AN EXPERIMENTAL INVESTIGATION OF CERTAIN ALLEGED RELATIONS BETWEEN CHAR- ACTER AND HANDWRITING

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At least since 1662 when Camillo Baldo published in Italy his treatise on the method of determining the character of a person by his handwriting (2, p. 2), there has been in existence a more or less systematic and growing body of belief on this subject. During this period graphology has been regarded with favor and respect by many individuals of note, among whom may be mentioned Leibniz, Goethe and Sir Walter Scott (2, p. 7 ff). An extensive body of literature including periodical publications has come into existence on the subject, particularly in France and Germany. It has often been associated with physiognomy, chiromancy and magic (4, p. 126). The claims of the graphologists are frequently very extravagant. Two of the more recent expounders of graphology deserve special mention because of the positions they occupy in the field of the recognized sciences. One is William Preyer (10), professor of physiology at Jena and author of one of the classical works on infant psychology. The other is George Schneidemühl (11), professor of comparative pathology at the University of Kiel. While stoutly asserting the necessity of reducing graphology to the status of a true science, these writers show little less credulity than the pamphlet written on the same subject by William L. French and put out by a pen manufacturing company for advertising purposes (6). The more pretentious works on graphology are predominantly *a priori* deductions from very general principles which are often true enough in themselves. These deductions are copiously illustrated by reproductions of handwriting often of illustrious or notorious personages. Though extensive collections of handwriting seem to have

been made by some of these writers, none of them have gone beyond a more or less casual observation. Crépieux-Jamin, it is true, reports what purports to be an experiment but it is without scientific value (2, pp. 106-137).

As for so much else, we are indebted to Alfred Binet for the only serious attempt to bring the rather elusive subject matter of graphology under objective scientific conditions. Binet's report of his experiments makes a volume of 257 pages (1). He was especially fortunate in having as collaborators a number of professional graphologists one of whom, Crépieux-Jamin, is probably its most famous modern exponent (4, p. 123). In his first experiment Binet presented each of his subjects with 180 addressed envelopes which had been written in about equal numbers by men and women. The subjects were to tell the sex of the writer in each case. Crépieux-Jamin made the highest score, 79% of right determinations. Another graphologist made a score of 75%. A number of individuals with no special training made scores ranging from 73% to 66% of right cases (1, pp. 8-11). It will be noted that chance alone would yield 50%. This experiment has been repeated with untrained subjects by Downey (5) and Starch who each obtain substantially similar results.

In another experiment Binet obtained samples of writing from 37 individuals of recognized intellectual eminence such as Renan and Bergson. With each of these he paired the writing of a person of similar education and general social level but of very mediocre intelligence. The subjects were asked to state which of each pair of writers was the more intelligent. Crépieux-Jamin came off best again with the astonishing score of only three errors out of 36 determinations, or nearly 92% correct. Six other graphologists scored respectively 86%, 83%, 80%, 68%, 66% and 61%—all distinctly superior to chance (1, pp. 73, 101 ff.). Binet concludes: "On pourrait dire, introduisant ici une distinction nécessaire, que les signes graphiques d'intelligence ont une réalité incontestable, mais ne concordent pas nécessairement et constamment avec une grande intelligence, quoique cela arrive le plus souvent" (1, p. 100).

As a final test Binet investigated the ability of the graphologists to tell the character of the writers from their handwriting. He secured specimens of the handwriting of eleven notorious assassins. With each of these he paired the writing of an honest citizen in a rather humble walk of life. The subjects were directed to tell which of each pair of writers was superior in general morality. This was a more severe test apparently, though the number of right judgments continues to exceed chance. Once more Crépieux-Jamin comes off best with three errors out of eleven judgments, or 73% right. Two other graphologists made a score of five errors each, which is little better than chance (1, pp. 245-246). Summing up all three experiments Binet says: ". . . cette conclusion, c'est que dans la graphologie, comme dans la céphalométrie, probablement aussi dans la chiromancie—il y a quelque chose de vrai" (1, p. 251). And again: "Qu'il s'agisse du sexe, de l'âge, de l'intelligence ou même (ce dernier point avec plus de réserve) qu'il s'agisse du caractère, nous arrivons toujours à la même conclusion" (1, p. 252).

