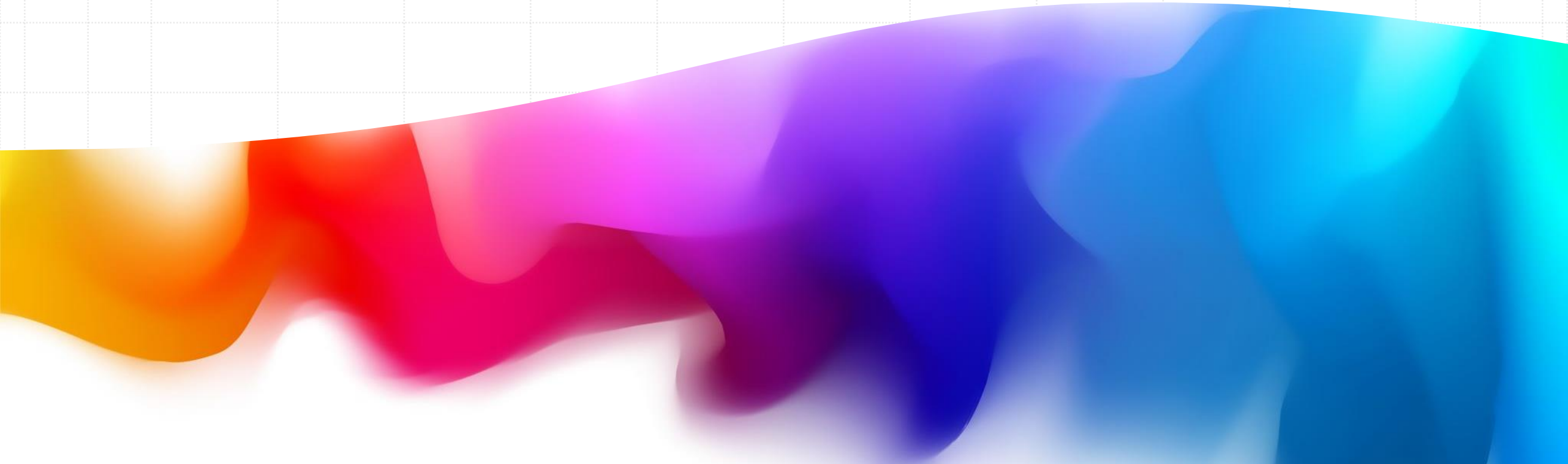




# Travels in Forensic Hyperreality

The Adventures of Alexander Ignatiev  
at the 2023 National Forensics  
College



## A list of useful abbreviations:



NIJ- National Institute of Justice

OJP- Office of Justice Programs



NIST- National Institute for Science and Technology

OSAC- Organization of Scientific Area Committees for forensic science



AAFS- American Academy of Forensic Sciences

ASB- AAFS Standard Board



ANSI- American National Standards Institute



ASTM- American Society for Testing and Materials



SWGDE- Scientific Working Group on Digital Evidence



PCAST- President's Council of Advisors on Science and Technology



# Why am I talking about this?

- PCAST 2016 Report
- Groups of “experts” are constantly creating and revising standards for forensic evidence
- NIST and OSAC attempt to provide oversight
- 2023 PNAS special edition

# Why is Alex the right guy for this session?

The screenshot shows the Martindale website header with a search bar and a 'GROW YOUR PRACTICE' button. Below the header, the breadcrumb trail reads 'HOME / MISSISSIPPI / HATTIESBURG / ATTORNEY PROFILE'. The main profile section for Alexander Ignatiev includes a placeholder image with the initials 'AI', his title 'Member at Alexander Ignatiev Attorney at Law, PA', and address '612 N. Main St., Hattiesburg, MS 39403-2076'. It also displays three review metrics: Overall Rating (3.1, 3 Reviews), Peer Reviews (3.1, 3), and Client Reviews (No Reviews). An 'UPDATE YOUR PROFILE' button is visible below the profile information.

