LSU E. J. OURSO COLLEGE OF BUSINESS

Dr. Chun's Numb3rs & L∅gic

Selection Bias - Part I

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Selection Bias I

"A college professor who toured the country interviewing prisoners concluded that dishonest people were, generally speaking, not as smart as honest people."

(Note: A reviewer destroyed the professor's premise by pointing out the professor had only interviewed the dishonest people who were dumb enough to get caught.)

* Representative sample? Selection bias!

Selection Bias II

"People don't report if studies are randomized," says Ian Roberts, professor of epidemiology at the London School of Hygiene and Tropical Medicine.

In many medical studies, how animals are selected, or whether assessments were blind, are rarely included in the methods and thus create a potential for bias.

"Imagine a cage of 20 rats, and you've got a treatment for some."

"So you stick your hand in a cage, and pull out a rat. The rats that are the most vigorous are hardest to catch, so when you pull out 10 rats, they're the sluggish ones, the tired ones."

"They're not the same as the ones still in the cage, and they're the control group. Immediately, there's a difference between the control and treatment groups."

The Filtering Phenomenon

Selection bias

There is a strong general tendency to filter out the bad and the failed, and to focus on the good and the successful. Casinos encourage this tendency by making sure that every quarter that's won in a slot machine causes lights to blink and makes its own little tinkle in the metal tray. Seeing all the lights and hearing all the tinkles, it's not hard to get the impression that everyone's winning. Losses or failures are silent.

The same applies to well-publicized stock market killings vs. relatively invisible stock market ruination, and to the faith healer who takes credit for any accidental improvement but will deny responsibility if, for example, he ministers to a blind man who then becomes lame.

Musing about Movies

Selection bias

In the arts section of the newspaper, you see several ads for current movies. Each movie ad contains quotes from certain movie critics.

Some of them read, "Two thumbs up!", "The supreme adventure of our time", "Absolutely hilarious", or "One of the top ten films of the year!"

Do you pay attention to the critics? How do you determine which movies to go to?

Experts say that while the popularity of a movie may be affected by the critics' comments (good or bad) in the beginning of a film's run, word of mouth is the most important determinant of how well a film is going to do in the long run.

Morale of the Story

- It is prudent to be skeptical – not so skeptical that you will not believe anything, but skeptical enough to check any statement before you accept it.
- Ask to yourself, "Is this a representative sample?"

What you see on TV is not what you get at the restaurant…

"Déjà vu" is a selective memory!

Selection Bias

At the beginning of the first World War, the uniform of the British soldiers included a brown cloth cap. (They were not provided with metal helmets.)

As the war went on, the army authorities and the War Office became alarmed at the high proportion of men suffering head injuries. They therefore decided to replace the cloth headgear with metal helmets. From then on, all soldiers wore the metal helmets.

However, the War Office was amazed to discover that the incidence of head injuries then increased. It can be assumed that the intensity of fighting was the same before and after this change.

So why should the recorded number of head injuries per battalion increase when men wore metal helmets rather than cloth caps?

*** Possible explanation:**

The number of recorded head injuries increased, but the number of deaths decreased.

Previously, if a soldier had been hit on the head by a piece of shrapnel, it would have pierced his cap and probably killed him. This would have been recorded as a death, not a head injury.

After helmets were issued, it was more likely that a fragment of shrapnel would cause an injury rather than death. Thus, the incidence of head injuries increased, while the incidence of deaths decreased.

