Probative Inference from Phenomenal Coincidence

Demystifying the Doctrine of Chances

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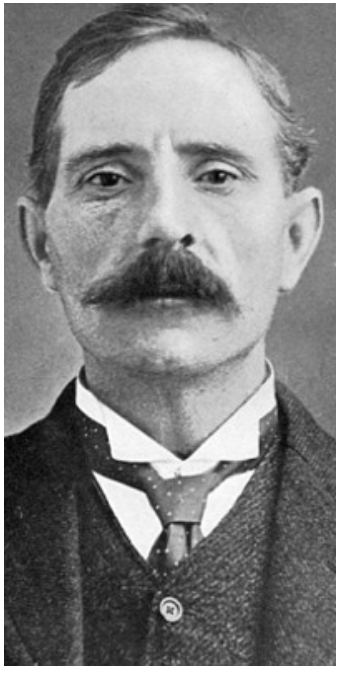
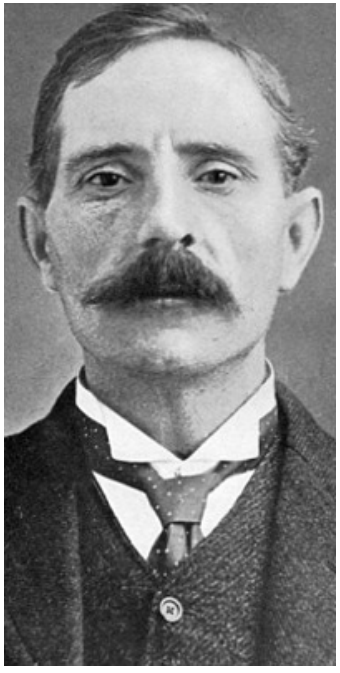
Outline

Rex v. Smith



George Joseph Smith

Rex v. Smith



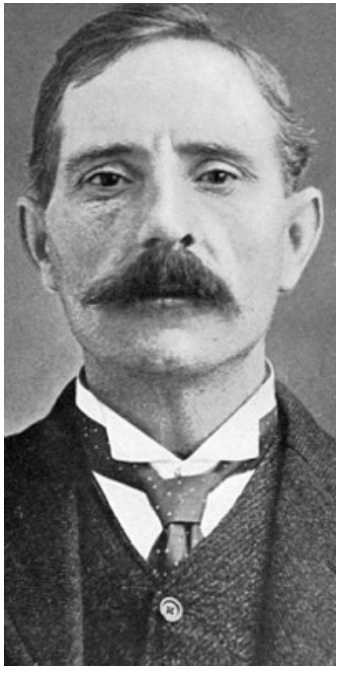
George Joseph Smith

aka John Loyd

Margret E. Lofty

Married: Dec 17, 1914

Rex v. Smith



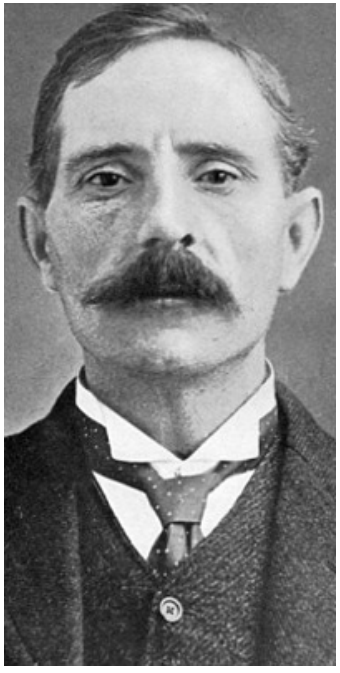
George Joseph Smith

aka John Loyd

Margret E. Lofty

Married: Dec 17, 1914
Drowned: Dec 18, 1914

Rex v. Smith



George Joseph Smith

aka John Loyd

Alice Burnham

Married: Nov 4, 1913
Drowned: Dec 12, 1913

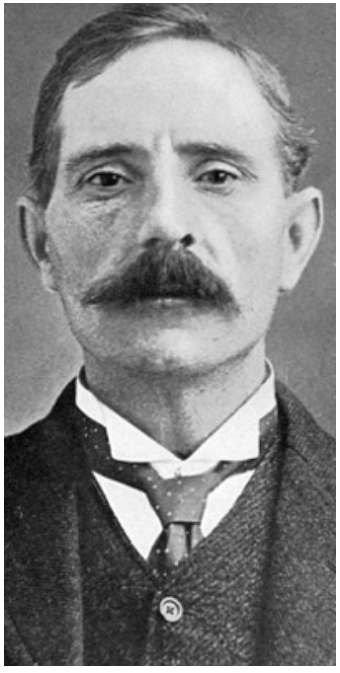
Margret E. Lofty

Married: Dec 17, 1914
Drowned: Dec 18, 1914

Rex v. Smith

"I admit the two deaths form a phenomenal coincidence, but that is my hard luck. You may think it strange, but it was the irony of fate that my two wives died in that way."

