**SUPPLEMENTARY TEXT**

John P.A. Ioannidis[1], Richard Klavans[2], Kevin W. Boyack[2]

[1] Departments of Medicine, of Health Research and Policy, of Biomedical Data Science, and of Statistics, and Meta-Research Innovation Center at Stanford (METRICS), Stanford University

[2] SciTech Strategies, Inc.

## Contents



## Technical note on methods

An author publishing the equivalent of one full paper every 5 days will end up publishing 73 papers in a calendar year. We selected this number as a threshold to define and study outlier, hyperprolific authors. Of course, published papers may reflect the final presentation of work that has happened over many years, but focusing on calendar years allows to study peaks in productivity and to use a clearly definable time unit.

We identified all author records in Scopus that included 73 or more published full papers in any single calendar year between 2000 and 2016. Full papers included in our analysis are the ones classified as Articles, Conference Papers and Reviews in Scopus. All other Scopus categories of published items (Editorials, Letters, Notes, Short Surveys, Errata, and so forth) were excluded. Papers take variable amounts of effort to produce. For items such as editorials, notes, letters to the editor, in theory large numbers of publications are possible to produce by authors who have a talent, proclivity or obsession for writing; such works may occasionally be very important and influential, but they take, on average, substantially less time to produce than Articles, Conference Papers and Reviews. We acknowledge that there are exceptions to this rule and that the amount of effort may vary substantially within each paper type. Some papers require a hundred-fold more effort than others and the depth of their peer-review varies a lot. However, the adopted approach offers an objective selection rule. Moreover, errors in assignment of papers to different categories that would misclassify the item as eligible or ineligible (based on our broad classification) are uncommon in Scopus, although some extended commentaries may be classified as Articles or Reviews (some of these may need substantial work anyhow). We also acknowledge that the types of and amount of effort needed for Conference Papers varies substantially across scientific disciplines, but, in many disciplines, they are valued as much as or more than Articles. In contrast to conference meeting abstracts in the medical and life sciences which are short and not indexed in Scopus, Conference Papers indexed in Scopus tend to be quite lengthy, substantial contributions. We nevertheless also present data excluding Conference Papers. Overall, the eligible items may or may not include new data collection, or analyses or original ideas and this is very difficult to judge across tens of millions of Scopus-indexed items. Other popular databases such as Google Scholar and Web of Science would be less suitable for

this project. Google Scholar sometimes has multiple entries for the same paper and these are not always bundled together; moreover, it does not assign published items to different types that would allow separating full papers. Web of Science generally avoids duplicate entries but has less complete coverage than Scopus in several scientific fields.

We used data from Scopus from May 2017. Improvements, including additions to the back catalog, are made continuously to the Scopus database, hence there may be minor differences versus current author name searches using a commercial version of Scopus.

For each of these hyperprolific author records, we assigned all their eligible papers published in 2000-2016 into 12 major scientific fields, as previously defined in a map of science,[1] and identified the field that had the largest share, hence called primary field. We have also derived information on their secondary field.

Of the 9214 author records meeting this hyperprolific definition, the large majority (n=7888, 86%) had Physics as primary field. We excluded these author records without any further cleaning within their set. Of the remaining 1326 author records, we excluded those for whom both the first and last names were Chinese (n=909 [799 with listed affiliation from China, 6 with listed affiliation from Taiwan and 9 with listed affiliation from Hong Kong]) or Korean (n=29 [28 with listed affiliation from Korea]). Scopus has not had sufficiently good performance in disambiguating different authors with the same Chinese or Korean name, despite some improvement over time. Therefore, the vast majority of hyperprolific records with Chinese or Korean names would not represent single authors. [The partial exception is recent calendar years, where disambiguation for such names has improved (not perfectly so though) and thus we could approximate the number of hyperprolific authors with Chinese names in 2016 through manual inspection of the author records.]

The remaining 388 author records were further scrutinized in depth for eligibility. We excluded 2 that represented group names and 115 where no single author had >=73 full papers in a single calendar year (in 65 cases journalistic news or editorial items had been miscoded by Scopus as full articles; in 20 cases two or more authors had been merged in the same record; in 1 case a meeting organizer had been entered as an author in all conference papers from that meeting; in another 29 some papers had two Scopus entries, which we identified through search for items with identical titles, manual verification of overlap and verification through communication with authors in some instances). Moreover, for 6 authors their publications had been split into 2 hyperprolific records and these split records were merged. Therefore 265 eligible hyperprolific authors remained. Detailed information on their names, institutions, fields (with proportion of papers assigned to each field), citation metrics (total citations, H-index, Hm-index adjusting for co-authorship), primary and secondary fields (and the fractions of the papers represented by these fields), productivity (full papers published per year between 2000-2016 and overall), number of calendar years meeting the definition of being hyperprolific (with and excluding Conference Papers), and proportion of papers with middle position authorship (i.e. not as single, first or last author) appear in the Supplementary Data.

Scientists split across several fields may be true interdisciplinary researchers, but very wide splitting may herald that the author record contains papers from 2 or more different scientists. As shown in the Supplementary Data, the primary and secondary field combined account for the vast majority of papers in the vast majority of scientists.

The proportion of full papers with first, last or single authorship ranged widely from 1.5% to 97.9% across the hyperprolific authors. Citation impact may need to consider multiple indictors that consider total citation impact (total citations, H index), co-authorship adjusted

impact Hm, and impact in single/first/senior positions – a composite indicator of all these factors is proposed in ref. 2. However, author position is not a perfect surrogate of the work and contribution in each paper.

The listed number of papers per calendar year excludes double counts from items that have 2 or more Scopus entries with the same title published in different venues in the same year and classified as the same document type. Such duplicates are rare and they occur primary in the field of optoelectronics and photonics where either the same Conference Paper may have been presented at 2 or more meetings and/or it may have been included in two databases abstracted by Scopus. Extremely rare is the situation where the same paper is published concurrently in multiple journals at the same time with agreement of all the journals (e.g. some papers on reporting standards), or where there are two separate records for a single paper in the same journal, one based on an initial deposit and one including page numbers once the document is in print. The number of papers in the Supplementary Data (and well as the provided estimates of citation indicators) may be slightly under-estimated for some of the listed authors. Highlighted author records in the Supplementary Data represent the same author who has been split into two author records that each qualifies for hyperprolific authorship in at least one calendar year (an occurrence in 6 authors, as mentioned above). Screening 30 other randomly selected hyperprolific authors identified that 2 of them (Albert Hofman and Didier Raoult) have additional author records that are not hyperprolific and that would not affect the count of calendar years for which they are hyperprolific. For example, for Albert Hofman 1906 full papers are under Scopus ID 36048731400 (online search), while another 408 full papers have been entered under Scopus ID 57202569967. However, the number of calendar years with >72

full papers is the same when only the first record is considered or both records are combined. Thus, the second record is not shown.

We performed an e-mail survey of the 81 hyperprolific authors who had published more than 72 full papers in 2016 and 27 of them replied. For the text of the survey and responses to the open-ended last question, see below. We also invited hyperprolific authors to provide their views on their extreme productivity. For the text of the invitation and responses, see below.

Hyperprolific authors are only the tip of the iceberg of a much larger number of authors who publish also a very large, even if not as astounding, number of papers. The number of these prolific authors is also rising rapidly. Based on separate author record counts (with the caveats discussed above), a total of 22171 authors apparently published more than 36 papers indexed in Scopus (more than one every 10 days) in at least one calendar year between 2000 and 2016 (9327 excluding Physics). In 2001, 548 authors published more than 36 full papers, while in 2016, 9020 authors published more than 36 full papers. Excluding Physics, the respective numbers are 375 and 1858. Using a threshold of more than 20 full papers per year, the respective numbers of author records were 4858 in 2001 and 24208 in 2016 (3061 and 11918, respectively, excluding Physics). Using a threshold of more than 10 full papers per year, the respective numbers of author records were 28617 in 2001 and 93213 in 2016 (21425 and 69562, respectively, excluding Physics). Much like the hyperprolific authors, these prolific authors probably reflect also a combination of top excellence plus pressure to publish, albeit to lesser degrees. They may also represent, in some cases, situations where authorship criteria become lax, although exact contributions certainly must vary on a case-by-case basis. This rapidly increasing cohort of prolific authors may include some of the most hard-working, smart, and energetic scientists along with some manipulative and politically savvy.

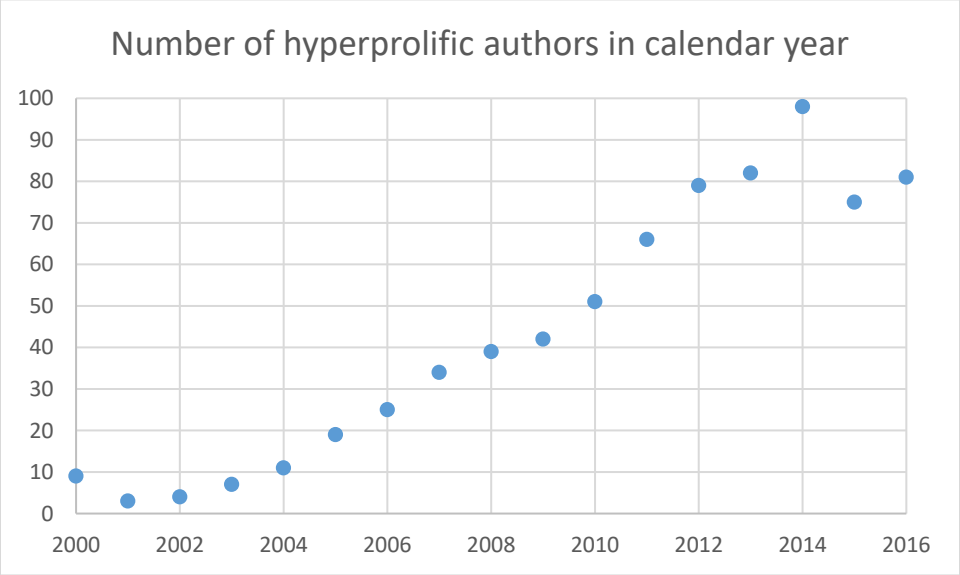
Some limitations are worth discussing. We tried to clean the Scopus data meticulously and tried to solve problems of inappropriately merged or inappropriately split author records, but some errors are still possible, although unlikely to be serious enough to affect any of the main findings of the analysis. Scopus keeps correcting its author record data and authors may offer feedback to make such corrections. Errors seemed concentrated in some circumscribed fields, e.g. optoelectronics/photonics. Second, it is impossible for an outsider to know what each author has contributed to a specific paper and what the exact authorship dynamics are within an authors' team. While we describe overarching patterns, whether and how authorship is justified unavoidably varies for each single author and each single paper. We did not examine contributorship statements, since these are available only for some journals and not archived in Scopus. Moreover, one cannot verify their accuracy and there is some evidence that reporting of contributions can also be gamed.[3] Nevertheless, it has been shown that, based even on self-stated contributions, many listed authors do not fulfill all the necessary criteria for authorship.[4]

## References


1. Klavans, R., & Boyack, K. W. Research portfolio analysis and topic prominence. *J Informetrics* **11**, 1158-1174 (2017).
2. Ioannidis, J.P., Klavans, R., & Boyack, K.W. Multiple citation indicators and their composite across scientific disciplines. *PLoS Biol* **14**, e1002501 (2016).
3. Sauermann, H, & Haeussler, C. Authorship and contribution disclosures. *Science Adv* **3**, e1700404 (2017).
4. Bates, T., Anić, A., Marušić, M., & Marušić, A. Authorship criteria and disclosure of contributions: Comparison of 3 general medical journals with different author contribution forms. *JAMA*, **292**, 86–88 (2004).

