THE ROLE OF GENETIC FACTORS IN THE CHILD DRAWING BEHAVIOR

A Preliminary Twin Study

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A sample of 27 MZ and 32 DZ twin pairs, aged 6 to 12 years, has been tested with the Draw A Family Test. Significantly higher concordance values in MZ than DZ twins have been found with respect to some graphic-structural factors (i.e.: line, hand pressure, area of the drawing, dimensions of the figures, distribution, and shading) as well as with respect to contents factors, such as spatial representation and cotwin's valorization. These correlates of personality development would thus appear to undergo significant genetic conditioning.

INTRODUCTION

From the first attempts of scribble and representation in the child, interindividual differences may be clearly noted in the use of the line, space, and color, and in the choice of given narrative and expressive contents rather than others. These differences are known to reflect different emotional and mental states, both conscious and unconscious; hence, different personality traits.

A twin study has therefore been undertaken, aimed at studying the role of genetic vs. environmental factors on drawing behavior in the child.

MATERIAL AND METHODS

The sample consisted of 118 individual twin subjects, 64 male and 54 female, aged 6 to 12 years (mean age, 8.1). The resulting 59 pairs included 27 MZ and 32 DZ twin pairs. Zygosity determinationwas based on the following criteria: (1) blood-group analysis (A_1A_2BO, MN, and Rh-Hr systems); (2) physical resemblance, as determined by a trained tester with apposite scales and standards; (3) questionnaire analysis; and (4) dermatoglyphic analysis.

In order to avoid any possible trauma due to separation, both twins were tested in the same room, although no twin could ever see the drawing being made by his/her cotwin. All drawings were made with a black pencil on a 22 × 22 cm sheet of white paper. The following instructions were given: "Draw a family, any type of family you think of" (Bergé 1946, Corman 1967). This formula was preferred to the other one, "Draw your family" (Minkowska 1952, Porot 1952, Fukada 1958), since thus the child does not have to concentrate on his own family and is more free to express his feelings.

When the drawings were finished, the twins were asked to specify who were the various persons drawn and what were they doing. The parents of the twins were then asked to describe the actual composition of the family. The drawings were evaluated following the techniques described by Corman (1967).

The drawings were analyzed with respect to both graphic structural factors and contents factors.

By *graphic structural factors*, we mean those aspects of the drawing that are related to the formal and maturational characteristic of the graphic representation, such as:

(1) Type of line (continuous, discontinuous);

(2) Hand pressure (heavy, average, light);

(3) Area of space employed or type of utilization of space (upper, central, or lower area; upper right or left; central right or left; lower right or left; the whole area);

CODEN: AGMGAK 25 218 (1976) — ISSN: 0001-5660
Acta Genet. Med. Gemellol. (Roma) 25: 218-220

(4) Dimensions of the figures (large, average, small), evaluated in relation to the average child's production at the various ages;
(5) Distribution of the figures (gathered, dispersed, intermediate);
(6) Shading (present, absent);
(7) Movement (present, absent);
(8) Body image.

By *contents factors*, we mean those aspects of the drawing that are related to the subject's attitude with respect to other family members. These have been codified as a diagnostic instrument of personal attitudes, troubles, and disadvantage in family relations (Minkowska 1952, Porot 1952, Corman 1967). They are:
(1) Elimination of some family member(s) and especially of the cotwin (that therefore represents a threatening element);
(2) Spatial representation or separation: a figure may be isolated from the rest of the group or from another figure through the use of a vertical line (*compartmentalization*, cf. Burns and Kaufman 1970), or of a fence, a tree, etc. Another possibility is that of one figure represented outside, while the rest of the family or other persons are represented at home. Finally, isolation may be indicated by representing a family member engaged in his own activity, a clearly different one from that of the other members;
(3) Representation of the relative exerting the leading role (*valorization*). This relative — generally the first figure on the left, or in a dominant position — is the largest in size and in the number of details. Generally, this is the relative most admired by the child.
The above factors have been uniformly and independently evaluated in each subject. Intrapair concordance or discordance was assessed before the twin pair's zygosity was known.

