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SIX BASIC FACTORS IN HANDWRITING CLASSIFICATION

Theodora LeH. Smith

Mrs. Smith's interest in handwriting began before 1925. For a time she studied under Dr. Robert Saudek in London and subsequently resumed her work with the problem of handwriting classification. This work has engaged her attentions for the last fifteen years, and her present paper describes the six basic factors which she has found useful in classifying large volumes of handwriting.—EDITOR.

Effective scientific investigation of any subject depends upon the development of a highly reliable and differentiating set of measures which will form the means by which specified aspects of the problem at hand may be formulated and checked and gradually a body of dependable information can be accumulated. This is true of handwriting as of any other subject. It was felt to be necessary to examine the whole field by achieving some sort of systematic order. The routine work required to complete a classification for handwriting has taken years, but the results of such measures are beginning to show up and may be interesting to workers who approach handwriting from many angles.

A classification is arrived at by determining, first of all, those things that do not belong together. A process of analysis and separation has to take place, and for handwriting this was a prolonged and complicated task. Considerable experimentation showed that six major divisions, adaptable to measurement, but not necessarily always measured by a ruler, proved to be an adequate break-down of the first set of graphic factors, which together make up any writing anywhere. These factors are speed, size, slant, spacing, pressure, and form. The method of comparison was resorted to, due to the limitation of experimental conditions. To set up a series of scales of millimeter measures would so enlarge the field as to make practical work impossible.

SIZE

A small number of steps, usually from seven to ten, turned out to be sufficiently effective as divisors. Size, for instance, is measured in comparison with the Palmer Method, widely used in our public schools today. This model is called "medium" in size. Any writing which approximates this "ideal medium" is labeled Medium for the classification. Large writing is twice this size and small writing twice as small. Most school copies advise a fair medium in size, something not too cramped for the eyes of the child and not too extended for the small hand. As a matter of fact it seems to be instinctive with most writers to be moderate in this respect, and by far the larger number of writings are medium in size.

At first the three-step scale of Large-Medium-Small seemed to be sufficient. But pure size proved not to be enough. There are those writers who extend their long and tall letters further up and down than the recommended proportions, i.e., twice the height of the small letters for some school models, and three times for others. It is not out of the way to find a *t* stem five to ten times as high as the letter *m*, for instance. This extension of size proportions sometimes starts in the first writing lesson and becomes a life habit. In order to meet up with this complication it was necessary to add three more size degrees; large with extended size ratios; medium with extended size ratios; small with the same.

If one were to take a hundred specimens of writing and sort them according to their size, leaving out of consideration for the time being, the excessively small or out-size large (which is called Huge and can be more than an inch high) these divisions would work very well. But there proved to be one more hitch. There are those writers who never seem to be satisfied or set in the matter of size, but consciously or unconsciously (or both) fluctuate from one measure to another, showing a fair sprinkling of them all. They settle for no normal size whatever. Eventually there was nothing for it but to add another degree on the size-scale and call it All Sizes. Here All Sizes must be represented in order to differentiate from any of the more normal size standards which may happen to fluctuate a little, more or less. If All Sizes are not shown an incorrect decision has been made. This all size group has now grown to be second in number and importance (after Medium) and bids fair to give us vital information not suspected up to this time. The size scale now reads:

1. Large
2. Medium (standard school copy size)
3. Small
4. Large with extended size ratios
5. Medium with extended long letters
6. Small with extended size proportions
7. All Sizes

Each of these divisions has taken on a character of its own. Each section can be subjected to millimeter measurements, plus the introduction of greater refinements of scaling when the need is felt. For the time being they serve adequately.

SLANT

Five other sensible scales present themselves. The scale for slant is very simple. Slant is a matter of measuring variations from the vertical.

There are few scripts that hold strictly to the rigid upright, and these prove to be quite special, for it takes more than the usual powers of steadiness and concentration never to waver, when writing, either slightly to the right or to the left. If wavering takes place, then we are dealing with an all-slants production, and the trick is to estimate how great the variation and in which direction the main trend reveals itself. Some writings slant backward so slightly that as a feature it is hardly obvious. Others are backhand in so pronounced and conspicuous a fashion that this particular factor dominates the whole picture. Others show both an extreme backward and forward swing. There must be a way to tab these trends, for they may lead on to others that confirm and back them up.