## Figures: trends over time and effects of co-authorship

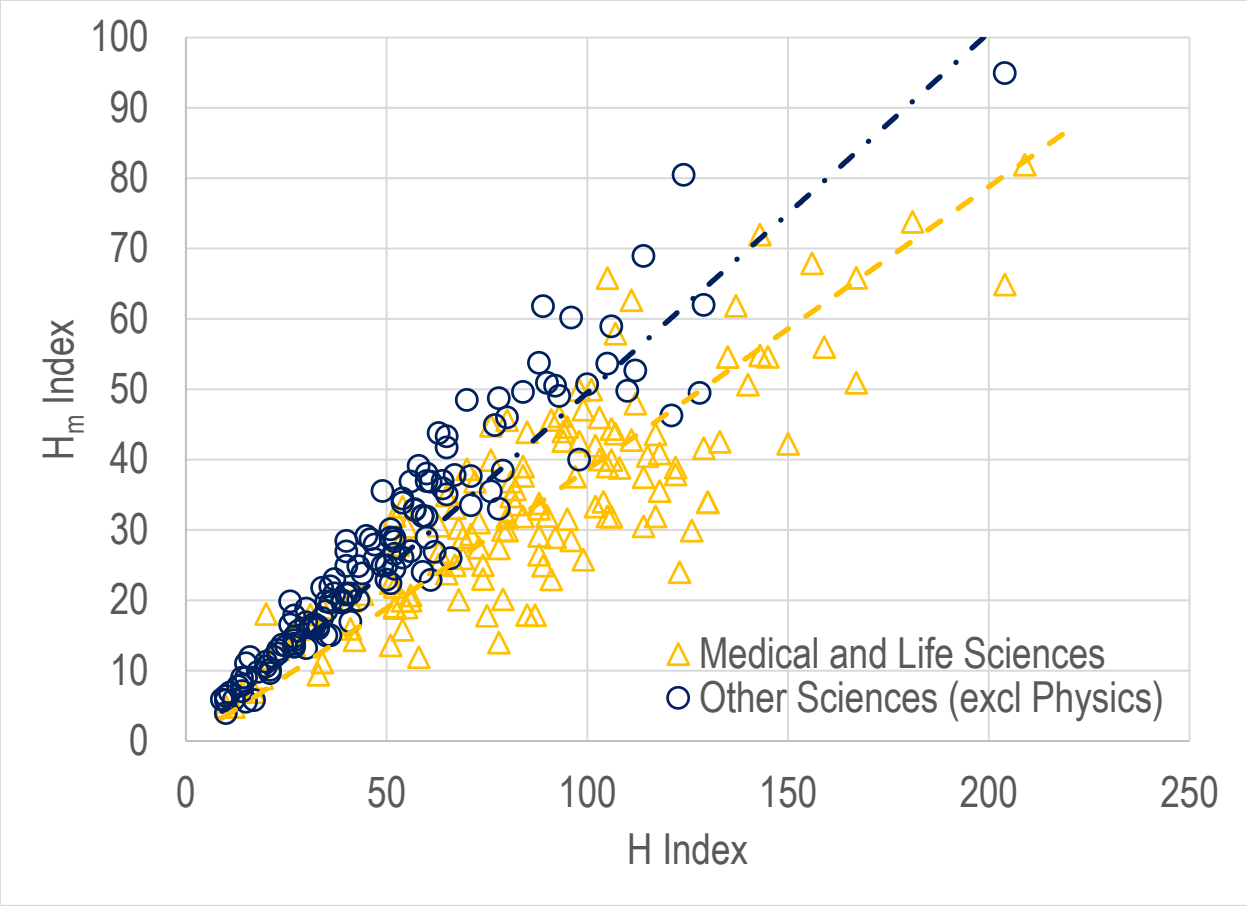
Supplementary Figure 1 shows the number of authors exceeding 72 full papers in each calendar year (after excluding author record with primary field in Physics and fully Chinese and Korean names). As a reference comparison, from 2000 to 2016 the total number of authors (excluding Physics) increased only 2.5-fold. The exclusion of authors with Chinese and Korean names may explain the small spurious dip in 2015-2016, as there are probably many Chinese hyperprolific authors in these recent years, while there were sparse in the early period. Apparently, there are currently well over 100 hyperprolific authors each year, excluding Physics.



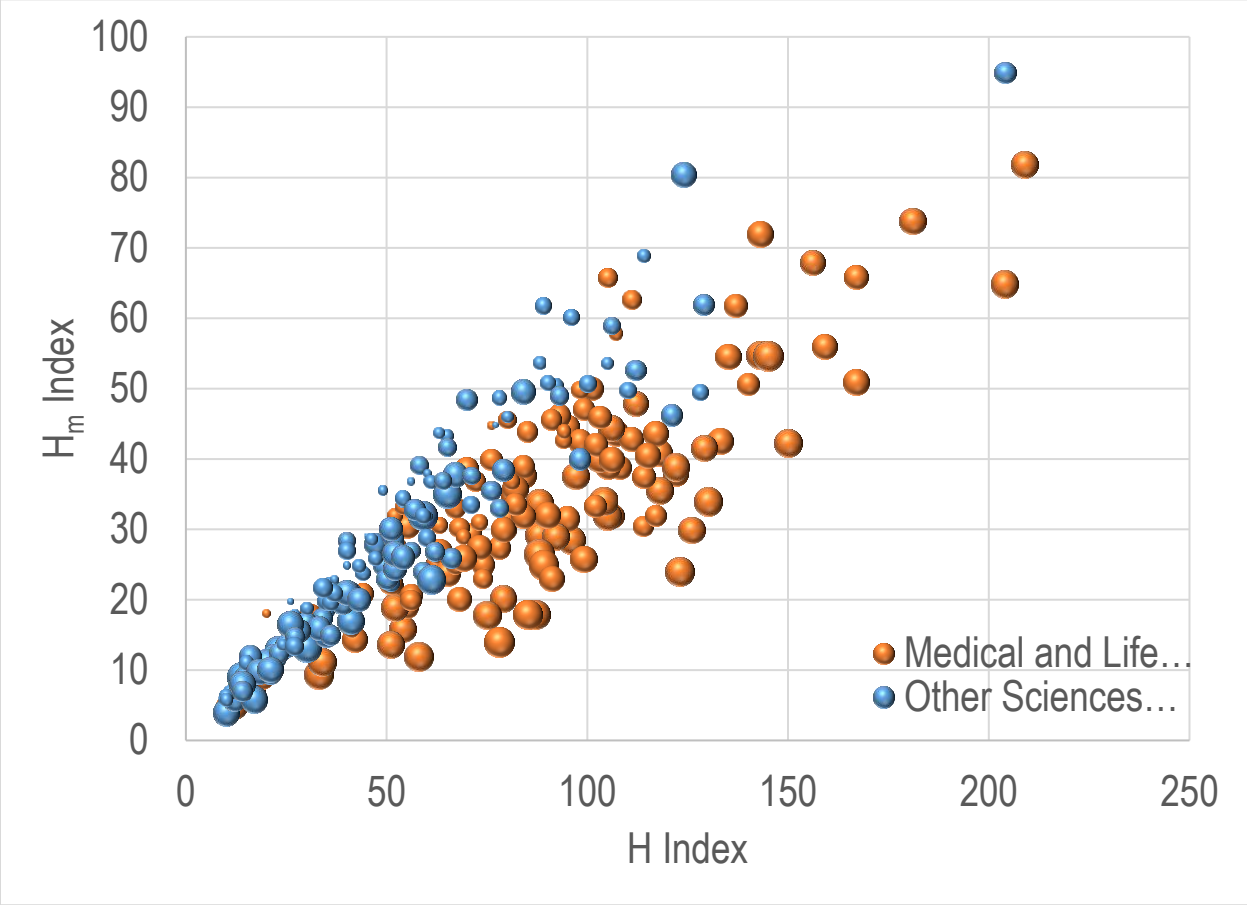

Supplementary Figure 2 shows the scatterplot of two kay citation indices. Many authors especially in the medical sciences had a less impressive co-authorship-adjusted Schreiber Hm index than Hirsch H index. A scientist with an H index has H papers that have each been cited at least H times. The Schreiber Hm index is calculated in a similar fashion, but each paper is counted as a fraction 1/k, where k is the number of its authors. (Schreiber, M. A modification of the h-index: The hm-index accounts for multi-authored manuscripts. *J Informetrics*, **2**, 211-216

(2008). For a typical scientist, on average the h index is about 2.5 times the Hm index in the medical and life sciences and the h index is around double the Hm index in other sciences (excluding Physics). The plot below shows the Hirsch H index (horizontal axis) and Schreiber Hm index (vertical axis) for the 265 hyperprolific authors, separately marked for medical/life sciences and other sciences (excluding Physics).

Several hyperprolific authors in the medical and life sciences (in particular epidemiologists and cardiologists) have very extensive co-authorship, and therefore their values are below the reference curve of the average medical and life scientists. Conversely, most hyperprolific authors in other sciences (excluding Physics) have limited co-authorship and their values are above the reference curve of the average scientist in these fields. The reference curves use data from all scientists who have an H-index of at least 9 except for those with primary field being in Physics and those from China and Korea (785,181 author records are eligible in the medical and life sciences and 346,314 author records are eligible in the other sciences, excluding Physics).


100
90
80
70
60
50
40
30
20
10
0
$H_m$ Index
0
50
100
150
200
250
H Index
Medical and Life Sciences
Other Sciences (excl Physics)

The Supplementary Figure 3 below shows the same data, but the size of the points is proportional to the proportion of middle-authored papers. As shown, many hyperprolific scientists with high H index and/or high H/Hm ratio have large proportions of middle-authored papers, but there is substantial diversity.



## Survey to hyperprolific authors for calendar year 2016: text of email

The survey was sent in May 2018 and two reminders were sent within 20 days. The text of the survey was as follows:

Dear colleague,

on behalf of the Meta-Research Innovation Center at Stanford (METRICS), we are conducting a short survey to understand authorship norms. The work is under consideration at Nature.

You have been selected because we have identified you as one of the most prolific scientists across all science based on the number of full papers published during the calendar year 2016. These are papers indexed in Scopus as Article, Review, or Conference Paper, excluding editorials, opinion articles, and letters.

We would greatly appreciate if you could offer us insights on your productivity. Please reply to this e-mail (jioannid@stanford.edu) with your responses to the questions listed below.

1. In what percentage of the full papers that you published in 2016, did you do the following?
1a. substantially contribute to the conception or design of the work; or to the acquisition, analysis, or interpretation of data for the work
Answer (pick one): 0-25%, 26-50%, 51-75%, 76-100%
1b. Draft the manuscript or revise it critically for important intellectual content
Answer (pick one): 0-25%, 26-50%, 51-75%, 76-100%
1c. Approve of the final version before publication
Answer (pick one): 0-25%, 26-50%, 51-75%, 76-100%
1d. Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved
Answer (pick one): 0-25%, 26-50%, 51-75%, 76-100%

2. Do you think that contributions in all 4 criteria above should be required for authorship?

Answer (pick one): Yes, No

If no, which of the above you think should be required?
A) Conception or design or data acquisition or data analysis or data interpretation: Yes/No
B) Draft or revision of manuscript: Yes/No
C) Approve final version: Yes/No
D) Being accountable for all aspects of the work: Yes/No

3. In how many full papers published in 2016 were you the author who contributed the most (compared with any other listed author) specifically to the writing the draft or to critical revisions of the manuscript?

Answer (pick one): 0-5, 6-15, 16-25, >25

4. What, in your own words, do you think should be required for authorship?

We thank you in advance for your contribution to the survey.

John P.A. Ioannidis, MD, DSc
Professor of Medicine, of Health Research and Policy, of Biomedical Data Science, and of Statistics
Stanford University

---

## Survey to hyperprolific authors for calendar year 2016: open responses

The responses to the open question "What, in your own words, do you think should be required for authorship?" were as follows:

The active participation in data acquisition of data, analysis and writing of the manuscript.

Come with knowledge into the paper – idea/development/design of paper – as well as in the case of senior authorship – review the paper fully before submission

Important contributions to data acquisition or analysis or write up. The first author can define what "important" constitutes. I don't think it is realistic that every author can be accountable to all aspects of the work. This criteria should be dropped because it is impossible to achieve/not practical.

Conceiving and elaborate a research idea, and/or contributing a critical and/or substantial amount of data for the study, and/or writing a substantial part of the text, tables and/or figures. Being accountable can take various forms: from just being responsible for your contribution (integrity/correctness of just your data and/or analysis) to taking responsibility for the whole study (i.e. senior and/or corresponding author)

Contributed significantly to any of the following aspects: design, substantial data collection, analysis of the data. In addition, each author should critically interpret the data and read and revise the manuscript as well as approve the final manuscript. Being responsible for large collaborative projects, including major effort in data collection for other persons involved, I think it is appropriate to also acknowledge substantial contribution to data collection. Not just entering a few patients in a cohort, but a significant proportion. And this would not qualify for authorship on all the manuscripts based on those data, but just a few. This is especially for academic collaborations. If this is not possible, it will be hard to motivate people to put significant work into data collection. Nevertheless, all other aspects I mentioned need to be fulfilled. In my experience, there are many co-authors that never critically revise a manuscript. Being accountable for all aspects is true for me as an academic leader, but would be difficult for some of the authors less knowledgeable in e.g. statistical analyses. And for me as an academic it is not always possible to feel completely confident to be accountable for all aspects of a clinical trial. I try to check as much as possible, but will still be unable to be accountable for all aspects. E.g. I would be unable to check if all entered patient data are based on real patients in all sites.

The current criteria on paper are sufficient (A, B, C and partly D above). However, the practical interpretation is difficult. For instance, what constitutes critical revision? It is very difficult to propose quantitative criteria for such points. I try to judge/justify any authorship for myself by asking the question whether the paper would be substantially different (in terms of analyses conducted, conclusions, presentation of results) if my contribution is removed entirely. Mere data collection is for me not a criterion for authorship.

Being involved in data contribution/analyses and interpretation and review of results.

As a note: these days we are more and more used to working within research consortia, e.g. in the context of genetic analyses. This is a good thing for proper and replicated science. It does however result in an increase in publications, as some of the 'summary statistics' are being utilized in subsequent papers. For these papers, the consortium is often included as a authorship-group. These articles do show up in Pubmed under my name, but I personally don't count them as 'my papers' and don't have them on my CV as such, as there is a distinction between being a 'named author' versus a 'consortium member' authorship.

STRONG ENGAGEMENT WITH EITHER WRITING OR DATA COLLECTION OT DATA ANALYSIS, PLUS REVIEW OF MANUSCRIPT

Mainly:
1. substantially contribute to the conception or design of the work; or to the acquisition, analysis, or interpretation of data for the work
2. Draft part of the manuscript or revise it critically for important intellectual content

A significant contribution to the research project. Too many authors are given authorship only because they are senior physicians or operators which should not be enough to have authorship. Authorship should be given to operators only if the research project required a significant contribution from them to during the procedure to collect scientific data.

1a-c above. 1d can be discussed.

A contribution to at least one of the elements that make a research project / paper worthy of publication, e.g., conceiving of a grant that specified data collection for a particular question and thinking of the best way to collect such data, facilitating good data collection, analyzing the data, writing the paper, supervising the junior people involved in the project (in all aspects of the process). I know there is a tendency –as one of my colleagues puts it- that the last person to get his hands on the data be the major author on the paper. I consider –especially with the large consortium papers that allow meta-analysis and replication- to be all steps worthy of authorship. I am involved in multiple projects and only lead few of them, so I realize what an enormous task it is to QC hundreds, or even thousands, of result uploads, for example in GWAS. Still, these uploads would not be available for meta-analysis if someone had not realized the project locally. There is another side to my considerations as well. I have been involved in longitudinal data collection for over 25 years. My grant applications still get judged based on the ideas as well as on my CV and publication record, not on the data / results I make available to the research community. If I want to keep the longitudinal studies alive, this work needs be honored.

