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# POLICE SCIENCE

## LANDMARKS IN TYPEWRITING IDENTIFICATION

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In a relatively short period of time the typewriter has become an instrument of paramount importance in the correspondence and commerce of the world. Although the Remington Model 1 typewriter of 1874 was the first commercially feasible typewriter, patents for machines to impress letters on paper date back to 1715. However, none of these earlier machines had any utilitarian value. Earlier ideas, such as the keylever-typebar mechanism of Projean in 1833 and Beach's method of having typebars strike at a common center, developed in 1856, were utilized by Sholes, Soule, and Glidden in producing their typewriter, which was marketed as the Remington Model 1. This machine typed only upper case characters and was a "blindwriter", i.e. the typing produced was hidden by the typewriter mechanism and became visible only after the platen was turned. The success of the model 1 led to the Remington Model 2 in 1878. The improved Model 2, while still a blindwriter, had a carriage shift providing for upper and lower case characters. This typewriter proved to be quite successful from a commercial point of view and the typewriter began to take its place in the world of commerce (1).

In the years after 1878, other typewriters of varying designs appeared on the market. The more important machines include the Caligraph in 1883, the Columbia Bar-Lock in 1888, and the Wagner in 1893, the first practical visible writing typewriter. The greatest majority of the machines produced were of the key-lever and typebar variety, the turning typewheel designs were in the minority. The next step in the development of the typewriter was the Mercedes electric typewriter of 1921. While this was not the first electrified typewriter, it was the first one that had any commercial potential. In 1941, IBM introduced the proportional spacing typewriter which was equipped with

characters of varying width, similar to that found in regular printing. In 1961, IBM brought out their Selectric typewriter which utilizes a type ball turning at high speed to impress characters. All told, there have been over 350 different typewriter manufacturers in business since 1874 (2, 3).

In the years after 1878, when the use of typewriters proliferated, it was inevitable that someone would notice that not all typewriters of the same brand and type style produced identical typewriting, and that the product of one machine could be differentiated from the work of another similar machine.

The earliest known reference to the identification potential of typewriting, curiously enough, appears in "A Case of Identity", a Sherlock Holmes story by Sir Arthur Conan Doyle, in which the following passage appears:

"It is a curious thing . . . that a typewriter has really quite as much individuality as a man's handwriting. Unless they are quite new, no two of them write exactly alike. Some letters get more worn than others, and some wear only on one side. Now, you remark in this note of yours . . . that in every case there is some little slurring over the "e", and a slight defect in the tail of the "r". There are fourteen other characteristics, but those are the more obvious" (4).

It has been established that Doyle recorded in his diary that he finished writing "A Case of Identity" on April 10, 1891 (5, 6). The source of Doyle's data has not been ascertained, but it is of interest that his approach to typewriting identification is sound and that his terminology is precise.

The earliest comment in writing by a document examiner on typewriting identification was by Hagan in 1894. Hagan writes:

"All typewriter machines, even when using the same kind of type, become more or less peculiar

by use as to the work done by them. One of these characteristics which each machine manifests is that produced by varying alignment, in which some of the type make peculiar imprints which very positively connects the work done with the machine by which it was produced, and this occurs more particularly to such of them as have been used for some time, and so distinctly marked does this peculiarity become connected with the printing done by each machine that little skill is required when comparing the work done by a dozen of them. A knowledge of this fact sometimes becomes important in tracing up the source of an anonymous letter printed by a typewriter machine" (7).

This partial exposition of the principles of typewriting identification was followed in 1900 by Ames who wrote:

"Since typewriting has come so generally into use, the question often arises as to the identity of writing by different operators as well as that done on different machines. This may usually be done with considerable degree of certainty. Different operators have their own peculiar methods, which differ widely in many respects—in the mechanical arrangement, as to location of date, address, margins, punctuation, spacing, signing, as well as impressions from touch, etc.

