

The Uniqueness of Handwriting

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Forensic document examiners have recently witnessed three events that have raised questions, either directly or indirectly, about the basis for handwriting identification, specifically in the areas of the statistical and scientific basis for the uniqueness of handwriting. These events consist of the publication of an article titled *Exorcism of Ignorance as a Proxy for Rational Knowledge: The Lessons of Handwriting Identification Expertise*, by D. Michael Risinger, Mark P. Denbeaux and Michael Saks (137 U.Pa. L.Rev. 731, 1989), the recent Supreme Court decision of *Daubert v. Merrell Dow Pharmaceuticals Inc.* 113 S. Ct. 2786 (1993) (along with the subsequent affect on federal and state rules of evidence), and the results of the "Daubert" hearing preceding the hearing of *United States of America v. Robert and Eileen Starzecpyzel* 93 Cr. 553.

The examination of handwriting for identification purposes is a statistical analysis, yet is not based on a specific numerical uniqueness/frequency factor which could be translated to a mathematical equation. Nor are handwriting identifications based on a standard number of points of similarity as is commonly associated with fingerprint identifications. Yet forensic document examiners worldwide acknowledge that no two people share the exact same set of individual handwriting features.

Questions have arisen, and are bound to continue to arise, about the scientific basis for the axioms of handwriting identification. A survey was prepared and distributed to the newsletter editors of various forensic document examiner organizations within the United States and distributed during a technical session in the Questioned Documents Section of The American Academy of Forensic Sciences in Seattle, WA in February 1995, in an attempt to respond to these questions. The purpose of this survey was to glean the cumulative experience and knowledge of forensic document examiners concerning the uniqueness of handwriting and to review published and unpublished articles that have addressed the subjects of handwriting uniqueness and statistical or empirical analyses of handwriting characteristics.

The Survey

The survey questions were as follows:

1. How many years have you been a document examiner?
2. Do you work in private practice; federal, state or local government; or other? (Please specify.)
3. Approximately how many different writer's hand-

writing has been provided to you as known specimens for comparison purposes?

4. For comparison purposes, have you ever been provided handwriting specimens from relatives, people who have gone to the same school or other groups who may demonstrate an unusual degree of similarity in their handwriting? (Please specify these instances.)
5. Have you ever made a specific comparison of known writings of relatives, people who have gone to the same school or other groupings of people as part of a case or personal research? (Please specify.)
6. Are you aware of any empirical or statistical studies concerning individual characteristics and frequency of use? (Please list and include published and unpublished material.)
7. Have you ever found an instance in which two different people write exactly alike? (i.e. No differences in any individual characteristics. Totally indistinguishable.)

The Respondents

Ninety-one surveys were returned. A total of 1,490 man-years of experience were represented in the responses, which translates to an average of over 16.37 years of experience per person. The experience and employment of the respondents are as follows:

Table 1. Experience of respondents

Experience	No. of respondents	Percentage
0-5 yrs	16	17.58%
6-10 yrs	13	14.29%
11-15 yrs	23	25.27%
16-20 yrs	8	8.79%
21-30 yrs	23	25.27%
31-40 yrs	4	4.40%
40+	4	4.40%

Table 2. Employment of respondents

Employer	No. of respondents	Percentage
Federal Government	22	24.18%
State Government	14	15.38%
Local Government	7	7.69%
Private Practice	23	25.28%
Private and Government	25	27.47%

Study of Known Writings by Respondents

Collectively, the 91 respondents examined the handwriting of well over *one million* individuals. It should be noted that the respondents provided estimates and some respondents supplied only vague answers that could not be included in the collective estimates.

It is commonly recognized that certain groups of people may demonstrate an unusual degree of similarity within their handwriting specimens. The respondents have conducted examinations or specific research involving the similarity in handwriting of the following groups:

- Husband/Wife
- Mother/Father
- Father/Son
- Brothers
- Sisters
- Girls Junior High Basketball Team
- Female School Friends
- People of Jewish Background in Brooklyn, NY
- People Incarcerated Together
- Relatives
- Black Street Gang Members
- Architects and Draftsmen
- Foreign Nationals
- Twins
- Nigerians From the Same Village
- Two Teachers
- Black Females
- Italians, Belgians, Germans, Asians, Philipinos
- Close Childhood Friends
- Foreign Groups in Canada
- Classmates
- Students
- Mechanical Drawing Students
- Hmong Writers
- Residents of Hong Kong Who Were Taught English
- Columbians From the Same Village
- Secretary/Boss

Experience of Uniqueness in Handwriting by Respondents

The final question of the survey asked, *Have you ever found an instance in which two different people write exactly alike?* All respondents, with their collective 1,490 man-years of experience along with their research and experience in examining both handwriting of the general population and handwriting of certain groups, as described previously, answered this question, *No*.