More than being one of x nominated to be an author due to sample size!!! The large consortium (especially BCAC) are behaving appallingly in this regard.
I think there should be levels of authorship – and not those implied by order!
P.S. I have my name on about 70 publications per year, reflecting the cohorts I have helped establish and make freely available to many researchers and consortiums. About one-their of my publications are ones I am corresponding author on and are undertaken by my group, and led by me or by staff under my supervision. Another one-third are led by local colleagues and use the resources I helped establish. Some of these are led by people who I trained. The other third are

where our data has been "used' by external researchers and large consortiums (whose leaders think they own our data because they organised finding for measuring the latest SNPs), I am reduce to a "middle author", and that even gets held AGAINST me by some nasty (local) grant reviewers who are jealous of my success. Hence I do think I need to have categories of authorship - I DO think I and others like me deserve to be an author, and have a say, in the latter papers – as recognition of the contribution I/we have made. Basically, though, the idea of "number of publications" be the major (easy) way to assess a researcher is ridiculous, and even worse when it becasome "high-profile journals". Nature Genetics has ruined GWAS studies by having ridiculous rules for publication – designed by functional genomicists who are have a completely different agenda to epidemiologists and public health researchers. No GWAS has saved a life. I could go on for a long time telling you how bad I think the last decade has been, and I blame the lead researchers for thinking of their status and careers ahead of doing useful science. We should not let journals dictate how to do science – but sadly that is the way of the current world. As for opinionated ignorant reviewers for whom we have to be "responsive" … what can I say. The publishing world has reduced us to unpaid lackies doing their secretarial work – fighting with stupid computer systems to even submit a paper – and then having to dumb things down for the "general reader – or "clinicians" who are threatened by anything outside their small areas of expertise!!

INTELLECTUAL CONTRIBUTION MEETING VANCOUVER CRITERIA

Contribution to the design, conduct or supervision of the study, the analysis and drafting of the manuscript.

Distinction between innovative (basic) clinical research, research into mechanisms, phase I/II trials on one hand and Comparative effective research on the other hand. It cannot be accepted any longer that the evaluation of the effectiveness if healthcare is dependent on the politics of authorship. Pressing questions on the effectiveness of interventions should be prioritized and executed independent of authorships. In my field of women's health it is simply unacceptable that we do not know whether simple and potential life saving interventions are not evaluated while they are around for decades, while other interventions that are widely applied have never been evaluated. These questions should be solved independent of the academic politics of funding, authorship and citation index.

One among these:
1. Data acquisition
2. Data analysis and interpretation
3. Draft or important critical revision of manuscript
AND
- Approve final version

Substantial contribution, drafting or critical revision, being accountable for all aspects of the work, approval of final version.

Contribute to the conception, design, collection or data analysis. Write or correct the manuscript. Insure the accuracy and validity of the data provided by you or your group

Contribute substantially to one or more of the following: (a) concept, design and execution of the work; (b) arranging and providing the necessary funds for the research work including field work and laboratory analyses; (c) providing guidelines for preparation of the manuscript and authoring sections, correcting the whole manuscript and approving the final version; (d) helping with responding to reviews, revising and approving the final manuscript.

A-B-C are essential.

A combination of the criteria listed above (a,b and c) I think are essential

The author is or are the one who must substantially contributed to the completion of the manuscript in terms of the conception and design or acquisition of the data, involved in the analysis and interpretation of the data. In addition, an author must also involved in the drafting and revising of the manuscript critically for important intellectual content and give their approval of the final version for submission for publication.

If I was not impacted as mentioned above I may have published no more than 30% of papers that I was a co-author of in 2016, I do believe though, co-authorship must require: Concept or design of the study, contribution towards data analyses and the structure of the manuscript; Review of the manuscript; Final sign off; And if involved with contribution towards the above then accountability- though jointly with other authors.

Critical revision of the manuscript. I start by conceiving the novelty statement without writing any of the paper to ascertain that we have a sufficiently bold contribution and then revise all manuscripts several times word-by-word before its submission and again, when we get the reviews.

Authorship provides providing data, collaborating experiments as a cooperative researcher, and guidance on interpretation of data, preparation of thesis, as a leader, if they are responsible for the paper.

The conception/design of the study (this can either be broad in overall design of a study program or cohort; or narrow for a specific scientific question to be addressed); and to the acquisition, analysis, or interpretation of data for the study (this will obviously in some cases be more extensive than in others). Commenting on the manuscript (and in the case of a study program/cohort: checking whether the description of study design and execution is accurate). Agreeing with the final version and being accountable for the (relevant part) of the study.

Request to contribute comments sent to all listed hyperprolific authors (excluding Physics and Chinese/Korean names)

The request was sent by e-mail in August 2018 and the text was as follows:

Dear colleague

We have recently completed a project to identify and characterize hyperprolific authors, which we have defined as authors who have published an average of a paper every 5 days indexed in Scopus within a single calendar year, looking at 2000-2016. As you are one of these extremely productive individuals, your name will be listed in the supplementary materials.

The analysis is slated to appear in an upcoming issue of Nature. We state upfront that we have no evidence that the hyperprolific authors we identified are doing anything inappropriate, though we do think that many people may consider this implausible by most standards of authorship. We did want to reach out to you to ask if you had a brief explanation of how you fall into this extremely productive class, how you feel about belonging to this class, and if you have any other brief comments. We will compile these insightful comments in a supplementary file to accompany the publication of the analysis in Nature.

A response by August 30 would be appreciated. Thank you in advance for your consideration.

Sincerely yours

John P.A. Ioannidis, MD, DSc

Professor of Medicine, of Health Research and Policy, of Biomedical Data Science, and of Statistics

Stanford University

Of the sample of hyperprolific authors, at least 2 were known to us to be deceased, for 2 we could not locate an e-mail, and for another 4 all e-mails that we found did not seem to work. A total of 94 researchers responded, and 81 provided a comment.

The contributed comments appear in the next section.

## Comments contributed by hyper-prolific authors

Api, Anne Marie

Thank you for the opportunity to explain the publications that we have been writing. The Research Institute for Fragrance Materials, Inc. (RIFM) was formed, as a nonprofit corporation in 1966. Its purpose is to gather and analyze scientific data, engage in testing and evaluation, distribute information, cooperate with official agencies, and to encourage uniform safety standards related to the use of fragrance ingredients. All of RIFM's research is reviewed by an independent Expert Panel (The Expert Panel for Fragrance Safety (http://fragrancesafetypanel.org/)), an international group of dermatologists, pathologists, toxicologists environmental, and respiratory scientists that have no commercial ties to the fragrance industry. The Expert Panel advises RIFM on its strategic approach, reviews protocols, and evaluates all scientific findings. Their conclusions form the basis for the Standards set by the International Fragrance Association (IFRA).

Our Institute publishes safety assessments on fragrance raw materials. The current program is dedicated to publishing a safety assessment on all fragrance materials in current use. We plan to complete this project by 2025 (over 3000 materials). The publications themselves are available free of charge on an Elsevier website (http://fragrancematerialsafetyresource.elsevier.com/). They are all peer-reviewed publications. The RIFM staff and the Expert Panel are the co-authors. We all make contributions to the papers and then review the entire publication.

Baets, Roel

Your message came a bit as a surprise, I must admit.
I have quickly tried to rationalize the situation.
First of all, I am not familiar with Scopus. I rather use Web of Science.
WoS lists 563 publications that I have co-authored for the period 2000-2016.
Given that I work approximately 55 hours per week, that is close to 7 8-hour working days per week.
All of this means that I have been publishing an average of a paper every 10 8-hour working days, rather than 5. That translates to 33 publications per year.
Over the period 2000-2016 I have been advising (or co-advising) on average a team of 25 to 30 researchers (PhD students and postdocs).
With the assumption that every researcher produces on average 1 publication every year (this is probably a small underestimate), it is clear that there is a good match with the publication count.
I estimate that half of the papers at stake relate to work where I was the primary advisor (=last author in many cases), the other half where I was the secondary advisor (=not last author). In the latter case the daily supervision is more relaxed and the role as author relates to reviewing paper drafts and periodic review meetings of the scientific work, rather than daily supervision.
So I think the numbers make sense.
But I would not agree that I publish a paper every 5 days. That is too simplistic a statement, which in my case is simply not correct.
If I would need to state what it takes to be a “hyperprolific” author, I would say (as far as my case concerns): (very) hard work, a strong educational backbone, attracting excellent people, careful choice of research subjects in which one can make novel contributions, success with funding. And some luck here and there.
Last comment: the total publication output of an author is not very relevant as such. What matters is impact (scientifically and societally).

| | |
|---|---|
| Beller, Matthias | A brief explanation for the "productivity" of my research group at that is:<br><br>1. During that time period my work focused to >90% on scientific aspects. At the moment I am less prolific because of other several other duties (Editorship, Advisory Board member, ...).<br>2. I am working at a research institute and not a University. This means I have less teaching duties (only 1-2 h per week). In addition, to PhD students and postdoctoral fellows I have 5 permanent scientific staff members working with me. This makes "scientific working" much more efficient and productive.<br>3. We cooperate above average with other groups, which in my opinion improves scientific quality and productivity. |

Bellomo, Rinaldo

My first comment is that some investigators seem impossibly short and some impossibly tallJ
Some investigators seem impossibly non-productive and others impossibly prolific.
No mystery for either: it's the normal distribution curve with people at each tail end.
To people in the middle, each tail end will look improbable. They are right. By definition, they are. Gauss would be proud.

As to why I am in the prolific tail end, I could say that it is because I work 80hrs/week and have done so for 35 years (and my wife, God bless her, lets me), or because I absolutely love research
or because I have created networks of collaborators to expand the reach of what we do, or because I really enjoy writing and explaining things.
In truth, all of these explanations never even get close to the "core reason" and are fundamentally flawed because of hindsight bias.

How do I feel about being in this tail end? Don't think about it much. Too busyJ

Berk, Michael

A number of factors assist greatly in increasing my productivity:

Firstly, hard work is a given, but efficiency is probably more important. Years of experience have helped me to be able to say what I want to say quickly. Workflow management is also critical. Precrastination - doing things immediately as they come in – is a technique I have (hard) learned, and it means that my inbox tends to be small and manageable, facilitating the ability to take on new tasks. This is another key factor in my productivity. It also helps greatly to work for a University that has a minimalistic approach to meetings and to have little or no teaching load.

Similarly, it's essential to have extremely extensive collaborations (and interests) that cut across many fields. I have a very wide range of research interests and this wide angle lens assists in being able to tie lose ends together, see connections between seemingly unrelated issues, and capitalise on new opportunities in fallow fields. My mantra has always been that the breakthroughs are made at the intersection of silos. This means that I am asked to contribute to many different projects from many and various groups that overlap with my areas in psychiatry. Importantly, I am very regularly involved from the inception of the projects – in their design as well as their execution. For those projects where I am not involved from the outset, I am approached to bring new perspectives and insights that broaden the context and applicability of the research findings.

Having said that, it is also critical to know what to say no to. And be comfortable to say no to many things that are not mission critical.
It also helps that I lead a large team of researchers who are highly productive and motivated – a critical leadership task is to keep one's team motivated and productive and to provide mentorship and sponsorship. If your mentees and partners genuinely perceive that you are rooting for their success, they are motivated and able to give their best. I am also in the fortunate situation that my team are able to manage non-critical tasks without being micromanaged. This also aids productivity.

A cliché is that ideas are cheap, but if they are useful enough that others want to follow them up and provides value to partners, that enhances productivity. Being an academic cuckoo helps – laying fertile eggs in other peoples nests.

Generosity gives back generously. Our unit also creates many resources such as protocols, grant applications, etc., that can be used by other people and groups, adding intellectual and practical value to others work, creating and reinforcing partnerships and collaborations. These tangible research 'products' also result in increased collaboration on research papers.

All of these factors have allowed me to build a comprehensive foundation of

research outputs that have hopefully contributed to better outcomes for people with mental illnesses; this has and always will be our primary aim and focus.

Blaajberg, Frede

The way we work is that we often send our students to conferences (shorter papers) and do presentations to get feedback on what are doing, creating network and also for training in their carreer development. The best research are the expanded for journal papers – those are the ones I am counting – and I think if you did same analysis on this – just looking at journals – I will not be in any top –list

That being said – I am looking at the journal papers – and around 10 % of those are in top 1 % in Web of Science, which is good in my field.

Our field is booming – the electrification of the modern society is rolling out in full scale and the field I am working with - is a very core technology – therefore I have around 70 researcher in my team and with my long experience – maybe 100 researchers at other universities who work with me for doing research.

Times Higher Education touched a little the same as your Nature article – see

https://www.timeshighereducation.com/news/ten-most-prolific-and-most-cited-researchers

Maybe worth to see if it the same which is published

I hope you can use it

| | |
|---|---|
| Boccaccini, Aldo | It is interesting to learn that according to your analysis I am considered an extremely productive author. I have never asked myself before how I fall into this category, but I would say that the productivity of a person is directly proportional to the number of hours he or she works; if someone works many more hours per day than what could be considered "standard" (say 5-6 more hours every week day plus many more hours on weekends) then the output of such a researcher will be higher. In my case, the high output is perhaps also related to collaborative research, e.g. developing and maintaining a large international research network, something that is highly encouraged by European projects. Another aspect may be the emphasis I put on the publication part of the academic activity, and less on administration, university politics or IP/commercialization (start-ups). |

Boeing, Heiner

Wwhen I was a young scientist I was extremely lucky to receive substantial federal funding for the start of a cohort study being called EPIC-Potsdam. EPIC-Potsdam is part of the EPIC Study that turned out to be very productive over the last 25 years. I was contributing to EPIC as a whole from 1988 on when the first meeting was set up. Thus, you can find EPIC based papers including Interact and EPIC-CVD papers and also papers based solely on EPIC-Potsdam data in the literature coauthored by me.

