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Changing Slant: Is It the Only Change?

The examination of handwriting for identification purposes provides many interesting and thought-provoking problems. One of the most commonly encountered challenges arises when an individual consciously attempts to change, alter, or otherwise disguise the presence and appearance of normal, natural handwriting characteristics. Included among these mindful attempts are capital letter style changes, alteration of normal writing slant, and use of the awkward hand, to name just a few [1]. Throughout all such attempts, the fundamental axiom remains that the writing is not completely natural. However, while such attempts are a contrived, forced effort, in many cases they still contain those unique and individual characteristics upon which an identification or elimination can be based.

Even though the writing cannot be considered totally natural, each method employed in disguise may incorporate tendencies that occur as a natural happenstance with relation to certain types of disguise. It is the aim of this project, which was undertaken at the Georgetown University Forensic Sciences Laboratory in Washington, D.C., to delve into handwriting tendencies that may normally occur when an individual is asked to deliberately alter the normal handwriting slant.

Project Design

Figure 1 depicts a form, specifically devised for this survey, that contains a typewritten paragraph² and ruled writing areas. Blank copies of the form were randomly distributed among a group of 100 people of a wide variety of races, occupations, and geographical locations. The 15 normally left-handed and 85 normally right-handed respondents were sixteen years of age or older.

For the purposes of this survey, slant was classified as being either forehand (leaning right), vertical (perpendicular to the baseline of writing), or backhand (leaning left). Normally, 83% of those surveyed employed a forehand slant, 12% a vertical, and 5% a backhand. Consideration was then given to the directional movement of the slant in the second paragraph when compared to the slant in the normally written paragraph. In other words, if a normal forehand slant displayed a more exaggerated forehand slant in the "Changing The Slant" paragraph, this was termed as a rightward directional movement. Conversely, a normal forehand that changed to a vertical or backhand slope was deemed a leftward directional movement. Approximately 20% of the surveyed population changed slant in a rightward fashion, with 80% moving leftward.

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²The paragraph, excluding the final sentence, was obtained from a Personal History Data form used by the U.S. Postal Inspection Service.

INSTRUCTIONS: Using a pen, write the following paragraph in your normal handwriting. (NO printing please) Upon completing it, rewrite the paragraph altering your handwriting by only changing the slant of your writing.

A tour through our national parks would be enjoyable to you, I know. We left Los Angeles at 7:45 A.M., September 20, via Valley Boulevard, and motored to the Grand Canyon in Arizona. From there we drove to Zion National Park in Utah; next a jump to Yellow Stone. Then we drove to the coast, into California, and through the Red Wood forest to San Francisco, the Commercial Hub, arriving at 9:30 P.M., October 21. Here Mr. and Mrs. John X. Dix, of 685 East Queen St., Topeka, Kansas, joined us. I found the roads good, some quite equal to the best. I am voluntarily submitting this exemplar of handwriting for purposes of examination and comparison.

1. NORMAL HANDWRITING

2. CHANGING THE SLANT

NORMAL WRITING HAND _____

FIG. 1—Form that was used in the survey requesting samples of natural handwriting and handwriting with a deliberately altered slant. The actual forms were 11 by 14 in. (28 by 36 cm) in size and provided more space for the handwriting samples.

A further consideration involved the directional movement tendencies in the total population of each normal slant category. The results disclosed that normal forehand slant writers moved the slant in a leftward fashion by better than a 9 to 1 margin. Consolidating all normal vertical and backhand writers together as a group revealed a preference toward change in a rightward direction; this tendency surfaced in nearly three of every four writers surveyed.

After these necessary beginning determinations were made, the following categories were examined in relation to the manner in which slant changed.

Space Usage

The increased use of space, or the tendency to reduce the amount of space used, was considered as a factor of possible significance. It was found that in the changed-slant writing approximately half the writers used less space than normal, one in ten used more space, and the remainder displayed no significant change.

The direction of movement when compared to the differences in space used evidenced two rarities. It was quite uncommon for those who moved the slant in a leftward direction to use more space when changing slant; only 2 to 3% of the writers consumed more space when executing the paragraph while changing slant in this manner. Conversely, of those who altered slant in a rightward fashion, the tendency was to use more space.

Pen Pressure

The examination of pen pressure followed the guidelines offered in Ref 2.

In dealing with the question of pressure in handwriting, it is vitally important to remember that we are not referring to the positive degree of thickness of the lines, but rather to the *degree of contrast* as between thicker and thinner lines.

This degree of contrast, whether it indicated an apparent increase, no apparent change, or an apparent decrease when changing slant, was perused and the following results were noted. Overall, 82 writers displayed an apparent increase in pressure, 7 an apparent decrease, and 11 showed no apparent change.

A pattern of increased pressure began to develop when slant changed in a leftward fashion. Moving the slope to the right portrayed considerable variation. Interestingly, of the seven samples showing an apparent pressure decrease, six altered the slope in a rightward direction.

The overall 89% change in pen pressure tends to negate Saudek's assertion [3] "that the pressure cannot easily and constantly be altered with intent [as] writing pressure is one of the most individually typical features of handwriting."

