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THE INFLUENCE OF VARIATION ON TYPEWRITING IDENTIFICATION

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The work of every typewriter reveals some variation when repeated impressions of the same letters are carefully compared. Despite the fact that typewriting identification experts are familiar with this phenomenon, variation has not, as a rule, been frankly acknowledged in discussion of typewriting identification. In many ways this seems strange. All readily recognize the presence of variation in a person's handwriting, but when it comes to typewriting identification they tend to ignore it.

As a preliminary step in this investigation the various texts and writings on typewriting identification were reviewed. For the most part little or nothing is said about typewriting variation. Osborn (1) does not touch upon the subject. Neither does Mitchell (2) nor Quirke (3). Brewster (4) warns the reader about the existence of variation in typewriting and the need to examine several impressions of a letter. Baker (5) fails to recognize that such a thing exists. Gayet (6) in his several articles makes limited reference to the subject. Hilton (7) touches upon variation in typewriting to some extent, but like most subjects leaves the details for the reader to dig out for himself. Of the two most recent publications Harrison (8), discusses the subject briefly at several points, but Conway (9) in an effort to keep his discussion of typewriting identification as basic as possible omits any treatment of it. In other words no writer has thoroughly faced up to the proposition that typewriting variation must be recognized within identification problems.

It is proposed, therefore, that we look more closely at typewriting variation. What causes it? What kind of variation is to be found? How should document examiners approach the problem?¹

¹ The author has prepared a second paper which considers variable factors in typewriting identification, especially in the relationship to their value as dating

FACTORS INVOLVED

The causes of variation in typewriting are complex. No one single factor brings it about and with each problem, each machine, various factors involved may play a somewhat different role, may have a somewhat different degree of influence.

The composite picture would include the influence of the make and model of the typewriter, $f(m)$; the influence of play, $f(p)$ —that is the wear or looseness of moving parts; the influence of the position of any particular type face in the type basket, $f(b)$; the influence of the condition of the roller (platen), $f(r)$; the influence of typist touch, $f(t)$; the influence of those unpredictable variables which creep into many problems, $f(u)$. The mathematician would summarize the composite of these by the expression:

$$v = \int f(m) f(p) f(b) f(r) f(t) f(u)$$

This statement, complex or simple depending upon one's attitude toward mathematics, merely states that variation is derived from the composite influences of all factors described above. It would be well to briefly consider each of these more in detail.

Make and Model. Variation in any particular specimen of typewriting definitely reflects the influence of the typewriter make and model. We all recognize that there is generally more variation in the work of a portable typewriter than in a standard office machine while an electric machine should turn out the most uniform work. These differences cannot be entirely segregated from other factors in the variation formula. For example, there is a relation between the variation in an electric typewriter and the touch of the typist

information. It will appear in a later issue of this Journal.

who is using the machine. Salesmen may claim that the influence of typist touch is negligible with an electric typewriter, but this is not absolutely true. The electric machine may reduce the influence to a minimum, but with certain "ham" operators, such as this writer, even modern technology cannot completely triumph. Despite these interacting effects we must recognize that some portion of the variation is directly related to the model.

The construction design and manufacturing tolerances are not the same for each make. Here may be an inherent cause of variation in a particular make not found in a competitor's machine. For example, the old Smith-Corona ball bearing construction in the type bar pivot assembly resulted in greater alignment and off-feet variation than in other machines. Then too certain machines are just more sturdily built than others. Who, however, is going to point a finger at any typewriter company and say: "Your Romona typewriter is more loosely put together than your competitor, the Clementine," without having a long and detailed documentation to substantiate this point. We may well have reached this premise from our examination in case work of Romona and Clementine machines, but we are not going to create good will with the Romona company by making such an undocumented comparison in public.

Play. Play, or looseness in moving parts, is present even in new machines. Play, of course, is related to the ruggedness of construction of which we have just spoken. It is also obvious from our knowledge of mechanical operations that it increases with use and wear. Play in the type bar mechanism causes variation in such identification factors as letters off-their-feet, twisted letters, and those out of vertical and horizontal alignment.

There is undoubtedly a relationship between the frequency with which letters are used and the amount of play that is found in the type bar mechanism. In a small group of machines studied it was found that high frequency letters such as *e*, *t*, and *a*, showed more variation than the low frequency letters. Of course, in each specimen many more *e*'s and *t*'s were observed than *y*'s, and *w*'s which could influence this observation,²

² This statement must not be interpreted that if more examples of a letter are present in a document this will lead to greater variation, but rather that with many typewritten documents of only moderate length there may be only 4 or 5 examples of "y's" and "u's" and other low frequency letters. With this limited number

but it stands to reason that letters like *e* and *t* which are typed from five to seven times more often than *y* and *p* should develop greater wear at points of pivot.

