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# IDENTIFICATION OF SCISSORS BY TRACES LEFT ON PAPER\*

PAUL CHAVIGNY†

It is commonplace knowledge, and almost obvious, that a pair of scissors must leave revealing traces of identification on a piece of paper, whenever the scissors show denticulations in the cutting edge.

In a case involving the theft of bank notes which had been fraudulently removed from an envelope, an examining judge entrusted to me the task of determining whether or not the various cuts observed on the envelope, and on certain papers contained in it, had been effected by means of a pair of scissors found in the desk of one of the suspects.

It is perhaps relevant to mention that, although the facts observed in the examination of the cuts made with the scissors in question were of no help in the final result, the case in question was completely solved through the medicolegal investigation of the laboratory. One of the suspects was so confounded that he was obliged to acknowledge his guilt. As cashier, entrusted with sending by mail a sum of twenty thousand francs in bank notes, he had simulated beforehand a breaking of the envelope and had manipulated everything in such a fashion that the theft would be charged to the postoffice employees. As a matter of fact, he had deposited in the postoffice an envelope from which the bank notes had been abstracted and replaced them with the equivalent weight and volume in strips of paper.

In the course of the investigation, it was a great surprise to me to observe how little information the literature of criminology has to offer on the subject of sections made by means of a pair of scissors.<sup>1</sup> Consequently, here are the results of the research and examination which were conducted in this case.

In ordinary household practice, a pair of scissors is among the objects to which the least care and attention are given. Scissors are

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<sup>1</sup>[Dr. Rudolph Jeserich, in his *Chemie und Photographie im Dienste der Verbrechenauflklärung* (Berlin, 1930) records an arson case in which a conviction was obtained on the basis of this type of evidence. A pair of defective scissors in the possession of a suspect was found to leave the same characteristic marks as those observed on the cut edges of unburned paper scraps which formed part of the material used in starting the fire.—M. E. O.]

very rarely repaired or sharpened. In many homes one frequently will find scissors with blades that have become entirely blunt. Desk scissors are slightly better kept, although they too are often quite defective. In many instances, scissors in a household, especially kitchen scissors, have been put to the most unexpected uses. For example, they may be used as shears for cutting anything, even wire. It is not surprising, therefore, to find denticulations on the edge of the blades of such scissors.

The most common defect in scissors is the looseness in their pivot. Gradually the rivet forming the pivot becomes worn, loosens, and the two blades have free play one upon the other. It is not at all rare to find pairs of scissors the two points of which might be separated from each other for one and even two millimeters in a transverse direction. Hence, what might be the traces obtained on a sheet of paper, by using a pair of scissors just as defective, and in just as poor condition?

A strange thing, at first sight, is that the experiments made show that it is possible to cut fairly sharply a sheet of paper with a pair of scissors, even though the blade is blunted and quite defectively mounted on the axis.

With a pair of scissors which has very marked "play" at the level of the pivot, rather satisfactory results can be obtained by using, in holding the scissors, a certain well known ruse or device, namely, the thumb on one side and the third or fourth finger on the other side, inserted into the rings of the scissors, impressing upon the blades a torsion movement of one against the other transversely. This movement finally becomes somewhat automatic since one has to have recourse to it quite often because of the poor condition of the scissors used.

So far as the notches on the edge of one blade or the other are concerned, one would be tempted to believe that the slightest notch in the blade would manifest itself in an irregularity in the section of paper. To the contrary, however, it is observed in practice that the sectioned paper shows the irregularities of the blade quite imperfectly. Certain notches on the cutting edges of the instrument may be clearly visible to the eye and especially and markedly perceptible to the finger-nail run along the length of the blade, whereas on the sectioned paper their effects will be scarcely visible. This, it appears, is due to the fact that paper is a rather poor plastic substance. In order for the notches and irregularities in the blades to be inscribed on the section of paper, it is necessary for them to be of noticeable size.

A notch in the cutting edge of one of the blades will manifest itself in: (1) A depression on the edge of the paper section; and (2) An unraveling of the paper on one side or another of the section.