Rex v. Smith



George Joseph Smith

aka John Loyd
aka Henry Williams

Bessie C. A. Mundy

Married: Aug 26, 1910
Drowned: July 13, 1912

Alice Burnham

Married: Nov 4, 1913
Drowned: Dec 12, 1913

Margret E. Lofty

Married: Dec 17, 1914
Drowned: Dec 18, 1914

Rex v. Smith

Similar Circumstances

1. All three wives drowned in bathtubs
2. All died within days of seeing doctor for "fits"
3. All made wills in favor of Smith within a week of death
4. All had recently recalled all outstanding debts and accounts
5. All left either legacies or insurance proceeds to Smith
6. All were buried as quickly and cheaply as possible

Outline

Admissibility of Burnham and Lofty Evidence

Could Not Be Used

"[To show that George Smith] is a man of bad character, and therefore is very likely to have murdered Miss Mundy."

Could Be Used

"[In order for the jury draw its own inference] whether the death of Miss Mundy was by accident or design . . ."

Admissibility of Extrinsic Evidence (Modern Doctrine)

FRE 404(b)(1) Evidence of a crime, wrong, or other act is not admissible to prove a person's character in order to show that on a particular occasion the person acted in accordance with the character.

FRE 404(b)(2) This evidence may be admissible for another purpose, such as proving motive, opportunity, intent, preparation, plan, knowledge, identity, absence of mistake, or lack of accident.

Doctrine of Chances

Doctrine of Chances: stands for admissibility of evidence of

1. an improbable event
2. realized repeatedly
3. offered to oppose a theory of accident or random chance

Doctrine of Chances

Example: A card-player found to have ace in his pocket on a single occasion would not raise a definite suspicion, but discovery that the same player had an ace in his pocket on several different occasions would raise a suspicion.

"The matter depended on the unusualness of the occurrence and the number of times it was repeated. Each additional case increased the improbability of accident."

Debate over the Doctrine of Chances

Proponents of Doctrine

- Independent, objective, statistical theory of relevance
- Relevant without engaging in character or propensity reasoning

