

HISTORICAL REVIEW

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The field of forensic document examination has a rich history. Particularly in the early 1900s, before expert testimony concerning the identification of writing and other aspects of this discipline were readily accepted by courts in the United States, the pioneers of this field had the daunting task of proving its worthiness and usefulness to deciders of fact. Among those pioneers was Albert S. Osborn. Mr. Osborn's contributions to this field are widely known through the books he wrote on the subject. The Osborn family archives hold many of these original articles and, beginning with the article presented in this issue of *The Journal of The American Society of Questioned Document Examiners* many of these writings will be published or re-published.

The first article is *The Relation of Light to the Proof of Documents*, which was a paper originally presented at the eighth annual convention of the Illuminating Engineering Society at Cleveland, Ohio in September of 1914. The article was reprinted in the *Scientific American Supplement* in October of 1914 and again, in *Law Notes* (an early legal publication) in November of 1914.

Albert S. Osborn's concerns about the conditions present in courtrooms throughout the United States was memorialized in *The Mind of the Juror* in 1937. This article was one of the very early writings concerning this subject.

The Relation of Light to the Proof of Documents[★]

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I can think of no association that bears a name which affords such a temptation to the manufacture of figures of speech as an Illuminating Engineering Society. The name at once suggests the dark places that need your assistance. Every department of human activity does indeed need illuminating engineers and what we all want everywhere and all the time is more light.

Light is an important factor in the proof of documents and light engineers can promote justice by making it easier to prove the facts regarding dis-

puted documents. Anything relating to the subject of illumination that affects the quality of human vision is of vital importance in all forgery investigations. Justice has been defeated many times because court-rooms like cathedrals have been lighted with a dim light somewhat in harmony with some of the hampering old legal precedents. Partly because of poor illumination, judges and jurors in many instances have not been able to see properly, where the case depended chiefly upon visible evidence. This partial blindness in the past has been due in some degree to an ancient legal procedure that threw a twilight gloom around legal investigations, weaving such a network of restrictions about them as made it difficult to prove a physical fact. Strange to say, objections are still

[★]A paper read at the eighth annual convention of the Illuminating Engineering Society, Cleveland, O., September 21-24, 1914. Reprinted in *Law Notes*, November, 1914; Reprinted in *Scientific American Supplement*, October 17, 1914.

made to the use of the microscope, to photographs, and aids of every kind, and these objections, even in these days, are now and then sustained. All these old restrictions have been intensified by poor lighting and improper physical surroundings as well as by individual but unconscious deficiencies in seeing ability, for there is in fact a form blindness akin to color blindness.

When the necessity arises for proving a somewhat obscure physical fact by visible evidence this whole question of human vision with its defects and limitations becomes a question of vital interest. In the first place, it is important to realize that seeing ability is not by any means the same with all observers. It is an encouragement to improve our sense of sight to realize that only part of our skill comes by nature and that much comes from study and experience.

It is also helpful to consider just how it is that we actually see what we think we see. We all know that when we hear sounds we perform a mental operation and from these sounds infer certain things. From arbitrary combinations of sounds, for instance, we get an English word which conveys an idea, or from another combination a German word, and from still another combination we infer that a man is walking or a horse is running. When we see things, however, we are inclined to assume that we are receiving directly in the brain positive information instead of certain sensations which we must mentally interpret just as we have interpreted the sounds.

In much greater degree, therefore, than we are inclined to admit it is no doubt true that we really see but little more than we are able to compare with some experience or, standard that we already have in the brain. The savage does not really see a steam engine, or a watch, or a city, and in some degree we are all in the savage class. The thoroughness of this mental comparison and the final accuracy of sight depend upon two things, the force and clearness of the sensation that reaches the brain and the experience which the brain already possesses. The necessity for seeing clearly, therefore, is that we may interpret accurately.

This whole question of human vision and the aids that perfect and intensify it is naturally closely related to the question of discovering forgery and the numerous other physical conditions that may point to fraud of various kinds in connection with disputed documents, and is of special importance in connection with the showing and proving of these facts in a court of law, often against prejudice and usually with untrained men who must be made to see and understand. It is therefore essen-

tial that sense impressions of all kinds be clarified and intensified in every way possible, and the arrangement, distribution, and management of light has a most important bearing on the subject.

Under the old legal practice, now happily but all too slowly passing away, expert testimony regarding forgery and documents, involving as it does many technical interpretations of visible evidence, was mainly the giving of bare oral opinions on a contested question in courts of law. This practice, much criticized and discredited, still continues in certain cases relating to insanity and some other subjects that the ordinary man, no matter how assisted, is unable to pass upon intelligently. A new practice, however, has developed in most jurisdictions in connection with proof of physical facts relating to documents, by which referee, judge, and jury are actually shown the basis for whatever opinion is given, so that with the assistance of reason-giving testimony, now admitted in almost all courts and with the aid of instruments and enlarged, properly grouped photographic illustrations, they can finally reach their own conclusions regarding the disputed fact. Testimony is not simply oral, as in the past, but visible as well.