The distinctive character of the writing done on different machines is usually determined with absolute certainty. With most machines there are accidental variations in alignment. Certain letters from use become more or less imperfect, or become filled or fouled with ink. It is highly improbable that any one even of these accidents should occur precisely the same way upon two machines, and that any two or more should do so is well-nigh impossible. It is equally certain that all the habits and mannerisms of two operators would not be precisely the same. A careful comparison of different typewritings in these respects cannot fail to determine whether they are written by the same operator or upon the same machine. It should be remembered that writing upon the same machine will differ in all the respects mentioned at different stages of its use and condition" (8).

Both Hagan and Ames cover some of the aspects of typewriting identification, but fail to cover all the essential points. The emphasis on typist identification is understandable in view of the lack of standardization of punctuation, arrangement, etc. in the earlier days of typewriting. Lavay, writing

in 1909, plagiarized Ames' complete statement on typewriting and ignored the landmark articles of Osborn (9).

In several articles written between 1901 and 1907, Albert S. Osborn, the foremost document examiner of the early 20th century, clearly delineated the principles of typewriting identification used today. The data in these articles (10, 11) were enlarged upon in his first book in 1910 (12). The second edition of "Questioned Documents" is now a standard in all document and legal libraries and has been reprinted many times (13). The salient points enunciated by Osborn are as follows:

a. The typefaces used by the different typewriter manufacturers can be differentiated on the basis of design and have dating significance.

b. Through usage, typewriters develop individuality which can serve to identify the typewriting of a particular typewriter.

c. The gradual development of typewriting individuality plus ribbon condition and typeface cleanliness can be used to date a document or fix it within a period of time.

d. Horizontal and vertical malalignment; tilting characters; lack of uniformity of impressions (off-footedness); typeface scars, breaks, defects and deformities; overall depth of impression; and rebounding characters all serve to identify the typewriting of a particular machine.

e. Some individualities are more unusual than others and thus have greater probative value.

f. The principles underlying the identification of typewriting are controlled by the mathematical rules of probability as applied to independent events.

g. Peculiar habits of striking the typewriter keys, spacing, arrangement, punctuation, incorrect character usage, mistakes, corrections, etc. can be used to identify a typist or differentiate typists.

h. A sheet of paper cannot be re-inserted in a typewriter in exact register with previous typing done on the sheet of paper.

In subsequent years, other writers expanded somewhat on these ideas without adding any new basic concepts (14, 15, 16, 17, 18, 19, 20). Possibly the most significant article since Osborn has been Hilton's article on typewriting variation published in 1959 (21), wherein it was pointed out that typewriting is not a static process and that variation in typing exists. Hilton relates the various causes of typewriting variation to the process of examination and identification.

While the principles of individual typewriting

identification have remained relatively static, except for the problems posed by proportional spacing typewriters and Selectric typewriters (22, 23, 24), new complications have arisen in the area of typefont differentiation, i.e. the determination of the make and model of typewriter from typeface designs. In years past, the American typewriter manufacturers designed and produced their own typefaces. Each company had different typeface designs which were changed or modified as the years went by. The pica sized typefaces used on an Underwood standard typewriter manufactured between 1924 and 1926, for example, could be readily differentiated from all other Underwood typefaces of another era and all other brands. The few instances wherein one company copied the designs of another company, or utilized several different brand names for the same typewriter were known and posed no great problems. European typewriters were relatively unknown in the United States prior to World War II. In the 1950's, with the influx of inexpensive European typewriters and the purchase of European typewriter factories by American typewriter manufacturers, the simplistic situation of pre-World War II changed drastically. European typewriters are manufactured in a multiplicity of unit spacings, as opposed to the basic 10 and 12 characters per inch spacing used by American manufacturers. The European typewriter manufacturer may or may not produce his own typefaces. Typefaces produced by a typeface manufacturer may be sold to several different European typewriter manufacturers, and a typewriter manufacturer may purchase typefaces from several different typeface manufacturers, sometimes concurrently. Furthermore, American made typewriters have been equipped with European typefaces, and European typewriters have been sold under American typewriter brand names. The relatively simple schemes detailed by Hilton in the 1950's for differentiating American typewriters (25, 26) must now be correlated with the existing incomplete differentiating schemes for European typewriters now available (27, 28, 29). The absence of any comprehensive scheme for typeface and typewriter differentiation leaves the document examiner in the anomalous position of being able to identify the typing on a questioned document by comparison with a known exemplar, but unable to state specifically the make and model of typewriter used to prepare the questioned document.

