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DATING TYPEWRITING BY AN ANALYSIS OF VARIABLE DEFECTS

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Was this typewriting done on the date claimed or at some other time? To find the answer to this question by means of technical examination is often extremely complex. The problem, however, is somewhat common. The typewriting identification expert's method of solution involves a study of the typewriting impressions themselves usually with comparison with other typewriting of undisputed dates.

Several ways of establishing or fixing the date of typewriting has been detailed at other places in the literature.¹ The first consideration is obviously whether the design of type face which appears on the document was available on the date of the document. Other studies involve the comparison of the questioned material with specimens of undisputed date which have been prepared on the same machine. The broader periods of time are marked by sharp changes in the identifying characteristics of the machine. From time to time some new defect will develop. Thus, there may well be a particular date after which the questioned material could not have been typewritten because there is in subsequent specimens some defect which does not occur in the questioned typewriting, and by the same token some date before which the questioned document could not have been written. Closer time intervals may be worked out if it is possible to assemble a quantity of closely dated material from the machine in question. The pattern of gradual deterioration or decline in the inking qualities of a cloth ribbon, the development

pattern of clogged or dirty type faces which are reproduced in the work of the machine itself may help to pin-point the date. The matching of the ribbon condition or the degree and location of type face foulings in questioned and undisputed documents may permit accurate dating of the questioned typewriting. Because the principle pigment in the more common typewriting ribbons is carbon there are no chemical or visual tests on the questioned specimen alone which will give dating information. All of these factors together with associated evidence such as paper, printed forms, or other dating evidence in the document or the accessibility of the machine to the typist who prepared the document have been adequately treated in the references cited.

Despite these several criteria some problems may still be unanswered. This condition is apt to occur especially when the date estimate rests almost entirely on changes in identifying defects. With some machines no clear-cut change occurs within a period of one or two years. The circumstances of the case may make it essential to attempt to establish a narrower period in which the document was typewritten. For example, the dispute involves a document which is dated June 1955 but the objecting party claims that it was not written until after June 1956. No clear-cut change in any defect can be found between December 1954 and September 1956. Some refinement in methodology is certainly needed here.

GROWTH OF DEFECTS

Careful analysis of the problem reveals an avenue of attack. Few defects become a part of a machine suddenly or instantaneously. Rather most develop gradually over a period of time. In any typewritten material there may be certain letters which have variable qualities, for example

¹ For a concise discussion of the means of dating typewriting from the work of the machine see GEORGE G. SWETT, "The Dating of Typewriting", JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE, Vol. 50, No. 1, pp. 86-88, May-June 1959. This problem is also discussed briefly in this writer's book, THE SCIENTIFIC EXAMINATION OF QUESTIONED DOCUMENTS, Callaghan & Co., Chicago 1956, pp. 196-198.

malaligned impressions in the preponderance of instances, but not every. Breaks or damage to the actual type metal do not always result from a single blow, but frequently develop over a period of time as the result of wear, for example, caused by the repeated clashing together of two type faces so that the outside serifs or edges of the letters gradually become battered. In early stages of wear light impressions, especially, disclose the defect while heavier, more fully inked impressions do not. The variables or partial defects, although not as easy to explain or demonstrate to the layman, can nevertheless play a significant role in every identification problem.

Shifts in these variables can be studied and documented. The documentation is a means of dating typewriting. Let us consider the possibilities when a series of documents are carefully studied. In documents of one date certain letters may be found to contain defective impressions part of the time and nondefective in the balance of instances. It may be that every impression is defective, but in some instances the defect is more pronounced than in others, or the defect is made up of two or three elements sometimes and a single one on other occasions. As an example of this situation consider the letter "r" which in its most extremely defective printing condition types well to the left of its proper position and very much heavier on the left side, but with some impressions it merely shows a properly centered "r" printing off-its-feet. With this same machine at a second date the letter under study may now type to the left and off-its-feet in virtually every instance. Obviously, the defect is not the same on both dates. The period may be termed a period of growth in the defective quality of a typewriting character.

The problem of dating typewriting by a study of its work over several years is the problem of dating changes in its operating conditions. We all recognize that clear-cut changes are dating factors. What about these shifts in variable conditions of a particular letter. Are not they just as significant if properly evaluated?

PROCEDURE

How might we establish that a variable defect has during a specific period of time undergone sufficient change to serve as evidence that two specimens of typewriting from this machine were actually typewritten on different dates. The process can best be described as a semi-statistical

analysis. Let us study each improperly writing letter, or other defects in the machine, which is not constant, that is which appears defective in some impressions, but not all. The first step is to tabulate accurately the number of instances in which the letter prints with a particular defect and the number without. This study is carried out for each character of this class in the document. This same statistical tabulation must be made from documents of subsequent dates. Simple ratios of defect occurrence can be calculated for each character. An appreciable change in the ratio from one date to another can serve as dating evidence. An actual case illustration should help to clarify the technique.