PRESSURE

Pressure and form are the two most difficult measures to estimate. Pressure can be arranged along a continuum extending from the lightest stroke (which is carried out consistently) to the most exaggerated dark stroke which is made with a pressure so strong as to pierce the paper now and then. There must also be subdivisions for complex combinations, such as a consistently light body-writing, with heavy word endings and t-bars. Pressures fluctuate more than any other measure. A single word offers the opportunity for full-scale differences, yet some penmanship is a marvel of even flow, showing a pressure so smoothly applied as to seem to be machine made. Anyone wishing to classify handwriting can introduce as many degrees to the scale from light to dark, as he wishes. But the experience of this researcher is that four categories for even pressure strength and four for uneven productions works out in a very satisfactory way. The problem of the pen used is ever-present in pressure decisions. But on the whole a light writer chooses a fine pen, one that fits his hand and can accomplish the delicate work he prefers, and the writer who uses a crushing force falls into the habit of using a pen which allows him to exert himself as energetically as comes naturally, without at the same time splitting the pen nibs or destroying the paper. Experience is the only teacher here.

Pressure arises out of the man instinctively. Go into a college library where fifty students are taking notes and merely *listen* to the pens or pencils tracing their way along the page. This little experiment is a valuable aid in the study of pressure, for it is obvious from the scratching noises that some youths are expending three times as much energy in this exercise than others. The paper and pen have to conform to the treatment they get, and so eventually they do.

FORM

As pressure is an unconscious behavior, so also is form an unconscious expression. Few people can describe either of these two important aspects of their own penmanship and cannot explain why they are impelled to create as they do. Form emerges as naturally in handwriting as it does in art. The form scale took some ten years to evolve and could not be described in a short article without illustrations. But anyone used to handling handwriting will be able to construct a simple scale for form, based on the curve, or circle, the straight line or angle, the zig-zag, the wave, the up-and-over arcade or the thread. These lines are the deepest aspect of man's writing, and one he does not attempt to alter or modify. Even the forger finds it nearly impossible to eliminate from his habitual writing these idiosyncrasies of movement, in order to be left free to adapt his pen to the subtleties of some other writer. Here in pressure and form are the "life lines" which proceed from complex inner dispositions not yet identified in their true connection with the central nervous system.

We are looking now for similarities in order that all curved writing will fall together; all slow curved writing; all large, slow curved writing; all backhand, large, slow curved writing; all thick, backhand, large, slow curved writing; all well-spaced, curved, slow, large, backhand, thick writing. We are separating features, only to join them again later and to find that the interdependence of one measure upon another is as important as the particular factor itself.

SPEED

Directional trends and the speed of execution make all the difference. Speed in particular is highly significant. The speed scale is primarily divided into five gradations, again with subdivisions for variations and refinements. Speed has a greater influence than any other measure on the other factors in a code. A rapid writing, for instance, reaches down to the least stroke, modifies it, bends it to conform to the momentum and direction. It is safe to say that a formula is never truly understood until it is seen under all speed conditions, as in rapid writing, which is laid out on paper a paragraph at a time; temperate writing (expressed a sentence at a time); slow writing where the mind of the writer is satisfied to, or is only capable of, concentrating on one or two words at a time; or drawn writing where the single stroke or letter impulse can be as important a unit as a paragraph. The same five factors in any formula will be modified as they appear written in these dif-

ferent tempos. Each speed, in very fact, makes a new formula. Particularly is this true when haphazard and irregular speed impulses are in control. In these cases no one speed is set, as for a piece of music, but instead there are stops and starts, slow places and rushed places. No music is written to be performed in this manner, not even the most hectic jazz. A rhythm of one sort or another is counted upon to hold the selection together.

The speed scale is dominantly important and is simply: Exceptionally rapid . . . rapid . . . temperate . . . slow . . . drawn . . . jerky.

As the present listings stand, a normal distribution curve appears for these speeds, reaching a high spot (which is a sort of plateau) between temperate and slow, the speed at which most people write.

We are subjecting a handwriting specimen to quite a thorough-going analysis. The skeleton foundation, the framework and supporting structure must be made to stand out, even though no delicate instruments have been called into use. If the single unit of measurement is not very revealing, a combination of some or all will be.

SPACING

One way to achieve the best result is to be strictly particular about the spacing, for how a writer spaces, when he has become an adult and past the learning period, is as natural to him as the way he breathes. Nor does he vary in this subtle measure as long as he breathes.

