

DNA Mixture Interpretations and Statistics – To Include or Exclude

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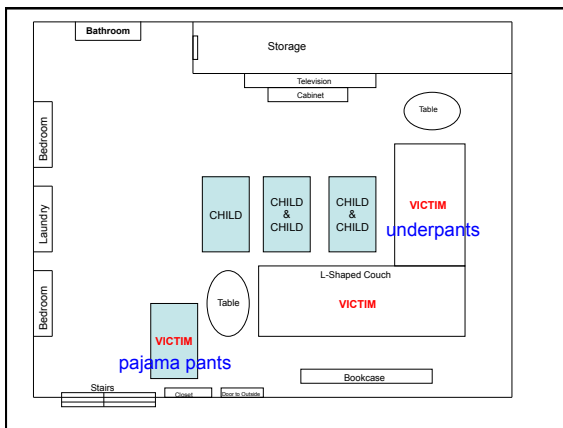
Prescription for Criminal Justice Forensics
ABA Criminal Justice Section



Cybergenetics

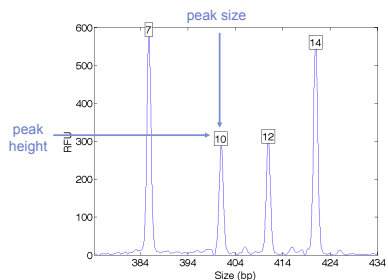
New York, NY
June, 2013

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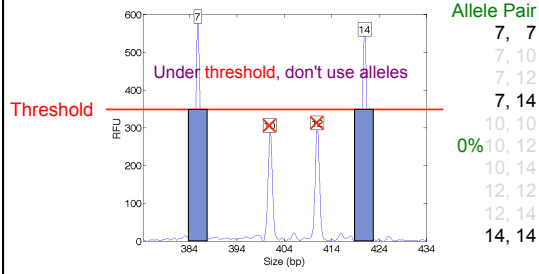
DNA mixture data

Quantitative peak heights at a locus



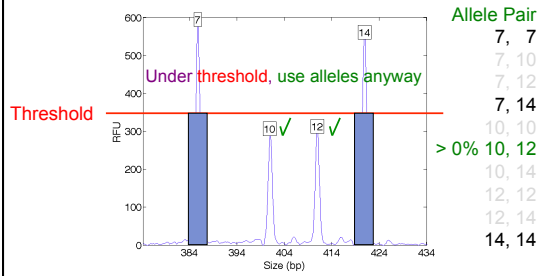
Peak thresholds

Simplify data for manual review



Allele dropout

Conjure phantom peaks



Manual interpretation issues

Evidence

- call good data inconclusive
- peaks are too low for methods
- too many contributors to handle
- potential examination bias

Database

- hit by association, not by match
- comparison: make false hits
- restrict upload: lose true hits

TrueAllele® genotype model

Evidence

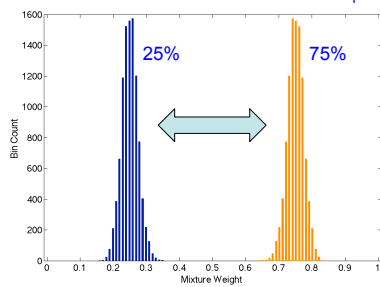
- preserve data information
- use all peaks, high or low
- any number of contributors
- entirely objective, no bias

Database

- hit based on LR match statistic
- sensitive: find true hits
- specific: only true hits

Mixture weight

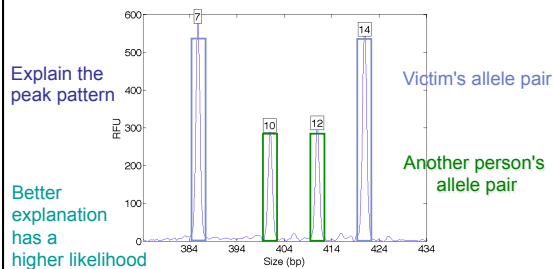
Separate mixture data into its contributor components



Genotype inference

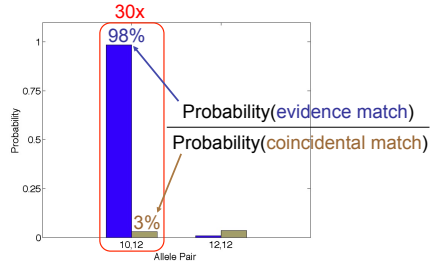
Thorough: consider every possible genotype solution

Objective: does not know the comparison genotype



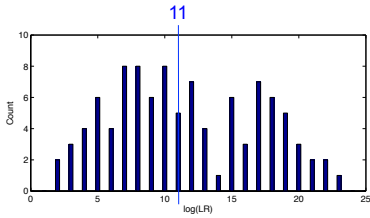
Match information

How much more does the suspect match the evidence than a random person?



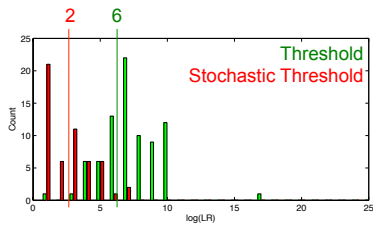
TrueAllele inclusion

Finds the right answer



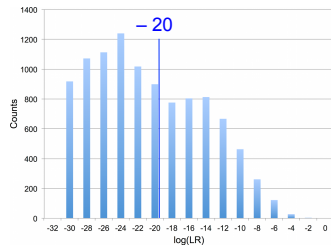
Thresholds lose information

Understate the probative force



TrueAllele exclusion

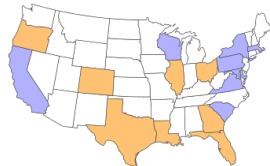
Does not find the wrong answer



TrueAllele usage

- child molester got: 20 quadrillion match, 22 years
- validation study: 4 peer-reviewed scientific papers
- admissibility: Pennsylvania, California, N. Ireland
- precedent: Pennsylvania appellate ruling
- approval: NYS Commission on Forensic Science
- cases: over 100 reports in criminal cases
- trials: over 15 (rape, murder, terror, weapons, ...)

TrueAllele deployment



Casework system
Interpretation services

DNA truth, criminal justice

This truth is incontrovertible. Panic may resent it, ignorance may deride it, malice may distort it, but there it is. - Winston Churchill

Genotype models are more accurate. Who cares?

Police	effective database
Prosecutor	convict the guilty
Defender	exonerate innocent
Court	the whole truth
Citizen	prevent crime

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