With the new and enlightened procedure and a court-room where seeing and hearing are possible, numerous surprising verdicts in cases of this class have been rendered. Three recent New York cases are conspicuous examples. In the first, four alleged eye-witnesses, two of them of irreproachable character, testified to the execution of a will, and a jury decided it was not genuine; in the second, six witnesses testified that they saw a certain contract signed, and a jury decided the document was a forgery; and in the third, a jury convicted a distinguished member of the bar of forgery of only two short words in typewriting that, by comparison, were shown to be written on his own typewriter.

It will readily appear that this change of practice regarding visible evidence makes necessary such an illumination of court-rooms or trial chambers as makes it possible to see with the utmost distinctness. To the end, therefore, that visible evidence in cases of this class, and in all kinds of cases, may be presented with the utmost clearness and force it is highly important that an illuminating engineer be consulted in regard to the arrangement and lighting of every court-room.

Another reason why court-rooms should be properly arranged and lighted is to enable judge and jury to see witnesses with the utmost distinctness as testimony is being given, as well as to hear them. That this result may be attained it is necessary that witness-box, jury-box, and judge's bench be ar-

ranged in proper relations to each other and near together. Fortunately, there is in all of us a kind of instinct, enforced by conscious and unconscious training, by which we judge whether or not those who speak to us are telling the truth. This important faculty is dependent upon both the senses of sight and hearing. We recognize at once an insincere tone; even dogs and children judge us in an occult and unknown manner. By the use of the eye as well as the ear, we unconsciously interpret all messages that come to us as exaggerated, true or false. That ancient requirement of the law that "the accused must be confronted by the witnesses against him" was no doubt in some measure based upon this important faculty by which truth is separated from falsehood. A witness should be placed close to and nearly, if not quite, facing the jury or the judge who is to decide upon the truth or falsity of his testimony, and the room should be so lighted that his attitude, appearance, and every changing expression is distinctly seen. Few of us have ever analyzed the evidences of sincerity and of untruthfulness as shown by hearing and sight, but we can understand how, at least to some extent, it can be done.

A visit to many a court-room is sufficient to show how such a room should not be arranged and should not be lighted. Artistic and architectural considerations, in many cases, would seem to be the only ones that had been consulted in the arrangement. In many a city of our land, of all places, the court-room is the one place where it is most difficult to hear and the most difficult to see, and the administration of the law could be greatly aided by the lighting engineer, the ventilating engineer, and the acoustic engineer. Trials should be held where every word spoken can be heard distinctly and where every piece of visible evidence can be clearly seen for exactly what it is.

There are many court-rooms so dimly lighted and so improperly arranged that it is almost impossible in them to prove forgery when such proof must be based upon the correct interpretation of delicate but highly significant visible evidence. In some few cases court and jury leave their accustomed places and in an informal and sensible manner gather around some low-placed, clean window where all can see and all can hear.

In connection with the proof of many different questions relating to disputed documents correct and adequate illumination is absolutely essential if the facts are to be proved. Vital evidence is sometimes based entirely upon the interpretation of indistinct stains, or delicate tints or colors which, under the dim light provided, all become a dull and

indistinct gray. In cases involving chemical erasures, in which certain indistinct yellow stains are of the utmost significance, such evidence is practically invisible under the yellow, flickering artificial light or the dim daylight of the average court-room. In many court-rooms the effective use of a microscope is simply impossible.

In many cases involving the identification of paper, where sheets have been interpolated in disputed documents, the case could be positively proven out in the court-yard, but under the conditions provided, intensified by the bad acoustic properties, injustice may triumph or the guilty may escape. Many a city in this land has spent millions of dollars on a court-house without one properly lighted and well-arranged court-room where clear seeing and distinct hearing are possible. Darkness and evil have always been associated and still are associated in many a court-room. The modern laws of some states happily require a certain amount of properly placed light in every school house, but such laws, it would seem, have not yet been applied to the law houses.

Light is also a great aid to justice in connection with the subject of photography as now applied to the investigation and proof of disputed documents. To the modern examiner of disputed handwriting and documents the photographic camera bears a relation to the business similar to that of the compass to the mariner. The relation of light to this question of photography is as close as the etymology of the word itself suggests. It writes out in a universal language its unmistakable interpretation of many things. Many disputed document cases are hastily settled as soon as they are properly illuminated by the photographic camera.

The camera assists us to see certain things which without its aid are too small for us to recognize in their true significance and force. It is one of the natural but erroneous human assumptions that we see all that exists before us, but we know that this is not true, and thus arises the necessity in connection with many questions of properly enlarging the thing to be observed. Many forgeries are perfectly apparent when enlarged a few diameters. The photograph also makes it possible to cut apart, group, and arrange the parts of a disputed document for effective study and comparison.