RESULTS

As shown in Table 1, intrapair concordance rates for the graphic structural factors are significantly higher in MZ than DZ twin pairs with respect to six out of the eight variables considered, i.e.: Line, Pressure, Area, Dimensions, Distribution, and Shading. It may be noted that, as was to be expected, the higher the number of variables considered within each factor, the lower the concordance rates, both in MZ and DZ twins. For the remaining two graphic structural factors, Movement and Body image, no significant differences were found.

Table 1. *Intrapair concordance rates for graphic structural factors in twins*

Graphic structural factor	No. of variables	Concordance rate (% values)		χ^2 test	p value
		MZ twin pairs (N = 27)	DZ twin pairs (N = 32)		
Line	2	96.2	59.3	11.03	< 0.001
Pressure	3	92.5	50.0	12.53	< 0.001
Area	10	85.1	43.7	10.75	< 0.001
Dimensions	3	88.8	46.8	11.53	< 0.001
Distribution	3	88.8	46.8	11.53	< 0.001
Shading	2	96.2	62.5	9.73	< 0.01

Table 2. *Cotwin representation in the twin's drawing*

	Cotwin represented in the drawing		Cotwins represented engaged in the same activity	
MZ twin subjects (N = 54)	29 = 53.7%	$\chi^2 = 2$, ns	26 = 89.6%	$\chi^2 = 9.8$, $p < 0.01$
DZ twin subjects (N = 64)	26 = 40.6%		10 = 38.4%	

https://doi.org/10.1017/S1120962300791074 Published online by Cambridge University Press

With respect to the contents factors considered, no significant differences between MZ and DZ twin pairs were found. However, MZ and DZ twin subjects appeared to significantly differ in their way of representing their cotwin. In fact, although both MZ and DZ twins represented their cotwin with essentially the same frequency (the difference is not significant), the MZ twins doing so tended to represent their cotwin at their own side, engaged in a common activity, whereas DZ twins tended to represent their cotwin spaced and engaged in different activities (cf. Table 2).

DISCUSSION

The graphic structural aspects of a drawing are related to the psychomotor development of the child, as well as to his/her mental maturity level and affective tendencies. For example, a heavy hand pressure indicates vigorous instinctive pulsions, whereas a feeble or discontinuous line indicates weakness, shyness, or uncertainty and inhibition of instinctive pulsions. Large dimensions of the drawing indicate extroversion, whereas small dimensions and short lines indicate inhibition and introversion. The shaded areas indicate that a special interest has been placed on certain figures, or parts of figures, and often indicate conflictual states or repressed pulsions. The area in which the drawing is placed has a well-known psychological value and provides an indication of the child's esthetic spatial sensitiveness. The space distribution of the figures is also an indication of how the available space is felt and utilized.

The finding of much higher concordance rates in MZ than DZ twin pairs for most of these factors supports the hypothesis of a relevant genetic conditioning. With respect to spatial aspects, as involved in the factors Area and Distribution, it may be noted that previous studies, through other diagnostic tools, have also shown heritability (cf. Vandenberg, in Glass 1958).

The apparent lack of significant differences between MZ and DZ twin pairs with respect to Movement, Body image, and some contents factors, might merely result from the limits of the test and does not necessarily indicate that genetic factors play a minor role.

The elimination of a sibling in the drawing of the family is a rather common finding and no significant difference has been noted between MZ and DZ twins. However, representations showing the cotwin involved in a common activity have been found to be much more frequent in MZ than DZ twins. This may be interpreted in terms of higher affinity and emotional ties, in MZ twins, and supports the hypothesis according to which the " twin situation " would be lived and felt differently in MZ and DZ twins, with the " couple effect " being stronger in the former.

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