It is extremely difficult to escape the responsibility as PI and not to coauthor studies that used concepts and data that had been developed and collected with own original intellectual contributions and had been authorized regarding quality as described in the method section. This responsibility also includes critical comments regarding the papers if required and agreement with the submitted version. I do not see a problem to read every 5th day a manuscript which topic has been approved in advance, to check it for proper use of concepts and data, to make critically comments, and to approve the final version. It is part of the regular duties of a head of a department. You must be aware that the number of subjects being in such a privileged situation to be asked for authorship in such a high number is small and confined to those that made major contribution at the beginning of the study and are scientifically active over a long time period in the same institution in a leading position that hosts and financed a study.

According to ICMJE an author should fulfill the following criteria:

* Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

* Drafting the work or revising it critically for important intellectual content; AND

* Final approval of the version to be published; AND

* Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Even if there could be a debate about the qualification as author in each single case, the authorship guaranties proper use of data, concepts, and a proper interpretation of the findings. I do not like to see a world in which data of all kinds from very different sources are analysed without solid background information, solely co-authored by the group of data analysts. I have a much better feeling if such a group is surrounded by knowledgeable scientists which could correct statistical modelling and interpretation due to the co-author status.

| | |
|---|---|
| Boffetta, Paolo | I think each paper should be evaluated according to its own merit, independent of how many other paper its authors have published in any given temporal interval. Personally, I published many papers, especially during 2009-2016 because in that period came to full maturity many large-scale collaborations (both multicenter studies and consortia) that I started and nurtured for many years. Some of the papers have a large number of authors, since they are based on the work of many individuals in the different stages of the projects. In general, my ambition has been to provide stronger and more definitive evidence with such large-scale collaborations compared to more limited investigations. |

| | |
|---|---|
| Budoff, Matthew | I have over 40 people working in my lab, each of them working on different projects. As I have supervisory roles with all of them, I help design the papers, contribute to the manuscript both in preparation and final editing, and take full responsibility for the results. Many of my post-docs are trying to get into residency or fellowship, so they are very motivated to write papers to help with their personal chances of furthering their chances of getting into a US based residency or cardiology fellowship. Further, I have masters students I supervise who are REQUIRED to write papers and do research, so they also publish regularly. Finally, I am the core lab director for cardiac CT for many NIH based trials, and thus have a responsibility to help with data collection, manuscript preparation and the methods section for these NIH based papers, and thus tend to be included when my labs work is used as the basis of the investigation. You should know that those of us in epidemiology have many papers that are derived from our phenotyped work, and thus able to publish on a few lines of investigation, getting multiple papers out of these observations.<br>I am fully funded by the NIH and thus am glad to be considered a hyperprolific author. |

| | |
|---|---|
| Calhoun, Vince | Regardless of the actual number, I'm not surprised I'd be in a highly productive category. I spend a large portion of my time working with folks on project ideas and editing papers. This is hard work, but also rewarding. I run a highly collaborative lab, we participate in a lot of international projects, we develop algorithms and release open software which often include technical papers plus a number of application papers, sometimes quite a few of the latter in different areas. I take a position that authorship on papers should be earned, and I try my best to provide added value to ongoing projects as best I can. I'm very proud of my lab and the work we do. In addition to our core research projects I currently lead two center grants which include substantial mentoring components across a variety of topics. So there are a lot of touch points and interactions that often lead to ideas and result in papers. |

| | |
|---|---|
| Cooper, Cyrus | The main reason for my "hyper-prolificity" seems to be the large number of collaborators in NCD epidemiology and genetics who use our invaluable cohort resources (questionnaire; physical exam; intensively phenotyped; and DNA/omic samples). I would put myself mainly in the category of UK Biobank or Framingham/Olmsted County as a metaphor, where I would expect quite a high output rate also. I am usually part of a large consortium of authors; often do not lead the paper but contribute/comment; and am asked to join the listings. My government and charitable funders seem to welcome this approach. Clearly, it is hard to see exactly how I can be viewed as equivalent in authorship of these papers to those that I actually lead in research terms, or contribute to as a significant co-investigator. In my highly cited listing (say top 125 in an h-index of 125) there are a large number of these sorts of papers and looking at the highly cited listings recently, there are many authors like myself in there. Finally, I am relatively late career (over 60ys) and that enhances productivity/reputation etc. I certainly see no adverse consequence to being in such a listing if interpreted appropriately (I would say I actively contribute importantly to around a third to 50% of the papers that actually have me named, but sample/data provision is the criterion most used by external collaborators) and I would happily decline authorship if that became the convention.<br><br>Please feel free to use this response in your paper if it helps, and do send me a blind copy if you get a moment, as it is hard to comment without seeing how pejoratively you view the finding. To me, it is a reflection of successful construction of internationally renowned data resources, and successful leadership of a large multi-disciplinary research unit. If the result is that convention dictates that I should decline authorship often, to the many leads worldwide who approach me for it, I should happily comply. It is the science, rather than the authorship, that actually stimulates me over this last 35 years. |

Dhama, Kuldeep How I fall into this extremely productive class,

Due to some family disturbances, I was living alone since the year 2011, so in positive directions I devoted my full time of 24x7 hrs mainly working for science with a passion, formulated a team of selected researchers from India as well as worked with reputed expert researchers from other countries (USA, Mexico, Switzerland, UK, Italy, Spain, China Thailand, Iran, Egypt and Pakistan), especially for writing quality review articles in well indexed journals in Scopus, Thomson Reuters / Clarivate Analytics and having Impact Factors.

Mainly working as team leader, I followed all good writing skills while having a check on any plagiarism issue, compiled the review articles in a team mode with able expertise of different team members, editing being done by senior members and finally by myself and tables and figures designed by experienced members, and thus got published many articles particularly during 2013 to 2018 years.

With excellent Academics (nearly 90% marks in BVSc., MVSc., PhD.) and PhD (Gold Medalist), I received several awards / honors / recognition at National and International levels, I also got opportunities to acquire high editing skills and good writing practices. I served as Editor for an Indian journal since 2002, and In between 2013-2018 served as Editor in Chief, Editor and Guest Editor in few International journals of repute as well as having high Impact Factor (Asian J Anim Vet Adv., Adv Anim Vet Sci, Veterinary Quarterly, J Exp Biol Agri Sci, Int J Pharmacol., Current Drug Metabolism, Front Immunology, Front Microbiology and others). I also served as peer-reviewer for evaluating papers of many International journals.

In a team mode, I always monitored progress of all the articles at different stages from initiation to submission / publication, and boosted and encouraged my team members from time to time for publishing quality articles.

I acknowledge a special thanks to Dr RK Singh, worthy Director of my Institute (Indian Veterinary Research Institute), who always appreciated hard works of mine and our team, and throughout promoted highly to publish in journals having high repute / Impact Factor.

Recently, in past two years, I also took help of professional English editing services of Editage for few articles to be submitted / published in high Impact Factor journals.

More recently, I received an award for having highest number of publications, h-index and citations in Scopus indexed journals, and high productivity in Veterinary Field from India.

During my service career and having special interest to acquire knowledge of related fields of my expertise I gained good knowledge of biomedical science,

along with this the skills and proficiency of my team members improved with the moving time.

How I feel about belonging to this class,

I am very much thankful and feeling honored that as per your statistical analysis I will be listed amongst the extremely productive individuals in the supplementary materials of Nature journal. I am feeling very happy that my hard works and a passion for science are being recognized.

Other brief comments:
I can understand that while being identified as extremely productive and / or hyperprolific author many people may consider this implausible by most standards of authorship; however with a high team spirit, following very hard works and a passion to serve science to my best, I/we followed all the good writing practices supported / equipped with experienced editing skills and a holistic vision - got published high quality reviews as well as research articles in different scientific journals well indexed in reputed scientific databases and having Impact factor; which altogether reflects and proves that hard works done in a team spirit and collaborative efforts, passion to serve science and encouraging working environment can pave way to publish high number of articles cumulatively in a calendar year along with tasting high success and promotions in academics.

I would wait eagerly and anxiously for seeing these insightful comments / explanation published in a supplementary file to accompany the publication of the analysis in Nature journal.

| | |
|---|---|
| Dougados, Maxime | I assume there are several reasons to explain my so-called " hyperprolific author profile"<br>1 I am a clinical researcher<br>The main difference ( at least in my opinion ) between clinical and translational research, is the fact that in case of clinical research as soon you have a question, you will get for sure an answer ( positive or negative ) in a predefined time frame<br>Moreover in case of clinical epidemiology a part from the main objective some ancillary objectives might deserve a specific publication<br>2 I have been involved in Systematic Literature review<br>Because of my position within EULAR ( European league against Rheumatism), I have been involved in the elaboration of different recommendations and during the process of these recommendations I have supervised different systematic literature review which have resulted in different publications<br>3I would like to insist on my last characteristic. I am in charge of different databases issued from cohorts, registries, international cross-sectional studies. In all these situations, the procedure to have access at the database is transparent and open ( for free) to the entire research community . I would like to take the example of DESIR which is a cohort of patients suffering from recent spondyloarthritis, I am the principal investigator, 25 centers in France are collecting the data (longitudinal follow-up of clinical, biological, imaging parameters). There is a scientific committee evaluating the proposals of research coming from different scientific researcher. As soon as the project is accepted by the scientific committee, the database is provided to the applicant for free. So far, thanks to this organization we have get around 50 publications<br>Moreover because one of my important field of research is focused on outcome measures permitting the evaluation of the efficacy of anti-rheumatic drugs, I have acted as a consultant for many pharmaceutical companies designing many clinical trials. Because of this position, I have been invited to act as an author or a co-author of manuscripts summarizing the results of these clinical trials |

| | |
|---|---|
| Dowdeswell, Julian | The main reason for my unusually large number of publications in 2016 was the appearance of a major volume of which I was the chief editor: Dowdeswell, J.A., Canals, M., Jakobsson, M., Todd, B.J., Dowdeswell, E.K. and Hogan K.A., (eds), 2016. Atlas of Submarine Glacial Landforms: Modern, Quaternary and Ancient. Geological Society, London, Memoirs, v. 46, 618 pp. This memoir was intended to describe and interpret the full range of glacially produced landforms found on the floor of the polar seas, and to show how assemblages of such landforms could be used to reconstruct the past extent and dynamics of marine-terminating glaciers and ice sheets. It was the culmination of a number of years of work, with over 200 contributing authors from more than 20 countries. The memoir's format, with over 180 papers in total, many of which were either two, four or eight pages long, meant that I was either lead author or a co-author on about 60 of these relatively short papers, together with much more substantial papers introducing and concluding the volume. This was a huge amount of sustained effort over almost three years for myself and the other editors, and I doubt that we shall be repeating it - I do not suppose, therefore, that I shall be picked out in metrics as having published at a rate of more than a paper every five days in a single year again! |

| | |
|---|---|
| Drioli, Enrico | Pleased to be in your list.<br>I am a senior Researcher and a Professor still active and interested to continue to learn and to teach daily. I decided many years ago to work on membrane systems, to understand better membrane phenomena, to develop new membrane operations of interest for solving strategic problems for an advanced industrial Society trying to reproduce what membranes have been and are doing in Nature. I promoted the creation of the first Institute on Membrane Technology by the CNR in Italy, in the late 80ies.A very multidisciplinary and multinational structure where hundreds of students and young researchers have been very active in the last 20-25 years. I promoted and coordinated the first Erasmus Doctorate School on Membrane Engineering sponsored by the European Union, where around 45 students from all around the World have been educated in Membrane Science and Engineering. Today Membrane Science and Membrane Engineering are attracting more and more attention in a large variety of industrial areas, in medicine, in biotecnology, in energy. In desalination, in waste waters treatments and reuse, in fuel cells, in some artificial hybrid organs etc, membrane systems are dominant technologies already. The large number of students and younger colleagues from Italy, China, Korea, Saudi Arabia and more who are interacting and collaborating with me, covering different expertise and topics, but all educated and attracted by the potentalities of Membrane Engineering is at the origin of our productivity. Their enthusiasm, expertise and visions made possible to solve all problems and obstacle present in promoting new ideas and new solutions.<br>Hopefully more will come! |

| | |
|---|---|
| Eggleton, Benjamin | I have been in a research only position for 15 years supported by an Australian Research Council Laureate Fellowship and ARC Centre of Excellence. |

| | |
|---|---|
| Ferrucci, Luigi | Not sure what you are looking for.<br>I am willing to work very hard for many hours everyday, including weekends. This is not a sacrifice for me, I love the work I do. I produce a lot of data that I share widely and freely with other investigators around the world. When somebody invites me to be a co-author of a paper, I always work on the project and provide substantial feedback and editing (if needed). That why I have published many papers. I am not sure what tricks people are talking about. Hard work is only trick I can offer as suggestion. |

| | |
|---|---|
| Fonarow, Gregg | I am very proud of my academic productivity. It is the result of dedication, hard work, creative thinking, long hours, excellent institutional support, outstanding colleagues, successful multicenter collaboration, and working in a field that has seen tremendous advances in recent years. I am highly motivated by the drive to make meaningful contributions to clinical science, mentor early career investigators, and to improve the quality of care and outcomes for those with and at risk for cardiovascular disease. I have adhered to the International Committee of Medical Journal Editors recommendations for authorship in my published manuscripts. |

| | |
|---|---|
| Franco, Oscar | Brief explanation: this is the result of the participation in multiple consortia, and two dedicated and motivated teams (ErasmusAGE and CVD Epi group) working with original analyses based in the Rotterdam Study and Generation R Study as well as in projects focused on summarizing the evidence with systematic reviews and meta-analyses. |