Such results and conclusions from a psychologist of Binet's repute suggests that we may not without a previous scientific examination safely ignore the claims of graphologists, however extravagant and apparently unfounded they may seem. The somewhat surprising revelations of character contained in physiognomy even as seen in ordinary photographs, should make us still more cautious (8, p. 48 ff.). Indeed facts are not wanting which render even probable at least a weak relation between handwriting and certain traits of character. Dearborn found, for example, a distinct tendency of the hands and neck to flex under unpleasant and to extend under pleasant stimuli (3). From this it is not a very far cry to the possibility that a confident or ambitious state of mind should produce a tendency to extension in the arm during writing which would make the lines slope upward from left to right. Upward sloping lines are in fact the generally accepted graphological sign of ambition. Neither would it be very surprising to find a slight tendency for energetic or forceful people to write with heavier pressure and so to make

heavier lines than less forceful persons. Various types of heavy lines are in fact common graphological signs of "force." It was with such possibilities in mind that the present experiment was undertaken.

Binet sought to test the skill of individual graphologists. In contrast, the present experiment seeks to test the truth of certain graphological theories, *i. e.*, certain correlations alleged to exist between specific traits of handwriting and traits of the writer's character. Obviously the reasons given by graphologists for their findings may be either more or less accurate than the findings themselves. The traits of character investigated were chosen as being at once associated with traits of handwriting which were susceptible of objective measurement and being among the less improbable of the relations alleged. They are shown in the following table together with the trait of writing most commonly supposed to indicate each:

TABLE I

Ambition	lines of writing sloping upward.
Pride	lines of writing sloping upward.
Bashfulness	writing traced with fine lines.
Force	(a) heavy lines, (b) heavy bars on the t's.
Perseverance	long bars on the t's.
Reserve	closed a's and o's.

The subjects were 17 students of the University of Wisconsin, all members of the same medical fraternity. Each man was first asked to write, in his ordinary manner, a paragraph from a popular magazine. The writing was done in each subject's own room, at his regular desk and with his own pen. The paper was uniform throughout, unruled, of good quality, size 8.25 by 10.75 inches. The material written is as follows, the parentheses indicating particular m's, n's and t's which were measured:

It see(m)ed to be a big (t)own; he wo(n)dered just why, in all his days, he had never made more (t)han four or five (t)rips to Brooklyn, but he did not wo(n)der for lo(n)g. His heavy (t)houghts dragged back to his own plight a(n)d the call just ahead of him. Cus(t)om a(n)d frie(n)dship co(m)bined would deprive him even of the fee he was about to earn. Not so much as the wre(t)ched car-fare he was spe(n)d-i(n)g would be his reward for a(t)t(e)n(di)ng the sufferi(n)g me(m)ber of the Ca(tt)erson fa(m)ily. In the ma(t)t(er of plain mo(n)ey profit, Brooklyn so far measured up to the Hallas s(t)a(n)dard in every respect.