Timing for an actor is one of the most important qualities in his art; rhythm, for the musician. Though in handwriting there is the "particular effort," for certain state occasions, the concentration of the normal writer is not great enough to remind him on the eighth page how he started to space on the first page. Fatigue sets in. Habit asserts itself. Instinct takes over. Spacing includes many different kinds of arrangements: the distance between lines, single strokes, letters, syllables, sentences, paragraphs, margins, quotes, commas, bars, etc. Spacing is largely a matter of timing, the inner feeling for space. It is the same on a post card as on a large sheet of paper. The observer must catch the "secret." Sometimes very "correct" and particularly deliberate outer spacial arrangement stands in contrast to inner spacing so confused that illegibility is the result, or vice versa. Distance between lines turns out to be a good guide. It is, however, impossible to explain space measurements in so limited an article. Where the original simple space scale is inadequate, the second section of measures has to take care of the exceptions, peculiarities and abnormalities.

The six basic measures which must be made for every writing in order to classify it, are as follows. This list is a simplified but systematic arrangement in classes, based on a definite scheme of natural relationships. It should enable even the inexperienced observer to apply the principles to any pile of writings he may wish to sort in proper order.

CARDINAL OR INNATE FACTORS

1. *Pressure*
 - a. Four categories of pressure strength—all even
 - b. Four categories of pressures—all uneven
2. *Form*
 - a. Ten simple forms
 - b. Four variations of simple forms
 - c. Three form-combinations

DEVELOPED FACTORS

3. *Speed*
 - a. Excessively rapid
 - b. Rapid
 - c. Temperate
 - d. Slow
 - e. Drawn
 - f. Jerky (containing elements of both speed and slowness—four degrees of this measure)
4. *Spacing*
 - a. Perfect (too good to be true)
 - b. Good (nothing touching anywhere)
 - c. Fair (most common measure—four degrees)
 - d. Poor (four degrees of this measure)
 - e. Bad (four degrees)

SURFACE FACTORS

5. *Size*
 - a. Large
 - b. Medium (standard school copy size)
 - c. Small
 - d. Large with extended long letters
 - e. Medium with extended size-ratios
 - f. Small with extended size proportions
 - g. All Sizes
6. *Slant*
 - a. Forward (tipping to the right as in school copy)
 - b. Backward (tipping to the left, opposed to school recommendation)
 - c. Upright (uncompromisingly perpendicular. Rare even in Manuscript print writing)
 - d. All Slants (writing tips one way and then another—Four degrees of this measure)

Apply these directions to any writing, and it will be possible to draw up some very positive codes. There will be formulas such as these:

light in pressure	half light and half dark in pressure
round writing (clockwise)	wavy indistinct forms
extremely rapid	made in jumps and starts
poor and ragged spacing	spacing badly confused
very large in size	exceptionally small
exaggerated backhand	tipping to the right abnormally
exaggerated pressure strength	conflicting pressure strengths
arcade writing (counterclockwise)	angular writing
temperately written	all sizes shown as if on purpose
well arranged	drawn as for a poster
medium in size	spacing measured by ruler
mildly all-slants	unfailing, rigid upright
strong and reliable in pressure	weak pressure, weaker in spots
angular writing	forms indistinct
good normal temperate speed	slowly, lazily drawn out
ideal spacing	lower loops pass through two lines below
medium with extended size-ratios	all-size
normal forward slant	all-slants

CONCLUSIONS

In most cases the six basic measurables or "dependent variables" are so pronounced as to be readily estimated, making an exact classification easy. In other cases this is not so true. The writing is too involved and complicated to be spelled out in six easy factors. There may seem to be some hidden elements that do not meet the eye. In these cases the second half of the process of classification must come to the rescue. There are classes established for slighter shades of meaning, special emphasis here and there, peculiar eccentricities and exceptions.

Writing identification differs from finger-print identification in that the elasticity and fluid quality of human behavior must always be allowed for. If men were machines and could be counted upon to turn out each day exact carbon copies of the work they learned in school, the classification problem would not be so complex. But even the banker knows that one signature precisely like another is so unnatural as to suggest a traced forgery.

In spite of the sense of movement and variety, the researcher will find that very little about handwriting is due to chance actions and slips of the pen. Even that which is supposed to be "exceptional" fits logically into what is basic. There is something very fundamental about the whole process.