## Education & Credentials

University Attended:	Georgetown University, B.A., 1998
Law School Attended:	University of Mississippi, J.D., 2001
Year of First Admission:	2001
Admission:	2001, Mississippi; 2001, U.S. District Court, Northern District of Mississippi; 2001, U.S. District Court, Southern District of Mississippi
ISLN:	917204928

2.96 Undergraduate GPA

2.92 Law School GPA (Class rank of 73 out of 126)

Divorced and remarried

Three dogs

Failed small-business owner

Three-time failed candidate for judicial office

Only a Mississippi resident for 25 years

# What does “forensic” mean for us?

- relating to or denoting the application of scientific methods and techniques to the investigation of crime.
- “Forensic science is undergoing an evolution in which a long-standing “trust the examiner” focus is being replaced by a “trust the scientific method” focus. This shift, which is in progress and still partial, is critical to ensure that the legal system uses forensic information in an accurate and valid way. In this Perspective, we discuss the ways in which the move to a more empirically grounded scientific culture for the forensic sciences impacts testing, error rate analyses, procedural safeguards, and the reporting of forensic results. However, we caution that the ultimate success of this scientific reinvention likely depends on whether the courts begin to engage with forensic science claims in a more rigorous way.” Koehler, et al., PNAS v. 120, No. 41 (October 2, 2023)

“All professions are a conspiracy against the laity.” - George Bernard Shaw





# The leading issues in criminal forensics

- Cognitive bias- what we know that just ain't so
- Pattern matching disciplines and close non-matches
- DNA- Probabilistic genotyping
- Pathology and toxicology
- Litigating cause and manner of death
- Shaken Baby Syndrome
- Confronting new technology
- Mississippi issues

# Cognitive bias- There are many kinds of cognitive biases

A systemic error in thinking caused by our natural and useful evolutionary ability to simplify information processing through a filter of personal experiences and preferences.

Survival tool

Not a basis for forensic science

“Based on my professional knowledge and years of experience...”

Paraphrasing Hemingway: The most essential tool for a good lawyer is a built-in, shockproof, bullshit detector.

Experts can't help themselves, and neither can prosecutors





## Post



**Attorney Alex Taubes** ✓

@alextt



Talk about implicit bias!



**Dígame Concejal** @RSGAT · 4h

Juror orientation video: In a criminal case, you may feel sympathy toward the victim, a witness, or even the accused.

Me: Whaddya mean "even"?!

8:35 AM · Oct 18, 2023 · 322 Views





# Cognitive biases are failures of logic

- So we can combat them by using logical rules or razors (e.g.):
  - Occam's Razor- the simplest explanation that accounts for all the evidence is the most likely
  - Hume's guillotine- what ought to be cannot be deduced from what is
  - Popper falsifiability principle- it's not scientific if it cannot be falsified
  - Sagan's standard- Extraordinary claims require extraordinary evidence
  - Hanlon's razor- Never attribute to malice that which can be adequately explained by stupidity
  - House's law- It's never lupus
  - If the expert cannot explain something so the judge understands it, it's not going to be useful to the jury

# Confirmation Bias





# Combatting cognitive biases

- What did the witness know about the case?
  - Irrelevant facts
    - Does a fingerprint expert need to know the race of the suspect?
    - Does the firearms examiner need to know victim or suspect residence?
    - Does the DNA examiner need to know the victim is an infant?
    - Does the lab technician need to know that the drug samples came from a trailer park?
- When did they learn it?
- Who told them?
- Why?


# How experts see themselves





# Pattern Matching Disciplines and close non-matches

- Fingerprints, shoe prints, tire treads, etc.
- These are super fallible
- Close non-matches are not separately recorded; they are discarded
- Based on testimony in a case Michael Williams tried in September, they are not kept in the bench notes; all that is left is a notation that a close non-match was found
- Close non-matches are potential other suspects; the more close non-matches, the more other suspects



# Koehler, Jonathan & Liu, Shiquan. (2020). Fingerprint error rate on close non-matches. Journal of forensic sciences. 66. 10.1111/1556-4029.14580.

- The accuracy of fingerprint identifications is critically important to the administration of criminal justice. Accuracy is challenging when two prints from different sources have many common features and few dissimilar features. Such print pairs, known as close non-matches (CNMs), are increasingly likely to arise as ever-growing databases are searched with greater frequency. **In this study, 125 fingerprint agencies completed a mandatory proficiency test that included two pairs of CNMs. The false-positive error rates on the two CNMs were 15.9% (17 out of 107, 95% C.I.: 9.5%, 24.2%) and 28.1% (27 out of 96, 95% C.I.: 19.4%, 38.2%), respectively. These CNM error rates are (a) inconsistent with the popular notion that fingerprint evidence is nearly infallible, and (b) larger than error rates reported in leading fingerprint studies. We conclude that, when the risk of CNMs is high, the probative value of a reported fingerprint identification may be severely diminished due to an elevated false-positive error risk. We call for additional CNM research, including a replication and expansion of the present study using a representative selection of CNMs from database searches.**



# What happened after Koehler in 2020?

- Subsequent unpublished research has shown that awareness of Koehler's research has increased false positives (should be published next year).
- What does this mean? Pattern matching IS NOT SCIENTIFICALLY VALID without additional work at the Daubert hearing.