TABLE II

	Ambition				Pride	Bashfulness					Force					Perseverance					Reserve		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Subject	Rank in Ambition	Average Upward Slope of Line in mm.	Rank in Upward Slope of Line	Rank in Pride	Rank in Bashfulness	Av. Width of Upward Stroke of t in .007 inches	Rank in Narrowness of Upslope of t	Index of Av. Width of m's and n's	Rank in Narrowness of m's and n's	Rank in Force	Av. Width of Bars of t's in .007 inches	Rank in Width of Bars of t's	Index of Width of Bars on t's	Rank in Index of Width of Bars on t's	Rank in Perseverance	Av. Length of Bars on t's in mm.	Rank in Length of Bars on t's	Index of Length of Bars on t's	Rank in Index of Length of Bars on t's	Rank in Reserve	Index of the Openness of a's and o's	Rank in Tendency to Close a's and o's	
A	15.5	+	5.90	1	13	1	22.9	15	1.49	4	14	26.4	4	1.15	7	16	12.30	3	2.34	3	6.5	25	15
B	4.5	+	2.80	7	4	2	24.1	16	1.85	8	12	29.6	3	1.23	4	4	8.85	11	1.34	14	3	13	8
C	1	+	1.25	14	1	10	17.3	8	1.00	1	3	18.1	12	1.05	13	1	10.55	5.5	2.05	5.5	2	7	3
D	17	-	2.90	16	14	15	20.7	13	2.10	10	15	18.7	11	.90	15	17	9.80	7	1.78	9	16	23	14
E	4.5	+	2.75	15	3	4	20.6	12	1.33	2	7	43.2	1	2.10	1	9	6.05	16	.88	17	10	40	17
F	14	+	1.30	10	7	6	15.3	4	1.59	5.5	11	23.2	6	1.52	2	14	7.50	13	1.36	12	8.5	8	4
G	7	-	15.00	17	9.5	11	16.1	6	1.59	5.5	9.5	17.1	14	1.06+	11	8	7.45	14	1.64	10	17	9	5.5
H	9	+	3.90+	3	12	3	21.4	14	2.37	12	6	24.2	5	1.13	8	5	9.65	9	1.35	13	8.5	9	5.5
I	10	+	.33	12	15	5	15.8	5	1.72	7	16	13.3	15	.84	17	11	9.70	8	1.80	8	15	22	13
J	2	+	1.70	9	9.5	8	14.2	3	3.63	16	5	19.8	10	1.39	3	6	10.55	5.5	2.48	2	1	20	11
K	11.5	+	2.30	8	5	7	18.2	9	2.39	13	9.5	20.1	8.5	1.10	10	10	7.25	15	1.26	16	5	16	9
L	13	+	.87	11	17	12	27.8	17	2.02	9	13	31.2	2	1.12	9	13	12.90	2	1.33	15	13	3	1
M	8	+	4.30	2	2	9	19.5	11	2.29	11	2	20.6	7	1.06-	12	3	9.50	10	2.07	4	4	20	10
N	6	-	.20	13	8	13	18.9	10	2.86	14	4	17.2	13	.91	14	12	5.85	17	1.80	7	6.5	35	16
O	3	+	3.10	6	6	17	5.7	1	3.67	17	1	6.8	17	1.19	6	2	22.30	1	4.02	1	14	12	7
P	15.5	+	3.50	5	11	14	16.7	7	1.36	3	8	20.1	8.5	1.20	5	7	8.25	12	1.54	11	11	6	2
Q	11.5	+	3.90-	4	16	16	12.2	2	3.26	15	17	10.8	16	.88	16	15	12.20	4	2.05	5.5	12	22	12

When the writing was finished the subject was given a set of sixteen small cards, each card containing the name of one of the other subjects. The card bearing the subject's own name was left out. He was directed to arrange the cards in the order of the amount of ambition possessed by the person indicated on each. Thus the name of the most ambitious person in his opinion would be placed first, the name of the next most ambitious person second, and so on. The rank thus given each subject was recorded on a special blank by the experimenter, after which he shuffled the cards with care. This process was repeated with each of the traits of character listed in Table I. and with each of the subjects. Assurance was given them that the records would be kept in such a way as to secure the strictly confidential nature of the results. The same experimenter conducted this part of the experiment throughout. He was on a basis of easy, friendly acquaintance with all the subjects. Because of the intimate personal relations obtaining in small semi-social fraternities, these subjects were peculiarly able to judge the character of each other.

From the 17 rankings thus obtained, the average position of each subject in each trait was found. The subjects were then re-ranked in each trait according to the size of these averages, the smallest (*i. e.*, highest) average rank in a given trait being 1, the next smallest being 2, and so on. These final rankings for the various traits of character appear in appropriate columns in Table II.

It was next necessary to secure corresponding rankings with respect to the various traits of handwriting supposed to be correlated with the respective traits of character. This was done by measuring the various traits of handwriting involved and then ranking the subjects on the basis of these measures. The nature and the extent of the relations existing between various traits of character and handwriting were then computed from the appropriate series thus obtained by means of Spearman's correlation formula:

$$R = 1 - \frac{6\sum D^2}{n(n^2 - 1)}$$

As indicated in Table I., ambition is very generally held by graphologists to be revealed by a pronounced upward slope of the lines of writing. Similarly, the lack of ambition is indicated by a corresponding downward slope, while intermediate degrees of ambition have intermediate slopes.¹ Since all of the lines of the various specimens of writing were of approximately the same length, the relative upward or downward slope of a given specimen would be indicated accurately by the average distance that the right end of the lines stood above or below the point where the lines would have fallen had they run across the page strictly at right angles to the margin. Each line of each specimen was thus measured to the nearest half-millimeter. The final averages with appropriate signs appear in Table II., column 3. The corresponding ranks of the various subjects appear in column 4. Their ranks in ambition as judged by their fellows, appear in column 2. A mere glance at these two series of ranks shows at once that there is no particular connection between upward sloping writing and ambition. It is true, subjects D, I and L agree fairly well as to their positions in the two series. On the other hand subject A who has the most upward sloping writing of the group is among the weakest in ambition, ranking 15.5. Again subject C who is the most ambitious member of the group has a distinctly downward sloping writing, ranking 14! When all the tendencies to agreement and disagreement are taken together in the Spearman formula, the correlation is found to be $-.20$. Clearly there is no tendency whatever for the ambitious person to write in an upward sloping direction.

