

## Distorting DNA evidence: methods of math distraction

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Seattle, WA

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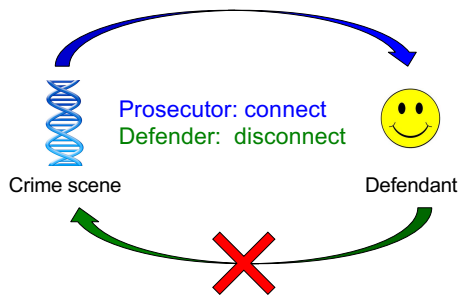
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## DNA evidence



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## Attack the DNA proof

Prosecutor: maintain clarity  
Defender: sow confusion

- Confuse DNA evidence
- Misleading statements
- Distort match statistic

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## Match statistic

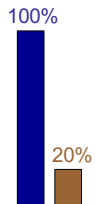
How much more (or less) *probable* is a **match** between **evidence** and **defendant** than **coincidence**

Simple DNA, one locus

$$\frac{1}{\text{RMP}} = \frac{\text{Prob}(\text{evidence match})}{\text{Prob}(\text{coincidental match})}$$

$$= \frac{100\%}{20\%} = 5$$

Random  
Match  
Probability




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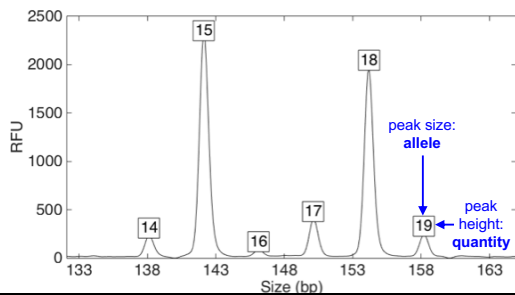
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## DNA mixture

Quantitative peak data at one locus




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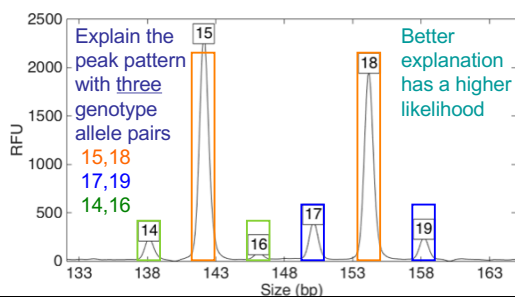
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## Computer interpretation

Consider every possible genotype solution  
Use all the data (no "pick and choose" bias)




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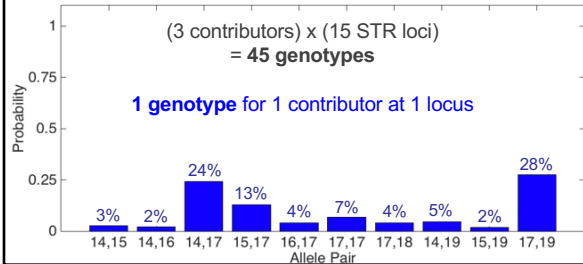
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## Uncertain genotype

Objective genotype derived from all the DNA data  
 Computer doesn't see comparison reference




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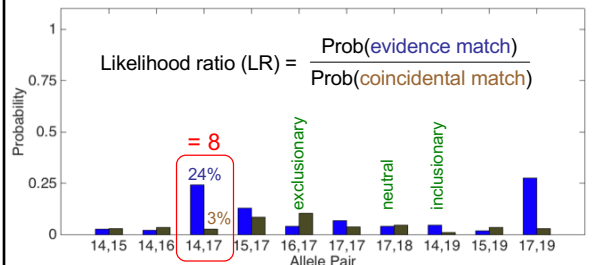
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## Match statistic

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




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## Confusing the issues

Science gives a simple ratio  
 Court is an adversarial process

Defender: sow confusion

How?

Distract jury with irrelevant arithmetic  
 unrelated to a valid match statistic

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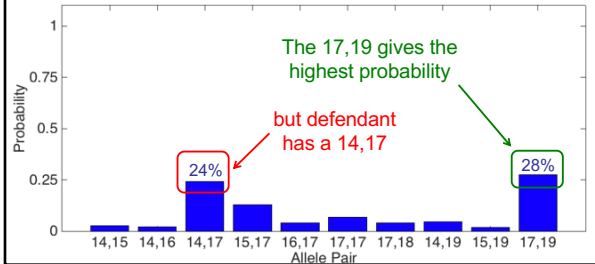
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## Ploy 1: "Highest Probability"




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## Example testimony

DEF EXPERT: The 8,11 at the CSF locus for this particular analysis was the **fourth most probable genotype** reported.

DEFENDER: Explain what you're saying to us.

DEF EXPERT: There are three genotypes other than 8,11 that have been accorded a higher probability.

DEFENDER: Okay. And D13? We're just going to go down through them.

DEF EXPERT: It was the **second highest**, this one listed in the table, is the second most probable.