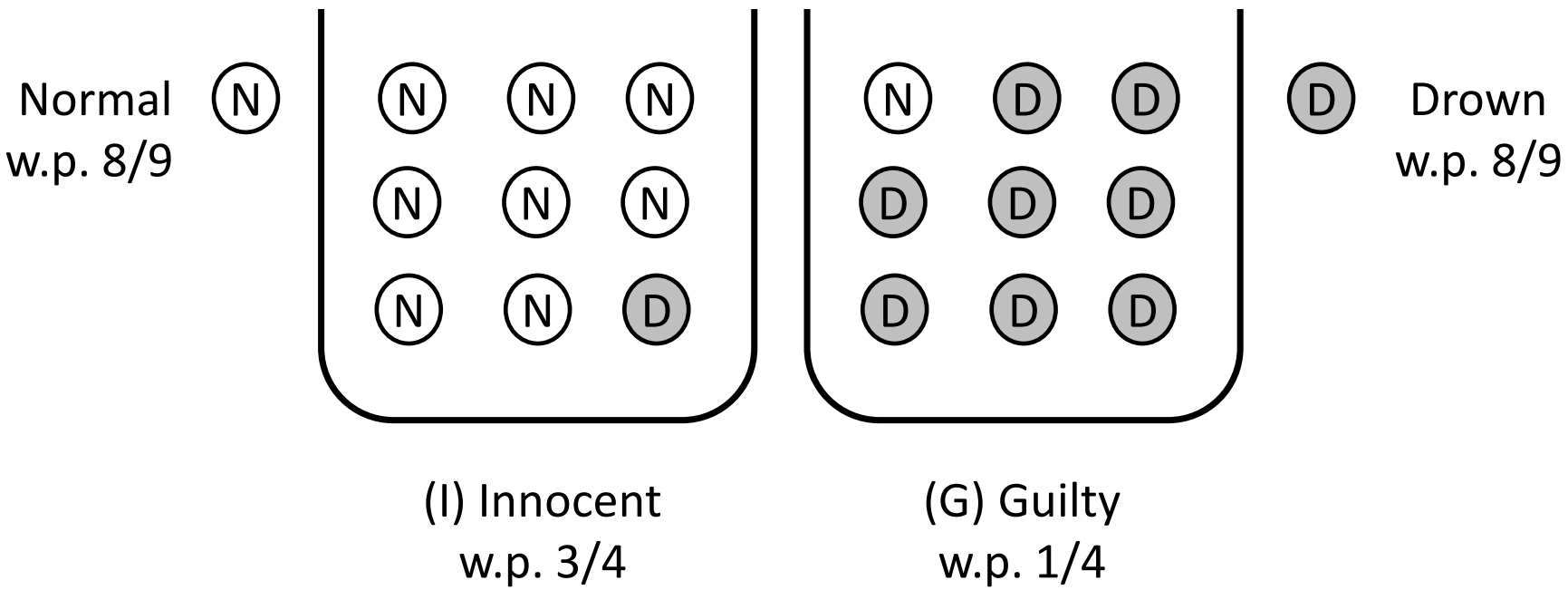
Opponents of Doctrine

- Ultimately, a species of character or propensity reasoning
- Not relevant absent character or propensity reasoning

Outline

Model of Wives/Baths as Balls/Urns

Figure: A Simple Model of the Bathtub Drowning Scenario



Outline

Phenomenal Incidence

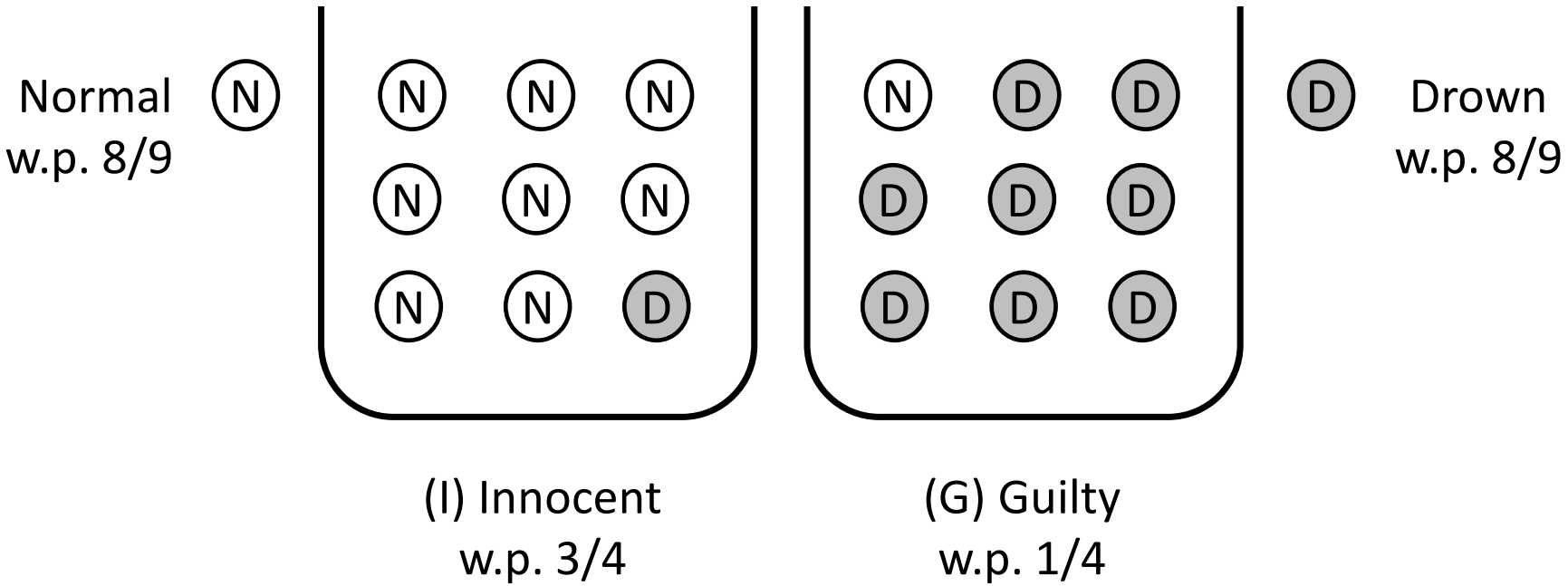
Before Evidence: Probabilities of guilt and innocence correspond to prior beliefs (about the population)