Document examiners trace their professional heritage back to the Justinian Code, Order 49,

Title 4, Chapter 11, enacted in 539 A.D. (30) however, the first case of record involving handwriting testimony by an expert did not occur in the United States until 1812 (31). In 1812, the first known case involving printed characters was also heard. In *McCorkle v. Binns*, the court stated, "I think that a foundation being first laid, the jury may be permitted to compare the types, devices, etc. of newspapers" (32). In a subsequent case in 1819, the court commented that, "The evidence was clearly admissible . . . the (expert) witness stated that from his knowledge of the notes of the bank, the paper, type, and the whole appearance, the (banknote) was forged" (33).

The first case of record in which expert testimony regarding typewriting was heard was *Levy v. Rust* in 1893 (34). The expert in this case was a typewriter mechanic who pointed out that some receipts in issue all possessed three peculiarities which were not found in typewriting prepared on the defendant's typewriter. The Hon. Mahlon Pitney, who heard the case, stated:

"An expert in typewriting is brought here and that expert sat down by my side at the table, and explaining his criticism of this typewriting, and I went over it carefully with the (magnifying) glass and. . . it appeared very clearly. . . He says these receipts running from February 2, 1891 to September 11, 1891, all contain certain defects in the mechanical work which are very clear to the. . . expert. . . He says that in every-one of these the period is too low. . . the letter "s" is "off its feet", and everyone of them makes a bad mark, and everyone marks exactly the same. There is not a period mark in one of the receipts and there is not a letter "s". . . in one of the receipts that has not the same characteristics. Then he says that the letter "u" is a little too far to the left. . . if you compare that typewritten work which was apparently made on the 9th of March 1892, nearly a year after this other work was done, it contains precisely the same peculiarities. . ."

The judge, who found for the defendant, did not cite any prior cases on typewriter examination. The judge felt that the seven receipts in question had not been prepared on the defendant's typewriter, as alleged by the plaintiff, but had undoubtedly been prepared on the plaintiff's typewriter.

In a series of legal decisions subsequent to *Levy v. Rust*, typewriting identification gained acceptance in the courts. In *Hunt v. Peshtigo Lumber*

Co., tried in Wisconsin in 1903, it was conclusively demonstrated that a document purportedly prepared in 1893 must have been prepared after 1896, the date when the typeface in question was first used on a Smith-Premier typewriter (35). In *Huber Mfg. Co. v. Claudel* in 1905 (36) the writer of a typewritten letter was identified by a document examiner.

In the State of Utah v. Freshwater in 1906 (37) a typewriter expert testified that in the documents he examined:

"That certain letters were defective, broken and out of repair, that certain others were out of alignment and the spacing between certain letters were too great; that those peculiarities and defects appeared in the affidavits and typewritten letters and the addresses referred to which were typewritten; that he examined 24 typewriting machines in Provo City (Utah), one of which had the same defective type, which made lettering, lining, spacing in exact conformity with the peculiarities in these respects of the affidavits, letters and addresses in the envelopes."

In the *People v. Storrs* in New York in 1912 (38), the trial judge allowed typewritten exemplars to be introduced into evidence which were not relevant to the case in issue, but were introduced solely for the purpose of comparison with the typewritten will in issue. The exemplars were introduced over the defense counsel's objections. On appeal, the court stated:

"In as much as its (typewriters) work affords the readiest means of identification, no valid reason is perceived why admitted or established samples of that work should not be received in evidence for purpose of comparison with other typewritten matter alleged to have been produced upon the same machine."

