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Distinguishing Fact from Fantasy in Arson Investigations

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Arson/homicide is the only crime for which a defendant can be sent to death row based on the opinion of a person who may not have attended college. Arson investigations are unique in this regard. They are also unique because, over the years, a mythology has developed regarding “indicators” that an investigator can use to determine that a fire was intentionally set.

A distinguishing feature of all arson investigations is that, unlike almost all other crimes, it is first necessary to determine that a crime has, in fact, taken place. When a bank has been robbed, or a victim has been murdered, there is usually not a question of what happened, only who did it. With arsons, and particularly with arson/homicide, the reverse is often true. If, in fact, the fire was intentionally set, there is frequently no doubt about who did it.

There are approximately 500,000 structural fires in the United States every year, and of these, about 10% are labeled “suspicious” or “incendiary”. Even if fire investigators correctly determine the cause 95% of the time (a wildly optimistic number) that means that there are more than 2,500 miscalled arson cases every year. Even with careful screening by prosecutors, miscarriages of justice are going to take place. This presentation will address the sources of error in fire investigations, and will provide attendees with a list of “red flags” that should alert them to the possibility that the initial determination that the fire was intentionally set rather than an accident might be erroneous.

The mythology of arson investigation developed largely because the practitioners in this field lack the educational foundation to question the myths, which were handed down to them by trusted mentors. Unlike medicine or the physical sciences, where the court can reasonably assume that the expert has completed a prescribed course of scientific study, there is no accepted curriculum that prepares one for a career as a fire investigator. Ours is a system where the belief structure of the mentors is passed on to the apprentice and journeymen investigators, who pass it on to their successors. Once an investigator has secured a conviction based on a myth, he is unlikely to question that myth, and may even defend it in the face of scientific refutation. The largest allegedly professional organization of fire investigators, the International

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Association of Arson Investigators (IAAI) went so far as to file an *amicus* brief in the *Kumho* case in 1997, requesting that the supreme court exempt fire investigators from a *Daubert* reliability challenge. The brief argued that fire investigation is “less scientific.” Of course, the Supreme Court rejected this specious argument unanimously, but there is still a large cadre of fire investigators who hold tightly to their cherished myths.

Some of the indicators that lead to erroneous determinations of incendiary origin are those that are believed to indicate a fire that burned “faster than normal,” or “hotter than normal.” “Normal” is never actually defined. Some of these indicators include:

1. large shiny “alligator” blisters
2. crazed glass
3. sharp lines of demarcation
4. sagged furniture springs
5. spalled concrete
6. low burning and holes in the floor
7. sharp angles in ‘V’ patterns.

All of the above are not actually very meaningful in assisting an investigator to determine the cause or origin of a fire.

The author has conducted more than 2,500 fire investigations, and has been involved in acquittals or dismissals in twenty-five cases, most of them capital cases, where the initial investigator made an erroneous determination. Sufficient erroneous calls have been seen to allow the categorization of errors made by fire investigators as follows:

1. overlooking critical data
2. misinterpreting critical data
3. misinterpreting irrelevant data (such as the erroneous indicators listed above)
4. ignoring inconsistent data
5. two-dimensional thinking
6. poor communication between investigators
7. faulty chemical or engineering analyses

The following is a list of red flags to watch for when presented with a hypothesis that a fire was intentionally set. These red flags do not necessarily mean that the determination is incorrect; they simply mean that it requires additional scrutiny.

1. an arson for which there is no credible motive
2. an arson determination based entirely on the appearance of the burned floor in a fully-involved compartment
3. an arson determination based on “low burning,” or “crazed glass,” or “spalling,” or “shiny alligatoring,” or a narrow ‘V’ pattern, or melted/annealed metal

4. an arson determination based entirely on the unconfirmed alert of an accelerant detection canine
5. an arson determination based on a fire that burned “hotter than normal” or “faster than normal”
6. an arson determination wherein neutral eyewitnesses placed the origin of the fire somewhere other than where the arson investigator says it was set
7. an arson determination for which the only evidence is some expert’s mathematical or computer model that “determines” multiple origins or an accelerated fire
8. an arson charge against a defendant whose first brush with the law is arson and homicide

The remedies for deficiencies in other forensic sciences are generally not applicable to fire investigation. There exist no accreditation programs. Certification is common but meaningless. The system was designed to protect those currently in practice. Standardization of methodology is the only leg of the forensic science “quality triangle” that has had an impact on the field. Since the introduction of NFPA 921 in 1992, a “standard of care” has begun to take hold. Inappropriate practices have been curtailed, but they still happen every day.

Because of the way the system is set up, our society will continue to ask arson investigators to make sophisticated decisions about chemistry and physics despite the fact that they have never taken chemistry or physics beyond high school. Errors will be made, and defendants will be brought to court charged with serious offenses by people who simply do not know any better. It is hoped that after this presentation, attendees will be equipped with what Carl Sagan delicately referred to as a “baloney detector,” to allow discrimination between arson determinations based on science and arson determinations based on mythology.



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Evaluating Allegations of Arson

If there is not a satisfactory answer to any of these questions, there is a very good chance that the fire was accidental, and the determination of an incendiary cause was made in error.

- **IS THERE A CREDIBLE MOTIVE?**
- **IS THIS ARSON CALL BASED ENTIRELY ON THE APPEARANCE OF THE BURNED FLOOR IN A POST-FLASHOVER COMPARTMENT?**

i.e., the fire investigator opines that there were “accelerants” used based on his seeing “pour patterns,” but the laboratory results are all negative. Or the investigator cites low burning as evidence of accelerants, but the lab report is negative.

- **IS THIS ARSON CALL BASED ON “LOW BURNING,” OR CRAZED GLASS, OR SPALLING, OR “SHINY ALLIGATORING,” OR A “NARROW V PATTERN,” OR “MELTED/ANNEALED METAL?”**

Fires do burn downward without “help.” Crazed glass means only that hot glass was rapidly cooled. Shiny “alligatoring” means nothing. A narrow v-pattern is said to indicate a rapid fire. This is not true. Melted metals are used to determine temperatures achieved by the fire, but a well-ventilated gasoline fire burns no hotter than a well-ventilated wood fire. Annealed bedsprings or furniture springs do not indicate the presence of accelerants.

- **IS THIS ARSON CALL BASED ON AN UNCONFIRMED CANINE ALERT?**

Canines are a useful tool for selecting samples to submit to the laboratory. Dogs can only tell us where to collect samples, not what the samples contain.

- **IS THIS ARSON CALL BASED ON A FIRE THAT “BURNED HOTTER THAN NORMAL?”**

It is the amount of ventilation that determines the temperature of the fire, not the nature of the fuel.

- **WILL THIS ARSON CALL FAIL ABSENT A COMPUTER MODEL OR A MATHEMATICAL CALCULATION?**

If there is no hard evidence to support the computer input, what we have is dandified conjecture.

- **DO NEUTRAL EYEWITNESSES PLACE THE ORIGIN OF THE FIRE SOMEWHERE OTHER THAN WHERE THE ARSON INVESTIGATOR SAYS IT WAS SET?**

Investigators should consider ALL of the data, including (especially) eyewitness statements. If they have the origin wrong, they almost certainly have the cause wrong too.

- **IS THIS THE DEFENDANT’S FIRST CONTACT WITH THE LAW?**

When the accused is your mom’s age, and has so far lived an exemplary life, it is unlikely that she just one day decided to become a felon.

- **IS THE ACCUSED REFUSING TO COP A PLEA THAT INVOLVES NO JAIL TIME?**

Why would someone who is guilty risk 10 years in the penitentiary, if they can get off with probation?

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