Three Infamous legal cases

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It is said that there are two kinds of statistics, those that are looked up and those that are made up. The case of People v. Collins contains examples of the latter.

People v. Collins, Crim. No. 11176, Supreme Court of California, March 11, 1968, California Case Law, Cal 2d., Volume 68. Defendant Collins was accused of robbery and was convicted. The conviction was appealed to the Supreme Court of California. The following evidence was presented at the original trial. A woman had her purse stolen. The witnesses did not get a good look at the robber’s face, however witnesses were able to describe some characteristics of the robber, the get-away car, and the driver. The prosecution calls an Instructor of Mathematics (hopefully not a member of RSS or ASA) to testify. The instructor explains the product rule for multiplying probabilities of independent events. The prosecution suggests these probabilities to the instructor: black man with a beard 1 in 10, man with a moustache 1 in 4, white woman with pony tail 1 in 10, white woman with blonde hair 1 in 3, yellow automobile 1 in 10, and interracial couple in car 1 in 1000. He asks instructor what the probability would be for these events to occur simultaneously, using these estimates, and the instructor replies 1 in 12,000,000. The Prosecutor claims these estimates are conservative and the truth is that the real chance is closer to 1 in a billion. The jury finds defendant guilty. The ruling of the appeals court: “It is a curious circumstance of this adventure in proof that the prosecutor not only made his own assertions of these factors in the hope that they were conservative… but invited the jury to substitute their estimates.” “There was another glaring defect in the prosecution’s technique, namely an inadequate proof of the statistical independence of the six factors.” For instance the probability of a white women with blond hair may not be independent of her driving a yellow car. Another example of this is that a man with a beard may not be independent of the man having a moustache. Also, wouldn’t the fact that an interracial couple was in the car already be taken into account given the perpetrator was African-American and the women driving the car was white? The final ruling of the appeals court was “Mathematics, a veritable sorcerer in our computerized world, while assisting the trier of fact in the search for truth, must not cast a spell over him. We reverse the judgment.”

Sally Clark was a solicitor in Cheshire, England. Her son, Harry Clark, born 3 weeks premature, died 8 weeks after birth. She was accused of murdering Harry. Her first child had died less than 3 weeks after birth, his autopsy concluded he had died of natural causes. He had signs of respiratory infection. Sally was arrested for 2 counts of murder, despite the fact that there was little evidence against her. Sir Roy Meadow, the President British Paediatric Association, gave statistical evidence against her. He testifies that the probability of a random baby dies of a cot death (SIDS) if the mother is > 26 years old, affluent, and a nonsmoker is 1 in 8543. Therefore the probability of two children from such a family both die of a cot is (1 in 8543) x (1 in 8543) = 1 change in 73 million. The judge’s summary to the jury was, “Although we do not convict people in these courts on statistics … the statistics in this case are compelling. After her conviction one juror said, “Whatever you say about Sally Clark you can’t get around the 1 in 73 million figure.” Sally’s conviction was upheld on appeal. 2001, Royal Statistical Society issues a news brief condemning the use of the multiplication rule for independence in this case. “This approach is statistically invalid. … The well-publicized figure of 1 in 73 million has no statistical basis.” In 2002, Ray Hill, Professor of Mathematics at the University of Salford, analyses other published data. He concludes the probability of having a second child die a cot death, given a first child in a family died a cot death, may be as high as 1 in 60. In 2003, after spending 3 years in jail, Sally’s second appeal was upheld, and she was released from jail. This was only after a new pro bono lawyer, while reviewing the evidence, discovered a pathology report revealing that Harry was infected with staphylococcus aureus and that this fact had been hidden from her defense team. In 2007, Sally Clark died, of apparently natural causes, due to acute alcohol intoxication.

Lucia de Berk, a nurse, was sentenced to life imprisonment in a Dutch court as a serial killer in 2003. The circumstantial evidence against her was that she was on duty when several unexplained deaths had occurred. A law psychologist stated at the trial that the chance of a nurse working at the 3 hospitals and being present for so many unexplained deaths was 1 in 342 million. The probability was based on the number of suspicious deaths on the shifts she worked versus the number of suspicious deaths on the shifts she did not work. Her conviction was upheld on appeal in 2004. After her incarceration, experts in statistics, toxicology, and medicine reviewed the evidence used to convict her. A report requested by the prosecution after the verdict, but prior to the appeal, shows the level of digoxin in the first unexplained death was not a lethal concentration. The way decisions were made concerning the gathering of the evidence are criticized. For instance in the case of one of the deaths, 5 experts reported that the death was not suspicious but 1 expert disagreed and his opinion was used to classify the death. In another, an expert changed his opinion after becoming aware of the controversy. Statisticians report that the figure 1 in 342 million was incorrectly calculated and was meaningless. Several do their own analysis and report estimates of 1 in 50 or 1 in 9. A witness against Lucia was a detainee in the criminal psychological observation unit who testified she told him that “I released these 13 people from their suffering.” He recanted his testimony. A key toxicologist who testified for the prosecution decided, based upon new medical information, that his original conclusions may not be correct. It has been proven that a medical specialist and his assistant were with the first baby that died and her statement that she was not near the baby at the time it died was true. It has been noted that in one unit 7 suspicious deaths occurred prior to her working on the unit, and only 6 occurred in a similar time-period after she joined. In 2008 the Dutch Supreme Court freed Lucia until a new trial could take place. In December 2009 a court ruled that recently gathered evidence confirms that 3 of the deaths were due to natural causes. A further court hearing took place March 17, 2010. The prosecutor proclaims that the state now believes that Lucia de Berk did not murder or attempt to murder anyone. She was released from jail after serving five years, during which time she had a stroke.