Position in Basket. The position of a type face in the type basket may affect the degree and quality of variation. The position in the basket determines two significant factors: the length of the type bar and the direction or arch through which the type face approaches the paper surface.

A character which is located near the outer edges of the type basket, when it is used repeatedly, is much more apt to play "high-low, east-west" than the letters located nearer the center of the basket such as the *n* and *h*. This term "high-low, east-west" merely describes the tendency of letters, particularly the *a*, to sometimes type above and sometimes below the base line and to vary back and forth between improper left and right alignment or for that matter to fall at any point of the compass between these four cardinal points. Because of the way the *h* and *n* move toward the paper in an arch that is almost at right angles to the paper surface variation in their alignment is most apt to be on a purely right-left axis. In any machine with a special keyboard we can expect to find a different pattern of variation in letters if they were in a substantially different place in the type basket compared to the standard typewriter keyboard.

Typist Touch. Typist touch involves several elements, but one is the irregularities in rhythm which at times leads to partial stacking of some letters and skipping in other instances. Type bars operated by skilled fingers which hit the keys squarely in the center, hit them with uniformity of force, and hit them in a steady rhythm undoubtedly produce more uniform typewriting than that of the near beginner or amateur typist. This latter operator may score frequent "near-misses" on the edge of the keys, hit some hard and some soft, and use an irregular beat changing from fast to slow and back with no particular pattern. The end product can best be described as rough copy. Thus, a change in typing pattern is certain to modify the variation pattern found on a machine. It may be difficult to isolate the effect, but then it is difficult to isolate the effect of each individual factor in the variation formula.

of examples it is obvious that the sample may not be truly representative of the actual condition of these letters and that certain variable impressions may not be encountered in this small group. In a document of comparable length 50 to 100 examples of "e's" and "t's" may be encountered constituting a good sample.

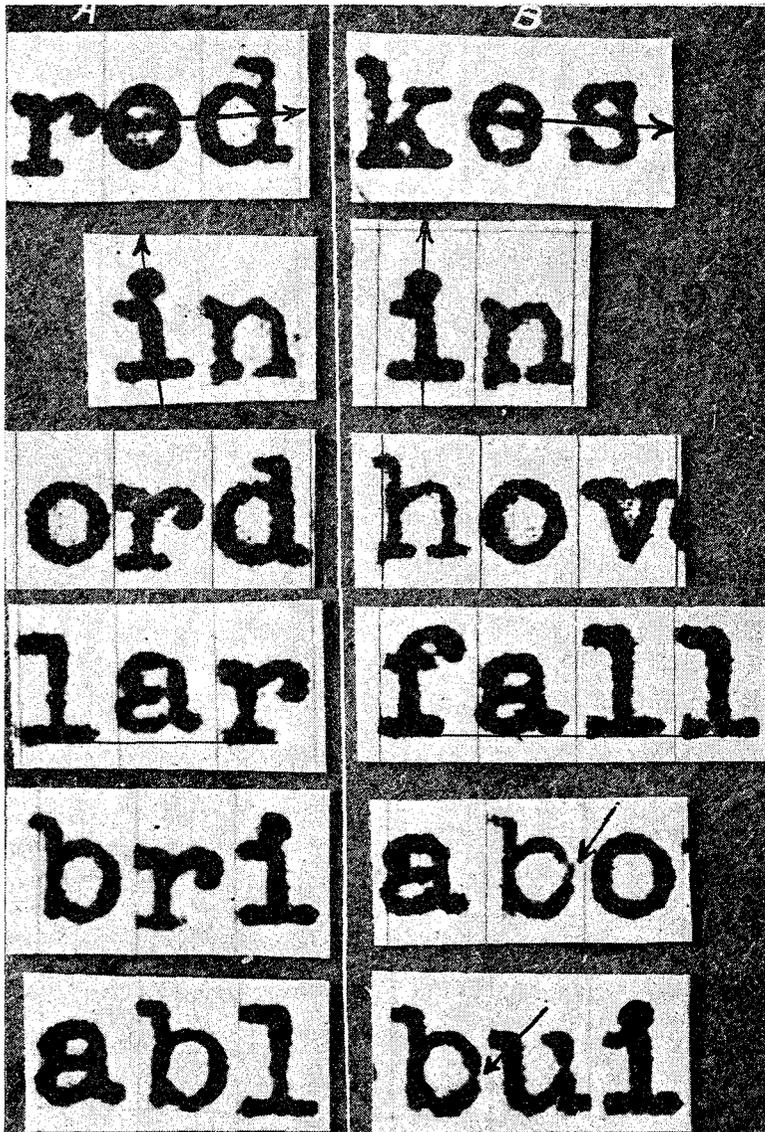


Figure 1.

