CRIME DETECTION

Crime Laboratory Science Clears Up Mysteries

Study of Handwriting Reveals Chances of Two Persons With Same Script May Be One in 30 Billion Billion

By DR. WILMER SOUDER, National Bureau of Standards.

(EDITOR'S NOTE: Dr. Wilmer Souder has for 15 years been in charge of the Government's crime laboratory at the National Bureau of Standards. This laboratory foreshadowed that of the Department of Justice "G-Men." It was the first experimental laboratory set up for the exclusive use of Government departments in crime research.)

SCIENTIFIC detection enables men who are probing a crime to confront a criminal with facts. Such evidence is impartial, cannot be discredited, and is not susceptible to "fixing."

Here is a typical case. Two girls went out driving in an automobile. A man riding a bicycle approaching the girls went off the road and down a hill against a stone wall and was killed. The girls admitted they were at the scene when all this happened, but they claimed their car did not touch the bicycle or the man.

The bicycle, the girls declared, seemed to go to pieces, and when the man could not control it, he went over the bank. Their car had a dented fender, but they explained this as the result of a previous collision with a post.

This was their story, and, while it sounded queer, it was difficult to disprove it.

And then we found a little mark about the size of a 50 cent piece, on the dented fender of the car. That small mark, overlooked in ordinary inspection, solved the case. For its indented shape fitted exactly the curvature and knurling of the notched adjusting cone on the front fork of the bicycle. Confronted by this evidence, the driver of the car pleaded guilty to manslaughter.

Examine Bullets

One of the services that the Bureau of Standards crime laboratory has rendered in the past is teaching students how to inspect, compare, and photograph bullets and shells. By scientific methods of examining projectiles, it is possible to identify the gun from which they were fired—often an important point in an unsolved case.

On the walls of our laboratory, you may see enlarged pictures of bullets, or, rather, parts of bullets. Some of the photographs are on a scale so large that the whole bullet thus reproduced would fill a room.

These highly enlarged pictures show plainly the distinctive markings of the gun that are left on each bullet that passes through the gun barrel. As the bullet speeds through the barrel, it acquires a pattern of grooves and scratches that are the fingerprints of that particular gun left on the bullet. Each gun barrel, and each land in the barrel, leaves its own peculiar markings which are different from any other.

If it is suspected that a certain gun fired a fatal bullet, we fire a test bullet from the gun, and put the two bullets—the fatal bullet and the test bullet—under comparison microscopes which join the images of the two bullets in a common eyepiece.

Every side of the bullet is studied in this way, and it is possible to point out whether or not the fatal and test bullets bear the same patterns in corresponding grooves.

Study Photographs

If both bullets do bear the print of the same gun, then we make enlarged photographs of sections of the bullets, showing how the patterns do match. These enlarged photographs can be studied more easily than the bullets themselves, and the photographs are accepted in court as evidence.

Identifying the gun that fired a death shot may, or may not, clear up a crime, for, of course, it must still be proved that the owner of the gun or the suspect having access to the gun actually fired the shot. If a prosecutor is unable to place his suspect at the scene of the crime, he had better not go to court until he has additional evidence. Merely proving that a certain gun fired a fatal bullet is not enough.

In its research on crime detection, our laboratory has accepted no cases except those coming from Government departments. But in 15 years of work we have accepted cases from every branch of the Government Service. We are now attempting to limit this work strictly to a research service. We feel that we have about completed our part in the task of aiding in the selection of equipment and in setting standards for this type of scientific crime detection, and prefer to accept only those cases of a very highly technical nature.

Handwriting Study

Many people ask about the study of the scientific principles supporting the identification of handwriting.

All I can say is that it is not easy to master handwriting any more than it is easy to master the theory of music or any other professional calling. It takes work and study.

Each element of writing must be judged, and these elements make a long list: for example, style, nationality, slant, skips, shading, alignment, proportion, defects, disguise, and a host of others.

Each of these elements must also be weighed in terms of the frequency of its appearance in the writings of other individuals. Perhaps some peculiarity of a letter is discovered which is found only once in a thousand handwriting specimens. Perhaps a *t* is crossed in a way used by not more than one person in 100. Each of these divergencies from normal or perfect writing has a value.

For each abnormal element of writing we select a fraction expressing the probability of its appearance in the writing of other individuals. These separate fractions must then be multiplied together. When their product is, say, the fraction one over ten billion, we are forced to the conclusion that we should have to search through a group of ten billion individuals before we should expect to find another individual who would repeat the characteristics charted in the questioned writing.

Obviously, there are not ten billion people in the world, and therefore having found one individual who duplicates the questioned writing it is a useless task to search for a second.

Lindbergh Case

A recent case in which the Bureau of Standards laboratory studied handwriting clues was that of the Lindbergh kidnaping. We entered that case shortly after the child was stolen in 1932 and before the ransom was paid. Our services concluded on testifying at the trial in Flemington, New Jersey, in January, 1935.

In that time, in our search for the writer of the ransom notes, I compared between 8,000 and 10,000 documents. On all of these except the last set, the

reports were, "No, this is not the writer."

When I computed the factor of certainty for the documents identified as written by Hauptmann, on a very conservative rating, I found the fraction to have one as a numerator over 3 followed by 19 ciphers as the denominator. This, from a mathematical standpoint, confirms the identification "beyond all reasonable doubt."