# What can you attack at Daubert hearing?

- The expert individually (this gets harder as forensics gets more scientific)
- The discipline (this gets harder as forensics gets more scientific)
- The basis for the opinions
- The opinions themselves
- The validity of the opinions
- Reliability of the methods used to derive opinions



# Probabilistic Genotyping- Lies, Damn Lies, and Statistics

- Probabilistic genotyping refers to the use of biological modeling, “Bayesian” statistical theory, computer algorithms, and probability distributions to calculate likelihood ratios and infer genotypes of a DNA profile.
- Uses- extracting DNA profiles from muddled or limited samples; not for single point source DNA
- Weaknesses of methods- they are literally probabilistic and do not rise to the level of reasonable scientific certainty
- How the Flark is this BugSpit admissible? One stupid federal judge let it in once, and it took off.

# The Machine that Goes Ping



# Probabilistic Genotyping is a black box process

- Feed cherry-picked data into a custom algorithm to look for certain specific alleles
- STRmix is the leader in the market
- TrueAllele is distant second
- Others are inconsequential
- Claim to be Bayesian, but are they? NO.

**GAO** Science, Technology Assessment, and Analytics

SCIENCE & TECH SPOTLIGHT:  
**PROBABILISTIC GENOTYPING SOFTWARE**

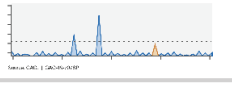
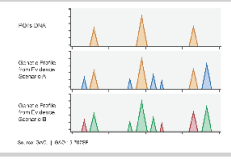
SEPTEMBER 2019

**WHY THIS MATTERS**  
New developments in software to analyze contaminated or partly degraded DNA could greatly facilitate criminal investigations. However, the validity of the analysis and the implications for constitutional due process protections remain unsettled.

**THE TECHNOLOGY**  
**What is it?** Probabilistic genotyping software (PGS) is used in criminal investigations to help link a genetic sample — such as a sample from crime-scene evidence — to a person of interest (POI). It facilitates genetic analysis in complicated situations, such as when a sample is partially degraded or contains DNA from more than one person.  
**How does it work?** The usual first step is to gather genetic material from both the evidence and the POI. Both samples are then separately analyzed using a process that examines multiple regions of DNA whose length varies among individuals. Investigators can then create genetic profiles that allow them to distinguish among individuals using this variability.  
Next, laboratories compare the genetic profile of the evidence with that of the POI. They often do this with a computer simulation of many different scenarios (Fig. 1). PGS provides a probability that the evidence gathered would have led to the evidence profile that was obtained, if the POI were — or were not — a contributor to the sample. Investigators can use the relative values of these two probabilities to establish the strength of the evidence in favor of, or against, the POI.

**OPPORTUNITIES**  
▪ Usable on a variety of samples. PGS allows for interpretation of genetic material that is degraded, comes from multiple people, or is present at low concentrations, such as when a person only touched a piece of evidence (instead of leaving blood behind, for example).  
▪ Scenario analysis. PGS also could facilitate analysis of a large number of scenarios and may help ensure consistency in laboratory methodology.

**CHALLENGES**  
▪ **False negatives.** When a genetic marker is present but at a concentration too low to detect, it may produce a false negative result (Fig. 2).  
▪ **False positives.** Conversely, when contamination or random “noise” gives the appearance of a marker that is not actually present, it can lead to a false match.



**Figure 1.** Genetic profiles consist of “beats.” The peak heights represent the quality of DNA fragments, and the peak’s horizontal position corresponds to the length of the DNA fragment. The top graph shows the POI’s DNA profile. Genes are the probability that the DNA from the POI (orange) could have been mixed with DNA from one or more other contributors (blue) to generate the evidence sample. Scenario 1 includes the possibility that DNA from other contributors (green and red) could have generated the sample, resulting in the same evidence profile.

**Figure 2.** A peak (orange) below the threshold (dotted line) for recognizing peaks, which may inadvertently exclude the POI during matches. The rest of the peaks below threshold could represent background “noise” or multiple profiles of DNA fragments.