| | |
|---|---|
| Ganjali, Mohammad Reza | This is a great pleasure for me to hear about my name as a hyperprofilic authors. I always work hard and never pay attention to such ranking. By a quick search in scopus or other scientific databases, you can find several thousand people working in higher rates and harder than me and in fact are more and more hyperprofilic than me!!! And for me it was interesting that my name also was placed among such authors! I think I should still work more and more to really obtain such a place.<br>I think in most of the works especially research work if a person prefer to work individually and not in a team, it is not possible to reach to such a place or success (if call it success!). Here I point to some important factors which are helpful in these kinds of achievement.<br>• Without having a professional, expert and wide research team, it is not possible to be hyperprofilic<br>• Having a roadmap to achieve the goal<br>• Right Leadership the research team, management the projects, and follow up the details of the work through an effective timetable to be sure that we are going according to the map<br>• Have a close engagement to the colleagues in a team, collaboration of the members in a friendly, responsibly and compassionate manner<br>• Work on focused research fields to be expert on that field, not research on everything to be like an ocean with one meter of depth!<br>• Believe in extending the boundaries of knowledge and service to humanity, even it would be negligible (Never give up on small things and seemingly worthless phenomena and never ignore them hopping that there are bigger works to do. Every research can be someday valuable)<br>Fortunately, I have succeeded to form such a research group. In 2005, I established a center (called Center of Excellence in Electrochemistry) at University of Tehran. In this center most of the researchers are young, super-active, innovative, very educated, hard worker and they are my former students who graduated and needed to be supported! I gathered those people, provided many equipment, space and the most important, a research road map and lead them in the road closely.<br>Now the budget of our center is really low compare the developed institutes and it will have more potential capacity to work more and better if there is a good financial support.<br>Such a system with right management and good collaborations of the expert people causes every member grow up fast and faster than working individually! Our team now are working on designing sensors/biosensors/nanosensors for clinical, environmental and industrial applications and also working on new energy systems to make the life better for all of the human. |

Grobbee, Diederick

Thanks for letting me know that you are working on an analysis of highly productive authors. Of course I would be pleased to share my insights with you. Science is my main focus and I am committed to high quality research the results of which, positive or negative, should become available to the international scientific community trough publications. Generating new knowledge is the aim, publishing the means of getting the knowledge disseminated. I love doing my job, including the mentoring of my fellows, my involvement in major research projects and my contributions to the published papers. Much of it results from working in the right environment and with the right people.

Sometimes early experiences have a lasting impact and I started my career in another highly productive environment, the department of Epidemiology at Erasmus University. My first paper hit the Lancet and this too was the result of a focused, efficient and science driven culture. And it certainly whetted my appetite for scientific communication.

In 1996 I started a new research group at the University Medical Center Utrecht, the Julius Center for Health Sciences and Primary Care. The Julius Center was designed with a view to delivering and teaching high quality and relevant clinical and epidemiologic research. The staff was handpicked and the strategy, culture and infrastructure were tweaked to the maximum to promote research. This soon yielded indeed a growing stream of international papers. Currently around 500 to 600 per year. In our Center we adhere to the criteria for authorship spelled out by the ICJE.

An important driver of Dutch research is the system of (salaried) PhD fellows. In my unit the typical duration of a PhD fellowship is between 3 and 3.5 years. All our fellows follow an obligatory training program of about 120 ECTS which we created ourselves to quickly and predictively raise their knowledge of principles and methods of research, data-analysis as well as writing skills. The results of the PhD work are bundled as (potential) publications in a printed thesis booklet with a public defense.

It is my strategy not to include lengthy introductions, redundant discussions or anything that will not find their way into the published domain. A typical thesis comprises 5 to 8 published or publishable papers as chapters. In those years I probably supervised around 15 PhD fellows at a time. And I clearly did not do the supervisory work alone. The supervising team usually has one or two daily supervisors, at associate or assistant professor level, and one or two senior supervisors at a full professor level. Alongside the formal training program, the whole team meets, depending on the stage of the work, once every 4 to 8 weeks for an hour or so. Fellow and daily supervisor once a week. For me this means 3 to 6 PhD fellow meetings a week, likely with a similar amount of reading time. On average one can expect from this set-up that annually some 30 to 35 papers are published in which I serve as one of the authors. Please note that the research

is clinical, methodological and epidemiological and there is an abundant infrastructure for research projects and data collection. For these papers I have been involved in virtually all aspects of the design, execution, analyses and reporting of the results. I was typically also involved in securing the funding.

In addition, I work on a daily basis with post-docs and other staff. I am also involved in international consortia as for example in genomic research and EU sponsored projects, major international clinical trials, occasional work for guidelines or invited editorials etc. All of this may occasionally well result in some 50 or more papers a year. And yes, it is a lot of work which would not easily fit in a 9 to 5 job, but it is fun too and certainly not depriving me from other pleasures of life. I believe publishing is a means for sharing knowledge and insights, not an aim. I firmly believe that that quantity should not override quality (1). But high volume and high quality is not contradictory either.

1. (Grobbee DE, Allpress R. On scientific authorship: Proliferation, problems and prospects. Eur J Prev Cardiol. 2016 May;23(8):790-1.).

Hammouti, Belkheir

Concerning my CV, I thank God that I had the opportunity to live in French Farms (in Morocco). Then, my Father migrated to Paris where he worked and spent most of his Life from 1965 until his death in July 2011).
Besides, I spent my childhood in the Farm of a certain Abraham Azincott - French Jewish – who later left Morocco to Israel around 1968. As my Grandfather was responsible of the Farm, I had the chance to be enrolled in the nearest School.
After their departure, the farm deteriorated quickly, the water went away, the trees were cut and it turned into a real desert as the proverb says: the good follows its founders.
Also during my formation (secondary School- academic studies in Rabat: 1970-1986) I was educated and taught by more than 120 French teachers that strongly influenced the building of my personality and contributed to the shaping of my career, with the pills of working for human dimensions.
My ethics guide me to help students from all Moroccan Universities (24 cities) by interpreting the results, writing articles and teaching PhD students to submit articles to journals indexed in SCOPUS.
I collaborate with Colleagues in more than 20 countries of this beautiful world as France, Spain, Saudi Arabia, India, USA, Algeria, Egypt, Tunisia…
The support and guidance of my colleague Prof Sekkou Kertit, Ecole Normale Superieure Takaddoum, Rabat are unforgettable: He gave us the art to write papers. He is warmly thanked.
Despite the modest means and the lack of communication between Colleagues-Researchers, I try to bridge the different institutions of Morocco as well as those of more than 20 countries to mark our presence and produce this number of scientific publications ... I try to serve Master's and PhD students.
And since Time is Money: I spent the majority of my time working in the Laboratory and the office, or at home from 5 am to 11 pm. I supervise, directly or indirectly, more than 80 PhD students.
I won several awards: the Elsevier/Scopus Prize in 2006, as the most published author in Morocco between 2000 and 2005 and the Arab Prize for Chemistry, in 2013 I was awarded by the Union of Arab Chemists in Emirates. I was also invited by the American Chemical Society (ACS) to attend PITTCON 2010 at Orlondo among the Middle East and North Africa (MENA) delegation.
I was also invited by the King of Morocco, The King Mohammed VI, in July 2015, who congratulated me for my works and rewarded me by a Royal Medal.
With the poor materials and means of research as well as the lack of communication between our colleagues-researchers I try to make the impossible possible by visiting many different institutions in and outside Morocco. This is what I am doing to justify my existence and produce this number of scientific publications.
I thank so much these databases as Scopus that gives us the opportunity to communicate, publish and develop our skills. Thanks again to them that we are known throughout the World!
My CV is updated each month on JMES :
http://www.jmaterenvironsci.com/Document/biographie/CVHammoutiB.pdf

Hanzo, Lajos Throughout my 42-year career I have enjoyed close and productive collaboration both with my 119 PhD students as well as with a comparable number of valued international academic colleagues. The enlightenment and support I gained is gratefully acknowledged.

| | |
|---|---|
| Harrison, William TA | My publication *annus mirabilis* in 2007 arose due to a set of circumstances. As well as my own research in inorganic chemistry, I was and am the departmental crystallographer at Aberdeen and over the years prior to 2007 I had accumulated myself and on behalf of my colleagues a considerable number of "orphan crystal structures", which were unexpected/unwanted side products of reactions or arose from the research projects of undergraduate students or were done to assist co-workers in developing countries and did not easily fit into larger publications. We had always intended to publish these in a crystallography journal over some unspecified timescale but it became a matter of greater urgency when in 2007 the natural journal for these, *Acta Crystallographica* (Section E) announced a change from a "traditional" (subscription) to an open-access publication model. This was sufficient incentive to "clear the decks" of a large number of these structures by submitting them to *Acta E* before the publication-model switchover deadline at the end of 2007. They are undeniably modest papers but like every crystal structure, they add to the crystallographic body of knowledge (including in databases) and several project students were excited and very grateful to see their names in print and have their CVs enhanced.<br><br>As to "how I feel" about this, my main focus these days is teaching and supporting students and until John Ioannidis contacted me, I had forgotten all about these publications and I had no idea that they define me as a "hyper-prolific author" -- perhaps he could inform my own management (assuming that this is a good thing)... |

| | |
|---|---|
| Harun, Sulaiman Wadi | Thank you for recognizing me as one of the prolific authors. My achievement is mainly due to my association with many young and productive postgraduate students who work tirelessly. More than 50 PhD students have graduated under my supervision. Although most of the publications are not breakthroughs, the aims of writing these papers are to disseminate scientific findings and cultivate the culture of publishing. I am grateful to the support of many collaborators who share materials and ideas from all over the world. |

Hopper, John

With the help of some key colleagues, we set up genetic epidemiology studies in the early 1990s before most people had tweaked to the idea. We didn't even have a dedicated laboratory collaborator when we started to collect blood samples J We also set up two major cancer family studies funded continuously now by NIH for three decades. These studies are now in effect cohorts.

For the first decade or more we worked very hard on collecting data, and got little no publications per year during that time period – so this has to be taken into account. Rather than publications per year, you should add up publications over 30 years J

We invested enormous amounts of time and intellectual effort in this, with the hope that it would pay off. I estimate spending more than one year of my life flying back and forth from Australia for meetings with US and Canadian collaborators.

Not only has this been the case for productivity from our individual studies, but because with the turn of the century it became apparent that to get believable results one needed much large sample sizes than any one study could provide, the multicentre pooled studies came into vogue.

This changed the norms for authorship, and led to massive authorships not seen before.

To not be an author on papers that used our resources would be unfair.

But obviously our contributions on such multicentre papers was not as much as if we were working on our own data alone. But this does not necessarily diminish our contributions. For many papers I sent back editorial comments on drafts on the statistics, design, methodology, and interpretation, not to mention the awful misuses of the English language that has become rampant – led by "scholars" at Cambridge(s) and other places where you would hope they know better J

Hyde, Kevin

It is relatively easy to explain the high productivity

A. Reasons for high productivity

1 We are a large collaborative team of more than 130 scientists from around the globe (70 PhD, 10 post-doctoral fellows, 50 senior scientists), many with their own research groups, funding, research projects and students.

2. The cost of a PhD in Thailand is about 5000 US$ per year (fees plus stipend) so it is relatively easy to fund numerous PhD students through internal and external sources.

3. Mycology is a dynamic field with numerous changes and advances and has suffered from years of neglect.

4. Senior students mentor and train junior students and teach them to carry out research and publish. Capable post-doctoral fellows not only have their own projects, but co-supervise groups of about six students. Each senior collaborator looks after their own topics and students. All read papers before submission.

B. What does it feel like to be prolific?

This is because the students, post-doctoral fellows and senior collaborators work so hard with dedication and I would like to thank them for this.

| | |
|---|---|
| Ikram, Afran | The main explanation for the increase in publication activity has been the many collaborative efforts that I am part of. This is not unlike the physics field with biomedical research, especially the genetic epidemiological work, now increasingly becoming a major collaborative effort, in which multiple teams from multiple centers worldwide work together to achieve major breakthroughs. In such a setting, it is also difficult to pinpoint single or few main leaders - it truly becomes a peer collaboration. In order to correctly give credits to the many many people involved there is the choice between co-authorship or acknowledgement. Given the current criteria for co-authorships, these people fulfil those criteria and thus serve as co-author. A middle-ground is also becoming increasingly common, which is to be mentioned as collaborator under a banner-author for a consortium. I also have several of such banner 'authorships', i.e. I am findable under my name but my name is not directly visible in the author byline but in a supplement or acknowledgement. I do not have any strong preference which of these options is the best as long as researchers in and outside that field of research realise what the accepted norm in within that field.<br>These various options also indicate that 'authorship' and the meaning thereof is changing. Being an author does not necessarily indicate the main discoverer of a new law of nature, but instead it indicates one essential person within a larger network of activity that results in scientific discovery. This also means that the value we give to authorships in terms of funding, status, merit should change or at least people should be aware of this.<br><br>My feeling of being part of this group is neutral. It merely confirms what I indicate above: my research has become increasingly collaborative. Collaboration in turn indicates multiple developments: 1) we are searching for more subtle and complex effects (i.e. genetics), 2) we realise that cooperation is more productive in science than competition, 3) in an ever connected world you increasingly recognise opportunities for scientific breakthroughs that might be on the other side of the world rather than in the small community that you work in within your institute. |

| | |
|---|---|
| Ismail, Ahmad Fauzi | To be listed as one of the extreme productive researchers is an honor to me and my country Malaysia. It is beyond my expectation to be featured in a study published in Nature. I consider myself very lucky to be able to work in what I am very passionate about and to be recognized for doing so.<br><br>The backbone for the success in high impact publication lies in the strong and synergized teamwork, excellent postgraduate students, research officers and postdoctoral fellows, international collaboration, conducive research environment, good laboratory facilities and sufficient research funding. Engaging in research that excites us could bring us far. The passion-driven approach has prompted us to go extra miles in order to achieve greater satisfaction. This will consequently attract like-minded and passionate group of people to work collectively toward common goals. This serve as a strong foundation to further instill harmonious working culture with trust, mutual respect and quality conscious among ourselves.<br><br>We should not forget our academic obligation, especially in exploring the curiosity, generate new knowledge and educating the World. Publication is one of many ways to do this. We should publish as a social responsibility entrusted to us |

Kanatzidis, Mercouri

Thank you for your email. It is a bit surprising.