CASE EXAMPLES

An extended document of eleven pages was obviously not all typewritten at the same time. There was a sharp difference in the ribbon condition of the last two pages as compared to the first nine. The problem was to determine whether the witnesses who stated that the first nine pages had been prepared some eight months before the last two were actually correct in their recollections. A number of identifying characteristics appeared to have undergone some modification during this period of time, but no clear-cut, new defect could be found in the later typewriting.

A study of variable defects reveal the following conditions. In March the "e" printed a non-defective impression 37 out of 50 times and an off-foot impression (too heavy on the top) in the remaining 13 instances (Figure 1). Thus, in about three quarters of the examples this letter was without defect. In October it has become more defective, printing unevenly in 31 out of 51 impressions and evenly in the remaining 20. In other words roughly 60 percent of the impressions show a defect. (As a matter of interest a document typewritten in the following May revealed that the letter had become even more defective with 80 percent of its impressions too heavy along the upper edge.) One cannot say that in October this "e" was always defective while back in March it was not. In fact in October only slightly more than half of the impressions were defective. Standing alone this semi-defect might not be of great significance in an identification, but when compared with the condition six months before the shift in the letter's writing characteristic takes on greater significance.

Figure 1

Illustration of the change in the printing condition of the "e" from March to October. In both portions of the illustration the upper section above the short white rulings represents examples of the "e" printing an even impression while the lower section represents examples of the "e" printing appreciably heavier on the top than on the bottom.

Figure 2

Reproduction of a comparison chart showing the change in the most common printing of the letters "u", "n" and "d" in March and October and showing a similar change of condition between the first pages and the last pages of the will in question. The key letters in the extreme columns at greater enlargement were used to show the typical printing condition of the three letters. Note the even impression of the "u" in March and the uneven impression, heavier on the right, in October. The printing of the "n" in a twisted position in October was seldom found in March and the centering of the "d" had shifted during this same period of time. This illustration does not attempt to show the frequency of occurrence of the more typical defects in each period.

Three other letters, the "n", "d" and "u", were studied. The "n" had undergone change. In March 5 out of 6 impressions found the "n" standing erect, but October it was twisted or leaning in roughly 8 out of 10 instances. In March the "d" struck well centered in almost all impressions, only 1 out of 9 was out of position to the left. By October this letter was in its proper position half of the time and out of position to the left the other half. The "u" showed a similar change. In March two-thirds of the "u" were without defect, but in October four-fifths printed very heavy on the right side (Figure 2).

Here is a machine in which at least four characters had undergone some modification within six months. Exhaustive study and tabulation permits demonstration of these facts.

Similar techniques can be applied to the condition in which a serif is gradually worn away. One problem so studied revealed that at the beginning of a disputed period in the history of the machine the left serif of the "l" printed fully, but within a year it could be demonstrated photographically that this serif was worn and in the majority of instances was printing somewhat short. Here again the defect was not clear-cut and consistent for there were those instances in the later specimens when the letter would print without apparent defect. There had been, however, a change which could be observed, measured, and demonstrated photographically.

LIMITATIONS

There are limitations to the use of this technique. One must appreciate that three or four impressions do not constitute a sound statistical basis upon which to make a determination. Twenty-five examples may be all that one wants to illustrate, but fifty or one-hundred at a minimum should be studied. This means that the technique can only be applied to documents of several pages and that a few lines of typewriting probably could not be dated unless a sharp consistent change could be located.

A switch of a few percentage points in an analysis of this kind is meaningless. If in the example of

the "d" above one is to consider at one end of the scale a roughly 50-50 division between defective and nondefective printings, then one cannot consider at the other end a 40-60 ratio.² This is not a significant change. In all probability unless there is a change of the nature of from 2:10 to 8:10 or 9:10 a single character should not form the sole basis for an opinion as to date. However, there may be circumstances which would modify this statement, and each problem must be evaluated on its own merits.

Statisticians have developed means of measuring the significance in a difference between two ratio determinations. Some workers might wish to use such measures, but this writer would take position that a more conservative attitude should be assumed. Thus, after a study of a hundred or more impressions in a carefully typed document a change of defect ratio was found to be of the nature of 80 or 90 percent nondefective to even as low as 60 or 70 percent defective the change would have dating significance. This is to say that if at the start of a period the condition was virtually nondefective and at the end of a period it was just slightly defective there is some difference in the machine which might well be considered as indicative of the time in which a questioned document was typewritten.

CONCLUSIONS

Studies to date typewriting from its work can sometimes leave us without any clear-cut answer to the problem. It is entirely possible that even during a considerable period of time the machine has undergone no measurable deterioration. However, the methods described in this paper do represent some further extension of criteria previously used, and if conservatively handled, represent a valid means of establishing the period during which a specimen of typewriting may have been prepared.

² With some typewriters ratio-variation of this magnitude are encountered between two documents typewritten at the same time, especially when only 25 to 50 impressions are available for study. The apparent inconsistency may be due largely to the limited sample, but in any event must be anticipated.