

## Are we foregoing quality in favour of quantity?

Alok Bang

*Increasing importance placed on quantity of publications and its adherence to career rewards is changing the way science is done where quality has taken a backseat. While quantity with quality is welcome, current practices are promoting the former at the cost of the latter. This piece comments on misplaced importance given to quantity, resulting into lack of scientific creativity and advancement, as well as increased scope for scientific malpractices. The article ends with a note to correct the situation.*

*I don't mind that you think slowly but I do mind that you are publishing faster than you think.*

– Wolfgang Pauli (1900–1958),  
Physicist, Nobel Laureate.

### Current scene

Do quality and quantity of scientific publications have to be in conflict? They do not have to be, unless the publications – which are the end result of a process – become goals in themselves. The problem gets magnified because a researcher's career graph is made to adhere to the total number of publications, the journals where they are published and how often they are cited, as a result of which s/he is under constant pressure to publish. This is especially true for early career researchers who are being judged for tenures, grants and fellowships based on their productivity.

### General concerns

Pressure and creativity share a negative or at best a curvilinear relationship<sup>1</sup>. The pressure to publish therefore, may affect scientific creativity and may result in the eventual lack of scientific advancement<sup>2</sup>. Scientific creativity involves 'thinking outside the box' which comes from original and innovative ways of tackling questions. While the equipments, softwares and methodological advancements have come a long way making it easier to perform research, they have not resulted into equally creative and path-breaking answers. Scientific advancement relates to moving forward of the discipline and will come from synthesis of newer concepts, hypotheses and frameworks. I believe that the lack of scientific creativity and scientific advancement in current research is a result of lackadaisical attitude that has seeped into the community because the focus is shifting to quantity of research than its quality.

### Specific concerns

Does the overdrive for quantity really exist? If yes, what are the repercussions?

*Academic arms race.* In evolutionary biology, an arms race between two individuals, populations or species refers to adaptations by one partner, selection pressure exerted on the second partner, and a counter-adaptation in response to this by the second partner. This results in a constant back-and-forth feedback response that the partners exert on each other<sup>3</sup>. By pitting oneself against the number of publications coming from another research group, and efforts to outdo these numbers by publishing even more, we are indeed entering an academic arms race. Apart from intrinsic inclinations, there exist external pressures to enter this race. Young researchers, as young as undergraduate interns, are now inquiring whether the outcome of their internships will result into publications. How do such misplaced interests come to be? It is now becoming frequent to have rules preventing students or early-career researchers from graduating, or being awarded tenures or grants if they do not have certain number (high) of publications per year.

*The process of collaboration.* The number of authors in a manuscript is increasing year after year<sup>4</sup>. While the era of interdisciplinary science and complexity in research questions may partially explain the rise in the average number of authors, there are other reasons<sup>5</sup>. Such publications many times come from research groups that are huge and work as assembly lines. Instead of a few scientists working on the whole manuscript, parts of it are handled separately and then joined together. This may give fractured narratives. The second problem of multi-author papers is much severe. Many journals still do not have guidelines on what constitutes an author. In

absence of such guidelines, authorship becomes subjective<sup>6</sup>.

Influential names are added to facilitate the process of publication. This is difficult to prove as exaggerated claims of contributors find their ways into manuscripts to justify their presence. But many researchers may have experienced this unfortunate phenomenon – how new names who at best could be mentioned in the acknowledgements section – suddenly find their ways into the author lists.

Both these phenomena lead to an efficient method of publishing more, with little regard to the content.

*Choice of research.* The approach chosen for a research project, whether simulation-based or empirical, should depend on the question. Research ideas are focusing more on modelling than on empirical research partly because it might be quicker and because it may result into more manuscripts<sup>7</sup>.

*Divisive tactics.* It is not uncommon to break manuscripts into halves and quarters. A cohesive and comprehensive story now-a-days gives way to fragmented stories in the form of fractured manuscripts. Journal editors streamline this trend by preferring shorter articles<sup>8</sup>. The readers may have to shift between those many different publications to get the complete understanding of a research question. Apart from increasing the number of publications, this serves another numerical advantage – of citations. Multiple publications will result into more citations. Adding to that, by citing one's related publications – sometimes even before they are published – a researcher is making sure that her/his product finds a hassle-free entry into the world of numbers.

*No place for gray results.* The clean, significant results that differentiate publishable science from non-publishable science are bane of our times, which may cause cases of fraudulent behaviour. As certain disciplines such as ecology are

least expected to be governed by universal rules, and are more stochastic than deterministic in nature, it might be an even bigger problem. While indirectly linked to the issue of quantity, the pressure to publish more and as early as possible may exacerbate consciously exercised fraudulent scientific practices, or subconscious behaviours of seeing trends in places where there are none<sup>8,9</sup>.