I do know I publish many papers, but had no idea I was a “hyperprolific” author. How do I do it? I am not sure. My research group is made of about 30 highly motivated young scientists (grad students and postdocs) who work hard and produce a lot of new and exciting research results. There are three main motivating factors to publish these results. One is the novelty of the results, the other is the need to tell the world about it (tax payers mainly fund the research, they have a right to know, we have obligation to tell..) and the other is the need to build a strong track research record for them (grad students and postdocs) in order to be competitive in the job market.

I do not set a goal to publish this many papers. It just happens because the new and innovative research results are there. Part of my research philosophy is this “if you haven’t published it, you haven’t done it”. And yet, we still do not have time to publish everything that can be published. I do not think I am necessarily more productive than others with similar group sizes and funding. I think they too have lots of exciting new results but choose to publish only a fraction.

Katus, Hugo

It took me by surprise that I belong in this very special group of authors. The reasons for my high number of publications are listed below. In summary I feel a great responsibility to move and support research in our large department and assist whenever possible and by any means the research of all members of my department. My contribution to each manuscript is reflected my position in the list of authors of each publication.

Activities as chief of one of the largest cardiology department:

I am chief of a Department for Cardiovascular Medicine responsible for a large clinical and research workforce including more than 150 MDs or PHDs. I am driving and inspiring the research strategies in the entire department, which includes the acquisition of third party funding for the clinical and basic research groups, the provision of equipment and infrastructure for research, the generation and allocation of revenues from the clinical department for consumables in basic research, weekly discussions with the research groups in my department, the reading of all manuscripts and in depth discussion of all relevant data. To promote science I approached my patients and private foundations to support our research programs. I did succeed to acquire more than 150.000.000 € by this personal initiative which was and is used to improve scientific infrastructure and implement innovative clinical diagnostic and therapeutic modalities.

Activities as mentor and leading scientist/speaker of large research networks:

I have planned many large research initiatives, written the proposals and then served as the speaker of successful research consortia such as the National Genome Research Initiative in Germany, the EU Initiative BEST AGING, the Heidelberg/Mannheim partner site in the German center for Cardiovascular Research, and many other national and international joint research activities. Within these initiatives I have been persistently involved in the monitoring and evaluation of the research projects and discussed in detail the scientific strategies and results with the responsible investigators of my department.

Activities as a member of executive board in large clinical trials such a PLATO, Copernicus, etc:

In these boards I was involved in the planning and supervision of large international randomized trials comprising more than 20.000 subjects. The results of these trials were continuously discussed in the boards and the data generated are analyzed until today in scientific and publication board meetings. All manuscripts and presentations originating of these trials are read by me and discussed in detail with the colleagues. For example in PLATO-Trial we analyzed more than 16.000 patients and so far more than 60 manuscripts have been published based on the sophisticated analyses of the enormous data set of this multicenter randomized clinical trial.

Inventor of the troponin T assay and father of troponin testing in medicine:

We have changed practice in Cardiology by our troponin assay invention. As such I am part of guideline committees, served as author for many editorials and review articles and our original manuscripts in the field are well received.

We attempt to protect our intellectual property

So far we successfully acquired some 30 patents on original findings and their diagnostic or therapeutic translations.

Kawachi, Ichiro

Each year I supervise around fifteen visiting scholars and postdocs from all over the world (US, Canada, Japan, Korea, China, New Zealand, Brazil, UK, Scandinavia, the Netherlands). They come & study in my lab for 1-3 years funded by their own universities/governments. They often bring their own data. Each scholar publishes between 2-3 papers per year, on which I am usually the senior author. As a journal editor myself, I am well aware of the criteria for authorship. I fulfill the authorship criteria because I co-develop the study questions & analytic design with my scholars & I contribute to writing the manuscripts, including line-by-line editing. Hence my lab produces between 30-45 papers in any given year (on which I am co-author). I probably end up co-authoring an additional 20-30 papers with other authors because I continue to have ongoing collaborations with my lab members after they leave my lab and return to their countries. At any given moment, I am probably involved in 50-60 different manuscripts which are at different stages of development (drafting for initial submission, responses to reviews, etc).

Your definition of hyperprolific authorship -- "one paper every five days" -- is a caricature of someone who hatches an idea and writes a paper literally every five days. As you know, science does not proceed like that; nobody works on papers serially & end up writing 70 papers per year. I end up with 70+ papers in Scopus per year because I am working on dozens of projects in parallel. Many of these papers reflect the end-product of years of working together with my colleagues on a given project. If you have been doing research for 26 years, you end up a far-flung network of dozens of collaborators across the globe and dozens of papers in various stages of completion.

The tone of your assertion that my "hyperprolific" productivity is "implausible by most standards of authorship" does not bode well for an impartial approach to scientific inquiry. You already seem to have reached some sort of negative conclusion despite your claim that "we have no evidence that the hyperprolific authors we identified are doing anything inappropriate". Do let me know if what I have described above is "implausible". If you are running a wet lab with only a couple of postdocs, it would be implausible to publish 30-45 papers a year. When you have a lab of 15 fellows (many of them experienced faculty members in their countries who bring their own data), it is not implausible.

And now if you will excuse me, I need to go back to editing one of my fellows' new papers...

Kivshar, Yuri Thanks for asking.

I have no teaching, my main job is research.

I have a very strong background and extremely good teachers, so I have a broad scope of training and also more theoretical than experimental.

I have many ideas, and I have two groups In two countries to realise them with my younger collegues and students.

When you have ideas, people like working with you, they fabricate samples you need (our fabrication is in 4 places and 3 countries)

Last but not least, I keep changing the topics every 8-10 years, currently this is my 4th topic of research, and I bring ideas across the field

| | |
|---|---|
| Klenk, Hans-Peter | To fall for some time (mainly 2010/11) into the class of extremely productive authors required the coincidence of (i) heading the largest department of Europe's leading Bioresource Centre (DSMZ) with a significant number of very capable and experienced curators and technical assistants who supported my projects in the exploration of microbial diversity in interdisciplinary cooperation with a global network of collaborators and a good number of dedicated, gifted students and postdocs, and (ii) the role as Co-PI in various phases of the DOE-funded Genomic Encyclopaedia of Bacteria and Archaea, which based on the outstanding technical capacity at the Joint Genome Institute, developed a timely new field of research to establish a paradigm change in using genomics for the evaluation of microbial diversity and systematics. The integration of interdisciplinary contributions from a team of international contributors to transform a research field was only achieved by years of extremely long (on average 80+ hours per week) working hours for research in parallel to administrative tasks. The joy of extreme productivity irreversibly exploited my health and culminated in a stroke accompanied by administrative destruction of my professional situation to avoid further 'publication success'. Certainly not a pattern to be followed by young researchers eager to deliver outstanding publication records for the better of science. |

Koren, Gideon

I was asked to comment on the context of my productivity, as measured by my publication numbers. This has led me to personal reflection on different tenets of productivity, hoping that this can be helpful for other colleagues.

Creativity:

I showed creative tendencies at an early school age, asking questions and trying to answer them. In addition to scientific creativity, I have written and composed over 600 songs in Israel which were recorded by top Israeli artists and many of them are part of Israel's song sheet. I edited 10 medical books and wrote two books for adults ("Prozac Baby" and "Children of Neverland" which are on Amazon). My short stories book "Vital Signs" is slated for publication in early 2019. I find that the creative part of my brain does not distinguish between the pleasures of scientific creativity and the arts.

Collegiality:

Rarely can research questions be answered to date by one individual. I collaborate very well with large circles of colleagues. And I never forget how to spell their names when a paper is submitted for publication, sometimes years later.

I am aware that in many universities "bosses" and "professors" are included as authors in papers they were not part of, kind of a "status tax". I never put my name on a paper in which I have not been part of the intellectual journey and practical work.

Research Team:

For over 35 years I have assembled a research team of more than 70 individuals, including clinicians, basic researchers, laboratory technicians and information specialists, among other. I trained 120 graduate students at the MSc and PhD levels and over 70 postgraduate trainees from 42 countries. I had of course to find the funding for this endeavor, but this is the apparatus that turns research questions and hypotheses into scientific papers. In his invitation letter to me Dr. Ioannidis commented that "many people may consider this implausible by most standards of authorship" to write so many paper. I believe this depends to a large extent on the research team, its organization, productivity and ethos of work. My work is meeting all standards of authorship. The "implausible" adjective mentioned in Dr. Ioannidis comment reminds me the story of a man who stands in the zoo in front of the giraffe cage, nods his head and says to his son: "there is no such animal".

Supportive environment:

I have been extremely lucky to work in two very supportive environments, where I have been protected to conduct research for at least 75% of my time. I believe it is now widely accepted that clinician scientists who cannot afford such time protection have major difficulties in succeeding in this very competitive environment. Moreover, top research institutes provide support to their scientists in many different ways, from mentoring all the way to strategic thinking.

Area of research:

Researchers focusing on basic laboratory work cannot typically exhibit the productivity as measured by number of papers as have clinicians, because of the time it takes to plan and execute laboratory projects. In my case, I have

established a unique counseling project for pregnant women on the safety/risks of drugs in pregnancy. Follow up of these pregnancies has yielded the first evidence on fetal safety/risks of many drugs, such as Prozac and misoprostol. This pipeline has generated large numbers of publications, often in high impact journals. In contrast, my clinical pharmacology laboratory work has generated far fewer papers.

Penmanship:

I have encountered many excellent colleagues who conceive great ideas, but for whom the writing process is a nightmare. I have been lucky, as I have been enjoying writing, often 14 hours a day and more.

Industriousness:

I am working 16 hours a day. I am at work hours before most other people arrive, and see them leaving home at the end of their day.

The Proof of the Cake:

Writing many papers does not necessarily mean that these articles are worthy. Luckily, there are objective metrics to judge the merit of scientists' work. I have been among the top 4 scientists in my research institute for the 16 years of using an objective evaluation system that synthesizes all research measures. As of August 16, 2018 my work has been cited 56,517 times with an H index of 107. Two hundred and thirty of my papers have been cited more than 100 times each, the top being 1397. Sixteen of my papers were published in the New England Journal of Medicine, and 15 in Lancet. Our work has led the FDA to ban several medications from use in children, has proven that neonates remember circumcision pain, changing the attitude to neonatal pain, and has established the safety/risks of scores of drugs in pregnancy. A large number of my trainees have succeeded in launching academic careers in different countries, and their publication record was a key component in their success.

Finally, Dr. Ioannidis has asked me how I feel "about belonging to this class". I do not accept "this class". This is an arbitrary definition made by those who decided to define it. I perceive myself as an individual who is highly committed to scientific discovery. I do not feel I have to apologize for my high productivity. And, yes, there is such an animal.

| | |
|---|---|
| Kulmala, Marrku | In short: I think that I am there since in some of those years also extended abstracts are listed in Scopus / ISI<br><br>other reason is that I have a wide collaboration and very proactive way of working. |

| | |
|---|---|
| Lang, Florian | How you fall into this extremely productive class<br>I have been blessed by excellent young collaborators from all over the world. Their dedication and team spirit fueled our productivity. Beyond that I am grateful to the many fellow scientists asking for my intellectual input. Moreover, the generous support from the University of Tübingen and of the DFG have been prerequisites of our scientific success<br>How you feel about belonging to this class<br>I am not particularly proud of the numbers of papers published. I am, however, proud that several of those papers generated current text book knowledge and impact on diagnosis and treatment of patients. I am further proud to have guided many top scientists in their early career. |

Lippi, Giuseppe

Well, there is a rather simple explanation for this. I am an University Professor and writing articles is my duty (and pleasure). I have as many as 7 different research teams who work with me in my network, at my Institution and abroad. And, incidentally, I have personally written or completely reviewed the content of as many as 99.99% of papers that I have published. Then, I just sleep 3-4 hours per night. The time at which this message is reaching you will tell, right? My work is my one and only hobby, since (unfortunately) I have no children or other hobbies. To summarize, I am not a superman, I am simply doing my job.

