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Taking responsibility for scientific discourse

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Recent exploration of the darker side of the scientific literature (1) supports the idea that more than honest error plagues modern scientific discourse (2). Many solutions focus on improving administrative oversight (3). I believe that a greater burden of responsibility and potential for change falls on each of us. Here, I delineate some practices that might transform modern discourse.

Rapidly test competing hypotheses with unconventional search engines. For example, a Google search yielded an important paper as the first hit [(4), as cited in (5)]; this paper was much more challenging to find in a search of the same terms on PubMed. It is time-prohibitive to collect and read all cited papers, leading to a problematic compression of breadth. Multiple reviewers can ameliorate this problem, but the danger remains of creating an environment where responsibility is undesirably diffused.

Seek statistical consultation from an expert, or better, experts. Although statistical training is a core subject in graduate programs, too often the skills acquired are inadequate to deal with the actual complexity of the acquired data. Greater quantitative rigor extending to all facets of data-handling should be the common goal. Many journals now utilize an expert statistical reviewer; this should become the norm.

Describe your data analyses and results to a colleague who is not a coauthor. Such communication increases the likelihood of noticing an oversight in design, analysis, or logic. If such dialog took place on a large scale, the implications for translational research could be substantial.

Fight to publish results that are clearly negative. The scientific literature and grant system are focused on positive results, but robust negative findings, if highlighted by journals, would prevent future labs from wasting time and money recreating these efforts.

Examine unspoken pressures. Too often scientific acts are affected by influences other than those of “pure” science, such as conducting un-blinded reviews, affirming popular literature conclusions despite contrary empirical evidence, meeting promotion requirements, sustaining unhealthy hierarchies in laboratories, fulfilling a priori grant data despite insufficient statistical power, and keeping one’s constructed intellectual towers buffered from attack. Although these factors could be attributed to effectively playing the modern “game” of science, failure to consider their influence will guarantee their undesirable expression (6).

From an organizational level, refinement of guidelines for grant and paper review will be invaluable to improve both the process and products of science. However, I fear the solutions developed can only be as healthy and sustainable as an individual’s resolve to infuse meaningful content. The responsibility for scientific progress has seemingly shifted from the individual to the literature as a whole, with this latter agent being a poor policeman and historian (7). Continued dilution of responsibility within scientific discourse and lack of personal engagement is at our collective peril. Each intentional discourse provides the opportunity for

engagement. Thrown together at the collective target known as science, I have little doubt that these efforts will hit their mark.

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