

Twin Method: Defense of a Critical Assumption

Sandra Scarr¹ and Louise Carter-Saltzman²

Received 4 December 1978—Final 22 October 1979

Since Galton's time, critics of the twin method have rejected the evidence of genetic differences in human behavior, because the twin method assumes that identical and fraternal pairs have equally similar environments. Twins whose genetic similarity is misperceived by themselves and others provide a critical test of the adequacy of this assumption. The relative effects of perceived and actual genetic similarity on cotwin differences in cognitive, personality, and physical development were assessed in a sample of young, adolescent twins whose genetic similarity was often misperceived. Twins' responses to questions about their own and others' judgments about their zygosity and physical similarity, and the ratings of similarity by eight judges, were used to estimate the perceived similarity of the twins. Actual zygosity was established by matching cotwins on 12 or more blood group loci. Perceived zygosity and perceived similarity by self and others were found to be insignificant biases in the twin study method.

KEY WORDS: zygosity; twins; blood groups; cognitive abilities; personality; skeletal growth; tissue growth; skin reflectance; perceived similarity of twins.

INTRODUCTION

Twin studies have provided the bulk of evidence for genetic variance in human behavior. The classic twin study method compares the similarity of monozygotic (MZ) to dizygotic (DZ) pairs. The greater similarity of MZ than DZ twins is interpreted as evidence for the influence of genetic differences on behavior.

This research was supported by grants from the National Institute of Child Health and Human Development (HD-06502) and the W. T. Grant Foundation.

¹ Department of Psychology, Yale University, New Haven, Connecticut 06520.

² Department of Psychology, University of Washington, Seattle, Washington 98195.

One of the basic assumptions of the twin method is that the within-family environments of MZ and DZ twins are equally variable. Kamin (1973), for example, has suggested that the greater intellectual similarity of MZ twins can be accounted for by the greater similarity of their environments.

Most investigators of twins would agree that MZ twins share more experiences during development. Monozygotic twins are more often confused for each other by parents, teachers, friends, and strangers (Cederlof *et al.*, 1961; Cohen *et al.*, 1973; Nichols and Bilbro, 1966). Because of their striking physical resemblance, MZ twins are likely to be treated more alike by significant others. Parents, in fact, report that their MZ twins were more similar behaviorally throughout development. Parents also hold more similar expectations for their MZ than DZ twins with respect to social responsibility and independence (Scarr, 1968).

Likewise, MZ twins themselves report that they are more similar in many aspects of their life style. They more often share the same friends, spend more time together, and make more similar choices in dress, foods, sports, study habits, etc. (Jones, 1955; Scarr, 1968; Smith, 1965). Thus the evidence of greater environmental similarity for MZ than DZ twins is overwhelming. But does this constitute a bias in the twin study method?

Critics of twins studies have assumed that differential treatment of MZ and DZ pairs constitutes *prima facie* evidence of bias. It does not. The direction of effect in the correlation between zygosity and environmental similarity is not at all clear. It is possible that the greater genetic similarity of MZ twins leads to more similarity in their environments. Parents and others may respond to the behavioral similarity of MZ pairs with more similar expectations for them, and identical twins themselves may select and attend to more similar aspects of their environments.

If the usually observed behavioral differences between MZ cotwins are smaller than those between DZ cotwins, then critics assume that the experiential differences between DZs are a sufficient explanation for their greater behavioral differences. If that were true, then MZs who are treated more differently by their parents than other MZs would be less similar than MZs who are treated more alike. This was the logic of the study by Loehlin and Nichols (1976), who calculated the correlations between environmental differences of MZ cotwins on those variables that differentiated MZ and DZ twins and personality and intellectual differences between MZ cotwins. They found little relationship between differences in parental treatment and experiences and test score differences. Thus the differences in treatment between MZs who were treated similarly and those who were treated differently could not account for the magnitude of the differences between MZs and DZs.