TECHNICAL NOTE

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Transfer of Pencil Writing by Cellophane Tape

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ABSTRACT: This study explores the susceptibility of pencil writings to being transferred when transparent cellophane tape is used as the conveying agent. Comparative examinations of transferred pencil signatures with genuine pencil signatures disclosed that a transferred signature could be mistakenly identified as an original writing. The identification of characteristics inherent to transferred writing is discussed. The study seeks to acquaint the questioned document examiner with pitfalls intrinsic to the examination of pencil writings covered by cellophane tape.

KEY WORDS: questioned documents, pencils, handwriting

Occasionally, examiners of questioned documents encounter problems wherein the questioned entries are made by pencil. Documents executed with pencil, particularly pencil signatures, provide the opportunity for the ingenious forger to alter genuine signatures.

Hypothesis

It is possible for a genuine pencil or ball-point pen signature to be transferred to another document. The subject of transference of writing has been addressed in the past. A review of the literature yielded some information regarding the transfer of pencil and ball-point pen writing.

Hodgins [*1*] stated "that pencil signatures, regardless of age, were very susceptible to transfer." The transferring agents were wax paper and cellulose tape. Another statement reads, "Cellulose tape did not generally succeed in 'lifting' a signature and ... it frequently tore the paper fibers in the area of the original signature."

Conway [*2*] stated:

> The transferability of ball pen writing, for example, a signature, has been mentioned as an objectionable feature of the ball pen, especially during its early history. The heel of the hand, and even a hard boiled egg or the peeled surface of a raw potato have been cited as feasible of use to transfer a genuine signature on one document to a second spurious document. The transfer would be accomplished by impressing the transferring agent, say the hand, on the genuine

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> signature, receiving the impression, and then stamping it on the second document. The practical dangers of such transfers appear to have been exaggerated, although it was no great feat to transfer the form of a signature written with many of the early ball pen inks. The rapid drying resinous inks which predominate today are not readily susceptible to such transference. More important, it is not possible to transfer the indentation of the ball point and its rolling path. The furrow of the rolling ball and the quality of its ink line under the microscope distinguish ball pen writing from the flat, lifeless form of a transferred writing.

Harrison [*3*] confirmed Conway's thoughts when he stated:

> Under the most favorable circumstances, something which might be read as a signature could indeed be transferred, but very few would regard such a vague and diffuse production as having been made with a pen—its spurious nature would be obvious on the most casual inspection.

An important reference to pencil-written documents was made by Osborn [*4*] when he cautioned,

> Without reasonable explanation, the fact that a disputed document which is the basis of a claim of any considerable importance is written in pencil often is a suspicious circumstance in itself.

The comments of these authors and an article written by Moore [*5*] prompted this paper. Moore's article dealt with attempting to determine the sequence of ball-point pen writings by using cellophane tape as a "lift" (transferring agent) and placing the tape onto a white index card, which provided a background. Moore's technique of using cellophane tape brought to mind a possible method of pencil or ball-point pen ink transference.

Methods

Initially, attempts were made to transfer ball-point pen ink signatures from the surface of a white index card by pressing a strip of transparent cellophane adhesive tape over the entire signature. After the tape was pressed over the signature, it was then removed with a steady, even pulling motion.

The resultant lift of the signature was pressed onto a new card. The same method was applied to various colored inks, and upon examination of the lifted signatures it was apparent that the amount of ink transferred was minimal. Additionally, the furrow caused by the rotating ball could not be transferred, which confirmed Conway's conclusion [*2*]. Other factors that restricted the transfer of ball-point pen ink included the viscosity of the ink, the drying time, the grade of the paper, and the size of the rotating ball. In short, there were many obstacles that made it impractical to continue with this method of transferring ball-point pen ink signatures. However, the transference of pencil-written signatures is another matter.

