# HANDWRITING IN THE EARLY DETECTION OF DIS-EASE (ADDITIONAL DATA)

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**Abstract –** The purpose of this study was to continue with the research undertaken at Poole Hospital, identifying and establishing the traits in writing in support of the hypotheses that early detection of heart related problems is possible by identifying the common traits. The samples of writing from the 68 patients who had attended the cardiac outpatient clinics and who had consented to their medical records being accessed by the Researcher were used as subject and control group; 21 of whom had been diagnosed as not having a cardiac related disorder, the other 47 were diagnosed with cardiac pathologies. 2 different tests were carried out and the groups were split into Without Heart Disease, MI, All other Heart Disease and Without Heart Disease and With Heart Disease. Various writing traits were analysed including pressure on the paper, shape and malformation of the letter 'o', breaks in the letter formation and resting dots, the placing, number and on which letters they appeared. A chi-squared test showed no significant differences between the patients and the control group in the number of breaks, malformed 'o's and pressure; however a Kruskal-Wallis Analysis of Variance test showed that Resting Dots on the letter 'e' were statistically significant in the MI group. Further analysis was carried out by a 2nd researcher replicating the 1st phase research, there was a strong correlation between the 2 researchers on malformed 'o's, pressure, DP's and Resting Dots, but very low correlation on the number of breaks.

## 1. Introduction

Almost every book written on handwriting analysis incorporates at least a paragraph and often chapters on clinical graphology. However, very few scientific papers have been published by the authors to validate the claims, although some studies on neurological and psychological issues have been published[1-7]

Many of the books carry contrary information on what traits can be identified, for example Dr Claude Santoy[8] in her book 'Write Whats Wrong' suggests that Cardiovascular Deficiencies can be seen through "light, spasmodic pressure combined with broken and altered strokes" as well as "the letter 'o' in a heart shape and other traits. Paul de Sainte Colombe[9] in his book entitled 'Grapho-Therapeutics' also states that breaks in the letters are a sign of cardiac disorders and Monica O'Hara-Keeton[10] goes a stage further and suggests that breaks in the up-strokes are a sign of breathing difficulties leading to cardiovascular disease. Renna Nezos[11] in a chapter on Clinical Graphology within her book 'Advanced Graphology' writes of Cardiovascular Malfunctions and gives a list of writing traits including half formed letters, jerky movements, irregular connectedness of letters, and descending baselines among others. Bela Mittleman, M.D. writing the foreword in Ulrich Sonnemann's[12] 'Handwriting Analysis as a Psychodiagnostic Tool' in 1950 writes about the psychodiagnostic techniques and how 'numerous classroom experiments were conducted in "blind" graphological analysis' 'showing considerable agreement in general diagnosis and on specific clinical manifestations'. The book contains a long chapter on the Graphic Expression of Psychopathology and within that a small paragraph on "dotting" in the case of cardiac disease. Sonnemann's dots are in the "course of strokes", forming a dotted line instead of a fluid pen stroke, he also mentions dots placed between words as being the need of the writer to rest; and finally P Scott Hollander[13] writes that "pain dots" are like "blobs of ink" in the script. Although all of these books contain information on how to recognise cardiac disease in writing no statistically significant recordable scientific studies have been found to show Cardiac Disease in its many forms.

With so many traits listed for cardiac disease, the Researchers elected to have initially a four-string hypotheses, and from the first phase of this research project found Resting Dots in the stroke of the writing and Resting Dots on the upper middle zone of the letters "a", "e" and "o" as being statistically significant.

There were no dots found in the "course of strokes" nor were dots found between letters and words to any great degree. The chi-squared test showed no significant differences between the patients and the control group in the number of Breaks, Malformed o's and Pressure. However the t-test showed that the mean ratio of Resting Dots to letters in the handwriting of Patients was significantly higher than in the Controls. The Mean Resting Dots ratio in patients was 0.31 (SD 0.14), and in controls was 0.17 (SD 0.94), this difference was statistically significant ($p<0.001$), Cohen's $d = 1.2$, and led to the further breakdown of the Resting Dots.

## 2. Hypotheses

Prior to data collection the hypothesis quoted four types of handwriting error:-

- Resting Dots, the placing, number and on which letters they appeared[13]
- Breaks in the letter formation [9,12]
- Shape and Malformation of the letter 'o' [12]
- Pressure on the paper – light, medium, heavy and variable.[13, 14]

Second hypothesis suggested after the findings from the first phase of the research that Resting Dots on the upper middle zone area of the letters 'a', 'e' and 'o' would signify heart disease.

