, N. G., & Eysenck, S. B. (1977). An Application of the Analysis of Covariance Structures to the Psychogenetical Study of Impulsiveness. *British Journal of Mathematical and Statistical Psychology*, 30:185-197.

Feldman, S. D. (1971). The Presentation of Shortness in Everyday Life—Height and Heightism in American Society: Toward a Sociology of Stature. Paper presented before the meetings of the American Sociological Association.

Felson, R. B. (1980). Physical Attractiveness, Grades and Teachers' Attributions of Ability. *Representative Research in Social Psychology*, 11:64-71.

Felson, R. B. (1985). Reflected Appraisal and the Development of the Self. *Social Psychology Quarterly*, 48:71-78.

Felson, R. B. & Bohrnstedt, G. W. (1979). "Are the Good Beautiful or the Beautiful Good?" The Relationship Between Children's Perceptions of Ability and Perceptions of Physical Attractiveness. *Social Psychology Quarterly*, 42:386-392.

Fuller, J. L. & Thompson, W. R. (1978). *Foundations of Behavior Genetics*, Saint Louis: The C. V. Morsby Company.

Gabrielli, W. F. & Mednick, S. A. (1983). Genetic Correlates of Criminal Behavior: Implications for Research, Attribution, and Prevention. *American Behavioral Scientist*, 27:59-74.

Gangestad, S. & Snyder, M. (1985). "To Carve Nature at Its Joints": On the Existence of Discrete Classes in Personality. *Psychological Review*, 92:317-349.

Garcia, R. L. (1984). Countering Classroom Discrimination. *Theory into Practice*, 23:104-109.

Gedda, L. & Brenci, G. (1983). Twins Living Apart Test: Progress Report. *Acta Geneticae Medicae et Gemellologiae: Twin Research*, 32:17-22.

Gedda, L., Parisi, P., & Nance, W. E. (Eds.) (1981) *Twin Research 3: Intelligence, Personality, and Development*. New York: Alan R. Liss, Inc.

Gilmore, D. C., Beehr, T. A., & Love, K. G. (1986). Effects of Applicant Sex, Applicant Physical Attractiveness, Type of Rater and Type of Job on Interview Decisions. *Journal of Occupational Psychology*, 59:103-109.

Green, S. K., Buchanan, D. R., & Heuer, S. K. (1984). Winners, Losers, and Choosers: A Field Investigation of Dating Initiation. *Personality and Social Psychology Bulletin*, 10:502-511.

Harrison, G. A., Givson, J. B., & Hiorns, R. W. (1976). Assortative Marriage for Psychometric, Personality and Anthropometric Variation in a Group of Oxfordshire Villages. *Journal of Biosocial Science*, 8:145-153.

Heath, A. C. & Eaves, L. J. (1985). Resolving the Effects of Phenotype and Social Background on Mate Selection. *Behavior Genetics*, 15:15-30.

Henderson, N. D. (1982). Human Behavior Genetics. *Annual Review of Psychology*, 33:403-440.

Hildebrandt, K. A. & Fitzgerald, H. E. (1983). The Infant's Physical Attractiveness: Its Effect on Bonding and Attachment. *Infant Mental*

Health Journal, 4:3-12.

Hirokane, T. & Yoshida, T. (1984). The Study of Cue Dominance in Impression Formation. *Japanese Journal of Experimental Social Psychology*, 23:117-124.

Hjorland, B. (1982). Er du kon eller grim? Om psykologisk forskning i fysisk tiltroekning. *Udkast*, 10:414-425.

Holden, C. (1980). Identical Twins Reared Apart. *Science*, 207:1323-1328.

Hood, A. B. (1963). A Study of the Relationship Between Physique and Personality Variables Measured by the MMPI. *Journal of Personality*, 31:97-107.

Horn, J. M. (1983). The Texas Adoption Project: Adopted Children and Their Intellectual Resemblance to Biological and Adoptive Parents. *Child Development*, 54:268-275.

Horn, J. M. (1985). Bias? Indeed! *Child Development*, 56:779-780.

Horn, J. M., Loehlin, J. C., & Willerman, L. (1979). Intellectual Resemblance Among Adoptive and Biological Relatives: The Texas Adoption Project. *Behavior Genetics*, 9:177-207.

