Why the empirical sciences need statistics so desperately

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Abstract

Science can be described as a systematic attempt to extract reliable information about the world. The cognitive capacities of *homo sapiens* come with various biases, such as our tendencies (a) to detect patterns in what is actually just noise, and (b) to be overly confident in our conclusions. Thus, the scientific method needs to involve safeguards against drawing incorrect conclusions due to such biases. A crucial part of the necessary toolbox is the theory of statistical inference.

There exists a large and well-developed (but of course incomplete) body of such theory, which, however, researchers across practically all of the empirical sciences do not have sufficient access to. The lack of statistical knowledge therefore forms a serious bottleneck in the quest for reliable scientific advances. As has been observed by several authors in recent years, statistical malpractice is widespread across a broad spectrum of disciplines, including (but not limited to) medicine, cognitive sciences, Earth sciences and social sciences.

In this talk I will first try to describe the overall situation and provide some concrete examples. I will then move on to discuss the more difficult issue of what can and needs to be done.

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