In 1913, Congress amended the U. S. Code to permit the usage of admitted or proven handwriting exemplars for comparative purposes. By court decisions the statute was extended to cover typewriting and eventually all the states recognized the necessity for such exemplars and the inequity of requiring that a document be in evidence for other reasons before it could be used for purposes of comparison (39).

One of the early objections to expert testimony regarding typewriter identification was the possibility of forgery of typewriting. It was postulated that the inherent individual characteristics of a typewriter could be eliminated and then the type-

faces and typebars of the machine could be altered so that this typewriter could produce typewriting precisely similar to the work product of another machine. While on a purely theoretical basis it must be granted that such is within the realm of possibility, on a practical basis, it has not proven so. In two landmark cases such a defense was utilized, forgery of a typewriter was tried, and the objective was not obtained.

In the case of the *People v. Risley*, William Kinsley, a document examiner, demonstrated that the words "the same" had been added to an affidavit. The body of the affidavit had been prepared on a Remington typewriter equipped with pica sized type, while the words "the same" had been typed on a typewriter equipped with Underwood Medium Roman sized typefaces. Kinsley compared the individualities found in the words "the same" with the exemplars taken from an Underwood Medium Roman typewriter owned by Risley, the defendant, and found agreement in thirteen typewriting peculiarities. The defendant hired one Arthur W. Buckwell, a skilled typewriter mechanic to rebuild and alter a similar Underwood typewriter equipped with Medium Roman typefaces so that it would produce typing similar to that found on the questioned document. Buckwell later stated that although he had worked extensively on the typewriter, he was unable to make it type precisely as the machine used by Risley to make the addition to the affidavit. Kinsley was able to show that the typing from Risley's typewriter and Buckwell's typewriter could easily be differentiated (40).

The second case involving alleged forgery by typewriter was the Alger Hiss Case, the most celebrated typewriting case in legal annals. The case is of particular interest since it encompasses the most important aspects of typewriting identification. On December 15, 1948, Alger Hiss, a former State Department official, was charged with testifying falsely that he had never turned over any State Department documents or copies of such documents to Whittaker Chambers, a former Communist agent, and further, of testifying falsely when he said that he had never seen Chambers after January 1, 1937. The first Hiss trial in 1949 ended in a hung jury, but he was found guilty at his second trial ending in January 1950.

Forty-two typewritten copies of State Department documents, which Chambers identified as having been given him by Hiss were established by expert testimony to have been typed on the

same typewriter as a series of letters which had been admittedly written by Priscilla Hiss on a typewriter which had belonged to the Hisses. The government presented expert testimony by Ramos C. Feehan, an FBI document examiner. In his testimony, Feehan indicated some, but by no means all of the individualities upon which he based his conclusion that the documents produced by Chambers and the Hiss letters were typed on one and the same typewriter. Feehan was not cross-examined by the defense and furthermore, the defense stated that their own experts had reached the same conclusion. This was conceded by the defense in their opening statement to the jury.

The defense introduced a typewriter, Woodstock serial number N230,099 and identified it as the original Hiss typewriter. The defense then proceeded to show through witnesses that the Woodstock had passed out of the possession of the Hisses in the crucial early months of 1938. The same defense was used in both trials. The government, on the other hand, did not try to show that Woodstock serial number N230,099, produced by Hiss, was actually the typewriter used to prepare the forty-two State Department copies or the Hiss letter exemplars. The expert testimony only established that the State Department copies and the Hiss letters were written on the same machine. The government had tried diligently, but was unable to locate the Hiss typewriter by their own efforts, since only Hiss knew where it was.

On appeal, Hiss contended that Woodstock typewriter number N230,099, which was located and introduced by the defense, was not the original Hiss typewriter, but a machine fabricated by Whitaker Chambers to produce exact replica typing of the original Hiss typewriter (that which typed the Hiss exemplar letters). The defense contended that Chambers accomplished this fabrication between August 1948, when Chambers publicly accused Hiss of being a Communist, and November 1948, when Chambers produced the documents.