Horn, J. M., Matthews, K., & Rosenman, R. (1981). Blood Groups, Physical Appearance, and Personality Similarity in Adult Dizygotic Twins. In Gedda, L., Parisi, P., & Nance, W. E. (Eds.) *Twin Research 3: Intelligence, Personality, and Development* (pp. 121-125). New York: Alan R. Liss, Inc.

James, W. H. (1983). Twinning, Handedness, and Embryology. *Perceptual and Motor Skills*, 56:721-722.

Johnson, R. W. (1985). Correlates of the Tendency Toward Physical Attractiveness Stereotyping: Individual Differences in Cognitive Structure and Political Party Affiliation. *Canadian Journal of Behavioural Science*, 17:29-39.

Jones, M. C. (1957). The Later Careers of Boys who were Early or Late Maturing. *Child Development*, 28:113-128.

Jones, M. C. & Mussen, P. H. (1958). Self Conceptions, Motivations, and Interpersonal Attitudes of Early and Late Maturing Girls. *Child Development*, 29:491-501.

Kalick, S. M. (1978). Toward and Interdisciplinary Psychology of Appearances. *Psychiatry*, 41:243-253.

Kalick, S. M. & Hamilton, T. E. (1986). The Matching Hypothesis Reexamined. *Journal of Personality and Social Psychology*, 51:673-682.

Kellerman, J. M. & Laird, J. D. (1982). The Effect of Appearance on Self-Perception. *Journal of Personality*, 50:296-315.

Kendler, K. S. & Holm, N. V. (1985). Differential Enrollment in Twin Registries: Its Effect on Prevalence and Concordance Rates and Estimates of Genetic Parameters. *Acta Geneticae Medicae et Gemellologiae: Twin Research*, 34:125-140.

Kleck, R. E., Richardson, S. A., & Ronald, L. (1974). Physical Appearance Cues and Interpersonal Attraction in Children. *Child Development*, 45:305-310.

Koskenvuo, M., Langinvainio, H., Kaprio, J., & Sarna, S. (1984). Health Related Psychosocial Correlates of Neuroticism: A Study of Adult Male Twins in Finland. *Acta Geneticae Medicae et Gemellologiae: Twin Research*, 33:307-320.

Koulack, D. & Tuthill, J. A. (1972). Height Perception: A Function of Social Distance. *Canadian Journal of Behavioural Science*, 4:50-53.

Krantz, M., Freidberg, J., & Andrews, D. (1985). Physical Attractiveness and Popularity: The Mediating Role of Self-Perception. *Journal of Psychology*, 119:219-223.

Krebs, D. & Adinolfi, A. (1975). Physical Attractiveness, Social Relations, and Personality Style. *Journal of Personality and Social Psychology*, 31:245-253.

Lang, J. S. (1987). How Genes Shape Personality. *US News and World Report*, April 13, 58-66.

Langinvainio, H., Kaprio, J., Koskenvuo, M., & Lonnqvist, J. (1984). Finnish Twins Reared Apart III: Personality Factors. *Acta Geneticae Medicae et Gemellologiae: Twin Research*, 33:259-264.

Lawson, M. C. (1980). Development of Body Build Stereotypes, Peer Ratings, and Self-Esteem in Australian Children. *Journal of Psychology*, 104:111-118.

Lerner, R. M. (1982). Children and Adolescents as Producers of their Own Development. *Developmental Review*, 2:342-370.

Litman, G. K., Powell, G. E. & Stewart, R. A. (1983). Fine Grained Stereotyping and the Structure of Social Cognition. *Journal of Social Psychology*, 120:45-56.

Loehlin, J. C., Horn, J. M., & Willerman, L. (1981). Personality Resemblance in Adoptive Families. *Behavior Genetics*, 11:309-330.

Loehlin, J. C., Willerman, L., & Horn, J. M. (1985). Personality Resemblances in Adoptive Families when the Children are Late-Adolescent or Adult. *Journal of Personality and Social Psychology*, 48:376-392.

Lykken, D. T. (1982). Research with Twins: The Concept of Emergenisis. *Psychophysiology*, 19:361-373.

Lykken, D. T., Tellegen, A., & DeRubeis, R. (1978). Volunteer Bias in Twin Research: The Rule of Two-Thirds. *Social Biology*, 25:1-9.

