

Engineering Statistics

IES 302

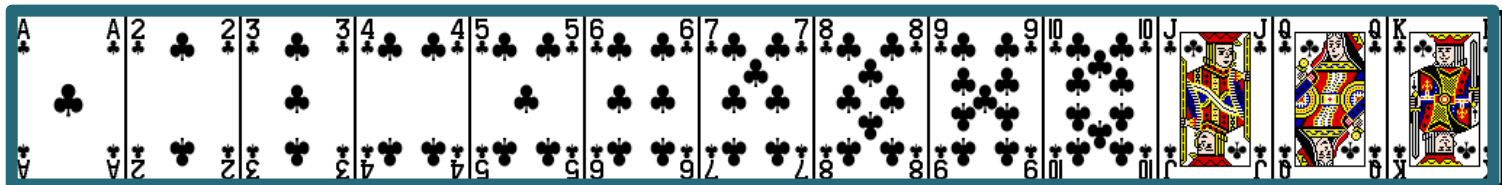
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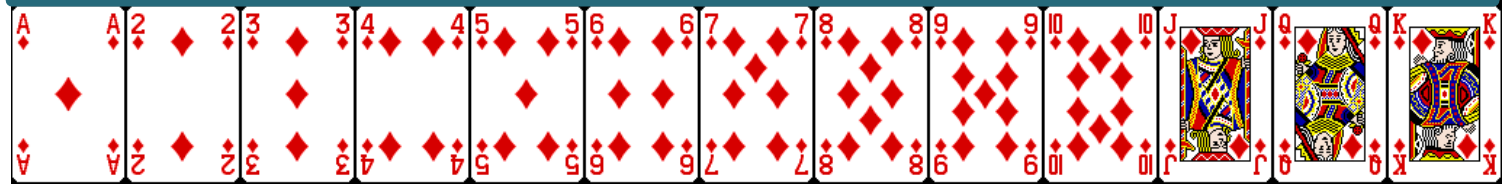
6.2 Independence

