Why we should always be critical about articles

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Introduction Data collection and analysis evolved drastically and exponentially since the beginning of the new millennium. Researchers and professionals found a wide area where they could apply their skills thanks to computer science, giving genesis to all new kind of field such as computational biology, quantitative marketing and data journalism.

In combination with the ubiquitous pressure to publish in academic fields and popular media, it became common to find articles pretending to shake established knowledge and conception.

This would be beneficial to society, if these claims were mostly true, which is unfortunately not the case.

This essay explains why the readers should always be cautious when studying research based on data.

Reasons to believe studies There is no discussion that fields became excessively specialized and nobody can be an expert on the integrity of its field. Most academic journals and newspapers require papers to integrate an innovation, leading to undesired complexity. Hence people often believe the content and conclusion of an article based on the reputation of its authors and there are often judiciously chosen qualified reviewers checking the papers.

Mechanism leading to deception However, even the reasons stated previously do not guarantee that most articles are correct. Ioannidis (2005) provides the main reasons. These fall in two families: human and statistical errors.

On one hand, the pressure to publish force researcher to find and publish evidence of their ideas at all cost. This leads two either corrupting data by leaving undesirable observations, torturing them until some statistical test is positive and in the worse case, purely faking them.

On the other hand, even when authors are honest, statistical traps might occur. The most common is the oversight of multiple test correction. When the latter is ignored, it becomes inevitable to find false discovery given the sufficient amount of data. Concretely, researchers might repeat an experience twenty times and publish only the results of the last experience, as test were significant enough only on the last trial.

Moreover, as journals want to publish innovative researches, they often reject confirmatory studies, often rejecting the assertions made in a previous article, thus leading to less confirmation studies publications, which are often quite expensive on human and pecuniary resources.

Conclusion In brief, although data became universal and most arguments are now data-driven, readers should not believe any argument solely based on the data and the analysis derived from them. In spite of the complexity of the subjects, critical minds should always ask about the processes and the intentions of the authors of articles, as there exists a variety of statistical tools and pitfalls to falsify results. Our recommendation is to stay open-minded and keep a confidence band of statements and updating it with experiences, facts and discussion with the majority of community of experts.

References

Ioannidis JPA. Why Most Published Research Findings Are False. *PLoS Medicine*. 2005;2(8):e124. doi:10.1371/journal.pmed.0020124.