## 3. Participants

Handwriting samples were requested from 76 patients attending the outpatient cardiac clinics and Nuclear Medicine Department for stress testing, of which initially 61 were used as meeting the hypotheses generated. Initial reasons for non-selection of 6 of the patients included:- Educated in another country, samples written in script form, sample copied from other works, samples written on wrong paper, sample written with the wrong pen. There were a further 9 samples of writing which were put aside for later analyses to be used if necessary. Participants were asked to state their age, gender, country of education and handedness.

The Control Group was made up of Patients who have not been diagnosed at this stage as having any form of Cardiac Disease.

The breakdown of age and gender of participants was as follows:

**Table 1:** Breakdown of Age x Sex

| | Total No. of Patients | | Patients with Heart Disease | |
|---|---|---|---|---|
| **Age** | **Male** | **Female** | **Male** | **Female** |
| Teens | 1 | 0 | 0 | 0 |
| 20s | 0 | 1 | 0 | 1 |
| 30s | 1 | 2 | 1 | 0 |
| 40s | 5 | 2 | 2 | 0 |
| 50s | 3 | 12 | 2 | 5 |
| 60s | 5 | 14 | 5 | 9 |
| 70s | 10 | 11 | 10 | 9 |
| 80s | 0 | 0 | 0 | 1 |
| Totals | 25 | 42 | 20 | 25 |

Of the 45 patients with diagnosed heart disease, 12 have had a Myocardial Infarction either before the sample of writing was taken or since. Many of the patients have been identified as having more than one type of cardiac malfunction: 22 have been diagnosed with Ischaemia, 21 have Angina, 9 have Coronary Artery difficulties, 20 have various Conductivity problems, 8 have other diagnosed heart problems including muscular, 7 have Stents fitted and 2 have Pacemakers. The Mean age of female patient

participants with heart disease was 68 years and the Mean age of male patients with heart disease was 66, the overall mean age of Participants was 66 with Females being 68 and Males 62.

## 4. Method

Approval for the research was granted by Dorset Research Ethics Committee, and by Poole Hospital Research Governance Department.

Initially analysis in malformation of the letter 'o' was conducted on a positive or negative criteria and was found not to be statistically significant. In the 2nd phase of the research numerical analysis was employed to analyse malformed o's in the Patient Participants writing.

A second Researcher was used to do a cross-check on 30% of the Patient and Control Participants writing samples, using exactly the same parameters and equipment as the main Researcher but totally blind to the results. His data was entered on separate sheets and kept apart from the main analyses, until a correlation was carried out on the 2 exercises against the hypothesis.

For the second phase of the Research consent had been given by all but two of the patients' to access their medical records for details of all their pathologies. This information was entered onto a spreadsheet together with as much information as possible on the medications taken by the patients. With the research concentrating on finding cardiac disease in writing all the heart related malfunctions were lifted from this sheet and put on a new spreadsheet headed up Practical Analysis. The headings were Ischaemia, Angina, MI, Coronary Artery, Conductivity, Other Heart, Stents and Pacemakers. The Main Researcher entered up the data on the remaining 8 patients' writing that had previously not been analysed and included it into this phase of the project in order to increase the sample size.

Further information was received verbally from another graphologist that the length of t-bar crossings, both on the lower case and upper case could be very important in diagnosing heart disease; and as a result of this Graphologist's impressive exercise in being able to pick out the Patients with diagnosed heart disease it was decided to include this into the latest phase of the research. No written evidence was offered by the graphologist to support this theory.

## 5. Results

**Table 2:** Comparison between findings of Main Researcher and 2nd Researcher

| Trait | Mean (SD) of 1st Researcher | Mean (SD) of 2nd Researcher | Mean (SD) of Difference | p-value | Correlation Coefficient |
|---|---|---|---|---|---|
| Resting Dots | 37.74 (19.90) | 37.36 (19.13) | 0.37 (2.87) | 0.29 | 0.99 |
| Resting Dots upper middle zone (UMZ) | 18.63 (12.12) | 18.79 (11.85) | -0.16 (3.40) | 0.42 | 0.96 |
| Resting Dots 'a' | 3.79 (3.10) | 2.58 (2.56) | 1.21 (2.12) | 0.01 | 0.73 |
| Resting Dots 'e' | 5.32 (4.82) | 4.58 (3.73) | 0.73 (1.45) | 0.02 | 0.97 |
| Resting Dots 'o' | 3.10 (2.58) | 3.05 (2.30) | -0.05 (1.43) | 0.43 | 0.83 |
| Dark Patches | 10.47 (8.19) | 10.95 (7.26) | -0.47 (2.87) | 0.24 | 0.94 |
| Breaks | 1.42 (2.12) | 2.26 (2.21) | 0.84 (2.19) | 0.06 | 0.49 |

