Profiles in Productivity: Greater Yield at Lower Cost with Computer DNA Interpretation

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Crushing Weight of Evidence …

DNA quantity
property crime, touch, …

DNA quality
mixed, degraded, low level, …

DNA problems
backlogs, low information yield

… a long wait for evidence

TrueAllele® Casework

Computer interpretation of DNA evidence
by mathematically modeling STR process

Primary goals
- objectivity
- ease of use
- information
- productivity

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Objectivity - *inherent*

DNA evidence data → interpret → DNA evidence genotype

Only crime scene DNA evidence, no suspect information

Objectivity - *inherent*

suspect genotype

DNA evidence data → interpret → DNA evidence genotype → match → DNA match score

population genotype

Objective computer interpretation of quantitative DNA evidence

Ease of Use - *ask questions*

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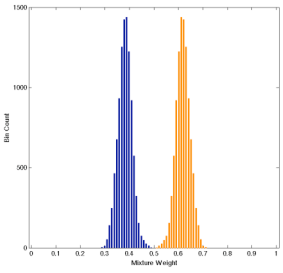
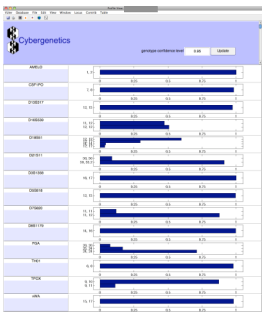
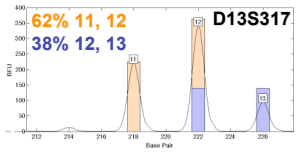
Ease of Use - *get answers*



Genotype



Explain Reasoning



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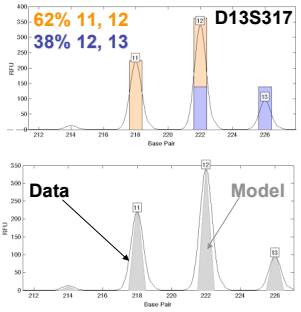
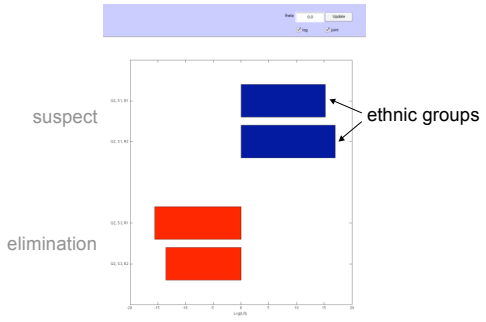
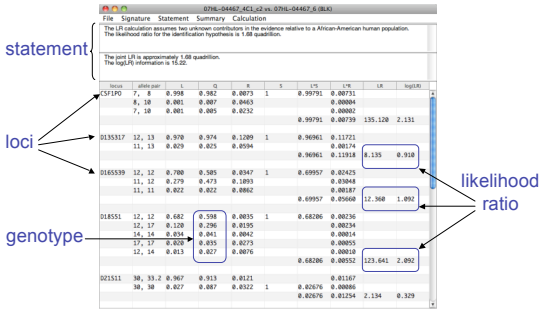
Explain Reasoning



Report



Report



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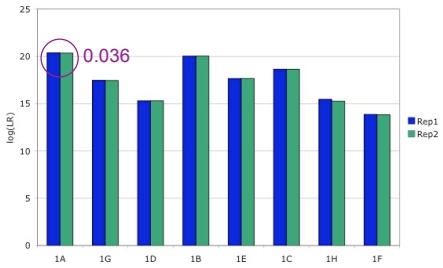
Mixture Validation Study

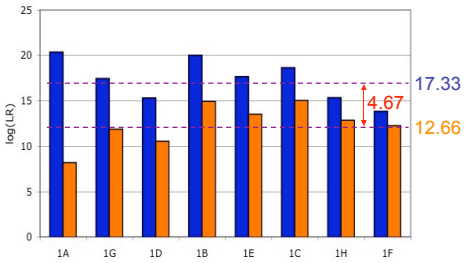
368 total evidence items (Epi & Spm = 2 items)

- 97 Reference Samples
- 25 Vaginal, Anal, or Penile Swabs
- 39 Semen Stains
- 13 Clothing or Bedding
- 11 Weapons
- 69 Bloodstains
- 9 Fingernail Scrapings
- 8 Dried Secretions
- 32 Misc (cigarette, condom, hair, bite marks, etc.)

Information - *reproducibility*



Information - *one unknown*



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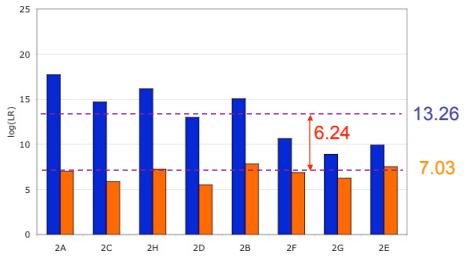
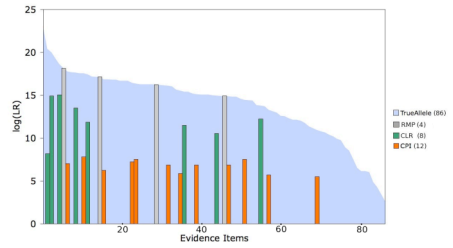
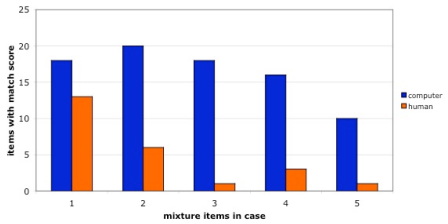
Information - *two unknown*



Information - *all mixtures*



Productivity - *item yield*



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Data Classification

Mixture items assigned a degree of difficulty

Simple: two person mixture with a known victim

Medium: two unknown mixture samples

Complex: three or more unknown contributors, or a partial profile

Productivity - *extra effort*

	Simple	Medium	Complex	Total
Number	35	20	33	88
computer log(LR)	16	13	12	14
human yield	49%	25%	21%	29%
expected effort	**2.1**	**4.0**	**4.7**	**3.4**

Who Benefits?

Probability in service to utility

- Laboratory
  reduce costs, increase efficiency
- Society
  reduce crime, increase safety

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Conclusion

DNA demand
workload, complexity, …

DNA capacity
resources, analysts, …

Automated computer interpretation

- objectivity
- ease of use
- information
- productivity

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http://www.cybgen.com/information/pub_a19.shtml

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