(1) At the moment when the notch in the blade begins to act on the line of section of the paper, the sectioned paper molds itself in some fashion in this notch. This molding will be found exactly on the edge of the paper in the form of a depression, that is, a hollow forming the outlines of a small groove. It would appear that the opposite blade, the one whose edge is normal, has pushed the paper back in the other lip of the section. Consequently, from this fact, it will be possible to discover, provided there do not exist any nicks on one of the two blades, in what direction the scissors and paper were held with reference to each other.

(2) On the same level, the one corresponding to the notch where the paper has been pushed back upon itself as has been previously stated, there will be produced, in addition, a localized unraveling of the fibers of the paper in the form of a small brush. This brush of fibers is found on *both edges* of the sectioned paper even when the notch is found on only one of the two blades. At this point there is a tearing, an unraveling of the fibers of the paper, instead of a clear cut incision. The distance over which this unraveling occurs corresponds rather closely to the size of the notch appearing on the cutting edge of the blade. From all of this it may be concluded that in those cases where one finds a well marked trace on the paper, that there existed a defect in the blade. But the converse is not true, since, as we have stated before, the paper by no means registers slight details.

There exist various difficulties in identification resulting from the foregoing facts:

(A) When a sheet of paper is sectioned through its entire length with a pair of scissors which has blades of a definite dimension, one actually uses in successive steps only the middle part of the cutters. However little skill one possesses in handling the instrument, one performs the "stages of cutting" with strokes of the scissors with such exactness nothing reveals the points of junction over the length of the paper cut.

(B) In a great many cases it will be impossible to determine in what direction the characteristics of the section have been effected or in what manner the scissors were held. Indeed, when the longi-

tudinal section made on a sheet of paper is examined, it must be remembered that the section might have been effected in four different positions: a given surface of the paper from above or the same surface from below, then on each of its surfaces, in a forward or a reverse direction.

One will arrive at a clear understanding only if the notch in the blade has produced a depression or mold on the sectioned edge, and moreover on condition that only one of the two blades has notches. If the two blades showed notches simultaneously the observer would, in effect, find notches placed "head to foot" which would lead to no conclusion.

Possibly if the paper had not been handled by too many different people—a very unusual likelihood—the surface of the paper could be examined for a trace of fingerprints, for the hand grasps and holds the paper in a very special manner with the thumb being always above whereas the index finger is bent over in a hook underneath.

(C) The difficulty of identification of notches indicated on the edge of the section of paper can be observed by experiment. For experimental purposes it will suffice to use a pair of new scissors on one of the cutters of which there has been produced a series of irregularly spaced notches with a file or an engraving tool. When, with scissors thus prepared, a sheet of paper or thin cardboard is cut down its length, certain parts of this section are found to contain impressions or unravelings, but then, when one attempts to hold the cutting blade which is notched, along the edge of the cardboard which shows the irregularities, one finds that it is almost impossible, even by means of carefully employed sliding, to obtain sufficiently exact and especially, sufficiently repeated agreement of the spacing of these various irregularities. Moreover, this can be understood since the notches of the cutting blade have been placed quite irregularly over the length of the section, in proportion to the gradual progress of the scissors along the line of cutting.

(D) It is necessary to be on guard for the fact that the kinds of molds which are produced in the tissues of the paper at the level where the latter has been pushed down into a notch in the blade, run the risk of being deformed—leveled by the contact of awkward fingers, or of apparatus needlessly placed in contact with it. If an experiment of the kind with which we are dealing is to be undertaken, the fragment of paper must be manipulated and protected with the same care as a window pane bearing finger prints.

(E) A special case more favorable for the experiment is one in which one of the arms of the pair of scissors has been notched near its point. This locates the irregularity much more conveniently.

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The experiments conducted in this case seem to indicate that further attention should be given to this subject, although a conservative attitude must be taken concerning the value which is to be placed upon the facts observed by the investigator.