As you will see, I am first or last author in over 82% of my papers. This should be an unquestionable proof of evidence of my activity.

| | |
|---|---|
| Low, John | I was working in the field of X-ray crystallography in a small group essentially as the crystallographer responsible for data collection, structure solution and analysis. I worked with groups of chemists from many countries. This resulted in very fruitful collaborations hence the large number of papers. |

| | |
|---|---|
| Maffulli, Nicola | I trained in molecular biology and physiology before entering clinical training in Orthopaedic and Trauma, and in Sports and Exercise Medicine. This allowed me to have a wider vision of medicine, and to establish collaborative research links with colleagues in other fields. I trained in the old days of the UK system, where we were working more than 100 hours a week, and I have always slept four hours per night. I have always worked in academic department, and have been a head of department since 2001. I always tried to create an inter-disciplinary environment even within my department, and in this way I have been able to exploit the strength and competencies of my colleagues to produce research<br>A great honour! To more and more hyperspecialisation is seen as the recipe for prominence. This narrows our vision, and I believe instead that it corresponds to producing technicians: I want to be a professional. |

| | |
|---|---|
| Martin, Nick | It is gratifying to be amongst this select group. The explanation is that I spent the last 4 decades building large twin-family databases, deeply phenotyped in multiple domains, and then collecting DNA from them, first for linkage studies (which didn't work) and then to participate in large GWAS and –omics consortia covering hundreds of different phenotypes (which have worked). During this time I have built up a very wide international collaborative network whom I stay in touch with regularly and whose students and postdocs visit my lab to work on new collaborations. Scarcely a day passes without the arrival of another manuscript we have contributed to, and much of my time is spent critiquing and editing these (5am, most mornings), and initiating new ones. It should be noted that many of the papers now being published have hundreds of authors so my individual role in these is very small. On the other hand, the progress in human genetics is now mainly being driven by these huge collaborations depending on the combined efforts of many people, on a scale previously undreamt of and rivalled only by particle physics. I turn down almost as many authorships as I accept. |

McClements, David Julian

To be honest, I was quite surprised one year when I completed my annual faculty report a few years ago and found out that I had published such a large number of papers in one year. (I also wrote a couple of books in the time period you mentioned). Your email has made me think about the reasons. I list the ones that immediately come to mind below:

(1). I work in an applied science (food science) where papers are intended for both an academic and industrial audience. Foods are highly complex materials that contain many different ingredients and experience many different processing operations. Consequently, there is a need to test many different combinations of composition, structure, and processing conditions to understand how their properties are determined at a basic and empirical level, i.e., to develop structure-function relationships. I focus on the physicochemical basis of food properties, which has broad applications, meaning that I work in many different areas. For instance, we examine the impact of food composition, structure, and interactions on the optical, rheological, stability, sensory, and nutritional properties of foods and beverages.

(2). I work in the area of colloid and interface science, which is fundamental to many other areas, including agricultural science, food chemistry, food engineering, food safety, nutrition, and sensory properties. I have all of the analytical equipment required to carry out research in this area in my own laboratory, such as dynamic and static light scattering, particle electrophoresis, confocal fluorescence microscopy, dynamic shear rheology, simulated gastrointestinal tract, interfacial tension and rheology, differential scanning calorimetry, isothermal titration calorimetry, colorimetry, etc. Consequently, I commonly collaborate with researchers from different disciplines on a wide range of areas, e.g., developing antimicrobial delivery systems for food protection, formulating nutraceutical delivery systems for enhancing bioactive bioavailability, creating foods to protect omega-3 fatty acids and other bioactive agents from chemical degradation, encapsulation, protection and delivery of probiotics, understanding the gastrointestinal fate of food nanoparticles, identifying plant-based emulsifiers to replace synthetic and animal-based ones, creating reduced calorie foods, developing new food ingredients to reduce the calorie, fat and sugar content of foods, developing more sustainable food processing operations, identifying new methods to characterize food properties, etc.

(3). During the past few years, I have had over 30 people working in my laboratory at a time. Many of these people are exchange students or Post-Docs from some of the top universities in their countries, and are therefore already highly accomplished scientists and good writers themselves. I have also developed strong collaborations with a number

of researchers in my department and on campus. Finally, I also have strong collaborations with researchers who have worked in my laboratory previously and become faculty members themselves. Consequently, I work with a large network of people.

(4). I spend most of my time writing and editing manuscripts. I also encourage my students and Post-Docs to write the first drafts of papers, and give them clear guidance on how to do this through formal classes and personal meetings.

(5). I have become a highly efficient writer through many years' experience.

McKee, Martin

I do have a rich network of collaboration and I have always argued the case for having some individuals who explicitly seek to bridge disciplines and topics, and I suspect that may explain me in part. An example is our work on corporate determinants of health where I work with groups that typically are separate, on alcohol, tobacco, food, and Pharma. There are important similarities, as David Stuckler and I argued in this month's AJPH, but these communities tend to work in silos.

I think another factor may be that I strongly encourage my students to publish. As I mentioned, I view mentoring them through the publishing process as a learning exercise. In particular I stress the importance of not getting discouraged by rejection and turning round reviewers comments quickly. Far too often people put these papers in the "to do tomorrow " tray.

Also, as you just saw, I work exceptionally long hours (even now typically 12 + hours a day and I only sleep about 5 hours). I don't recommend that!

Anyway, I look forward to seeing the paper.

Maybe it will be the incentive my colleagues keep seeking for me to slow down...

Mikhailidis, Dimitri

1] Team efforts

As part of a large and active team you can make a significant contribution to a publication but the effort is less than if you were doing the same work alone or with a couple of co-authors. Some authors like to work alone or with very few colleagues. Others build lasting networks involving former research fellows and other colleagues. There is no problem with either type of researcher. Several factors may play a role in how things develop. Also, how well you train your research fellows and other staff is important. They then become more competent co-authors. You can also do what I call “distance training” by editing/commenting on publications to help less experienced colleagues improve their writing skills. Helping less experienced researchers with designing and interpreting studies is also crucial.

2] Language

Is your primary language English? If not, you may find writing in English a difficult and slow process, at least when you start publishing. However, scientific writing is relatively uniform and you can master the correct style quite quickly provided you carefully note corrections and how more experienced authors write.

3] Hard work

Obviously you cannot have too many other interests if you wish to publish a lot. You also need to use every opportunity to get together with your co-authors (e.g. at international meetings, between lectures!) to sort out a joint publication. You also often need to have phone conversations with co-authors to discuss ongoing projects. This can be expensive but is effective.

Mol, Ben

Thank you for the opportunity to respond on your project to identify and characterize hyperprolific authors. I understand that the definition of a hyperprolific author is someone who has published an average of a paper every 5 days indexed in Scopus within a single calendar year, looking at 2000-2016. I think I qualify for that definition each year from 2011 onwards.

With respect to an explanation of hyperprolific output, I think the 'how' and the 'why' questions are important. The question on 'how' I can be prolific is answered as I was instrumental in the build-up of networks that do comparative effectiveness research. To establish this, my strategy was to generate an idea, involve other collaborators, usually allowing them the major academic credits (a PhD student usually being first author, the direct supervisor being last author and the PhD thesis not defended in my own University). This is demonstrated by the fact that I (co-)supervised >100 PhD students at 9 different Dutch universities.

My role was usually formulating the research idea, getting the project funded, interpreting the results and editing publications. I have put major effort in the logistics of the networks. Your review indicates that I meet the standards for authorship in the overwhelming part of my publications. While I used this method of collaborative working in The Netherlands until 2013, I am now establishing similar collaborations internationally in all continents, with Asia as a new focus.

Other ingredients of the prolific output are that I never give up on a question that I feel needs to be answered, that I do not spend much time and energy in political fights, that I think I have a good brain in phrasing a scientific question and organizing the logistics, that I value acknowledge the role of others and that I work long and efficient hours. My portfolio includes obstetrics, reproductive medicine and to a lesser extent benign gynaecology and gynaecological oncology, which gives me a wider scope to publish on than many of my colleagues.

The more important question is the 'why' I do this. My 'research' focuses on everyday clinical practice. I ask myself the question whether the interventions we do (or not do) make a difference for women and their families. I think that many of my studies (timing of induction of labour (Koopmans, Lancet 2009, Boers BMJ 2010, Van der Ham PLOS 2012, Broekhuijsen Lancet 2015); when to start fertility treatment (Van der Steeg Human Rep 2007, Steures Lancet 2006, Bensdorp BMJ 2015)) have resulted in better outcomes for women and their families around the world.

Other interventions that I have assessed have been around for decades. Induction of labour with balloon (known since the 50's, Jozwiak Lancet 2011, Ten Eikelder Lancet 2015), prevention of preterm birth with cervical pessary (around since 1959, Liem Lancet 2013) and tubal flushing with oil-based contrast (around for more than a century, Dreyer NEJM 2018) were all close to be abandoned by ob/gyn practice, but in the comparative effectiveness research I organised these interventions seem to improve relevant outcomes. These studies really make a difference, and we are not talking about a few lives that are saved here each year. The more important question than the one on authorship is the

question why these studies have not been earlier, but that is maybe a future subject of your research.

I want to thank my wife Jasmina and daughter Nour for allowing me to work passionately, and for the good time I have with them when I do not work.

| | |
|---|---|
| Möller, Hans-Jürgen | For more than 40 years I had positions as professor of psychiatry at well-known German universities: in this long period I was nearly 25 years full professor of psychiatry and chairman of psychiatric university departments: in Bonn (6 years) and later on in Munich (18 years). Especially in Munich I had a huge department with a long research tradition, an outstanding infrastructure, rich financial resources and a high number of coworkers. I myself founded several research groups with well trained and creative coworkers, who developed excellent skills and a high productivity under my guidance. Most of them finally reached high academic positions, about 10 of them even became full professor of psychiatry and chairman of psychiatric university departments ore reached similar research positions. All this contributed to a high productivity among others in terms of scientific publications.<br>Of the majority of publications I`m not the first or senior author myself, but one of the authors, at different positions in the list of authors, depending on my own personal respective contributions. If I appear as first author I have written the paper myself.<br>The fact that I had high positions in different international psychiatric societies, e.g. I was president of the WFSBP, the CINP and the EPA, might have increased my reputation and thus the chance of acceptance of papers. In addition I was involved in most of the guideline papers of the WFSBP.<br>Finally I would like to state, that I worked with an extremely high engagement. The current term „work and life balance“ was unknown to me. |

Mori, Masaki

Being the head of a busy surgical department in a University Hospital, my responsibility is to supervise a a large number of graduate students as well as permanent members of staff. Up to graduate students, join the department every year, each of whom will stay for an average of four years. Most of the graduate students are surgical residents.

I am responsible for planning and designing projects for the graduate students, as well as providing ongoing supervision. The students, permanent members of staff and myself work together as a team to conduct research and write review papers.

| | |
|---|---|
| Murad, M Hassan | Here are the reasons which apply to my work but also may apply to others on this list:<br>a. Type of research: The type of research is an important factor that enables hyperprolific authorship. Most of my research does not require prospective patient enrollment. My research focuses on evidence synthesis, retrospective studies and methodology research (meta-epidemiologic studies).<br>b. Research process: Our process is divided into milestones or chainlinks; which allows involvement in a certain link (for example, develop a protocol for a systematic review), skip a link or more (skip literature search and abstract screening), then get involved in another link (data abstraction, analysis, write up, etc).<br>c. Mentorship: I mentor 10 or so research fellows, each have their own interests within clinical epi, as well as many other mentees nationally and internationally. I advise these individuals and guide them in their own projects. Their productivity fuels mine.<br>d. Collaboration: this is different from mentorship. This refers to being part of various bigger circles (GRADE, AHRQ EPC programs, Cochrane groups, etc) that produce common guidelines, position statements and conduct methodology research. Author mapping should show a large number of coauthors from these circles.<br>e. Content: I do not have a specific disease interest (my research relates to methodology and spans tens of diseases).<br>f. Personal attributes: to be hyperprolific, a person must have certain attributes (such as being intelligent, highly organized, writes well, collaborative, good mentor, dedicated and persistent). |

| | |
|---|---|
| Nadarajah, Saralees | The reasons that I am so productive are:<br>i) hardwork<br>ii) love for the subject - statistics and its applications<br>iii) having many collaborators (over 200 in nearly every part of the world) |

Naidu, Ravi

Being classified as ‘hyperprolific author’ came as something of a surprise to me. I do not generally keep count of my own publications, let alone those of other researchers. Whatever my publication output happens to be, I see it as part of a natural career progression. I am fortunate to have had the opportunity to teach, train and mentor many dozens of researchers. I continue to collaborate with many of these, some of whom are now scientific leaders in their own right (I am honoured that they are so willing to seek my guidance). Thus, as with others at the same career point as me, it is inevitable that my output has grown over time. If my achievements are at all noteworthy, I can pin this down to several factors:

1. Vision – from early in my career I developed a clear sense of the research I wanted to pursue. Besides focussing on current popular research themes, I look at least five years ahead to plot a path for not only my research, but also funding opportunities.

2. Resources – I have worked extraordinarily hard to win funding that has allowed me to carry out my vision. As an example, the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, for which I am the founding CEO, has received well over $160 million from government and industry. Over the course of my career, I have earned more than $260 million in funding. Funding of this magnitude has enabled me to establish highly productive research teams (and attendant publication rates).

3. People – I could not have achieved a fraction of my success if not for the people I work with, from master’s and PhD students to other research leaders. I have consistently strived to surround myself with teams of high-achieving people, as seen today in the University of Newcastle’s Global Centre for Environmental Remediation (GCER) – Australia’s only centre of excellence in remediation science. GCER currently houses 60 PhD students, 35 employed scientists, and 15 visiting scientists – all of whom work on themes and projects that I have initiated.

4. Resilience – I have refused to let any setback, no matter how large, hamper my progress. Although it is not for everybody, I work very long days – sleeping 3 to 4 hours per night – to get through my workload. This work ethic was instilled in me as a schoolboy growing up in a Fijian farming family. My father was partially blind and had lost a leg to diabetes. Before and after school, I worked on the farm, and did my homework well into the night. This approach – to persevere until you succeed – has stuck with me for life.

5. Process – Over the years I have developed a process that allows me to contribute to a high volume of research papers. I am lucky to be in a position where I can outsource language editing, leaving me free to focus purely on the technical aspects a paper.

Taken together, the above factors have allowed me to produce a significant

scientific output. It is important to note that it has taken me decades to reach this point. If my publication rate is noteworthy, it is the culmination of many years of hard work, not only by me, but by the many others who have played a part in my achievements.

