any scientists are aware of the subtle influences on their own scientific conduct, but many others are not. Sydney Brenner, the joint winner of the 2002 Nobel Prize for physiology or medicine, delightfully described a slide in which data points were scattered very close to a straight line—but a large mysterious black object lay in one corner. By degrees, the onlooker realizes that the object is a thumb placed over a data point that is far away from the straight line. The thumb covered it up because the result was supposedly anomalous. The test tube was dirty, the animal was sick that day, or something else was amiss. Many other such rationalizations—perhaps they should be called rules of thumb—are produced and the damage done may not serious.

A famous example of selective use of the thumb was provided by the data on which Gregor Mendel based his laws of inheritance. The eminent statistician R. A. Fisher argued that, on grounds of probability, the data were too good to be true. Mendel had presumably started to see (correctly as it turned out) a pattern while he was still doing the critical breeding experiments and then began to drop data that did not fit.

Another form of data selection can lead to serious error. Before the discovery of stratospheric ozone holes in the 1980s, statistical analysis of satellite data threw out the “outliers” on the assumption that such measurements were unreliable. It was only when scientists working at one station in Antarctica repeatedly obtained low values that the processing mistake was discovered and the ozone holes recognized. Treasure your exceptions! The data point lying under the researcher’s thumb might be the most interesting result of the whole study.

Social psychologists and sociologists have long been aware of the subtle ways in which bias can creep into research. The behavior of their subjects sometimes results not from the effects of any experimental manipulation, but merely from the attention paid to them by the experimenter. Much evidence suggests that experimenters often obtain the results they expect to obtain, partly because they unwittingly influence the outcome of the experiment.* The expectancy effect is sometimes comparable in size to the effect of the experimental manipulation itself. Many scientists take appropriate steps to avoid this kind of bias. They use “blind” procedures so that the person making the measurements cannot unconsciously bias the result. Analysis is carried out ideally while the researcher remains unaware of the identity of each group. Although many are careful, others are not and do not even recognize the problem.

Suspect findings damage unnecessarily the reputation of scientists for integrity, lending weight to the more bizarre views about the social construction of science. The reality of prejudice or theoretical conformism in scientific work emphasizes that a considerable job of educating many members of the scientific community is still needed. That kind of awareness becomes all the more necessary when issues of funding and promotion are at stake. Some notorious cases have demonstrated just how ferocious can be the pressure from commercial funders to ignore good scientific practice. A well-known example was the shameful treatment at the University of Toronto of Nancy Olivieri, who published data uncongenial to the drug company that had funded her.†

Sources of funding can undoubtedly exert corrupting influences on scientific behavior. The bad cases should be condemned when they are discovered. “Affiliation bias” may, however, be much more subtle, leading research workers to select evidence suiting their own preconceptions. All scientists need to be very careful about how evidence was obtained in the first place. Desirable modes of scientific conduct require considerable self-awareness as well as a reaffirmation of the old virtues of honesty, scepticism, and integrity.

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Desirable Scientific Conduct

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