Title: “Cargo cult science! Why most published research findings are false”

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Summary:

Doubting scientific integrity: Significance, reproducibility, evidence – all that is crucial when evaluating scientific results. One generally thinks that science always speaks the truth, that researchers make their statements deliberately and that they can prove them right by experimental data or sometimes simply by logic. However, the belief that scientific publications are free of faults erodes. For some time now, critics have pointed out grievances on several levels of the scientific system that make the published results attackable. Is this doubt about scientific integrity justified and if yes, what does that mean for scientists as well as for the public? In Berlin, we discussed these two questions with Dr. Jochen Kruppa, group leader for statistical bioinformatics in the Charité Berlin.

Learning about critics: To better understand the criticism on science publications after a short round of introducing ourselves we split into groups of two and read texts of different critics such as Karl Popper, Richard P. Feynman, James R. Wilson and John P. A. Ioannidis. After that, the groups presented what they learned about the different points of criticism.

About cargo cult science: Of course, we also figured out where the term cargo cult science comes from and what it means. The term traces back to Richard P. Feynman, who compared some science being done with the so-called cargo cults existing in several parts of the world, especially in Melanesia. In second world war by plane Europeans brought cargo to the back then quite isolated Melanesian island cultures. The people living on that islands where fascinated by the planes and the Western cargo and somehow started believing that it was gods passing and leaving goods. After the Western people were gone, they started imitating what they saw. By various symbolic acts such as building airplane runways they thought they could make their “gods” and the material wealth come back. The cargo cult was born.

When science becomes a cargo cult: But what does science have to do with cargo cult? Feynman says, that sometimes researchers act because of a certain belief without questioning whether this belief itself is false. They constantly optimize the procedures in their work and publish results in the faith they are contributing to credible science, but indeed they do not. More general, one could say that cargo cult in science means a lack in questioning the everyday work and not being honest with oneself and others. Moreover, this is not necessarily always a conscious process, but researchers fool themselves, too. Just as the tribes of the Melanesian islands were not aware of the Western world. Often, they are not trained well enough about how to capture and analyze data. Thereby, their expectations and habits easily can falsify the results. Furthermore, the current academic system does not encourage scientists to act against cargo cult science either, but on the contrary rewards success instead of critical reflection of one’s results. In addition, dependencies on financial support and scientific journals mainly publishing positive results strengthen the trend towards cargo cults in science.
How to act against

Regarding the problematic points mentioned above, we came up with the following claims.

Scientific integrity longs for: On the one hand a proper education on how to produce and handle data. Searching for faults, not only for success and using failures to learn from them is essential. This also goes for showing all the data instead of only the best and being able to repeat the results. On the other hand, an environment that does not punish negative results by a loss of financial support and discrediting but provides incentives for critical reflection and non-populism. Moreover, the ability to - if necessary - question the results of others with no need of considering hierarchy issues. It should not never be seen on a personal level and finally we also need journals that publish negative results, too.

By being aware of that, we hope to help improving the future scientific work.