Matheny, A. P., Wilson, R. S., Dolan, A. B., & Krantz, J. Z. (1982). *Annual Progress in Child Psychiatry and Child Development*, 1982, 229-245.

Matthews, K. A. et. al. (1984). Familial Resemblance in Components of the Type A Behavior Pattern: A Reanalysis of the California Type A Twin Study. *Psychosomatic Medicine*, 46:512-522.

Mazur, A., Mazur, J., & Keating, C. (1984). Military Rank Attainment of a West Point Class: Effects of Cadets' Facial Features. *American Journal of Sociology*, 90:125-150.

McClearn, G. E. & DeFries, J. C. (1973). *Introduction to Behavioral Genetics*. San Francisco: W. H. Freeman and Company.

McGue, M., Bouchard, T. J., Lykken, D. T., & Feuer, D. (1984). Information Processing Abilities in Twins Reared Apart. *Intelligence*, 8:239-258.

Merton, R. K. (1948). The Self-Fulfilling Prophecy. *Antioch Review*, 8:193-210.

Mills, J. & Aronson, E. (1965). Opinion Change as a Function of the Communicator's Attractiveness and Desire to Influence. *Journal of Personality and Social Psychology*, 1:173-177.

Monnelly, E. P., Hartl, E. M., & Elderkin, R. (1983). Constitutional Factors Predictive of Alcoholism in a Follow-up of Delinquent Boys. *Journal of Studies on Alcoholism*, 44:530-537.

Murstein, B. I. (1972). Physical Attractiveness and Marital Choice. *Journal of Personality and Social Psychology*, 22:8-12.

Mussen, P. H. & Jones, M. C. (1957). Self-Conceptions, Motivations, and Interpersonal Attitudes of Early and Late Maturing Boys. *Child Development*, 28:243-256.

Mussen, P. H. & Jones, M. C. (1958). The Behavior Inferred Motivations of Late and Early Maturing Boys. *Child Development*, 29:61-67.

Nance, W. E. (Ed.) (1978) *Twin Research: Psychology and Methodology*. New York: Alan R. Liss, Inc.

Nordby, V. J. & Hall, C. S. (1974). *A Guide to Psychologists and Their Concepts*. San Francisco: W. H. Freeman and Company.

Pang, V. O., Mizokawa, D. T., Morishima, J. K., & Olstad, R. G. (1985). Self-Concepts of Japanese-American Children. *Journal of Cross-Cultural Psychology*, 16:99-109.

Paulhus, D. L. & Martin, C. L. (1986). Predicting Adult Temperament from Minor Physical Anomalies. *Journal of Personality and Social Psychology*, 50:1235-1239.

Pittenger, J. B. & Baskett, L. M. (1984). Facial Self-Perception: Its Relation to Objective Appearance and Self-Concept. *Bulletin of the Psychonomic Society*, 22:167-170.

Plomin, R. & DeFries, J. C. (1981). Genetics and Intelligence: Recent Data. *Annual Progress in Child Psychiatry and Child Development*, 1981, 133-143.

Plomin, R. & DeFries, J. C. (1983). The Colorado Adoption Project. *Child Development*, 54:276-289.

Rand, C. S. & Hall, J. A. (1983). Sex Differences in the Accuracy of Self-Perceived Attractiveness. *Social Psychology Quarterly*, 46:359-363.

Robertiello, R. C. (1976). The Myth of Physical Attractiveness. *Psychotherapy: Theory, Research, and Practice*, 13:54-55.

Rowe, D. C. (1987). Resolving the Person-Situation Debate: Invitation to an Interdisciplinary Dialogue. *American Psychologist*, 42:218-227.

Rushton, J. P., Fulker, D. W., Neale, M. C., Blizard, R. A., & Eysenck, H. J. (1984). Altruism and Genetics. *Acta Geneticae Medicae et Gemellogiae: Twin Research*, 33:265-271.

Scarr, S. & Carter-Saltzman, L. (1979). Twin Method: Defense of a Critical Assumption. *Behavior Genetics*, 9:527-542.

Scarr, S., Webber, P. L., Weinberg, R. A., & Wittig, M. A. (1981). Personality Resemblance Among Adolescents and Their Parents in Biologically Related and Adoptive Families. *Journal of Personality and Social Psychology*, 40:885-898.

Scarr, S. & Weinberg, R. A. (1977). Intellectual Similarities within Families of Both Adopted and Biological Children. *Intelligence*, 1:170-191.

