Most people find statistics off-putting — who wants to look at a bunch of numbers? And Statistics courses, which are required for students in many majors, are usually viewed as a painful box to check. But when you put aside the numbers and the technicalities, statisticians also have some simple yet powerful concepts. One of them is the distinction between Type 1 and Type 2 errors. I guess you can tell from the less-than-gripping labels why many students don't find the statistics course enticing. But if more people understood the distinction, it would help improve public debate on a lot of issues.

It's probably easiest to explain the types of errors using a criminal trial as an example. A Type 1 error is a false positive — the risk of mistakenly finding an innocent person guilty. In contrast, a Type 2 error is a false negative — the risk of mistakenly acquitting a guilty person.   Here are some regulatory examples:

Climate change. Type 1 error is the risk of concluding that human beings caused climate change when they didn't. A Type 2 error is the risk of rejecting this conclusion even though it's true.

Chemicals. It's a Type 1 error to incorrectly identify a chemical as a carcinogen, while it's a Type 2 error to miss an actual carcinogen.

Endangered species. Type 1 error: mistakenly finding a species to be endangered. Type 2: overlooking an endangered species.

Ebola. It's a Type 1 error to quarantine someone who doesn't have Ebola; a Type 2 error is missing a contagious Ebola case.

The key point is that there's a tradeoff: the more you try to decrease the chance of a Type 1 error, the more you increase the change of a Type 2 error. For instance, the more safeguards you put in place to prevent conviction of the innocent, the greater the chance that the guilty will escape punishment. The reverse is also true: you can eliminate safeguards to be sure that you convict the guilty, but then you're also more likely to convict the innocent.

So here's the point: People tend to focus on one kind of error in a particular situation and not on the other. Thus, some people are so anxious to avoid the risk of incorrectly accepting the finding of climate scientists (Type 1 error) that they overlook the risk of wrongly rejecting those findings (Type 2 error). On the other hand, many people are so worried about overlooking a possible case of Ebola (Type 2 error) that they overlook the risk of imposing quarantines that aren't needed (Type 1 error).   The two need to be kept in

balance.

So don't just focus on   one kind of error without thinking about the other. It pays to consider both.