

MATH 1000 IN-CLASS ACTIVITY 7

MONDAY, FEBRUARY 5

Instructor: Alex Rice

Name:

These discussion topics were inspired by Chapter 6 of *How Not to Be Wrong* by Jordan Ellenberg, titled “The Baltimore Stockbroker and the Bible Code”.

Disclaimer: This problem contains rather morbid and upsetting subject matter, but I feel like it is an illustrative and compelling example of common misconceptions about probability, and the consequences thereof. This is completely true.

Sally Clark was an English lawyer whose two children died in infancy in 1996 and 1998, respectively, both apparently of Sudden Infant Death Syndrome (SIDS). Based on testimony from famous British pediatrician Roy Meadow on the supposed likelihood of such an occurrence, Clark was convicted in November 1999 of the murder of her two children.

- a) Dr. Meadow estimated that SIDS affects 1 in every 8500 children in the circumstances of Clark’s children. Based on that figure, he concluded that the probability of both of Clark’s children dying from SIDS was approximately 1 in 73 million. How did he arrive at that figure? What assumption(s) is he making? Given that SIDS is poorly understood, do you think his assumption is fair?

- b) Perhaps an even larger issue is the following: Several jury members stated that they interpreted Dr. Meadow's testimony as meaning that there was a 1 in 73 million chance that Sally Clark was innocent, which is troubling. For example, each individual may have a 1 in 73 million (probably worse) chance of winning a lottery jackpot, but that doesn't mean that if someone hits it, then there is only a 1 in 73 million chance that they didn't cheat, since millions of people play and the winner is only highlighted AFTER they win.

That said, if we accept Dr. Meadow's assumptions and concede that the probability of $1/73000000$ is accurate, and we assume that 10000000 women in the UK had at least two children during, say, the second half of the twentieth century (that figure is made up but probably the correct order of magnitude), what is the probability of this tragedy happening to at least one of those women?

Note: Sally Clark's conviction was overturned in January 2003, and the revelations about the misleading nature of Dr. Meadow's testimony led to the release of two other women that he had testified against. You can read more on the wikipedia page, particularly under the "Statistical Evidence" and "Aftermath" headings.