Selected Capital Letter Style Changes

Style changes may be defined as reverting to a printed (block) form of a capital letter from a script form, or vice versa. Eight letters were selected for analysis because of the differences in their script and printed forms (as displayed by the Palmer system of handwriting [4]). The eight letters and the number of style changes were as follows: "A," 1 in 100; "F," 1 in 100; "G," 3 in 98; "I," 0 in 100; "J," 2 in 99; "Q," 4 in 99; "S," 11 in 100; and "Z," 7 in 93. (The total number of samples in some cases is less than 100 because some writers deleted the line containing the necessary letters for comparison in the normal writing sample, the changed-slant sample, or both.) Obviously, there was a stronger normal tendency to alter the style of the "S" and the "Z" than any of the other six letters examined.

Style changes in these selected capital letters appeared to be affected by the movement direction. Recalling that approximately 20% of the population altered slant in a rightward direction, it was rather startling to find that approximately 41% of the style changes that occurred fell within this category. Therefore, those moving the slant to the right displayed the greater normal tendency toward style changes.

Staff Formation of the Lowercase "t"

Handwritten "t" staffs usually conform to a looped, retraced, single-stroke, or tented formation. A change in slant often brought about changes in the staff formation; nearly half of the total population altered the formation in some manner, with the general tendency being toward increased looped formations. Breaking down the changes that occurred in relation to the directional movement revealed the following:

1. A rightward movement in the second paragraph displayed additional retraced form usage by a 2 to 1 margin.
2. The predominate form when slant changed to the left was the looped form, as displayed by nearly 45% of the samples.

Thus the tendency to make a looped "t" staff was greater when slant went from right to left, while retraced "t" staffs dominated the left-to-right movement.

Formation of the Lowercase "d"

The staff or upper extension of the lowercase "d" requires similar movement and construction as does the "t," yet only 30% of the surveyed population changed this formation. Generally, though, looped forms again dominated the number of alterations.

Unlike the results obtained with the "t" staff, movement to the right as well as the left revealed additional looped usage. Therefore, no matter what direction slant changed, there was an increase in the use of the looped form in the upper extension of the lowercase "d."

Comments

The initial designs of this investigation were directed at finding common and unique characteristics occurring within a representative collection of samples employing a specific change of slant. Completed forms fitting a specific maneuver, such as a normal forehand to a more vertical, were to be examined in relation to the five chosen criteria and collectively compared against the tendencies of samples changing from a normal forehand to a more backhand, normal backhand to a more forehand, normal vertical to a more backhand, and so on. As the computations of the completed forms progressed, it became quite evident that most of the specific changes would not serve as a foundation to predict future writing tendencies. As a unintended consequence of such diverse results, the emphasis was placed on the overall directional movement as the primary determining factor.

In light of the above, two statements bear consideration. First, any future attempts involving the examination of a representative number of samples of each specific slant change could provide fruitful and meaningful information. Second, knowledge that the writing habits of the sampled population did not produce a great percentage of normally vertical or backhand writers plus the complete lack of anyone changing slant from a normal backhand to a more vertical slant provide a foundation of normal expectations.

Table 1 provides a capsule review of the surveyed findings with all categories compared to normal handwriting with the exception of capital letter style changes. Previous studies of normal handwriting procedures provided information that greater writing speed introduces a greater degree of expansion in writing [2]. It has also been stated that if normal writing has a forehand slope, then writing will naturally become narrower if written vertically, or vice versa [3]. Combining these claims with the findings of this survey delivers the conclusion that those changing slant in a leftward fashion execute the changed slant paragraph with less than normal speed. Conversely, those moving

TABLE 1—A review of the findings of the survey.

Characteristic	Direction of Change	
	Leftward	Rightward
Space use	less	more
Pen pressure	increased	varied
Tendency to change capital letter style	less	greater
Formation of "t" staff	looped	retraced
Upper extension of "d" formation	looped	looped

slant to the right write faster, thus using additional space. Applying these concepts to pen pressure implies that pressure increases as speed declines but no pattern emerges as speed increases.

Disguised cursive handwriting often produces the printed forms of capital letters [5], often accompanied by a change in slant. This study did not specifically request disguise; nevertheless, it demonstrated that capital letter style changes, whether to a block or script form, were more natural in the "S" and "Z" than in the other six letters that were scrutinized and that the rightward change in slant displayed the greater tendency to altered capital letters.

Persuant to capital letters, the use of an enlarged version of the lowercase letter deserves mention. This study found a normal 9% usage of this form as a substitute for the "G," and a 6% substitution for the "Q." Re-examination of the specific samples with these configurations indicated all were written by the right hand and both the normal and changed slant writing displayed this form. Some correlation may exist between the use of these forms as five of six writers using the large lowercase "Q" in both writings also employed the large lowercase "G" in both writings.

Writing speed may well be a factor in the formation of the "t" staff. If the claims concerning speed are valid, less writing speed resulted in more looped formations while quicker execution demonstrated retraced forms. One would expect that slower, more thoughtful, and deliberate execution would lead to use of the learned formation which the Palmer system teaches as retraced. The upper extension of the "d," which Palmer teaches as looped, was predominately looped regardless of the direction of change; thus, speed apparently did not affect the "d" as it did the "t" staff. Also, the upper extension of the "d" was not altered as often as the "t" staff.

In summary, not only was changing slant in a rightward fashion found to be less habitual but it also appeared to provide more variable changes among the surveyed population.

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