[v] 19 Samples of writing taken from Patients

**Table 3: Comparison between findings of Main Researcher and 2nd Researcher – Pressure**

| 2nd Researcher \ 1st Researcher | Light | Medium | Heavy | Variable |
|---|---|---|---|---|
| **Light** | 8 | 0 | 0 | 2 |
| **Medium** | 0 | 3 | 0 | 1 |
| **Heavy** | 0 | 0 | 5 | 0 |
| **Variable** | 0 | 0 | 0 | 0 |
| **Totals** | **8** | **3** | **5** | **3** |

Correlation between the 2 Researchers on Resting Dots, Resting Dots in the UMZ area together with Resting Dots on the letters 'e' have proven to be statistically significant with very few discrepancies between the 2 Researchers, however although Resting dots on 'o' are reasonably significant, the Researchers had a number of large differences between the number of Resting Dots seen on the letter 'a', and on the number of Breaks in the writing stroke. The 1-stringed t-test was used to compare the data. Although there were queries over the interpretation of Variability in Pressure the Researchers matched on 16 of the samples of writing out of 19.

**Table 4: Data Analysis**

| Trait | Patient Group (N) | Results | p-value |
|---|---|---|---|
| Ratio of Resting Dots to total letters | No Heart Disease (21)<br>M.I. (11)<br>All other Heart Disease (36) | 0.27 (0.12)<br>0.31 (0.13)<br>0.31 (0.15) | 0.66 [a] |
| Ratio of Resting Dots in Upper Middle Zone to total letters (UMZ)<br>Mean (SD) | No Heart Disease (21)<br>M.I. (11)<br>All other Heart Disease (36) | 0.13 (0.08)<br>0.15 (0.07)<br>0.14 (0.10) | 0.83 [a] |
| Ratio of Resting Dots 'a'<br>Median (IQA) | No Heart Disease (21)<br>Heart Disease (47) | 2.0 (2.0)<br>2.0 (3.0) | 0.75 [b] |
| Ratio of Resting Dots 'e'<br>Median (IQA) | No Heart Disease (21)<br>Heart Disease (47) | 3.0 (3.0)<br>5.0 (6.0) | 0.12 [b] |
| Ratio of Resting Dots 'o'<br>Median (IQA) | No Heart Disease (21)<br>Heart Disease (47) | 2.0 (3.0)<br>2.0 (3.0) | 0.80 [b] |
| Ratio of Resting Dots | No Heart Disease (21)<br>Heart Disease (47) | 0.28 (0.12)<br>0.31 (0.15) | 0.36 [c] |
| Ratio of Resting Dots in UMZ | No Heart Disease (21)<br>Heart Disease (47) | 0.13 (0.07)<br>0.14 (0.09) | 0.61 [c] |
| Ratio of Resting Dots 'a'<br>Median (IQA) | No Heart Disease (21)<br>M.I. (11)<br>All other Heart Disease (36) | 2.0 (2.0)<br>2.0 (4.0)<br>1.5 (4.0) | 0.95 [d] |
| **Ratio of Resting Dots 'e'<br>Median (IQA)** | No Heart Disease (21)<br>**M.I. (11)**<br>All other Heart Disease (36) | 3.0 (3.0)<br>**7.0 (4.0)**<br>4.0 (5.0) | **0.04** [d] |

| | | | |
|---|---|---|---|
| Ratio of Resting Dots 'o' Median (IQA) | No Heart Disease (21) | 2.0 (3.0) | 0.89 [d] |
| | M.I. (11) | 2.0 (3.0) | |
| | All other Heart Disease (36) | 2.0 (4.0) | |