Prior Probability of Guilt (Unconditional)

$$P(G) = 1/4 = 0.25$$

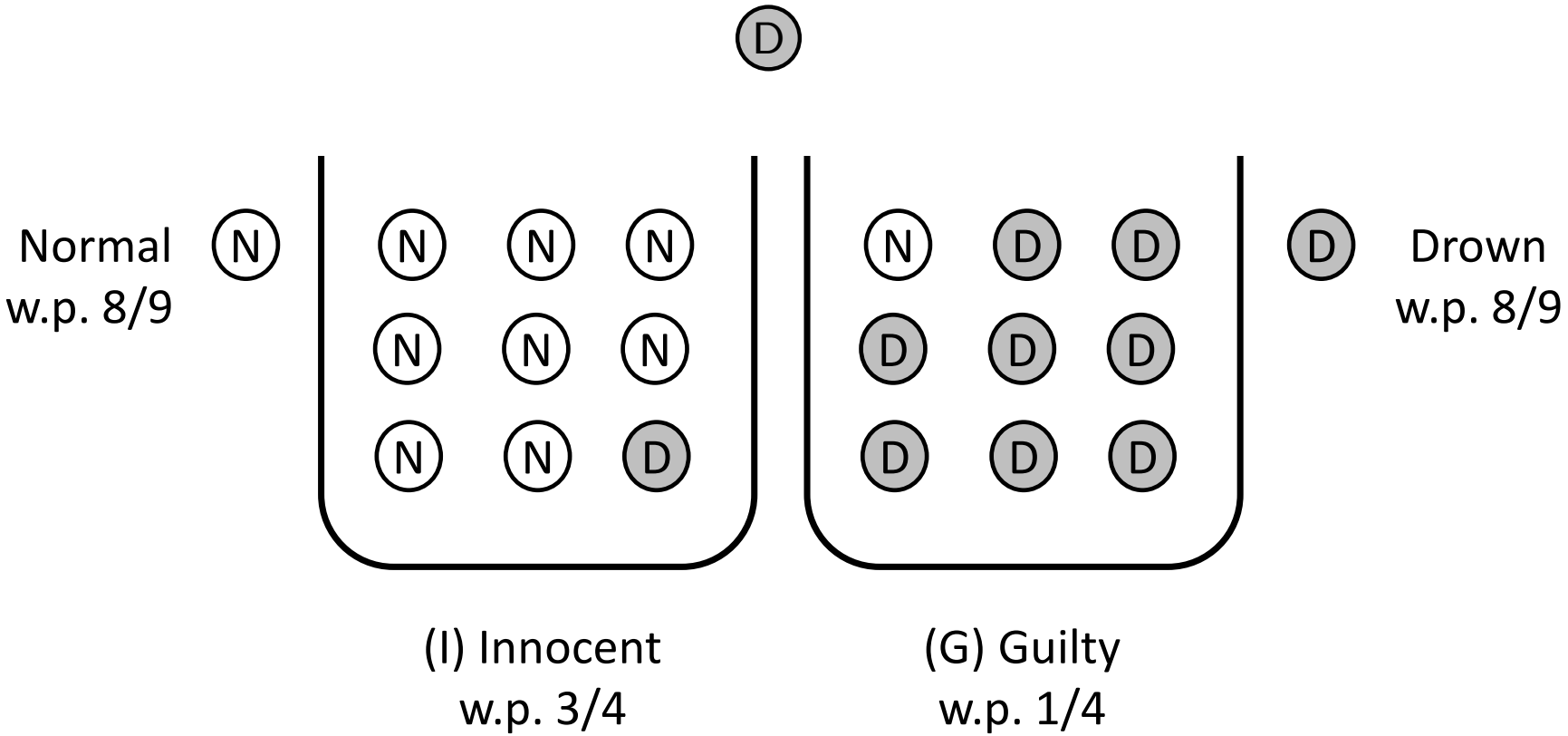
After Evidence: How does an observed outcome affect the posterior distribution of guilt and innocence?

Phenomenal Incidence



Phenomenal Incidence

A single wife is observed to have drowned.



