F13 Distorting DNA Evidence: Methods of Math Distraction

Mark W. Perlin, PhD, MD, Cybergenetics, 160 N Craig Street, Ste 210, Pittsburgh, PA 15213*

After attending this presentation, attendees will understand how misleading statements can confuse DNA evidence. Trial lawyers can apply these methods to sow confusion. Opposing lawyers can block these methods to restore evidentiary clarity.

This presentation will impact the forensic science community by providing insight into how scientific testimony can distort DNA match statistics in criminal justice.

DNA is often key physical evidence in a criminal proceeding. Connecting a defendant to a crime through genetic material left at the scene can be highly persuasive to a jury, and the absence of such a reliable connection may weaken a prosecutor's argument.

The DNA expert's ultimate scientific statement is the match statistic. How much more probable is a match between evidence and the defendant than coincidence? With abundant DNA left by a single person, this match number is one over the Random Match Probability (RMP). The numerator is one because of the perfect match between the evidence and defendant genotypes. The denominator expresses match rarity as the RMP of finding the defendant's genotype by chance.

A biological mixture contains DNA from two or more people. Mixture data can be explained by adding together the genotypes of these contributors. Since the data can be explained in multiple ways, a contributor genotype is a list of possibilities with associated probabilities.

Comparing a "probabilistic" genotype with a reference genotype (relative to a random genotype) yields a match statistic. This Likelihood Ratio (LR) measures identification information — the probability of a match relative to coincidence. When comparing with the reference, the numerator becomes an evidence genotype probability at the defendant's genotype, a number usually less than one. The denominator is again the defendant's RMP.

Court is an adversarial process. While match statistic science is clear, legal rhetoric can cloud the findings. How can a defender confuse people about a simple ratio of probabilities? Answer: by distracting the jury with irrelevant arithmetic unrelated to a meaningful LR.

Methods of math distraction infect courtroom testimony. Three common ploys are: (1) The defendant does not have the highest probability genotype; (2) other genotypes have probabilities that add up to more than half; and, (3) the match probability between the evidence and defendant is small. These math statements are often true, but they are irrelevant to the DNA match statistic. Whereas the LR is a ratio of probabilities, these distractions may feature an arbitrary big number, sum of numbers, or partial ratio. How can a prosecutor demonstrate to a jury that this is just bad math distorting good DNA evidence?

Drawing on transcripts of actual DNA expert testimony, this presentation will teach attendees how criminal defenders and their experts have employed these three methods of math distraction to confuse triers of fact. The transcripts will also highlight how prosecutors and their experts were able to rebut these baseless arguments. While honesty is commendable, sometimes rhetoric is a determining factor in an adversarial proceeding.

DNA evidence is only as persuasive as its presentation. Proponent experts communicate DNA results for jurors to understand. Defenders and opponent experts can confuse jurors about DNA match statistics with methods of math distraction. Prosecutors can expose flaws in these misleading digressions.

Ways of confusing and clarifying DNA match statistics for the finder of fact will be presented. This presentation will provide multiple lawyer and scientist perspectives.

Expert Testimony, DNA Mixtures, Trial Tactics

*Presenting Author