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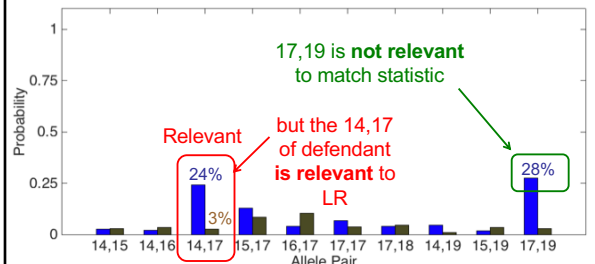
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## Fallacy explained




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## How to respond

PROSECUTOR: I'm going to object to the **relevance** of this unless they can bring some sort of expert opinion to bear on it, what's the significance.

THE COURT: So I would sustain that objection. So I would disallow your ability to get into that because it's outside the scope of the expert report.

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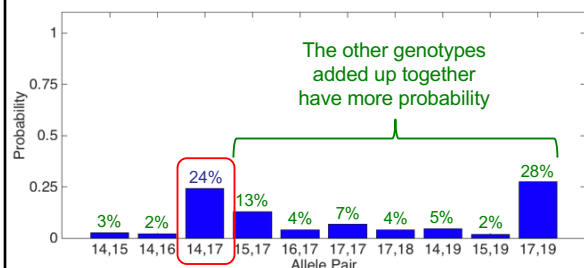
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## Ploy 2: "Add Up" others



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## Example testimony

DEFENDER: Are these probabilities based on 100 percent or something else?

DEF EXPERT: At each location there must be another set of genotypes that have probabilities that sum up to the difference. So for that first CSF locus, that 9 percent locus, there must be other genotype probabilities that sum to 91 percent. We have to sum up to 100 percent. So there are other possible genotypes.

DEFENDER: So we're talking – if we're talking about the CSF, we're talking 9 percent out of 100?

DEF EXPERT: Correct.

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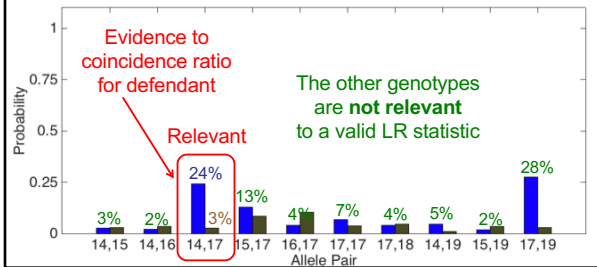
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## Fallacy explained




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## How to respond

### FRE Rule 401. Test for Relevant Evidence

Evidence is **relevant** if:

(a) it has any tendency to *make a fact more or less probable* than it would be without the evidence; and

(b) *the fact is of consequence* in determining the action.

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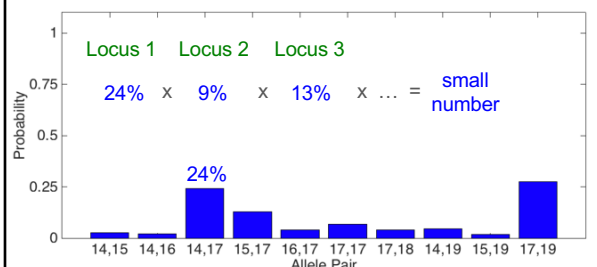
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## Ploy 3: "Match Probability" small




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## Example testimony

DEFENDER: And did you come up with genotype probabilities for Q5 after multiplying all these probabilities together?

DEF EXPERT: Yes.

DEFENDER: And what's your figure?

DEF EXPERT: It is [in] scientific notation 2.85 times 10 to the negative 10, and that is roughly equivalent to 1 in three and a half billion ...  
[the probability that] the suspect matches the evidence.

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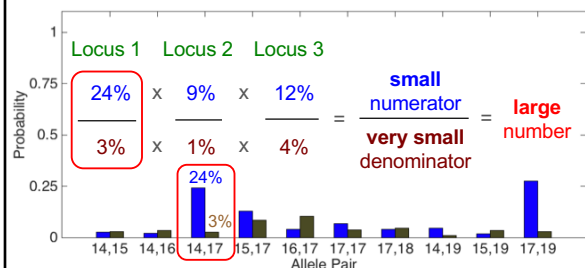
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## Fallacy explained



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## How to respond

PROSECUTOR: And were you there when he undertook a multiplication of the probabilities?

PRO EXPERT: Yes, I was.

PROSECUTOR: Okay. The **significance** of that product sum, what is the significance of it?

PRO EXPERT: It doesn't have any because it's just multiplying together the numerators. The probability of a match. A match statistic at each location is a probability of a match divided by the chance of coincidence, and that other equally important half of the calculation was left out.

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## Exposing confusion

**FRE Rule 403. Excluding Relevant Evidence**  
for Prejudice, Confusion, Waste of Time, or  
Other Reasons

The court may exclude relevant evidence if its *probative value is substantially outweighed* by a danger of one or more of the following: unfair prejudice, *confusing the issues*, *misleading the jury*, undue delay, wasting time, or needlessly presenting cumulative evidence.

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## More information

<http://www.cybgen.com/information>



- Courses
- Newsletters
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- Webinars

<http://www.youtube.com/user/TrueAllele>  
TrueAllele YouTube channel



Cybergenetics



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