Phenomenal Incidence

Posterior Probability of Guilt (Given Drowning)

$$P(G \mid \textcircled{D}) = \frac{P(\text{guilty drowning})}{P(\text{guilty drowning}) + \text{P(accidental drowning)}}$$

$$= \frac{P(\textcircled{D} \mid G) \times P(G)}{P(\textcircled{D} \mid G) \times P(G) + P(\textcircled{D} \mid I) \times P(I)}$$

$$= \frac{(8/9) \times (1/4)}{(8/9) \times (1/4) + (1/9) \times (3/4)}$$

$$= \frac{8}{11} \approx 0.72$$

Phenomenal Incidence

Inference: Evidence of a drowned wife increases the odds of guilt.

Prior Odds of Guilt

$$\frac{P(G)}{P(I)} = \frac{1/4}{3/4} = \frac{1}{3} \approx 0.333$$

Posterior Odds of Guilt

$$\frac{P(G|\textcircled{D})}{P(I|\textcircled{D})} = \frac{8/11}{3/11} = \frac{8}{3} \approx 2.667$$

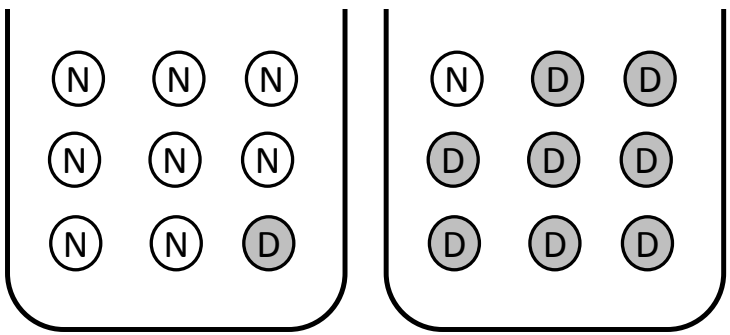
Phenomenal Incidence

Distinguish from Doctrine of Chances

1. Probative value of a phenomenal incidence
2. No special rule of evidence required

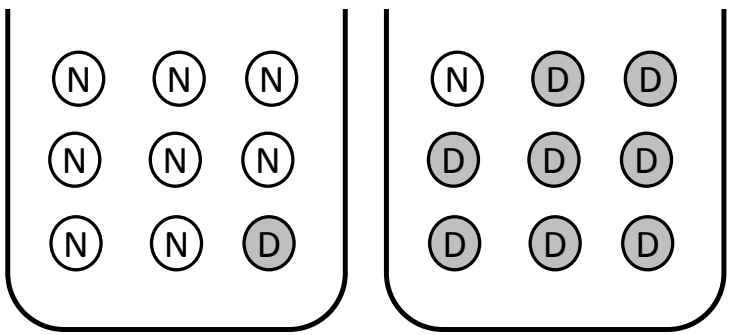
Outline

Phenomenal Coincidence



(I) Innocent w.p. 3/4

(G) Guilty w.p. 1/4

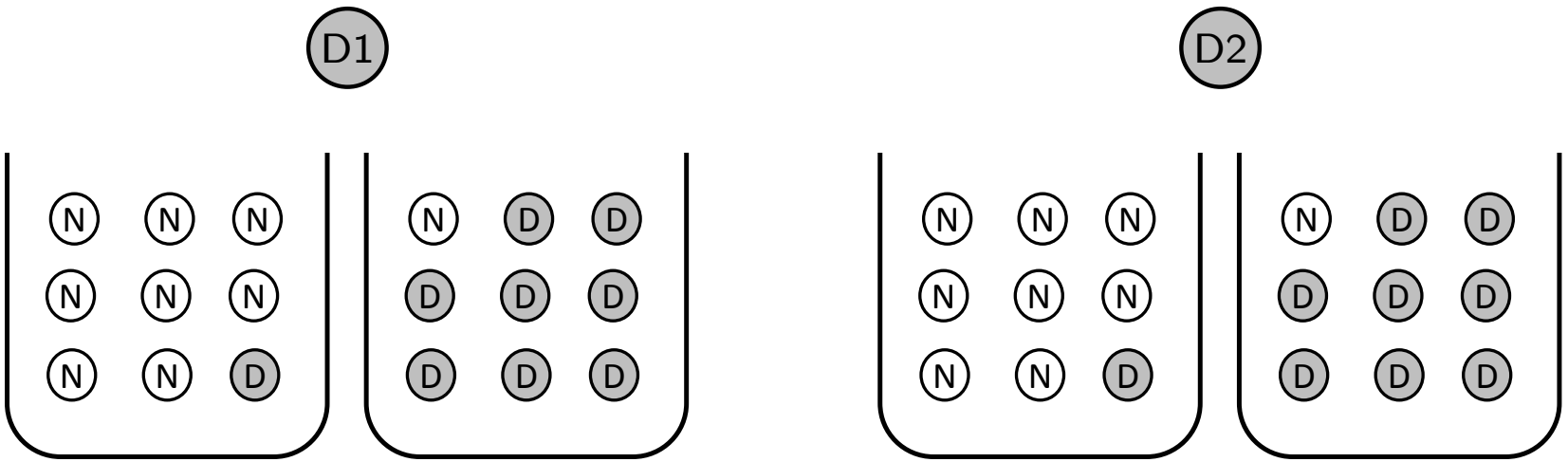


(I) Innocent w.p. 3/4

(G) Guilty w.p. 1/4

Phenomenal Coincidence

Now two wives have drowned in their baths.



Phenomenal Coincidence

Res Ipsa Loquitur Argument

- Corresponds to the probability $P(G1 \cup G2 \mid \text{D2}, \text{D1})$
- Not applicable in Rex v. Smith

Relevant Question: What is $P(G2 \mid \text{D2}, \text{D1})$?

Phenomenal Coincidence

Case 1: Baths are Stochastically Independent

If the two baths are stochastically independent, then

$$P(G2 \mid \text{D2}, \text{D1}) = P(G2 \mid \text{D2})$$

The extrinsic drowning is irrelevant to guilt or innocence on the intrinsic drowning, and is therefor inadmissible as evidence.

Phenomenal Coincidence

Case 2: Baths are Stochastically Dependent

If the two baths are stochastically dependent, then

$$P(G2 \mid \text{D2}, \text{D1}) \neq P(G2 \mid \text{D2})$$

The extrinsic drowning is relevant, and may be admissible if it supports a non-character and non-propensity inference of guilt.

Phenomenal Coincidence

Example Propensity(?) Inference

1. Assume that either (a) all deaths were accidents, or (b) all deaths were murders