Two Typewriters or Misinterpreted Variables?

Apparent differences in the slant of the "e" and "i", in the horizontal alignment of the "o", in vertical alignment of the "a", and in the damage to the right side of the "b" suggest that the typewriting in Column A comes from a different machine than Column B. However, these are only selected variations in letter impressions found in a single document.

An irregular typing pattern may cause letters to print too far to the right or left. Letters struck unduly hard or very soft may in the former case hide defects of the letters striking off-their-feet and with slight type face damage or in the latter case, and especially with a glancing blow on the key, may introduce an uneven impression.

Roller. The surface of the platen or roller can

certainly influence the uniformity of impression. A smooth, new, semi-elastic roller surface does little to introduce stray variations. On the other hand a badly pitted, old, dried out roller surface leads to a series of irregular impressions and greatly increases the variation found in the machine in which all types of stray defects are apt to appear.

Unpredictable Factors. No matter how care-

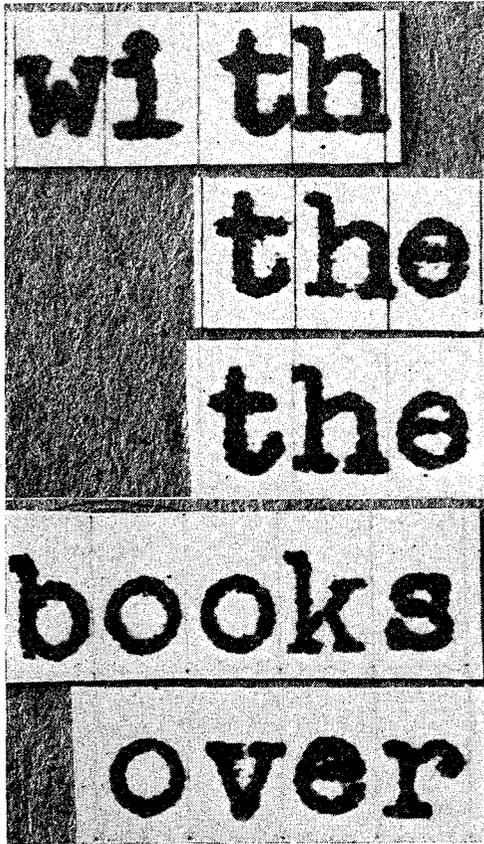


Figure 2.
Variation in Unevenness of Impression

A shift from an evenly print "h" to one printing heavy on the right side and from an even impression of an "o" to one heavy along the bottom is found on the same machine. Note also the variation in the horizontal alignment of the "t" and "h".

fully we try to define factors which cause variation in typewriting, there are going to be some unpredictable ones. How can you foresee an occasional flaw in the ribbon which leads to a stray impression or a bit of erasure dust which roughs up the printing surface and results in a defective impression. In fact odd irregularities of the paper itself which, though as a rule are very slight, may cause some unpredictable variable. A machine on a weak support may produce work with excessive variation. By the same token the cleanliness of the machine and the ribbon condition itself can introduce or hide variables that would otherwise be present. We have probably mentioned most of the infrequent causes, but probably a few more will be encountered from time to time.

KIND OF VARIATION

Variation can occur in any kind of identifying characteristic or attributes of a typewriter. In this paper we turn our attention to the more common ones. Variation in respect to alignment, that is too high or low, too much to the right or left; variation in respect to twisted impressions; variation in the evenness of impression, in the condition of type face being off-its-feet; variation in the apparent breaks or damage to the type face itself are of primary concern (fig. 1). A review of a few randomly selected machines revealed that each and everyone of these factors can vary. Not necessarily on each machine, not necessarily in the same way on each machine. Nevertheless, examples of variation in all of these characteristics can easily be located. They undoubtedly result from a combination of the factors already discussed.

Alignment variation is reasonably common. How often we are going to say it is present in a particular machine will depend upon the condition of the machine, the letter involved, and the operator's habits, and it will also depend upon to how close a tolerance we are going to hold.

Just what brings about the differences in the slant of successive impressions of a letter is hard to say. There must be play which causes the type block to twist as it is thrown against the paper. More important though is the need to recognize that the angle at which a letter prints relative to the line of writing is not always consistent.

Heavy impressions of a letter are known to eliminate the pictorial effect of striking off-its-feet. A well inked ribbon will hide slight unevenness of impression or small chips in the type metal, but in this discussion we are not concerned with variation between heavily and weakly inked specimens, but rather in the variables which occur from one typing to the next in the same specimen (fig. 2). Variation in the evenness of impression results from play in the type bar assembly, the work of the typist, and the roller surface.