The technique used with the ball-point pen ink signatures was also employed to lift pencil writing from papers of various quality. Because of the numerous grades of graphite pencil lead, only three were used during this study. Two colored pencils, blue and red, and three grades of graphite pencil, "Skillcraft" bonded No. 1 soft, No. 2 medium, and No. 3 medium hard, were used. An "Eagle Verithin" red and blue No. 748 was employed for the colored signatures. Four sets of signature cards were prepared, five cards to a set, one signature to a card, and each written with a separate grade or color of pencil. Of the four sets, two sets were used as the "control lifts" (removal of signature from card with tape) and placed on white index cards. The two sets which bore original signatures that had been lifted were discarded to prevent any possibility of an examiner being able to detect traces of adhesive deposited when the signatures were transferred. Then two more sets of signature cards were prepared by writing pencil signatures and placing a piece of tape over them. The end result left two sets of genuine signature cards "taped over" and two sets of cards bearing lifted and

transferred signatures. The four sets of cards were then intermixed and separated into two groups for a comparison examination:

Group A, questioned documents, contained five transferred signatures and four genuine signatures, and
Group B, standards, contained six transferred signatures and five genuine signatures.

Results

Comparison examinations of the two groups were conducted by all of the qualified documents examiners and student examiners, including this writer, at the U.S. Army Criminal Investigation Laboratory, Fort Gordon, Ga. The following information was gained.

1. The adhesive coating on the strip of cellophane tape transferred the main qualities of the original writing because of the excessive amount of graphite and clay particles deposited on the paper's surface. These particles readily adhered to the tape backing, as is visible in the transferred "Skillcraft bonded" portion of Fig. 1.
2. When there was an air bubble in the tape, the transferred signatures could be determined by using the microscope. The air bubble as seen through the microscope showed graphite particles adhering to the tape backing itself. An air bubble observed over a signature with no graphite clinging to the tape backing clearly indicated that the tape was placed over a genuine signature.
3. In some instances, an uneven lift of graphite particles gave the transferred signatures a blurred effect. However, the blurred effect caused by the tape was not always discernible, particularly when the writing was made with a hard lead.
4. One might think that the indentation of the pencil point would have an adverse effect on transferring pencil writing. It was this author's experience that there was little, if any, pencil track when the original signatures were prepared with a normal amount of pressure on the writing instrument. Even so, the cellophane tape "masked" any indentation on the

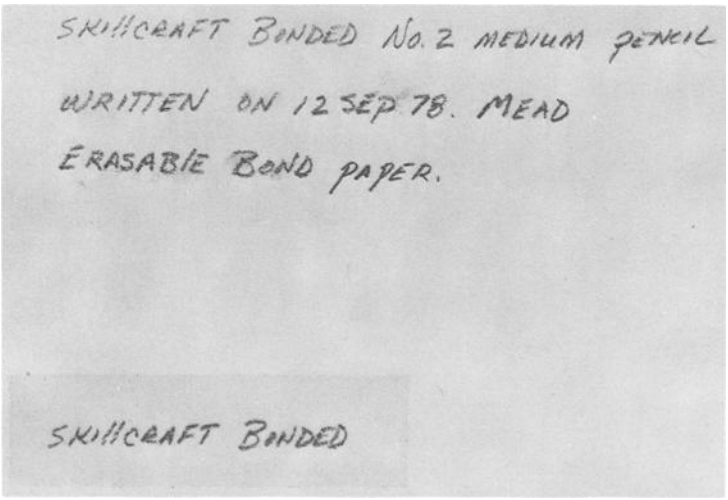

FIG. 1—*Successful lift and transfer of pencil writing from good quality bond paper. Note the slight fading of the words "Skillcraft bonded" at the top of the photograph. Also note the faint outline of the strip of cellophane tape in the lower portion of the photograph, outlining the transferred words "Skillcraft bonded."*

original signatures, thereby making both the original and transferred signatures look similiar.

5. It was noted that three consecutive separate lifts of a single original signature could be made with excellent results. The original signature suffered a slight amount of fading after each successive lift, but the original signature was still legible (see Fig. 2). The original writings produced by various colored pencils faded more than signatures produced by graphite pencils.

