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Statistics: time to update our brains

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Questions of Principle

OUR BRAINS aren't designed for life in the modern world. They support thought processes that were appropriate for our ancestors in the prehistoric forest, when the important information was vivid and particular, such as a sabre-toothed tiger about to pounce. But they go wonky when faced with statistics.

Some years ago, Maude Barlow, then special advisor to prime minister Pierre Trudeau on pornograpy policy, gave the following argument to show that pornography causes sexual crimes: "It's no accident that 48 per cent of rapists and 14 per cent of child molesters are pornography fans."

The argument seems impressive. But if we're persuaded by it we're persuaded by something that doesn't do half the work it has to.

To prove that pornography causes sexual crimes, you first have to show that the percentage of pornography fans who commit sexual crimes is higher than the percentage of non-fans who do. By this comparison you establish a correlation between sexual crimes and pornography. Then you have to rule out the other possible explanations of this correlation: that sexual crimes cause the viewing of pornography (unlikely) or that some third factor like upbringing causes both.

Quite apart from not attempting the second task, Ms. Barlow's argument doesn't complete the first.

Take her first statistic: that 48 per cent of rapists are pornography fans. On its own this statistic is useless. We have to know how the figure for rapists compares with that for non-rapists, and we aren't given the second figure.

This point is even clearer for the second statistic: that 14 per cent of child molesters are pornography fans.

If pornography caused child molesting, the comparable figure for non-child molesters would have to be lower than 14 per cent. But this is implausible. Pornography is a billion-dollar industry, its products consumed by millions of men. Surely, more than 14 per cent of men count as pornography fans. If so, child molesters as a group view less pornography, and, if anything, pornography may reduce child molesting.

What's going on? Why are we persuaded by statistics that are incomplete or even support an opposed conclusion?

Our brains evolved in a simpler world and lead us constantly astray when we reason about statistics. This is shown by the many psychological experiments summarized in *Human Inference Strategies and Shortcomings of Social Judgement* by Richard Nisbett and Lee Ross.

Just one thing we're bad at is judging correlations. Deciding whether B is correlated with A requires comparing the percentage of As that are B with the percentage of non-As that are B. But we conclude there's a correlation on the basis just of non-comparative information about some As that are B, for example, some child molesters who view pornography. We reach a statistical conclusion using less than all the evidence.

There are many other examples.

We've all seen the athlete, interviewed on TV after his game-winning home run, who says he dreamed of hitting it the night before.

He evidently thinks such dreams are significant; so probably does the interviewer. But they're deciding on incomplete evidence. We need to know not only how many players dream of home runs and hit them, but how many dream of them and don't, how many don't dream of them and do, and even how many don't dream and don't hit.

(We rarely get this extra evidence. Sluggers don't say, "Fergy, it's amazing, I didn't dream of hitting a home run last night." And people who don't get hits aren't interviewed.)

Our weakness also contributes, more alarmingly, to the persistence of false racial and gender stereotypes.

Stereotypes are really claims about correlation. If you believe that redheads are hot-tempered, you don't believe that all redheads are hot-tempered, nor do you believe that only redheads are hot-tempered. But you believe the percentage of hot tempers among redheads is higher than among blondes, brunettes, and so on.

Imagine that this stereotype is false, and your evidence shows it is false. You may still believe it because you attend more to the evidence in its favour than to what refutes it.

When you see a redhead getting angry, you're reminded of the stereotype and take it to be confirmed. ("Another hot-tempered redhead.") But when you see one being placid you don't take this as evidence against it. Why remember a stereotype about hot temper when no one's showing temper? Likewise when you see a blonde throwing a fit. Why connect that to any ideas about redheads? By attending more to evidence about As that are B you keep believing As are specifically B when they're not.

Stereotypes about redheads may be harmless, but ones like "Jews are clannish" and "women are emotional" are not. If they persist partly because of fallacious statistical reasoning, we should be worried.

As statistical information becomes more important, you would expect basic training about it to become more common, and even to be seen as part of essential literacy. But who is giving this training, either in our schools or, outside specialist courses, in university? Who is trying to bring our brains into the modern world?

Prof. Hurka teaches philosophy at the University of Calgary.

1 In the first column of the article EM9026 reprinted above, Prof. Hurka points out two *logical* inaccuracies associated with Ms. Barlow's interpretation of percentages of 48 and 14. Indicate briefly *other* type(s) of inaccuracies that may be involved in these two values.

2 Suppose the two additional percentages for ‘non-fans’ of pornography, discussed by Prof. Hurka in the first column of the article EM9026 reprinted above, were available and that they *were* appreciably lower than 48 and 14 respectively. Would the Answer (in the second paragraph) that pornography *causes* sexual crimes then be justified? Explain briefly.

- Explain briefly what *additional* line(s) of evidence would be needed to *reduce the limitations* on the Answer of a causal connection between pornography and sexual crimes?

3 Comment briefly on the plausibility of the argument, at the top of the middle column of the article EM9026 reprinted above, that the percentage of ‘non-child molesters’ who are ‘pornography fans’ is *greater* than 14 per cent.

(*continued overleaf*)

4 In the last paragraph of the middle column of the article EM9026 reprinted overleaf, Professor Hurka describes *four* proportions involving dreams and home runs. Describe the equivalent four proportions in the context of assessing the usefulness of a medical diagnostic test for a disease.

5 In the final paragraph of the article EM9026 reprinted overleaf, Professor Hurka gives his perception of the general *lack of availability of training*, except in specialist university courses, in statistical literacy. Indicate briefly, with reasons, whether you agree or disagree with this perception.

- What do you consider the most appropriate *setting(s)* for people to acquire statistical literacy? Briefly justify your choice(s).
  - Indicate briefly, with reasons, the degree of *importance* you attach to the development of statistical literacy among students as a goal for *all* levels of our educational system.

The article EM9026 reprinted overleaf is used in Figure 9.6 of the STAT 220 Course Materials, Figure 4.5 of the STAT 231 Course Materials. and in Statistical Highlight #66.

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