Some graphologists have held that ascending lines indicate pride.² The rank of the various subjects in pride as judged by their fellows is accordingly given in column 5. The correlation between pride and upward sloping lines is found to be $-.07$. There is no evidence of the alleged relation.

¹ Crépieux-Jamin (2), p. 78; Deschamps (4), p. 61; French (6), p. 5; Frith (7), p. 33; Preyer (10), pp. 27, 181; Schneidemühl (11), p. 171, 299.

² Crépieux-Jamin (2), p. 172; Schneidemühl (11), p. 299. See also Frith (7), p. 100.

Regarding bashfulness, graphologists are in less agreement. Schneidemühl says that it is indicated by writing traced in fine lines (11, pp. 196, 299). Accordingly, the width of each subject's writing was measured just at the bend of the upward stroke on the ten t's indicated by parentheses in the passage (p. 66). The measurement was made by means of a microscope containing a scale in the eye-piece. With the lens system used, the units on the scale were equal to .0007 of an inch. The average width of the ten strokes measured are shown for each subject in column 7. The corresponding ranks are shown in column 8. The ranks of the various subjects in bashfulness as judged by their fellows are shown in column 6. The correlation of narrowness of lines and bashfulness as represented by these two series of ranks is $-.45$. There is clearly no tendency for bashful people to write with fine lines.

Correlation was also computed between bashfulness and the tendency to lateral narrowness of the m's and n's. Both the height and width of the m's and n's marked by parentheses in the passage (p. 66) were measured to the 64th of an inch, by superposing an Osborn transparent glass scale (9, p. 93) and reading with a hand lens. Interference due to natural differences in the size of writing were eliminated by taking as the index of the proportionate width of the m's and n's, the quotient of the average width divided by the average height. These indices are shown in column 9 and the corresponding ranks in column 10. The correlation of bashfulness with narrow m's and n's is found to be $+.38$. This is the largest positive correlation obtained in the present study. It is rather ironical that it also should be the only relation investigated which, to the knowledge of the writer, has never been put forth by any graphologist.¹ The $-.45$ obtained between bashfulness and thin lines is the largest correlation of either sign obtained in the study and rather surprising. But, unfortunately for the theory of Herr Schneidemühl, it is negative. A real negative correlation is, to be sure, as interesting and important as a positive one. It will

¹ See however, Crépieux-Jamin (2), pp. 91 and 96; Frith (7), p. 38.

be proven later, however, that neither of these correlations are greater than might result from chance.

'Force' is held by graphologists to be indicated variously by heavy bars on the t's¹ or by heavy writing in general.² We have already at hand exact measures of the heaviness of the upstrokes of the t's in connection with bashfulness (column 7). The ranks shown in column 8 must be reversed in this connection, 17 becoming 1, 16 becoming 2, etc., since here the rank is according to *width* instead of *narrowness*. The rank of the various subjects with respect to force as judged by their fellows is shown in column 11. The correlation of force with heavy writing as indicated by these rankings is — .17. There is here no evidence in favor of the alleged relation.

The width of the bars on the same ten t's was measured at their widest points by the microscope as described for the up-stroke. These averages are shown in column 12, and the corresponding ranks in column 13. This trait of writing gives a correlation coefficient with 'force' of — .06. There is no evidence that forceful people cross their t's heavier than anyone else.

It might be urged that 'force' is indicated by the *relative* width of the bars on the t's as compared with the heaviness of the rest of the writing. A convenient index of this relative width is afforded by the quotient obtained by dividing the average width of the bars on the t's (column 12) with the average width of the up-stroke of the same t's (column 7). These quotients are given in column 14, and the corresponding ranks in column 15. They yield a coefficient of correlation with 'force' of + .27. This is no greater than chance affords.