As is well known, the whole photographic art is based upon the arrangement and control of light, and certain hidden facts in a forgery can be clearly shown in a photograph by certain special arrangements of light. In a laboriously perfected forgery in which the lines have been carefully retouched and over-written so that under ordinary vision the re-

sult seems to be perfect, a transmitted light photograph under proper enlargement is often sufficient to prove the fraud. By this means the varying thicknesses of the ink film itself are measured by measuring its ability to transmit light. If a line is retouched skillfully so that the edges are not broken or disturbed such additions under ordinary vision may be invisible even under magnification, but a transmitted light photograph of such a stroke, enlarged from four to ten diameters, will show in permanent form with the utmost distinctness every added stroke. In making a photograph of this character the document is lighted partly from the front, but with the strongest light from the back so that the light which makes most of the photograph is actually transmitted through the paper itself.

The transmitted light photograph is often more effective than the microscope to show retouching, but for preliminary investigations of this kind and also for direct demonstrations in court the following special application of light is of great aid. A microscope table with a glass top having a strong light close underneath is provided. This combination is very useful, especially when employed in connection with the stereoscopic microscope. An arrangement of this kind in the leading banks of the land, available for instant use, would save thousands of dollars every year, as by its aid an experienced observer, in many cases, is literally able to "see through" a forgery. By this means light is literally thrown on the subject.

Another condition under which special illumination is of great value is in the interpretation of certain kinds of erasures, especially erasures of pencil lines. The disposition of thousands of dollars may depend upon the interpretation of a few words or even a few figures and the determination as to whether or not they have been changed. Unlike an ink line, an ordinary pencil mark is made by sufficient pressure on the writing instrument so that a certain amount of graphite is worn off against the surface of the paper. If a mark of this nature is carefully erased so that the coloring matter is removed, it may become entirely illegible, although the depression still remains but is so shallow that it is invisible even under the microscope. If, however, such an erasure is photographed in enlarged form with a strong illumination through a narrow slit on one side with the rays of light almost parallel with the surface of the paper, the shallowest depression, where a word or figure has been so effectually erased that it is totally invisible under any other examination, then produces a shadow which, in a photograph of this kind, some-

times shows with absolute distinctness what was originally written.

Another class of cases under which the question of perfect illumination is of vital importance is in all ink investigations either to determine age or to discover whether two or more ink writings are identical or different. Some of these questions can no more be answered under the illumination of certain court-rooms than they could be answered in the light of the average cellar, while the same investigation if conducted under properly diffused white light shows a result that can be seen and appreciated by any intelligent man. It is easy to understand how desirable it may be under certain circumstances to show that writing is not as old as it purports to be, or to show that an addition or interlineation in ink is the same or different from other parts of the same document. The interpretation must be based mainly upon the recognition of certain colors. Under suitable conditions and proper lighting this recognition is possible with the average observer. In many court-rooms such facts cannot be proved.

All ordinary commercial ink of the present day is a chemical solution to which a temporary blue color is added so that the writing may be legible when first written. Fresh writing of this kind, as we are all aware, is of a distinct blue or bluish green color, which color gradually disappears as it is submerged or masked by the development of a stronger color from the chemical constituents of the ink, until it finally reaches a black or neutral gray. When used during the winter months modern ink, under the usual conditions under which writings are kept, requires many months to lose all its initial blue color, so that examinations like those described, to show that the ink is not as old as it purports to be, may be made a long time after the actual date of the writing. Wills and documents representing hundreds of thousands of dollars are brought into courts of law, purporting to be many years of age, on which the ink color has not yet reached its ultimate degree of blackness or intensity.

By the use of a special color microscope with two objectives and the Lovibond tintometer glasses it is possible to match and record this changing ink color with great accuracy. For example, it is easily possible to match more than a thousand variations in the color blue alone. If an ink of this class is accurately matched and recorded as it first appears on a document purporting to be several years of age and then the same portion of ink is observed under the same conditions a few days or weeks afterwards and the ink has distinctly changed from a

blue or distinct purple to a black or a much darker color, this is positive proof that such document is not as old as it purports to be. Most persons can recognize colors under favorable conditions, but the recognition and matching of colors in an investigation of this kind in the ordinary court-room under the conditions ordinarily provided is simply impossible. If evidence of this class is to be made use of, it is necessary that the ink should be observed under diffused white light of the proper intensity.

Another most interesting special application of light that promises to assist in disputed document cases makes use of those strange new rays of the spectrum out beyond the violet. By the use of a suitable screen and appropriate illumination it is possible to photograph totally invisible stains resulting from a chemical erasure so that the original writing becomes entirely legible.

Thus we see the advancement of knowledge in every field supplements that in every other field, and light engineers may be of great service in illuminating unexpected dark places in various divisions of human activity.