Clear Up Threats

Other kidnaping cases, especially threats of kidnaping, have been brought to us with requests for a study of the handwriting. For instance, a woman known to many Washington people received a note demanding $5,000, and containing a threat to get a member of her family if the money was not paid.

One man attributed this note to an aged friend of the family, frequently guilty of playing jokes on his friends. But the note had none of the elements of the writing of an aged person. It did not convey the style of writing taught 70 or 80 years ago. In fact, it bore abundant evidence of a young man's writing.

Further investigation showed that the writing of a servant, 22 years old, matched the threatening note perfectly. When he was confronted with an exhibit showing how the writing of the threatening note agreed with his own, this young man admitted his guilt.

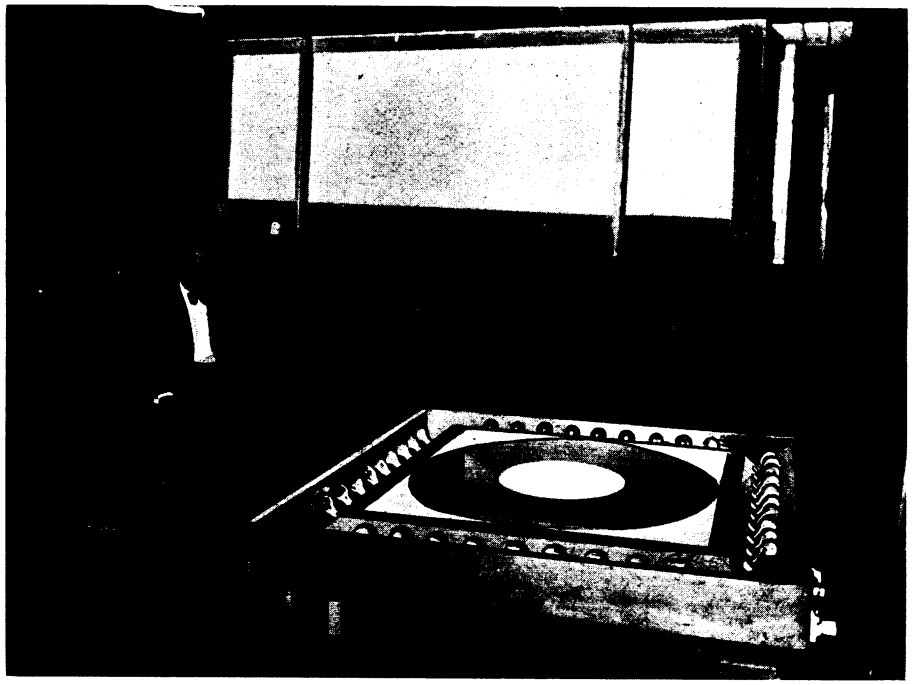
In identifying handwriting, in order to determine whether the same person wrote two or more items, it is necessary to keep in mind all rules or landmarks of identification. I have named a few of these. The handwriting expert must have a grasp of all. Instantly, he must recognize what is significant in a piece of writing given him for study.

Ignorance Causes Error

Failure to master and recognize these enables many amateurs and charlatans to appear as handwriting experts and to support, with incomplete testimony, whichever side seeks their services. The mathematical theory upon which handwritings are identified is sound, and must be mastered and properly applied if one hopes to keep his record clear of blunders or errors.

Science News Letter, June 20, 1936

Most members of the ladybird family eat insects; but a ladybird beetle from tropical America that eats beans—any kind of beans—is now an established pest in New York State.



ROOM-LIGHTING TESTER

With upper section raised to show its inner structure, is the new device at the University of Michigan with which scientists can test the effect on a given room of different lighting arrangements. Prof. H. H. Higbie, department of electrical engineering, is at the controls of his apparatus. In use, the upper hood is lowered so that it reflects light into the model room which is bounded with the electric lights. Illumination of the room is changed by varying the size and shape of the ceiling apertures through which the light is admitted. A photo-electric cell carriage, traveling back and forth through the room and measuring the light intensity, can be seen at the left.

ENGINEERING

Lighting Systems Can Be Tested Before Installation

A MODEL room for the accurate testing of lighting adequacy under any given conditions is now available to architects or builders in the illumination laboratory of the University of Michigan. This apparatus, the only one of its kind in the world, will make it possible for architects to determine in advance the exact performance of any lighting system which they may design, according to Prof. H. H. Higbie, department of electrical engineering.

By changing the ways in which light is admitted, and by varying the kinds of paint on the ceiling, floor, and walls of the model room, any lighting conditions may be reproduced to solve specific problems of illumination. The accuracy of the apparatus is insured by a complete check before each test is made. Numerous tests in full-size rooms have verified the applicability of the data obtained with the aid of this device.

A photo-electric cell, mounted on a carriage, moves back and forth, so that an accurate survey of the whole room may be made. The current generated in this "electric eye" is amplified, then recorded by means of an oscillograph. A beam of light, developed in the oscillograph, falls on a moving strip of photographic paper, thus making a graphic record of the trip of the "electric eye" about the room.

If it were not for reflections, this complicated apparatus would be unnecessary, since illumination could be calculated by mathematical means. The troublesome reflection difficulty, however, is solved by covering the "electric eye" with a diffusing glass, which catches light from all angles and transmits it to the photo-electric cell.

Science News Letter, June 20, 1936