Perseverance is held by certain graphologists to be indicated by prolonged bars on the t's.³ The length of the bars on the same ten t's already mentioned, were measured to the nearest half millimeter. The average results are shown in

¹ Crépieux-Jamin (2), p. 191; Deschamps (4), p. 84; French (6), p. 5; Frith (7), pp. 55, 120. See also Schneidemühl (11), p. 295.

² French (6), p. 17; Preyer (10), p. 168.

³ Frith (7), p. 97; cf. Crépieux-Jamin (2), p. 95.

column 17, and the corresponding ranks in column 18. The rank of the various subjects in perseverance as judged by their fellows appears in column 16. Perseverance and the tendency to make long bars on the t's as thus indicated, yield a correlation of exactly zero.

Recognizing the fact that a long bar on large writing might not be of the same significance as one of the same length on small writing, this disturbing factor was compensated for as follows: The height of the ten t's was first measured and averaged. The quotient obtained by dividing the average length of the bars on the t's by the average height affords a reliable index of the proportionate length of bar. These quotients appear in column 19, and the corresponding ranks in column 20. These yield a correlation with perseverance of + .16. There is clearly no connection here between perseverance and the tendency to make long bars on the t's.

Reserve is held almost universally by graphologists to be indicated by a tendency to close tightly the small a's and o's, whereas frankness is indicated by the opposite tendency to leave them open at the top.¹ It was found that no writer completely closed all his a's and o's, or left them all open. Accordingly a table was made of all the a's and o's showing for each subject the number closed, the number just open and the number wide open. The number of open letters plus twice the number wide open was finally taken as the index of openness. These indices are shown in column 22. The corresponding ranks in tendency to close the a's and o's appear in column 23. The ranks of the subjects in reserve as judged by their fellows appear in column 21. Reserve and the tendency to close a's and o's as thus indicated, yield a correlation coefficient of - .02. Once again we find no support for the claims of the graphologists.

A brief summary of the correlations obtained in the foregoing experiments is presented in Table III.

¹ Crépieux-Jamin (2), p. 87; French (6), p. 11; 13, 23; Frith (7), p. 102; Preyer (10), p. 155; Schneidemühl (11), p. 297.

TABLE III

CORRELATIONS OF CHARACTER WITH HANDWRITING

Ambition with upward sloping lines.....	— .20
Pride with upward sloping lines.....	— .07
Bashfulness with fineness of line.....	— .45
Bashfulness with lateral narrowness of m's and n's.....	+ .38
Force with heavy handwriting.....	— .17
Force with heavy bars on t's.....	— .06
Force with heavy bars on t's, varying size of writing compensated for	+ .27
Perseverance with length of bars on t's.....	.00
Perseverance with length of bars on t's, varying size of writing compensated for.....	+ .16
Reserve with closed a's and o's.....	— .02

There appear in this table fully as many negative correlations as positive. The average of the entire ten is — .016, or practically zero. And since the above are a fair sampling of graphologists' claims as to the relation between handwriting and character, this figure may be taken with some assurance as typical of the whole.

As an interesting check upon the technique employed, an equal number of correlations were computed from pure empirical chance. Symmetrical lotto blocks numbered from 1 to 17 were shaken thoroughly in an improvised dice box, thrown upon a table and arranged in a row by mechanical methods. The numbers of the blocks were recorded in the order thus appearing just as if representing the ranks of the subjects in a trait of character. The blocks were then shaken for about a minute, arranged in a row as before and the number recorded, this time as if ranks of subjects in a trait of handwriting. Then the correlation between the two orders was computed by Spearman's formula exactly as in the regular experiment. The following successive correlations were obtained by this means:

+ .22, — .23, + .07, + .10, — .17,
— .07, + .19, — .26, + .47, — .15.

The large positive correlation of + .47 which it is possible to obtain by this means should be compared with the correlations of + .38 and — .45 in Table III. The average of the group as a whole is + .017, which may be compared with a similar average derived from Table III.

The strictly negative results of the present experiment are not necessarily in conflict with the results of Binet. The two experiments do not test exactly the same thing, as has already been suggested. It is probably significant, however, that Binet's graphologists made very bad records on the only test of character he employed, even where the differences between the pairs of writers were extremely gross. The astonishing ability of Binet's subjects to tell intelligence from handwriting should receive special investigation. It is possible that the individuals whose handwriting was used in this experiment were too well known to furnish satisfactory material for subjects who make a special point of studying the handwriting of eminent men.

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