6. The paper surface upon which the pencil writings were made affected the quality of the lift. Poor quality paper, whether bond or writing tablet paper, could not withstand the adhesive properties of the tape (see Fig. 3). Good quality papers such as erasable bond or index cards yielded excellent lifts (see Fig. 1). The problem encountered with poor quality paper was experienced by Moore [5] in his experiments.

7. Even aged pencil writing can be lifted and transferred to another document (see Fig. 3). Note that a portion of the ruled base line was transferred during this lift. Also notice that the paper fibers were torn from the original document because of the poor quality of writing tablet paper.

8. If the cellophane tape bearing a transferred writing is removed from the second document no pencil outline remains on that document because the graphite particles cling to the tape backing.

9. The graphite pattern (a build-up of graphite particles on the side of the paper fibers in the direction of writing) from an original writing is transferred intact when cellophane tape is used. Careful scrutiny of the writing on the cellophane tape will sometimes reveal the actual fiber pattern of the document from which the original writing was lifted. In other words, the *paper* fiber pattern that has been impressed into the written line of the tape backing can be discerned and that fiber pattern will not match the paper fiber pattern of the document that bears the transferred writing.

These observations appear to support Hodgins' statements [*1*] that pencil signatures are

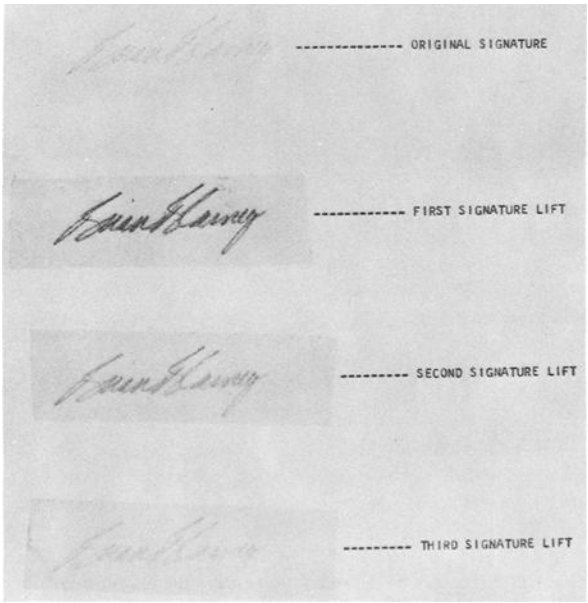

FIG. 2—*Three successful lifts of one original signature.*

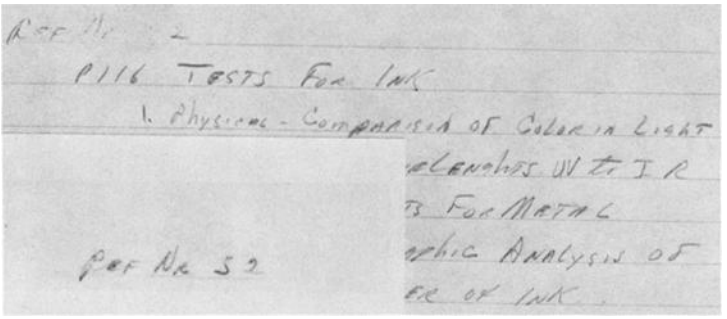

FIG. 3—*Lift of pencil writing from poor quality writing tablet paper. The original writing had been done during September or October 1965.*

susceptible to transfer, regardless of age, and that cellulose tape frequently tears paper fibers loose from the original document. However, his statement, "Cellulose tape did not generally succeed in lifting a signature," is not supported by this study. Further, cellulose tape is an excellent transferring agent, dependent only on the quality of the paper from which the lift is attempted.

Summary and Conclusion

This method of transferring writing has shown the possibility exists that a lifted signature could be mistakenly identified as an original writing. Therefore, the document examiner who faces a questioned document problem that involves a pencil writing, particularly a pencil signature covered by adhesive tape, should be aware of this technique and exercise extreme care before rendering an opinion.

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