Example: Club & Black

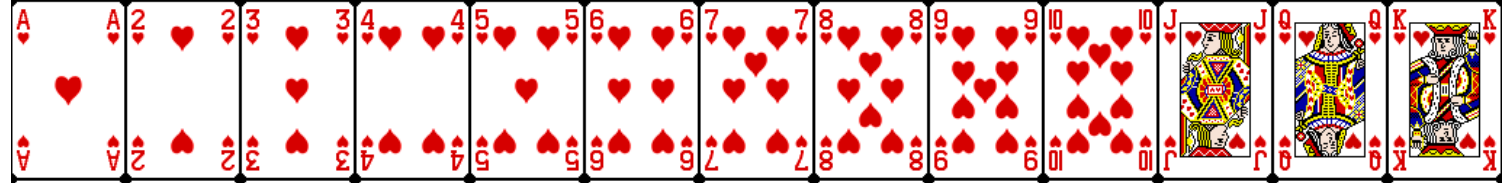
clubs



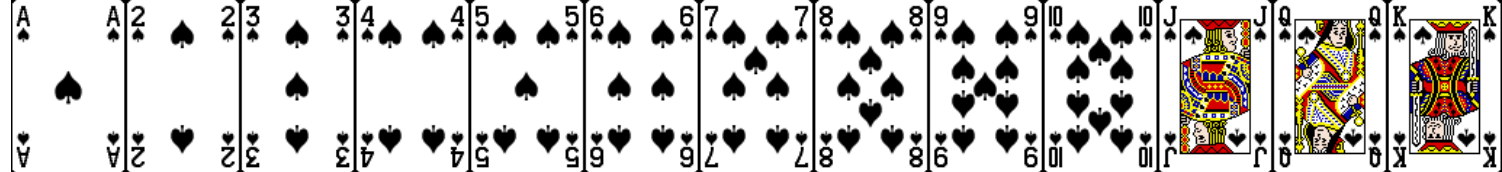
diamonds



hearts



spades



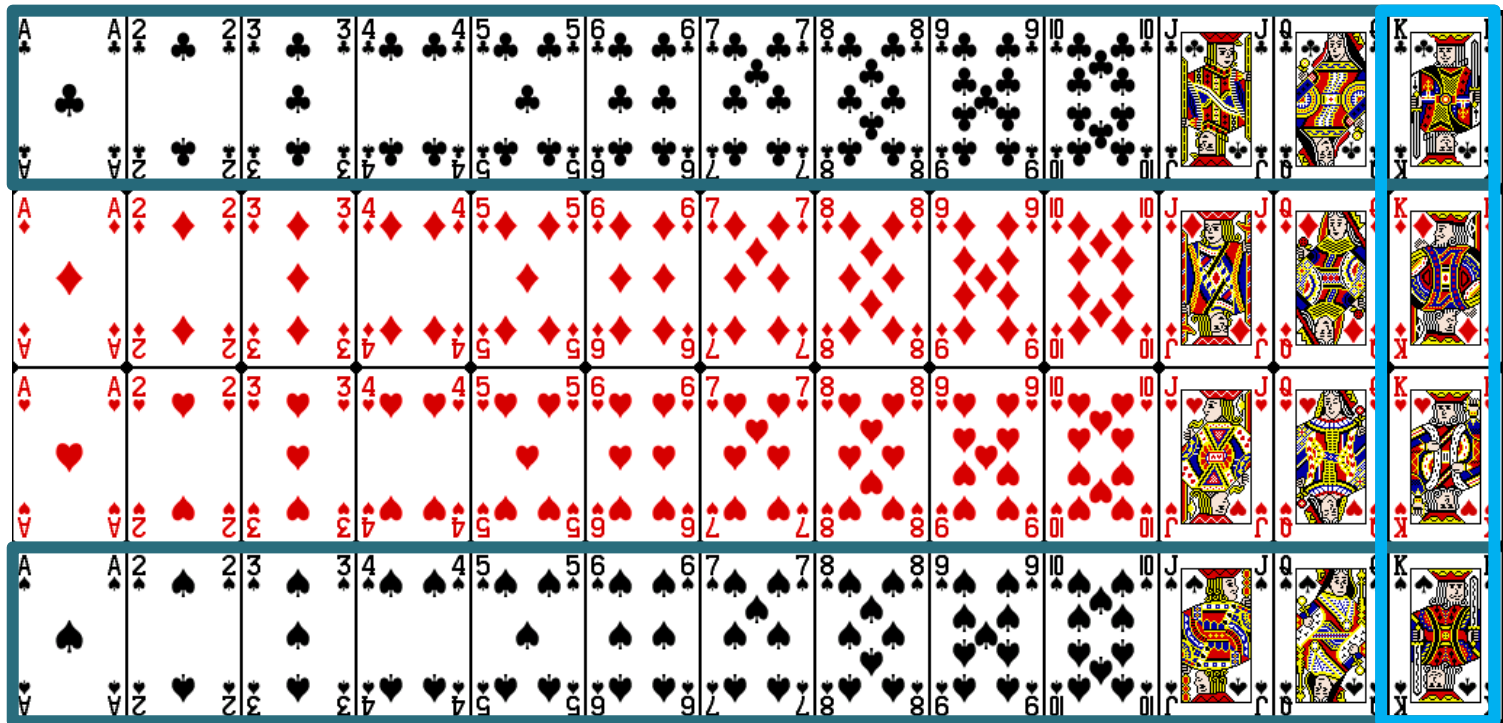
Example: Black & King

clubs

diamonds

hearts

spades



Sally Clark



[<http://www.sallyclark.org.uk/>]

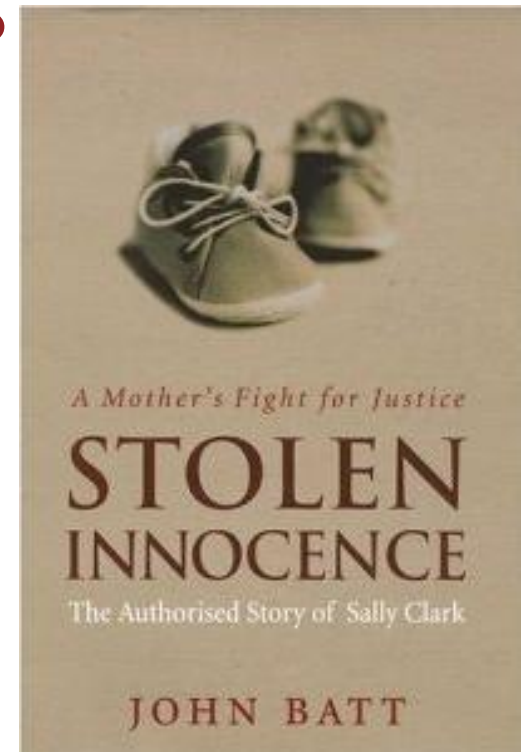
[http://en.wikipedia.org/wiki/Sally_Clark]

[<http://www.timesonline.co.uk/tol/comment/obituaries/article1533755.ece>]



Sally Clark

- Falsely accused of the **murder of her two sons**.
 - Clark's first son died suddenly within a few weeks of his birth in 1996.
 - After her second son died in a similar manner, she was arrested in **1998** and tried for the murder of both sons.
- The case went to appeal, but the convictions and sentences were confirmed in 2000.
- Released in **2003** by Court of Appeal
- Wrongfully imprisoned for more than 3 years
- Never fully recovered from the effects of this appalling miscarriage of justice.



Misuse of statistics in the courts

- Her prosecution was controversial due to **statistical evidence**

- This evidence was presented by a **medical expert** witness

Professor Sir Roy **Meadow**,



$$\left(\frac{1}{8500}\right)^2 \approx 10^{-8}$$

- Meadow testified that the **frequency** of sudden infant death syndrome (SIDS, or “cot death”) in families having some of the characteristics of the defendant’s family is 1 in 8500.
- He went on to **square** this figure to obtain a value of 1 in 73 million for the frequency of two cases of SIDS in such a family.



Royal Statistical Society



- “This approach is, in general, **statistically invalid.**”
- “It would only be valid if SIDS cases arose **independently** within families, an assumption that would need to be justified empirically. “
- “There are very strong a priori reasons for supposing that the assumption will be false.”
- “There may well be unknown genetic or environmental factors that predispose families to SIDS, so that a second case within the family becomes much more likely.”

[<http://www.rss.org.uk>]



Aftermath

- Clark's release in January 2003 prompted the Attorney General to order a review of hundreds of other cases.
- Two other women convicted of murdering their children had their convictions overturned and were released from prison.
- Trupti Patel, who was also accused of murdering her three children, was acquitted in June 2003.
- In each case, Roy Meadow had testified about the unlikelihood of multiple cot deaths in a single family.



How Juries Are Fooled by Statistics

- By Peter Donnelly