2. This makes the model sequential draws with replacement from the same urn
3. By iterated app. of Bayes' Rule, $P(G2 \mid (D2), (D1)) > 0.72$
4. Evidence of (D1) is thus relevant to the inference of guilt on the intrinsic event, but arguably requires character or propensity reasoning.

▸ Additional Details

Phenomenal Coincidence

Example Non-Propensity Inference

1. By prior reasoning, jury can infer $P(G1 \mid \text{D1}) = 0.72$
2. Guilt on earlier drowning implies knowledge of method
3. The likely possession of knowledge at time of second drowning changes structure of scenario
4. E.g. might increase probability of success if guilty
5. This change makes $P(G2 \mid \text{D2}, \text{D1}) > 0.72$
6. Evidence of D1 is thus relevant to the inference of guilt on the intrinsic event, and requires only non-character and non-propensity reasoning.

▸ Additional Details

Outline

Implications for Debate over the Doctrine of Chances

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Implications for Legal Practice

Not Special: Merely a pithy label for admissibility of otherwise admissible (i.e. stochastically dependent) extrinsic event evidence.

Analogy: Any non-character use of prior bad act evidence supports an analogous theory of relevance in a doctrine of chances context.

Corollary: As the probability of guilt on extrinsic events goes to one, the doctrine-of-chances inference converges in probative value to that afforded by the non-character use of prior bad act evidence.

Appendix

Appendix: Example Computations

Example: Constancy of guilt or innocence (i.e. sequential draws from the same urn with replacement)

$$\frac{P(G2 \mid \textcircled{D2}, \textcircled{D1})}{P(I2 \mid \textcircled{D2}, \textcircled{D1})} \approx 21.33$$

Return

Appendix: Example Computations

Example: Increased chance of success, $P(D|G) = 1$

$$\frac{P(G2 \,|\, \textcircled{D2}, \textcircled{D1})}{P(I2 \,|\, \textcircled{D2}, \textcircled{D1})} = 3.0$$

Example: Increased chance of attempt, $P(G) = 1/2$

$$\frac{P(G2 \,|\, \textcircled{D2}, \textcircled{D1})}{P(I2 \,|\, \textcircled{D2}, \textcircled{D1})} = 8.0$$

Return