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Crime in a Danish Twin Population

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The results of the small number of existing investigations of criminality among twins have mostly been considered as contributions to the discussion of the relative importance of heredity and environment. I attempt to look at the problem in a slightly different context, but find it useful to give a brief summary of the older investigations. The results of previous studies utilizing the twin method to throw light on the problem of crime appear from Tab. I.

I am sure you will remember Lange's conclusion from 1929: " As far as crime is concerned, MZ twins on the whole react in a definitely similar manner, DZ twins behave quite differently. In accordance with the significance of the twin method we must conclude that innate tendencies play a preponderant part among the causes of crime ".

There is one fundamental assumption behind the conclusions about the heredity of criminal behaviour, which is not fulfilled. The environment of each of the two twins in a pair must be equally similar or equally different, irrespective of zygosity. However, the milieus of the cotwins in a DZ pair are in fact more different than in a MZ one.

The Danish study is carried out in cooperation with the Danish Twin Register (Harvald and Hauge, 1965). The material consists of data about nearly 6000 pairs of twins, i. e., all twins born on the Danish islands in 1881-1910, where both twins have survived to the age of at least 15 years. The source material may be considered complete. About 900 pairs have been entered into the Central Police Register and/or into the local penal registers.

The main results of the Danish study appear from the bottom of Tab. I. As will be seen, the rate of concordance is not more than the half of what was found in previous investigations. The reason for this seems to be that the Danish sample is complete and unselected.

An important difference between previous investigations and the present one is that here we not only study a selection of criminal pairs, but also know the total of the twin population from where the criminal sample is drawn. This makes it possible to compute *the conditional frequency of criminality* for one of the twins when his cotwin is a criminal. Or, expressed in another way, how great is the probability that one twin has been convicted if his cotwin has? One of the results of this method of calculation is shown for males in Tab. II.

Tab. I. Previous and present criminological twin studies

Author		MZ twin pairs		DZ twin pairs	
		N.	Concordance %	N.	Concordance %
Lange, 1929		13	76.9	17	11.8*
Legras, 1932		4	100.0	5	0.0
Rosanoff, 1934		37	67.6	28	17.9**
Kranz, 1936		31	64.5	43	53.5
Stumpfl, 1936		18	64.5	19	36.8
Borgström, 1939		4	75.0	5	40.0
Yoshimasu, 1961		28	60.6	18	11.1*
	Total	135	66.7	135	30.4
Christiansen, 1967	♂♂	67	35.8	114	12.3**
	♀♀	14	21.4	23	4.3
	♂♀			226	3.5

* P $<$ 0.005
** P $<$ 0.001

Tab. II *

	1		2		3		Total
1	322	0.891	30	0.595	16	0.319	368
2	20	0.069	10	0.238	8	0.154	38
3	13	0.040	6	0.167	24	0.527	43
Total	355	1.000	46	1.000	48	1.000	449

* 1 = Crimes punished by deprivation of freedom;
 2 = Minor offences punished by fines or less serious reactions;
 3 = No punishment.

Tab. III shows that the conditional frequency of concordant crime in male twins is 0.527 in MZ vs. 0.219 in DZ; and, for minor offences, 0.235 in MZ vs. 0.084 in DZ.

For the sake of some of the following comparisons it is necessary to compare the observed frequencies with the ones expected within the corresponding population. The ratio between observed conditional frequency and expected frequency for the twin groups, I have called the " *twin coefficient* ", because it is a specific property attached to the twinship, including the specific twin situation; but it should at once be underlined that it is not a measure of heredity.

We can now shed light upon the following problem: *how far does the twinship in-*

crease the probability that a twin follows his cotwin, with respect to punishable behaviour, compared to the general occurrence of punishable behaviour in the corresponding twin population?

The results of a comparison of twin coefficients are shown in Tab. IV. Differ-

Tab. III.   Conditional frequencies of concordance according to zygosity

Zygosity and sex	Crime	Minor offences	No offence
MZ ♂♂	0.527	0.235	0.907
MZ ♀♀	0.353	0.000	0.980
DZ ♂♂	0.219	0.084	0.910
DZ ♀♀	0.083	0.000	0.980
DZ ♂♀	0.068	0.025	0.901

Tab. IV.   Conditional frequencies and twin coefficient according to zygosity

Zygosity and sex	Crime		Minor offences		No offence	
	Cond. freq.	Twin coeff.	Cond. freq.	Twin coeff.	Cond. freq.	Twin coeff.
MZ ♂♂	0.527	5.49	0.235	3.31	0.907	1.09
MZ ♀♀	0.353	20.76	0.000	0.00	0.980	1.01
DZ ♂♂	0.219	2.28	0.084	1.18	0.910	1.09
DZ ♀♀	0.083	4.88	0.000	0.00	0.980	1.01
DZ ♂♀	0.068	1.19	0.025	0.60	0.901	1.00

Tab. V.   Conditional frequencies and twin coefficient with respect to crime, according to birthplace

Zygosity and sex	Birth in towns		Birth in rural districts	
	Cond. freq.	Twin coeff.	Cond. freq.	Twin coeff.
MZ ♂♂	0.552	5.02	0.485	5.99
DZ ♂♂	0.214	1.95	0.227	2.80
DZ ♂♀	0.061	0.97	0.078	1.66

ences in the twin coefficients suggest that the twinship may affect the two persons of a pair differently.

According to the figures in Tab. V, the twin coefficient is higher for twins born in rural districts. The same holds true for twins born in 1881-1895, as against twins born in 1896-1910. Social class seems to exert a similar influence: the twin coefficient is higher for upper than for lower and middle class twins. Why?

I think it is possible to find criminological explanation to these differences, but here I should be more interested in learning whether similar differences in concordance in socially different population groups have been observed somewhere within the broad field of biology.

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