**GAO-19-797SP Probabilistic Genotyping**

Bayesian? I was promised no math



# WTF is going on with forensic DNA?

- It's no longer about being the gold standard, a five nines, one in 30 quintillion match
- It's about how likely our guy is to be one of the possible people in the soup
- The numbers are made up, and the algorithms are not tested or known



# Pathology and Toxicology





# Opioids vs Stimulants vs Inhalants

- Opioids kill you because they slow down your breathing, and heart, and build up fluid in the lungs, and are dose dependent
- Stimulants kill you because they destroy your heart (not dose dependent)
- Inhalants kill you by cutting off oxygen to the brain and literally poisoning you



# Opioids act on your opioid receptors

- Heroin
- Fentalogs
- Buprenorphine
- Loperamide
- Morphine
- Oxy
- Hydro
- Mitragynine (kratom)
- Agonists- unlocks (heroin, fentanyl, methadone)
- Antagonists- naloxone, naltrexone
- Partial- suboxone, tramadol

# Effects of opioids:

- Opioid ODs in the living
  - Sedation
  - Small pupils
  - Shallow breathing/snoring
  - Nausea
  - Chronic constipation
- Opioids ODs in the dead
  - Foam cones are not highly specific findings
  - Froth comes from the lungs; a healthy lung is light and fluffy; no fluid should come out; froth indicates pulmonary edema
  - Foam cone:
    - Non-specific
    - Multi-factorial
      - Opioid overdose
      - Drowning
      - Head Injury
      - Diabetic ketoacidosis

# Stimulants

- Cocaine and meth
- Blocks re-uptake of neurotransmitters in the brain
- Cardiac and cardiovascular toxicity
- Acute responses:
  - Arrhythmia
  - Hypertension
  - Increased heart rate (tachycardia)
  - Vasoconstriction
- Chronic effects
  - Enlarged heart
  - Atherosclerosis
  - Myocarditis
  - Aortic dissection
  - Stroked
  - Renal failure
  - Myocardial infarction

# Litigating Cause and Manner of Death

- Cause of death is a pure question of science
- Manner of death is what we care about
  - Coroners are legally required to render an opinion about the manner of death;
  - HOWEVER
    - This is a public health function, not a forensic function
    - Therefore, we should fight the coroner on the manner of death every time
- But we should also be prepared to fight on the cause of death



# Cause of death

- Cause of death is an injury or illness that sets in motion circumstances that lead to death
- Supposed to be a logical sequence of events
- Contributory causes are listed separately
- Drugs need to be identified; “acute combined drug toxicity” is not enough
- Medical cause of death is not always the legal cause of death



# Manner of death

- Manner of death- public health OPINION; remember this is a case by case fight
- There are only five accepted by NAME:
  - Natural
  - Accident (all drug deaths should be here)
  - Homicide
  - Suicide
  - Undetermined



# Resources on Cause and Manner of Death

- NAME- National Association of Medical Examiners (standards group)
  - <https://name.memberclicks.net/assets/docs/2020%20NAME%20Forensic%20Autopsy%20Standards%2010-17-2022.pdf>
- St. Louis Medicolegal Death Investigators Training (annual)

# Shaken Baby Syndrome







# Resources on SBS

- Guthkelch 2012
- Flawed Convictions, Tuerkheimer 2014
- The Forensic Unreliability of the Shaken Baby Syndrome, Papetti 2018
- Shaken Baby Syndrome, Findley, 2023
- Consensus statement 2018
- Forensic Neuropathology, 3d ed. (Leetsma, ed.)
- Cases-
  - Smith v State 315 Ga 287 (2022)
  - State v. Nieves 2020
  - State v Butts 2022

# Cellebrite Reader

- If you get Cellebrite records from the prosecution, you need to get the UFED report and a copy of Cellebrite Reader with it.
- Cellebrite Reader allows you to access the report, conduct searches within the report, and even generate your own reports.
- It's very easy to use.
- It's constantly updated, just like Cellebrite, so older versions will not work reliably with newer Cellebrite files.
- Request it in discovery and make the judge understand why you need it.

# CSLI- Cell towers

- Sprinkler analogy is useful in that it's almost totally wrong
- THE ANTENNA tells us about the coverage of the cell tower, which is the structure; the antenna is what does the work
  - Where is it
  - How big is it
- Call detail records: Number dialed, time of the call, and antenna (provider specific format)
  - There are other records out there, but CDR are the most common
  - Get the guide/key to the records. THEY change all the time
  - Blank durations are text messages
- CAST- FBI Cellular Analysis Survey Team (scumbags)- they claim an expertise they don't have; special agents attempting to testify as experts with no scientific background