It has been suggested that should handwriting not be unique examples of such would have manifested themselves through the collective casework and handwriting collection of all those surveyed. Eventually, and by now, a second individual with identical individual handwriting characteristics would have been discovered after an appropriate and scientifically based identification had been made. To date, no such examples have arisen.

It was noted, however, that numerous unsolicited

comments accompanied this answer. Most of these comments described instances in which two sets of limited writings, principally signatures, displayed few significant differences.

Published and Unpublished Empirical and Statistical Studies

While this writer does not suggest that the following is an exhaustive review of published and unpublished papers that contain or discuss empirical and statistical analyses of handwriting individuality, it is obvious that there is unquestionably a significant amount of information available concerning such analyses. Albert S. Osborn observed (*Questioned Documents* page 230) that if a statistical probability of one-in-two writers making the exact same letter formation is applied, the probability of two different people writing exactly alike in regards to 46 different characters is one in 68 trillion, based on the Newcomb rule of probability (one-half to the 46th power).

The first category of study is the various handwriting classification attempts have been made for many years. The files of this writer have systems going back to the 1920s (*Classification and Identification of Handwriting*, C.D. Lee and R.A. Abbey, D. Appleton & Co., 1922). Another example of early published papers is *Handwriting Classification*, A. Popkiss and J. Moore, Police Science, 1945. The best known modern systems include those of the FBI handwriting cards along with the Secret Service and Bundeskriminalamt of Germany systems of cataloging handwriting known as FISH (Forensic Information System for Handwriting). By the very nature of classification and cataloging handwriting, identical writings from two individuals should be detected, were they to exist and be entered into the systems. To date no classification/cataloging system has identified any two writers that possess the exact same set of individual handwriting characteristics.

In 1990, Roy Huber established a simple classification system based on envelopes received for personal purposes (*The Uniqueness of Writing—ASQDE*, 1990). As such, each sample contained common name and address entries. Huber was able to categorize nearly 500 writing samples into groups of 28 or less. He then makes the following observation:

"The diversity of the writing habits found in writers of these numbers left no doubt as to the distinctiveness or uniqueness of each writer's products."

Another area of study is handwriting classification and frequency statistics which determine, through survey and analyses, the frequency of certain characteristics from a defined population. According to survey respondents, one of the early published writers dedicating their efforts to handwriting classification and frequency statistics is Orville B. Livingston, document examiner for Milwaukee Police Department. Livingston published at least two separate articles on the subject (A Handwriting and Pen-Printing Classification System for Identifying

Law Violators, *Journal of Criminal Law, Criminology and Police Science*, 1959, Vol. 49 and Frequency of Certain Characteristics in Handwriting, Pen-Printing of Two Hundred People, *Journal of Forensic Sciences*, April, 1963).

A recent effort to classify handwriting by frequency statistics can be found in two articles presented by Richard A. Horton (A *Study of the Occurrence of Certain Handwriting Characteristics in a Random Population* presented at several meetings and *You Can't Argue With the Facts: Frequency of Occurrence, Competency of Findings* presented at NEAFS in 1994) which details the results of a two-year study of handwriting and includes the frequency analyses of numerous handwriting characteristics from among over 700 different writers.

Another example is a group effort performed by students of Mr. Joseph English in the mid-1970s (A *Statistical Examination of Selected Handwriting Characteristics* by Muehlberger, Newman, Regent and Wichmann, *Journal of Forensic Science*) which involved detailed frequency analyses of the "th" combination.

Numerous papers were submitted by respondents on the subject of individuality of a restricted population or specific situation. These papers include the following:

Examination of Unaccustomed Hand Signatures, Arthur T. Anthony, AAFS, 1988.

Identifying Characteristics in the Handwriting of the Visually Impaired, Brian S. Lindblom, ASQDE, 1983.

Data Obtained From a Survey of the Handwriting of Black Students in Grades One Through Twelve in a Study of the Letter Forms "J" and "W", Janis M. Winchester and John F. McCarthy, ASQDE, 1971.

A Second Survey of the Handwriting of Black Students in the United States in a Study of the Black "J" and "W." John F. McCarthy, IAFS, 1987.

Seeking Out Individualities in Handlettering, Joe Nemecek, ASQDE, 1969.

A Study of Unaccustomed-Hand Writing, Kenneth W. Newman, 1975.

A Preliminary Study of Hmong Handwriting, Janis S. Tweedy, ASQDE, 1991.

Similarities in the Handwritings of Members of One Family as Compared to Unrelated Groups, Viola Stevens, 1964.

Handwriting Styles Based Upon Cultural Education, Douglas Caywood, IAFS, 1978.

A Study of Handwriting of Adolescents, Janet F. Mason, AAFS, 1987.

A Comparison Study of the Handwriting of Adolescents, Christine T. Cusack and John W. Hargett, AAFS, 1988.

A Study of Vietnamese Class Characteristics, Barbara Torres, AAFS, 1987.

Handwriting Characteristics of Arabs Writing Hebrew, Jacob Janiv.