[a] ANOVA [b] Mann Whitney U Test [c] T-Test [d] Kruskal Wallis

**Table 5: New Tests**
**Comparison of groups**

| Trait | Patient Group (n) | Results | p-value |
|---|---|---|---|
| Malformation of letter 'o' Median (IQA) | No Heart Disease (21) | 0.0 (3.0) | 0.27[a] |
| | M.I. (11) | 2.0 (4.0) | |
| | All other Heart Disease (36) | 1.0 (4.0) | |
| Malformation of letter 'o' Mean (SD) | With Heart Disease (47) | 1.0 (4.0) | 0.32 [b] |
| | Without Heart Disease (21) | 0.0 (3.0) | |

[a] Kruskal Wallis [b] Mann-Whitney

The second part of the research project produced some intriguing results, table 4 shows that the ANOVA test for between groups No Heart Disease, MI, All Other Heart Disease on Resting Dots and Resting Dots Upper Middle Zone showed no statistical significance however patients with an MI using the Kruskal Wallis Analysis of Variance test with dots to the letter 'e' appeared as being statistically significant; the Median was 7.0 with IQA being (4.0) p=0.04. When MI was incorporated into the category – 'All Other Heart Disease' the letter 'e' was found not to be statistically significant. No other letters were found to be statistically significant.

Table 5 shows how the number of malformed o's against a breakdown of the patients' heart pathologies proves not to be statistically significant given the numbers of patients.

**Table 6: New Tests**
**T-Bars**

| Patients (n) | T-Bar Assumptions (n) | Results | p-value |
|---|---|---|---|
| Without Cardiac Disease (21) | No Heart Disease (14) | 66.7% | 0.18 |
| | With Heart Disease (4) | 19% | |
| | Possibly has Heart Disease (3) | 14.3% | |
| MI (11) | No Heart Disease (3) | 27.3% | |
| | With Heart Disease (6) | 54.5% | |
| | Possibly has Heart Disease (2) | 18.2% | |
| Other Cardiac Disease (36) | No Heart Disease (19) | 52.8% | |
| | With Heart Disease (8) | 22.2% | |
| | Possibly has Heart Disease (9) | 25.0% | |

**Table 7: New Tests**
**T-Bars**

| Patients (n) | T-Bar Assumptions | Results | p-value |
|---|---|---|---|
| Without Cardiac Disease (21) | No Heart Disease (14) | 66.7% | 0.41 |
| | With Heart Disease (4) | 19.0% | |
| | Possibly has Heart Disease (3) | 14.3% | |
| With Cardiac Disease (47) | No Heart Disease (22) | 46.8% | |
| | With Heart Disease (14) | 29.8% | |
| | Possibly has Heart Disease (11) | 23.4% | |

The chi-squared test for association was used for Tables 6 and 7, in assessing if T-Bars are a valid method in identifying cardiac disease in writing. You will see from both tables that it was easier to identify the patients that did not have heart disease (66.7% of the total) than those that did, but still not statistically significant.

## Discussion

The 2nd Researcher did not classify any of the writing samples with variable pressure, instead concentrating only on the majority of the writing whether it was light, medium or heavy suggesting that the use of an Analyzing machine would be more reliable to test the variability of pressure in writing. The Researchers discussed in depth on what was considered to be either a Dark Patch, or a thickening of the stroke. In most instances a Dark Patch was thought to be multiple Resting Dots or where the pen had rested longer causing a large 'blob' and was analysed as such by both Researchers. Breaks in writing stroke appear to be the most difficult to assess, with such a wide difference in totals between the 2 Researchers, no reasons have been identified for this variation.

People are all different and have varying levels of pain threshold and ways of dealing with illness, as Nezos[11] explains in her book, and this could be why there are a number of variant traits and may well explain the lack of significant findings in the traits listed.

The affects of medication in handwriting has been the source of much discussion and research; the information available in the patient records was not sufficient to do a full study in this phase of the project. It is felt that more samples of writing will be needed to analyse medication affects and for comparisons between particular types of cardiac disease and the writing. Most graphologists state that no one trait is sufficient to identify a problem and thus a further study is warranted to amalgamate a number of the writing traits to see if jointly they produce the signs of identifying cardiac disease in writing.

Pressure and the energy available for a particular task is an essential part of the study and therefore the production of specific equipment would be useful in furthering this aspect.

## Conclusion

The high level of independent replicable results between the researchers indicates the validity of the first phase of the research. A cohort of 11 patients and a p-value 0.04 for Resting Dots on 'e' shows a significant predictability for MI. The research results encourage further longitudinal studies combined with specific research to identify the influence of medication and expanded cardio pathologies.

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