

EVIDENCE ON FIRE

Human beings have long been fascinated by the awesome and unforgiveable power of fire. From old southern stories about barn burners to The Confession Tapes' chronicles of false confessions to murder by arson, fire investigations evoke the worst of human imagination. Playing off the evocative and destructive power of fire, fire experts historically conjured up pseudomagical powers in the courtroom, regaling jurors with investigatory findings that were "more art than science" and with stories about accelerant-detection dogs' supercanine olfactory abilities, which enabled them to pinpoint a fire's origin. The fire "expert," imbued with gravitas due to his uncanny ability to understand the mysteries of the element, easily awes and persuades a Western jury, which, as studies have noted, is largely composed of individuals unfamiliar with how to start, maintain, or use fire. Fire science, as it became known along its "progression from magic to science," is one of several forensic disciplines that has historically generated inaccurate expert evidence. Such faulty fire evidence has been responsible for several high-profile wrongful convictions.

10% 71% 80%

was the highest accuracy fire investigators obtained when identifying fire origin in a room two minutes after flashover.

Of people exonerated by DNA (1989-2015) were convicted based on forensic evidence, such as fire evidence.

Of federal judges have never appointed an independent expert to assist the court.

INTERESTING FACTS

- The AAAS, which includes noted fire-science expert and critic John Lentini, hypothesizes that the number of wrongful arson convictions secured as a result of the admissibility of invalidated fire science runs in the hundreds.
- Fire investigators are often law enforcement officers.
- Fire investigation training for some fire experts consists of only 120 hours.

The charge for reform that has revolutionized the reliability of modern-day fire science was instigated by corporate defendants subjected to civil liability in insurance coverage and products liability actions.

These civil litigants have raised formidable *Daubert* challenges to exclude so-called fire-science "experts" from trial and, ultimately, created a body of case law demanding greater reliability and substantive scientific findings from fire investigators.

Nonetheless, unreliable and unsubstantiated arson-expert testimony continues to be routinely admitted in criminal cases and has led to wrongful convictions.

History of Fire Evidence

"Slow and painful has been
man's progress from magic to
law."

-Ancient Chinese Proverb

Fire experts have long held persuasive power over western juries. But their testimony was often not backed by scientific validity.

As early as 1977, a government report noted that arson indicators "received little or no scientific testing." Instead, these fire experts relied upon intuition and rules of thumb.

Many of these rules were eventually scientifically debunked as mere myths. But sources which published these debunked myths continued to be widely referenced in the fire science community. This continued reliance on unreliable sources led the American Association for the Advancement of Science to characterize fire investigation as a field inundated with a "widespread, persistent, and problematic literature affecting the beliefs and the behavior of practitioners."

In 1992, The National Fire Protection Association published NFPA 921. NFPA 921 is a guidebook developed "to assist in improving the fire investigation process and the quality of information on fires resulting from that process." NFPA 921 "establish[ed] guidelines and recommendations for the safe and systematic investigation or analysis of fire and explosion incidents." The NFPA guidelines have undermined hundreds of faulty arson determinations and exposed fire investigation as a leading cause of wrongful convictions in the United States.

Fire Evidence



Historically, American courts admitted faulty fire-science evidence in both civil and criminal cases due to a lack of disciplinary scientific expertise. Once evidence-based fire experiments evolved to disprove fire investigators' long-held folk wisdom, however, civil litigants were quick to challenge unreliable fire evidence. Criminal defendants, on the other hand, largely limited their challenges to fire science to habeas corpus proceedings-- that is, postconviction civil petitions.

In 1993, the Supreme Court established in *Daubert v. Merrell Dow Pharmaceuticals Inc.* that trial judges are to act as gatekeepers, ensuring the exclusion of experts' unreliable principles, techniques, and methods. However, the judiciary routinely admits evidence in criminal proceedings that would be excluded from civil proceedings. The irrelevance of *Daubert* to the federal courts' assessment of scientific evidence in criminal cases has been well chronicled. Even the 2009 National Academy of Sciences Report criticized the judiciary for falling down on its gatekeeping function in criminal cases, stating, "in a number of forensic science disciplines, forensic science professionals have yet to establish either the validity of their approach or the accuracy of their conclusions, and the courts have been utterly ineffective in addressing this problem."

NFPA 921 acts as a shield against the admissibility of faulty fire evidence in civil cases, but does not similarly prevent the admission of such evidence in criminal proceedings. Since the publication of NFPA 921, numerous courts have held that expert fire evidence that fails to comport with its guidelines is inadmissible. Unfortunately, every one of those decisions involved a civil litigant's challenge to a civil opponent's proffered expert fire evidence.

Role of Fire Evidence In Wrongful Convictions



Han Tak Lee (Photo by Dong Chan Shin/Korea Daily)

Han Tak Lee spent over fifteen years incarcerated for arson and murder before his exoneration. His conviction was largely based on invalid fire evidence.

Han Tak Lee is just one of many individuals across the United States wrongfully convicted based on faulty fire science. There are several issues impacting the utility of fire science evidence at criminal trials.

- A common investigative theory in arson cases is that the fire was caused by an “open flame,” that is, that a human with an igniter intentionally started the fire. This theory allows the investigator to testify that the fire was intentionally started by a specific ignition source, such as a match or lighter, without any evidence of said match or lighter. This 'negative corpus' theory does not follow scientific methodology, but is still routinely utilized by fire investigators. The use of this theory is especially troublesome when considering the demonstrably low accuracy of fire investigators to determine the origin of a fire.
- Invalid fire science evidence can intersect with other forms of unreliable evidence, such as eyewitness testimony. Fire investigators are expressly permitted by NFPA 921 to interview witnesses *before* they investigate the scene of the fire. These eyewitness accounts may lead fire investigators to incorrectly determine the fire was intentional.

Improving Fire Evidence

Adoption of Linear Sequential Unmasking

This tool works to minimize and manage bias.

Linear sequential unmasking requires examiners to first examine trace evidence in isolation from the reference material and limits the changes that are permitted after exposure. Adoption of this tool would ensure the masking of eyewitness accounts until investigators complete an independent assessment of the fire scene.



Error Rates

Fire science should develop origin and cause error rates much like courts require of other types of evidence. Courts are precluded under *Daubert* from admitting forensic evidence testimony that lacks “any meaningful scientific validation, determination of error rates, or reliability testing to explain the limits of the discipline.” The proposition that forensic evidence ought to be inadmissible where the field at issue has failed to develop any reliable error rates is uncontroversial in the scientific community.



Objective Standard for Quality of Fire Related Evidence

In addition to linear sequential unmasking and the development of evidence-based error rates, the field of fire science should develop a standardized tool that determines whether the evidence at the scene is in a condition such that any reasonable determination of cause and origin can be ascertained.



Increased Utilization of Court-Appointed Experts

Defense counsel should request that the trial court appoint an independent and qualified fire expert when the state relies exclusively on unqualified law enforcement officers to provide “expert” fire-science testimony. Even when defense counsel fails to make such a motion, courts ought to appoint said experts to protect the defendant's right to due process and thereby attempt to avoid a potential wrongful conviction.