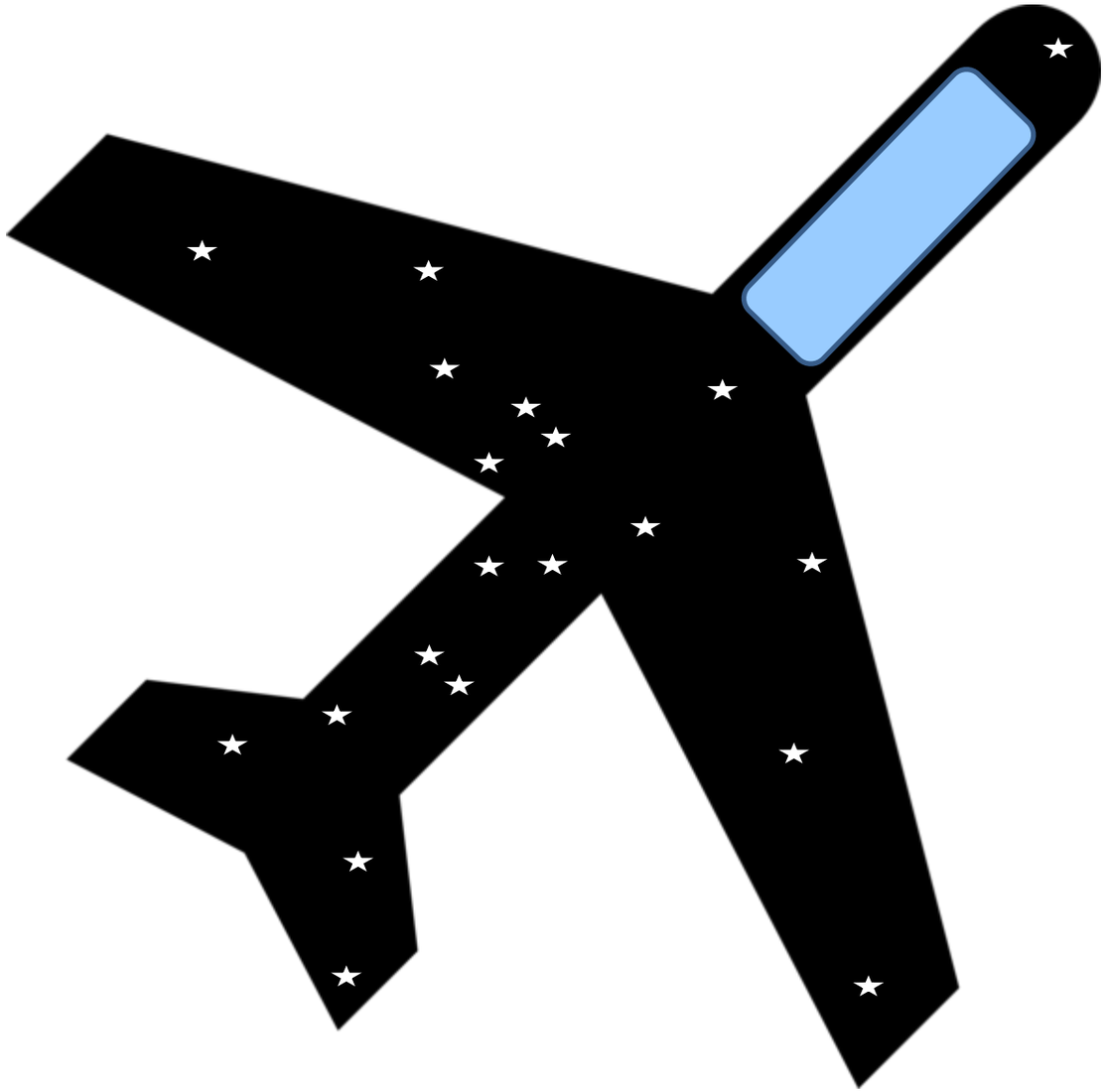
	Injured	Killed	Hit by shrapnel
Cloth cap	20	80	100
Metal helmet	70	30	100

Selection Anomalies

Abraham Wald, "A Method of Estimating Plane Vulnerability Based on Damage of Survivors," *Center for Naval Analyses*, 423, (July 1980).

During World War II, a lot of bombers were not returning from their missions, so the Royal Air Force wanted to put armor on the bombers.

A mathematician looked at the planes that returned, and noted where they had holes from enemy anti-aircraft fire. These holes were distributed more or less randomly throughout the plane except for two regions where there was nothing. His recommendation was to place the armor only in those two areas where no enemy fire was found, which seems counterintuitive.



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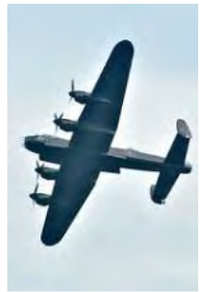

This mathematician hypothesized that any plane hit in those regions did not survive to return. The other areas could be hit and the plane could still limp back to safety.

- **Selection bias**: Only the aircrafts that were able to return to the base were available for the analysis.

Movie Trivia

The B-17 bomber is nearing the historic 25th mission, which is a tour-of-duty for American bomber crews.

She is the first plane to survive long enough to achieve this feat, and her crew is likely the first to return successfully to the States.

Memphis Belle (1990)

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