Scarr, S. & Weinberg, R. A. (1978). The Influence of "Family Background" on Intellectual Attainment. *American Sociological Review*, 43:674-692.

Scarr, S. & Yee, D. (1980). Heritability and Educational Policy: Genetic and Environmental Effects on IQ, Aptitude and Achievement. *Educational Psychologist*, 15:1-22.

Shields, J. (1962). *Monozygotic Twins Brought Up Apart and Brought Up Together*. London: Oxford University Press.

Shimizu, A. & Endo, M. (1983). Comparison of Patterns of Handedness Between Twins and Singletons in Japan. *Cortex*, 19:345-352.

Singer, J. E. (1964). The Use of Manipulative Strategies: Machiavellianism and Attractiveness. *Sociometry*, 27:128-150.

Sluzki, C. E. (1976). The Latin Lover Revisited: An Ethno-Communicational Vignette with Morals. *Acta Psiquiatrica y Psicologica de America Latina*, 22:107-111.

Snyder, M., Tanke, E. D., & Berscheid, E. (1977). Social Perception and Interpersonal Behavior: On the Self-Fulfilling Nature of Social Stereotypes. *Journal of Personality and Social Psychology*, 35:656-666.

Stroebe, W., Insko, C. A., Thompson, V. D., & Layton, B. D. (1971). Effects of Physical Attractiveness, Attitude Similarity, and Sex on Various Aspects of Interpersonal Attraction. *Journal of Personality and Social Psychology*, 18:79-91.

Tanke, E. A. (1977). Anticipated Future Interaction and the Self-Fulfilling Prophecy Effects of the Physical Attractiveness Stereotype. *Dissertation Abstracts International*, 37:6411-6412.

Torgersen, A. M. & Kringlen, E. (1979). Genetic Aspects of Temperamental Differences in Infants. *Annual Progress in Child Psychiatry and Child Development*, 1979, 251-263.

Tucker, L. A. (1984). Physical Attractiveness, Somatotype, and the Male Personality: A Dynamic Interactional Perspective. *Journal of Clinical Psychology*, 40:1226-1234.

Vagt, G. (1979). The Relationship Between Looks and Personality: Consider Yourself Beautiful, That Is What Matters. *Zeitschrift fur Experimentelle und Angewandte Psychologie*, 26:355-363.

Vandenberg, S. G. (Ed.) (1968). *Progress in Human Behavior Genetics: Recent Reports on Genetic Syndromes, Twin Studies, and Statistical*

Advances. Baltimore: The Johns Hopkins Press.

Vandenberg, S. G. (1984). Does a Special Twin Situation Contribute to Similarity for Abilities in MZ and DZ Twins? *Acta Geneticae Medicae et Gemellologiae: Twin Research*, 33:219-222.

Walker, E. & Emory, E. (1985). Commentary: Interpretive Bias and Behavioral Genetic Research. *Child Development*, 56:775-778.

White, D. R., Mauro, K., & Spindler, J. (1985). Development of Body-Type Salience: Implications for Early Childhood Educators. *International Review of Applied Psychology*, 34:433-442.

Willerman, L. et. al. (1980). Examiner Effects in Adoption Studies. *Behavior Genetics*, 10:431-434.

Wilson, E. O. (1975). *Sociobiology: The New Synthesis*. Cambridge, MA: Harvard University Press.

Wilson, G. D., Rust, J., & Kasriel, J. (1977). Genetic and Family Origins of Humor Preferences: A Twin Study. *Psychological Reports*, 41:659-660.

Zahr, L. (1985). Physical Attractiveness and Lebanese Children's School Performance. *Psychological Reports*, 56:191-192.

Zakin, D. F. (1983). Physical Attractiveness, Sociability, Athletic Ability, and Children's Preference for their Peers. *Journal of Psychology*, 115:117-122.

Zakin, D. F., Blyth, D. A., & Simmons, R. G. (1984). Physical Attractiveness as a Mediator of the Impact of Early Pubertal Changes for Girls. *Journal of Youth and Adolescence*, 13:439-450.

Zanna, M. P. & Pack, S. J. (1975). On the Self-Fulfilling Nature of Apparent Sex Differences in Behavior. *Journal of Experimental Social Psychology*, 11:583-591.