Broken or damaged type faces print differently depending upon the actual condition of the type face. If a serif is completely broken away from the letter, we will not expect it to print under any conditions. On the other hand if the damage to the type metal is such that the outer edge of the serif is worn down, but not completely removed, then whether the letter prints defectively or not may depend upon how hard it strikes the paper surface (fig. 3). Apparent type face defects also show up

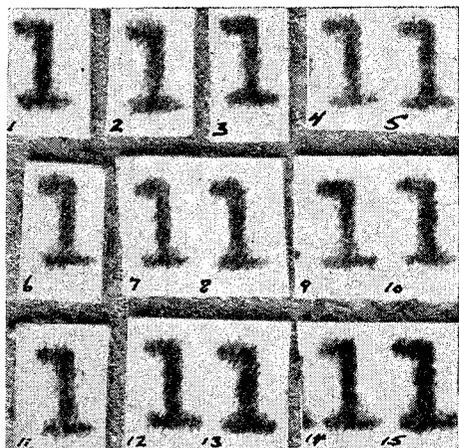


Figure 3.

Variable Impressions of a Worn Serif

Fifteen consecutive impressions of the "1" are reproduced from a carbon copy. The lower left serif of the "1" was damaged or worn, but not completely broken off. Compare for example the length of impressions 1, 3, and 12 and 8, 13, and 15.

off and on simply because of a pitted roller. To say that a type face with damaged metal cannot print properly is not necessarily an accurate statement. If variables are found in such letters, it is highly desirable to see the machine itself and to examine the actual type face. Only then does one know to what the variations in the typewritten copy are attributed.

HOW TO HANDLE VARIATION

If we understand variation in typewriting, it is not going to cause us any particular concern in identifying the machine. We can catalog the variation as being sufficiently frequent in a particular machine to be part of the defective quality of certain letters. We can otherwise classify it as an occasional variable which in no way invalidates our decision on the particular defect, but at the same time recognize that to identify typewriting accurately requires examination of repeated impressions of the letter before reaching a conclusion as to its semidefective quality.

Our problem in handling this quality of typewriting identification becomes greater when we start presenting a case to a jury. In the course of our reasoning we may have to face up to variation and to do something about it. But what?

Since it is not so widely understood or recognized one approach to the problem is to run away from it.

By proper preparation of comparison charts "there just ain't no such thing." Our charts merely show the defective letters; they do not show that every impression may not print defectively. This may be satisfactory until some alert cross-examiner recognizes that natural variation occurs in typewriting just like handwriting. You can imagine what his line of questioning will be.

Possibly a safer approach would be to consider the problem of variation, but treat it rather casually. To the layman variables in handwriting and typewriting may be complex and confusing. They may be especially confusing with a typewriter which is a machine—one supposed to turn out uniform and consistent work. Thus, in our discussion of the identifying defects we can point these out as the typical or more common impressions of the letters as they are found in this machine's work but admitting that there are some variable or non-typical imprints in the document. Often, especially with a limited degree of variation, this is the most advisable approach.

There is another way to get over this hurdle. It can be described as the frontal attack. Here we discuss and illustrate the most obvious variables using these factors as part of the identifying peculiarities of the machine. When variation is a prominent part of the typewriter's work this is the correct and scientific approach to the problem. There are many typewriters in which we are truly justified in including some such factors, because the variable quality of *e* or *a*, for example, may be the best way to describe its identifying peculiarity. This plan does not advocate the illustration of each slight variation that is to be found on a page of typewriting. Rather all must be considered in the course of identification, and then the true variables distinguished from the chance variables.

CONCLUSIONS

This paper has considered qualitatively the problem of variation in typewriting. No attempt has been made to measure how prevalent variation is in any kind or model of typewriter. No attempt has been made to measure the relative influences of the different factors which cause variation. In fact the variation considered has been limited to that which might be found repeated in several pages of typewriting done at one time under comparable conditions. In other words the variation

described is what might be termed the natural variation of any particular machine which would be like the natural variation found in a person's writing.

The variables would surely be increased if we considered the effect of preparing a different number of carbon copies, the effect of typewriter ribbons of different degrees of inking, and the effect of the machine being in different states of repair or adjustment from one use to the next. These factors have been presumed to have been constant.

What has been pointed out is that variation is present in every typewriter. The degree, the direction, and the quality of variation is individual to each machine; this is a basic assumption, but one which has been verified by experience. The fact that variation is present means that it must be considered in the identification problem and it must be considered in the presentation of the problem in the court. Just how these things are to be handled depends upon the particular case and the general practice of each examiner, but variation must be recognized in the course of making the identification otherwise there can always be a chance of error.

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