Handwriting of the Deaf and Hard of Hearing, G.A. Savage, *Canadian Society of Forensic Science Journal*, Vol. 11, No. 1, March, 1978.

A Study of Handwriting by Twins and Other Persons

of Multiple Births, Mary S. Beacom, *Journal of Forensic Science*, Vol. 5, No. 1, January, 1960.

A Study of Numbers, James J. Horan and George J. Horan, IAFS, 1984.

Initials A Special Category of Handwriting, Nanette G. Galbraith, AAFS, 1984.

The Relative Variability of Pen Lift and Pen Path Habits in Block Capital Writing, P.J. Nicholson.

A System for the Classification of Block Capitals, P.J. Nicholson, *Journal of Forensic Science Society*, 1984.

The Variability of Selected Features in Cursive Handwriting: Categorical Measures, M.A. Eldridge and I. Nimmo-Smith, *Journal of Forensic Science Society*, 1984.

The Dependence between Selected Categorical Measures of Cursive Handwriting, M.A. Eldridge and I. Nimmo-Smith, *Journal of Forensic Science Society*, 1985.

The Variability of Selected Features in Cursive Handwriting Measure Defined Along A Continuum: Letter Specificity, A.M. Wing and I. Nimmo-Smith, *Journal of Forensic Science Society*, 1987.

Frequency of Omission, Preservation and Reversals in Handwriting and Relative Value as Individual Characteristics, Jeannine Zimmerman, 1990.

Continuing the Search for the Black "J" and "W," Charles L. Haywood, ASQDE, 1991.

A Statistical Approach to Handwriting Comparison: Search for Characteristics That Are Usable in the General Linear Model, G. Chamberland and M. Ghirotto, CSFS, 1990.

Are We Seeing the Same Thing? Martha, Blake, 1994.

Finally, recent articles have been published regarding the area of validation for forensic document examination proficiency. The first is titled *Proficiency of Professional Document Examiners in Writer Identification*, by Moshe Kam, Joseph Wetstein and Robert Conn (*Journal of Forensic Science*, Vol. 39, No. 1, 1994) in which Drexel University researchers conducted parallel tests of seven forensic document examiners from the FBI and ten graduate students in engineering and business. The results were stated as follows:

"Using standard hypothesis testing statistical tools, the hypothesis that the professional and non-professional are equally proficient at performing writer identification was found in our test to have a probability of less than 0.001."

A second and more comprehensive peer reviewed paper by the same authors titled, *Writer Identification by Professional Document Examiners* (*Journal of Forensic Science*, 1997) resulted in the following conclusion from these university researchers:

"Test results lay to rest the debate over whether or not professional document examiners possess writer-identification skills absent in the general population. They do."

An additional article worthy of note is *The Principle of the "Drunkard's Search" as a Proxy for Scientific Analysis: The Misuse of Handwriting Test Data in a Law Jour-*

nal Article, by O. Galbraith, C.S. Galbraith and N.G. Galbraith. This paper reports on the results of a comparison study of a handwriting identification problem between lay handwriting examiners and an unidentified group that took the same test but which included at least some qualified document examiners.

A most comprehensive legal review of this matter can be found in an article in the University of Missouri, Kansas City (UMKC) Law Review Volume 66, No. 2 titled, *Handwriting Identification Evidence in the Post-Daubert World*, by Andre A. Moenssens. Moenssens is a Professor of Law, University of Missouri at Kansas City and Director-designate of the UMKC Forensic Center of Law, Medicine and Public Policy.

Current Direction

Additional studies are being conducted and papers prepared, by Dr. Moshe Kam at the time of this printing. While this author has had the opportunity to review drafts of each paper, specific information about these papers cannot be divulged at this time.

A Technical Working Group for Forensic Document Examinations (TWGDOC) is currently in progress as of the first of 1998. This TWGDOC consists of forensic document examiners representing federal, state and local government examiners along with those in private practice. The purpose of this working group is to establish written unified standards for this field.

A joint, federally funded project involving the U.S. Postal Inspection Service, Drexel Fusion Lab, and Pacific Northwest Laboratory is also currently in progress as of the first of 1998. This project is designed to test the basic premises and scientific basis for handwriting identifications particularly in the areas of standardized methodology, measurable handwriting characteristics, and empirical validation.

Additionally, numerous studies of foreign writings by continent are in the process of being compiled and presented at several technical meetings by forensic document examiners from the Immigration and Naturalization Service Laboratory in Virginia.

Conclusion

There is significant documentation based on the results of published and unpublished papers concerning handwriting cataloging, handwriting classification, frequency studies, proficiency studies, and studies of various limited aspects of handwriting to go along with the experiences of forensic document examiners to conclude that there is statistical basis, scientific basis of study, independent review and substantial experience that no two people write exactly alike. Much effort is currently being undertaken to provide a more extensive and comprehensive scientific support for the basic axioms of forensic document examination.

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