This remarkable argument had several implications. One, that Chambers knew where the original Hiss typewriter was located, and failed to tell the FBI; two, that he was able to fabricate and substitute the typewriter in a span of three months; three, was able to substitute the typewriter without the recent owner being aware thereof; four, had the appropriate State Department documents to copy; and five, had "the incredible ingenuity to lure the defendant into producing the typewriter and thereby bring about his own destruction" (41).

This line of reasoning also implied that the identification of the forty-two documents supplied by Chambers with the Hiss letters was erroneous, thereby contradicting the reports of the defense experts.

To bolster these contentions, the defense hired one Martin Tytell, a highly skilled typewriter re-builder of New York, to fabricate a typewriter which would produce typing identical to that on the documents supplied by Chambers. Tytell worked over a year on this project and finally built what he thought was an accurate replica of the machine used to type the Chambers Documents and the Hiss letters. The work product of Tytell's machine was examined in comparison with other documents in the case and even the defense experts conceded that the typing done on Tytell's machine could be differentiated. At least five document examiners made such examinations. The only solace gained by the defense was a statement by one defense expert, that if one were less than thorough and were unaware of the attempt to forge typewriting, one could be fooled by the work product of the Tytell machine.

The defense further tried to show through Donald P. Norman that Woodstock typewriter number N230,099 was a fabricated machine because the amount of solder on the typebars and the nickel content of the keys. The government was able to show by testimony from Woodstock factory personnel that solder variation on the typebars was not unusual for Woodstock typewriters manufactured in 1929 and that the nickel content of the keys was the result of dipping the typebars in a nickel bath to plate them and not the result of resoldering. The defense contended that spectrographic analysis indicated that the type was not all made from the same batch of metal. Again Woodstock personnel testified that because of the normal stockpiling of typefaces, in the neighborhood of 25,000 pieces, a full set of type would logically be drawn from type produced on several different occasions, and from different batches of steel.

The Hiss Case was resolved in July 1952 when Judge Goddard ruled that Hiss had not introduced any new evidence and that Tytell had not been able to demonstrate the practical possibility of forgery of typewriting.

Judge Goddard stated unequivocally that the Hiss defense had spent at least a year trying to fabricate a duplicate typewriter and that this

fabricated typewriter "still falls short of being a perfect duplication" (44).

In this case, which received a searching analysis by many competent experts, the basis for typewriting identification was not diminished in any way. The best possible type of experiment had been carried out and the experiment was not successful. The theoretical possibility will always exist, but as a practical matter, the Hiss Case removed such a possibility from the realm of practicality. On the other hand, the case certainly pointed out the necessity for thorough, painstaking examinations.

In July 1952, Tytell published a story about his efforts to aid Hiss in "True Magazine" (42). This ghost written article implied rather strongly that Tytell had in fact been able to build an exact replica of the typewriter used to type the Chambers documents. A short editorial accompanying the article included the unfortunate statement:

"A serious doubt is now thrown on the validity of convictions based upon. . ."expert" testimony. Certainly judges and juries will henceforth require much more proof than formerly to establish that a typescript did or did not come from a specified typewriter" (43).

The techniques of typewriting identification have not been advanced significantly beyond the concepts advanced by Osborn around the turn of the century. It remains the function of the document examiner to adduce the individuality in the typewriting under examination and to determine the probative significance thereof. The relative rarity or commonness of each individuality and its relationship to other individualities in the typing must be evaluated by the document examiner on the basis of his experience, knowledge, training, and judgment. Normally, the examiner does not assign a numerical weighting to each typing individuality, but usually gives an estimate as to the sufficiency of the sum total of the individuality for purposes of identification. If in the judgment of the examiner, the sum total of the adducible individuality is less than sufficient for a definite conclusion, he so states.

Future developments to be anticipated in the field of typewriting identification are statistical analyses of large groups of typewriting individualities to give statistical backing to the concepts of relative rarity of certain individualities, and to determine the dependence and/or interdependence of specific typewriting individualities.

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