*Absence of background, synthesis and perspectives.* There is a reason why original articles these days are heavy on methodologies, detailing state-of-the-art techniques and equipments, and results full of complicated models, equations and graphs beyond even the specialists' grasps. Where they lack are the beginning and the end parts of the manuscript – undoubtedly the most important sections. Introduction section requires creating a need for the pursuit of the given question in the context of what is already known. If not well-versed with the subject, and if enough time is not spent in review of literature, introduction may suffer from (1) factual errors such as wrong representation of the current advancements in the discipline, (2) practical errors such as re-inventing the wheel, (3) an assortment of miscellaneous errors such as wrongly citing papers because they have been cited by someone else before in a different context, or because the researcher read only the abstract and imagined what the manuscript would have to say. We all have come across instance where our papers have been cited for the wrong reasons. It is embarrassing when citations give more exaggerated credits than appropriate, all because the authors who cite a paper have either not read it or have not understood it. These errors may seem trivial, but are not a result of casual irreverence towards introducing one's work. It is a deliberate sweeping aside of an important part of the manuscript because it is a section that consumes time.

Many manuscripts assume that discussion is a section to repeat results using different words. Discussions are supposed to give an idea to the reader the reasons behind the trends in the data that have been observed, in what way the present manuscript has contributed to the gaps in knowledge and a discourse on

future directions. An effective discussion section requires reflecting. Ultimately, research in our respective specialties is not going to proceed with methodological technicalities and aesthetic data presentation, but with effective presentation of the background, synthesis and perspectives around the focal research idea. As the sociobiologist E. O. Wilson says, 'We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers, people able to put together the right information at the right time, think critically about it, and make important choices wisely.'<sup>10</sup>

### Corrective measures

There is no bigger joy for a scientist than to synthesize knowledge arising from her/his work and relate to existing knowledge. Though difficult and time consuming, synthesis of knowledge is a fulfilling and addictive process. As it does not come naturally but needs guidance, young minds should be trained not only in terms of how to carry out research, but to 'do' science which involves reflecting, making the whole process a more meaningful exercise. Though this might be considered a utopian idea, I believe that a researcher initiated into the joys of making sense out of her/his data and more generally, the philosophy of science, will seldom go back to sloppy ways of doing science.

For a more immediate outcome, the solution is that number of publications, citations, impact factors and such 'objective' metrics that can be generated without reading the papers should not be given undue importance in academia. Numbers are easier to grasp than descriptive assessments, especially by non-specialists, but their undue use in every sphere of science needs to be discouraged. In that sense, quantity is not different from an exams-based educational system and suffers from the same concerns scientists and pedagogues worldwide have voiced against it.

Most importantly, who starts the change? (This brings to mind the fable 'Who bells the cat?' and truly sums the academia's quest for numbers as nothing more than a rat race.) The importance of

quality over quantity has come to be increasingly highlighted as official policy by top institutions and academies like INSA which should serve as the beginning of the change in outlook and policy. On an individual level, scientists, especially young researchers, have to steer clear of being in the compulsive awe and fear of quantity. High productivity coupled with quality is always welcome but the former should not be at the cost of the latter. For more immediate change, it is the senior scientists – who are considered icons, are idolized by young researchers, and are parts of national and international committees that shape careers of younger researchers – who are in an envious position as they are relatively unaffected by this new trend and hence, can afford to voice concerns and impact the shallowness of quantity without quality. Senior scientists should lead by example and the juniors are sure to follow.

1. Baer, M. and Oldham, G. R., *J. Appl. Psychol.*, 2006, **91**, 963–970.
2. De Rond, M. and Miller, A. N., *J. Manage. Inquiry*, 2005, **14**, 321–329.
3. Dawkins, R. and Krebs, J. R., *Proc. R. Soc. London B*, 1979, **205**, 489–511.
4. Wuchty, S., Jones, B. F. and Uzzi, B., *Science*, 2007, **316**, 1036–1039.
5. Papatheodorou, S. I., Trikalinos, T. A. and Ioannidis, J. P. A., *J. Clin. Epidemiol.*, 2008, **61**, 546–551.
6. Rennie, D. and Flanagin, A., *J. Am. Med. Assoc.*, 1994, **271**, 469–471.
7. Lindenmayer, D. B. and Likens, G. E., *Bull. Ecol. Soc. Am.*, 2011, **92**, 245–246.
8. Statzner, B. and Resh, V. H., *Freshwater Biol.*, 2010, **55**, 2639–2653.
9. Lortie, C. J. and Dyer, A. R., *Oikos*, 1999, **87**, 183–184.
10. Wilson, E. O., *Consilience: The Unity of Knowledge*, Vintage Books, New York, 1999, p. 294.

ACKNOWLEDGEMENTS. I thank Raghavendra Gadagkar, Ajit Kulkarni, Ashok Bang and an anonymous referee for helpful comments.

*Alok Bang is in the Alternative Agriculture Resource Centre, Chetana-Vikas, Wardha 442 001, India.*  
e-mail: alokbang@gmail.com