As the News Feature explains, rather than being convenient shorthand for significance, the *P* value is a specific measure developed to test whether results touted as evidence for an effect are likely to be observed if the effect is not real. It says nothing about the likelihood of the effect in the first place. You knew that already, right? Of course: just as the roads are filled with bad drivers, yet no-one will admit to driving badly themselves, so bad statistics are a well-known problem in science, but one that usually undermines someone else's findings.

The first step towards solving a problem is to acknowledge it. In this spirit, *Nature* urges all scientists to read the News Feature and its summary of the problems of the *P* value, if only to refresh their memories.

The second step is more difficult, because it involves finding a solution. Too many researchers have an incomplete or outdated sense of what is necessary in statistics; this is a broader problem than misuse of the *P* value. Among the most common fundamental mistakes in research papers submitted to *Nature*, for instance, is the failure to understand the statistical difference between technical replications and independent experiments.

Statistics can be a difficult discipline to master, particularly because there has been a historical failure to properly teach the design of experiments and the statistics that are relevant to basic research. Attitudes are also part of the problem. Too often, statistics is seen as a service to call on where necessary — and usually too late — when, in fact, statisticians should be involved in the early stages of experiment design, as well as in teaching. Department heads, lab chiefs and senior scientists need to upgrade a good working knowledge of statistics from the 'desirable' column in job specifications to 'essential'. But that, in turn, requires universities and funders to recognize the importance of statistics and provide for it. *Nature* is trying to do its bit and to acknowledge its own shortcomings. Better use of statistics is a central plank of a reproducibility initiative that aims to boost the reliability of the research that we publish (see *Nature* **496,** 398; 2013). We are actively recruiting statisticians to help to evaluate some papers in parallel with standard peer review — and can always do with more help. (It has been hard to find people with the right expertise, so do please get in touch.) Our sister journal *Nature Methods* has published a series of well-received columns, Points of Significance, on statistics and how to use them.

"Too many researchers have an incomplete or outdated sense of what is necessary."

Some researchers already do better than others. In the big-data era, statistics has changed from a way to assess science to a way of doing science — and some fields have embraced this. From genomics to astronomy, important discoveries emerge from a mass of information only when they are viewed through the correct statistical prism. Collaboration between astronomers and statisticians has spawned the discipline of astrostatistics. (This union is particularly apposite, because it mirrors the nineteenth-century development of statistical techniques such as least squares regression to solve problems in celestial mechanics.)

Among themselves, statisticians sometimes view their contribution to research in terms of a paraphrase of chemical giant BASF's classic advertising tag line: "We don't make the products. We make them better." In doing so, they sell themselves short. Good statistics can no longer be seen as something that makes science better — it is a fundamental requirement, and one that can only grow in importance as funding cuts bite and competition for resources intensifies.

Most scientists use statistics. Most scientists think they do it pretty well. Are most scientists mistaken about that? In the News Feature, *Nature* says so. Go on, prove us wrong. ■

Lone wolves

A declining island wolf population underlines the influence that humans have on nature.

Ecologists have studied the wolves and moose on Isle Royale, a remote island in Lake Superior, for more than 50 years. As we report on page 140, after decades of isolation and inbreeding, the wolf population may be on the verge of dying out.

The US National Park Service, which manages the island, is moving slowly in deciding how to proceed. It has three options: total non-intervention; reintroduction of wolves only after the current population has hit zero; or pre-emptive genetic rescue by bringing in wolves from the mainland to diversify the gene pool. Arguments for non-intervention tend to rely on the perceived need to let nature take its course. This is nonsense. The whole system is highly artificial: wolves and moose have been on the island for less than 100 years, and human activity has been key to the wolves' decline. A previous wolf-population crash in the 1980s was caused by a disease transmitted by a domestic dog. Anthropogenic climate change is almost certainly reducing how often ice bridges form to the mainland, which makes it hard for new wolves to come to the island. Some even think that humans put moose on Isle Royale in the first place.

Arguments are more convincing for reintroducing wolves only if the current population dies out: waiting and watching may yield some useful insights into how highly inbred populations function. But the ecologists who run the island's predator–prey observation study warn that, as the wolves die out, the moose will gorge unchecked on their key food plant, balsam fir, preventing the plant from regenerating. The researchers think that by the time the old wolf population has died out and a new one is established, the ecosystem may have become dominated by pine or spruce, without enough firs to support a moose population that can in turn feed a viable wolf population. If the wolves die out, they could become nearly impossible to reintroduce.

And that might be fine, except that tourists and locals love the wolves of Isle Royale, and the National Park Service was founded with an obligation to protect "the enjoyment of future generations". Furthermore, the predator–prey study — the world's longest — would have to end. That would be a shame: it would be difficult to find another place where none of the predators, herbivores or trees are routinely exploited by humans.

The study's lead ecologists are in favour of genetic rescue. This fairly cheap intervention would allow the project to continue, and would stabilize an ecosystem with which many people feel a deep connection. Some researchers have suggested that any data on reintroduced wolves would have to be treated with caution. Certainly, the influence of the reintroduction would be acknowledged and studied. But the introduced population would not be any more artificial than the population that survived disease, or that which could suffer the effects of climate change.

Isle Royale data help ecology to approach one of its grandest questions. As study leader John Vucetich puts it: "Are ecosystems like other physical systems, governed by law-like patterns and processes, or are they more like human history, where we see one contingency after the next?" The early years of the study seemed to support predictions that in a closed system, predator and prey populations would follow law-like mirror-image cycles, driven by predation pressure. But the data never fitted the theoretical curves that well. And since then, factors from disease to fir abundance, weather, moose ticks and wolf inbreeding have taken turns as the key driver in shaping the populations.

The driver that will shape the future of Isle Royale is now the decision on whether to stage a rescue. Thus of the story of all Earth's systems is writ small on a wooded isle in a frozen lake: the course of human history is no longer merely analogous to the course of ecology. Ecology depends on human history. ■

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