# Geofence Warrants


- Geofences are any digitally definable location identifier; Sensorvault is for advertisement; cops found out about it and loved it
- 3-part geofence warrant process- DOJ worked this up with Alphabet, wanted to do it without a warrant; google wanted a 5 step process; DOJ said 3
  1. GOogle sends anonymized list of devices within specific coordinates at specific times- they require a convex polygon- they communicate back and forth with DOJ to define the area
    1. Cover letter back from Google
    2. Data output set
    3. Request correspondence
  2. First list is used to expand the search radius
  3. Information about the accounts associated with the device
    1. John thinks we don't get any geofence warrants where GOogle doesn't find our people
    2. Now this will be used to get a new warrant
    3. Anonymous number ID used to be static, but now it changes
    4. iPhones may not show up, and generally don't generate data to Google even if you're using a Google app, unless you're signed in; Apple shutting off location history can stop it

# Attacking Geofence Warrants

1. What are we going to do about it
  1. iPhones are owned statistically by more white people than black and brown people; possible 14th Amendment challenge
  2. Google has testified that people with location information turned on are only  $\frac{1}{3}$  of users
  3. Four cases:
    1. US v. Jones I- GPS
    2. Riley v. California- come back with a warrant
    3. Carpenter v. US- CSLI data
    4. Leaders v. Baltimore Police Department- operation persistent surveillance
  4. Precision intersecting with length of surveillance
2. Wait, can it get worse?
  1. Matching with close circuit tv- January 6
  2. Matching with CSLI
  3. Geofence+ who searched for what within the geofence (1st Amendment)

# New Discovery Requests

- Bench notes/digital data from crime lab
- Cellebrite Reader and UFED report
- What information was provided to the experts- bias
- All communications between LEOs and witnesses, prosecutors and witnesses, and witnesses and other witnesses- emails, texts, etc.



# The ANSI checklist for friction ridge analysis

- Over 100 rows in an excel spreadsheet
- 4 columns of data per row
- Has anyone ever seen one in a case?
- Includes things like camera height, resolution of photos, etc.
- Did you know that they are supposed to take photos of the comparisons? I didn't.
- They have to test the cameras, etc.
- They have to identify all the equipment used



# Issues in Mississippi

- Certifications Update- ME still not certified
- The crime lab drug people don't know botany or chemistry- khat is mistaken for weed sprayed with a synthetic cathinone.
- Bench notes are all recorded on the crime lab computers- be sure to request them
- Prosecutors don't know how to lay a foundation- just establishing their education and history of testimony is not enough- if they don't describe their testing and methodology in the proffer, object



# How prosecutors should voir dire experts in a Daubert hearing:

1

1 VOIR DIRE BY MR. IGNATIEV:  
2 Q Good afternoon, Ms. Goodman.  
3 A Good afternoon.  
4 Q I don't think that Ms. Harlin asked  
5 you, but what is serology?  
6 A Serology is the analysis of evidence  
7 submitted by law enforcement personnel for the  
8 presence or absence of bodily fluids. This could  
9 include blood, seminal fluid and preserving  
10 things like epithelial cells or skin cells or  
11 saliva for DNA.  
12 Q And all my questions are going to  
13 relate to a period of time where you examined  
14 evidence in this case, so we're talking 2022,  
15 okay?  
16 A Okay.  
17 Q Just as a background. All right, in  
18 2022 what division of the Mississippi Forensics  
19 Laboratory did you work in?  
20 A In the bioscience section.  
21 Q Was the bioscience section credited by  
22 any organization at that time?  
23 A Yes, we were accredited by A-N-A-B;  
24 also called ANAB.  
25 Q What other sections of the forensics

# How prosecutors voir dire experts:

- Q Who are you and what do you do for a living?
- A I am Steven Biochemist and I work for the State Crime Lab in serology.
- Q How long have you worked for the State Crime Lab in serology?
- A Ten years.
- Q Do you belong to any professional associations?
- A All of them.
- Q Have you been accepted as an expert in Mississippi Courts?
- A All the time.
- Q Your honor, move to have Mr. Biochemist accepted as an expert in obfuscatory explanations designed to induce a guilty verdict from jurors.

# A word on statistics- STUDY

<https://www.openintro.org/book/os/>

We will have to become conversant with statistical analysis if we want to manhandle experts. The courts (not yet in Mississippi that I know of) have been letting experts testify in terms of statistical probabilities that a particular defendant was a likely contributor of DNA to a sample.

1. This is not an acceptable standard for expert testimony.
2. Probabilities are being stated in terms of confidence intervals; confidence intervals are numbers of points in a 100 point range.
3. If there is a 65% probability that my client was a contributor to a given DNA sample with a 30 point confidence interval, what is the range of probabilities?
4. What do we call the probability that something is more likely than not?