Netea, Mihai

Regarding our performance as a very productive laboratory, I consider this as an achievement of our group and department, and not of myself as a person. Please allow me to explain this. When we re-organized 10 years ago the research laboratory of the department of internal medicine of Radboudumc, we decided together with my colleague Prof. Leo Joosten and the other PIs of the department to put our resources together in one single group, rather than splinter it in mini-research groups that would lack the resources and manpower to perform competitive research. Our department comprises 4 clinical divisions (infectious diseases, vascular medicine, endocrinology, diabetes) and all the PIs share an interest in inflammation and innate immunity. Therefore, we decided that all technicians, post-docs and PhDs of our department would work together: the financial resources from our grants are shared, but also the methodological progress by one researcher would be immediately shared to everyone in the laboratory, independently of the state of progress of their individual projects.

In this way, we have founded together the Division of Experimental Internal Medicine. We are 12 PIs working together, with a total of between 50-60 researchers at any time. All the PIs of the division are clinicians, and that is why me and my colleague Prof. Leo Joosten, who are heading the lab, are involved in helping and supporting the projects in the lab for all the clinician PIs. While we all work on inflammation and myeloid cells from a methodological point of view, the subjects studied vary depending on the interest of the various PIs: from fungal infections to tuberculosis, inflammation in insulin resistance to atherosclerosis, inflammation in thyroid cancer, etc.

Due to this organizational structure, we (me and my colleague Leo Joosten) are supporting and involved in all these various project, in addition to our own research interests. Myself I coordinate the work of 8 PhDs and 2 post-docs, but I am involved in the projects of the majority of other colleagues. The other PIs perform the day-to-day supervision of their PhDs and post-docs, but we have regular meetings together in which we discuss their projects, we propose new ideas and experiments, etc. I read and correct every manuscript on which I am co-author. After your e-mail, I also checked the statistics of my publications for 2017 as an example, and from the 54 papers published, it is only 9 on which I was senior author, which is I guess very good, but not necessarily exceptional. The other publications on which I am co-author are due to my involvement in the work of my colleagues, as detailed above. This is also true for the other colleagues of the department who are involved in each-others work.
In addition, in the last years we coordinated from Nijmegen two major international consortia: Human Functional Genomics Project (www.humanfunctionalgenomics.org) and International Trained Immunity Consortium (www.trainedimmunity.org), through which have built many exciting collaborations in these two subjects very important to us. This may also explain part of our successful research.

Finally, please let me invite you to visit us. We would be very happy to share

with you our experience of working together. I think that our collaborative lab model is one possible way in which to increase the impact of our work, and may be suitable also for other colleagues. You can also discuss with our PIs, PhDs, post-docs and technicians, who can share their view on this work model and how that influenced their research quality and productivity.

I hope this sheds a bit of light on our work, looking forward to hearing your thoughts,

| | |
|---|---|
| Nicolaides, Kypros | I think the most likely explanation is that we were dealing with a new field of medicine and had many collaborators with interest in this field. |

| | |
|---|---|
| Ogawa, Hisao | Recent research cannot achieve great results with one facility of research power. Collaborative research is necessary especially in many fields. Especially in the multicenter collaborative research I came, there are dozens or hundreds of cooperative researchers. It is difficult to select authors according to their degree of contribution. So it is natural that many authors will join as a cooperative researcher in one paper. |

Ozaki, Yukihiro

First of all, I never aimed up “hyperprolific authors”. I have simply aimed at a word top class scientist or a world leader in a particular field. In my case this is molecular spectroscopy. As a result, I could develop very active research group. “Active group” does not always mean “productive group”, but there may be some correlation between them. This is true in our case. My group has been so active in research that fortunately many active young scientists and students joined my group. Then, my group has become more and more active and productive. Probably I have been good at leading and encouraging young people. To develop active or productive research group, there is no doubt that the most important thing is to just collect active and productive people. They can further collect other active and productive people. Thus, good circulation always has continued for the last 30 years in my group. My group has very strong group motto. That is “Top among the Top”. A number of ambitious young people has got together under this motto. To collect many talented people, of course, one needs big funds. Thus, of course, the ability of collecting funds is crucial for an active or productive scientist.

One must be careful that the number of publications really depends upon research fields. Probably this sort of survey should be carried out for each different field. I feel my field is the field one can publish many papers relatively easily compared with other fields.

Of course, I feel very much honored to have been selected as a hyperprolific author. But my aim has been to publish high-quality papers not publish many papers as many as possible. Not the number but the quality is always much more important. If one would aim at becoming a hyperprolific author, the quality of his/her papers might become poorer. There might be some danger in the hyperprolificity.

Reis, Rui

It is for me an honour to be listed as a hyperprolific author. It is not easy at all to set-up a group respected and recognized as one of the best in the World in biomaterials, tissue engineering and regenerative medicine (TERM) from Portugal! I started the 3B´s research group (in the USA it would be the Reis group) from scratch 20 years ago, and I was able to attract international talent and to fund myself from competitive grants our own research building and all the state of the art equipment that made us quite competitive internationally. I3Bs is now an organic unit of University of Minho (similar to a Faculty/School) which is a unique situation on all the Portuguese research landscape.

The group is now very large with around 175 members (from around 20 Nationalities), being the largest in Europe and one of the largest in the World in biomaterials and TERM. Only a few people have tenured positions and all the other are hired from projects, that I am PI, and result mainly from my efforts. In the last decade I have been constantly responsible for projects totalizing around 40 to 45 MEuros. In consequence I have always many research assistants (some work with me for more than 15 years) and post-docs and I supervise or co-supervise many PhD thesis. The organization is similar for instances to the one of major groups in Japan or to well-known groups in our area, like for instances the Langer lab.

All our thesis are written by papers (typically with a minimum of 5 research papers and 1 review need to obtain the degree). We are involved in many international collaborations (with almost all the other major groups in our area) with a lot of exchange of students and staff in both directions. That also leads to a lot of work partially carried out in each location, and to many joint publications. We use a unique quality assurance system (we are ISO certified) in research, that sets-up standards and assures ethics and reproducibility of results and the filling of patents.

I have a deep knowledge of the works I am co-author, as it can be easily confirmed by everybody that has attend my hundreds of plenary and keynote presentations and several major award lectures in the most relevant congresses world-wide. I am not an author of all the works coming out from the 3B´s, only of the ones that I am involved in some way. There are many many works of which I am not the senior author, even if sometimes I am the PI of the funding protect, as we always recognize the efforts and contributions of Assistant and Associate Researchers/Professors.

Our system is really organized to publish and we always go for established journals, not for predatory journals, and we have a rather good average of impact factors and citations considering the area on which we work.

| | |
|---|---|
| Richardson, David | In terms of my own productivity I am extremely fortunate to work at one of the world's leading research centres in photonics. Over the past 30 years I have built and led a very large research group (30-40 staff/students) and am privileged to work with some truly exceptional, talented and committed people. I have also built/have access to world leading research facilities and am able to work across a wide range of technologies and application areas. My team and I collaborate widely - delivering technology to many other leading world class research groups and companies across the world. These are the key ingredients that allow my team and I to work at the forefront of our field and enable our high productivity. |

Ring, David

For me having numerous authorships is explained by:

1. A large ambitious group of full time research volunteers. Most of them are Dutch Medical students aiming for competitive orthopedic or plastic surgical residencies in The Netherlands or medical students doing a research rotation and looking for both fun and productivity in the United States. Add to that some Latin American and Iranian scholars with ambitions in the United States (I would call out two of note: Santiago Lozano-Calderon and Mariano Menendez).
2. A hierarchy of leadership. My long-term researchers (2 years) that earn a PhD degree from Dutch universities learn from their colleagues and then become experts and managers of the larger team. They extend me.
3. Notoriety. I'm known so people want to work with me. I'm known as someone who gets things done. This raises opportunities to work with various data sets that people have collected and collaborate with others. I decline all "prestige" authorships and prefer to be acknowledged. I'm always deeply involved in the conception, design, analysis, interpretation, and writing/editing of the work.

In addition to all the Dutch we have some from the UK and we also work with our local students, residents, and fellows. At Dell Medical School and UT Austin, I'm working more and more with the undergraduate students and graduates students on the main campus.

Some other factors are:

4. We do a lot of cross sectional, prospective cohort, retrospective case series, and database studies that are relatively easy to do. We do some randomized trials, but none are very sophisticated, multicenter, or NIH funded. Everything is on a shoestring and relies on volunteer spirit and ambition.
5. Some of what we publish might be considered pilot work. It's allowing less experienced researchers to have the experience from design to publication so they hopefully learn to love research and will help contribute to the larger studies.
6. We never pay to publish or use predatory open access or any open access. BUT there are tons of journal out there. Most orthopedic specialty societies have journals. There in an Indian hand surgery journal. Some of my Iranian friends have an orthopedic journal that is free and full PubMed, but very easy to get published in to date.

For me research is quality improvement and social justice, as are teaching, and dialogue / dissemination. They are part of helping people get and stay healthy. I'm hoping to foster a curious and contributory mindset in young and future doctors.

How do I feel about being a hyperprolific author? Proud of what my team has done and the influence we have had on surgery and medicine, and shy about people personalizing the work to me or thinking that a certain number of publications is a useful goal.

Romero, Roberto

My field of investigation, Obstetrics/Perinatology is terra incognita in medicine and the only discipline with two patients (mother and fetus). Many fundamental questions about biological processes essential for life from conception to parturition, including fetal growth, fetal death, pre-eclampsia, prematurity, congenital anomalies, maternal complications unique to pregnancies (i.e. amniotic fluid embolism etc.) remain unanswered. Thus, obstetrics/perinatology is an extraordinarily fertile field for investigation. My best answer is a combination of:

1) The importance of the field of reproduction.
2) The fundamental and critical nature of the questions that remain unanswered, many answers can make a difference between life, death or handicap (i.e. an induced preterm delivery at 23 weeks).
3) Obstetrics/perinatology now benefits from unprecedented technological advances which now make questions tractable such as deciphering maternal fetal dialogue.
4) The collaborative and multidisciplinary spirit of our team.
5) The commitment and passion we have for this work.

| | |
|---|---|
| Santosh, M | I fully realize that using normal scales, it is difficult to understand the productivity of hyper-prolific authors, although I am glad to receive the endorsement that there is nothing inappropriate. In my case, I have never aimed at becoming one among this category, nor do I take any particular pride in belonging to this group. It is just my life style and practice since my young days to be deeply involved and productive in whatever spheres I am working with, including multi-tasking. Regarding my publications, the exceptional productivity is the success of making best use of the opportunities and the different positions in various countries that came across me to build academic teams and collaborations in the most effective way leading to high productivity. Note that most of my papers are multi-author team work, and I have relatively few single author or first author papers. For me, science is more a way of life than a profession. Thanks to my family for allowing me to spare all the time to devote for my research, travel and jobs abroad over the last three decades. |

Schubert, Ulrich

I am very happy to hear that you characterize me (and my research outcome) as highly productive author. I always try to work on disciplines that are current challenges for the mankind. Being an organic and polymer chemist, I aim to find innovative solutions for, e.g., energy storage systems, nanomedicine but also self-healing materials. With the help of my coworkers, who are all specialists in various fields, a fully optimized organizational structure within the group, and fruitful cooperation with other experts (in Jena, within our joint three centers, and with external partners) it is possible to produce a high outcome in terms of publications and patents. In fact, it is my ambition to have an impact on worldwide developments.

A specialty of my research since 2002 is the application of high-throughput approaches using robotics and automation – a landmark change in polymer approach. Here I am one of the leading scientists in polymer science world-wide. The applied methods (like in proteomics, genomics etc.) allow the Ph.D. students and Postdocs to be highly productive – and reproducible! As a consequence, our Ph.D. students finish in average with >5 first author papers (with in average 6-8 dissertations per year in the group). In addition, nearly every Ph.D. student is writing a review/feature article to enable an overview over the field of work, and a landmark for the carriers of the young students.

Finally, I was successful to archive third party funding in the Netherlands and Germany of over EUR 35 Mio in the last 18 years, allowing me to run a highly active large research group with a superb equipment.

In connection with the full support of my wife (also chemist, supervisor of several of my Ph.D. students and co-manager of the DFG CRC Center PolyTarget), the short distances in Jena (5 min to the institute from our house, allowing intensive interactions with the student also in the evenings) and extensive seven day working weeks (and night) a successful publication output since 2003 could be established. However, certainly things will slow down with age.

| | |
|---|---|
| Shoja, Mohammadali M | Thank you for your efforts in doing so. Academic productivity at the level you are talking about is multi-factorial; it requires a high motivation on behalf of the academician combined with institutional support, family support and planning and good teamwork. I remember back in 2005 until 2011 at the peak of my productivity, I would work very long hours driven by my academic ambitions. I would work from 5 or 6 am until past midnight and the whole weekend. Additionally certain mindsets are crucial; for example, not all publications need to be in a top notch journal or an original article; short communications, case reports and letters are equally important. At the same time, one needs to foster creativity and be able to generate scientifically sound hypotheses. Only after this, one will be able to setup and conduct unlimited limber of experiments, collect data and publish interesting papers. The significance of scientific and creative mind cannot be overestimated. Teamwork with like-minded academics is a great plus. I benefited from a phenomenon, I would like to name it "time-zone effect." I was based on Tabriz, Iran and two main academics with whom I was collaborating were based on U.S and a nearby country. While it was day in Tabriz, my colleague in Alabama was retiring for the day. And while I was retiring from the day, my colleague in Alabama was just starting his work. Imagine both of us working extra-hours (~18 hours per day) and being in different time zones, the total daily hours that we could put on our collaborative projects would exceed 24 hours per day! |

| | |
|---|---|
| Stoeckli-Evans, Helen Margaret | During the period 1992-2006 I was responsible for running an X-ray Crystallography Service. We collaborated with many research groups both at home and abroad. There may have been one year when my name was associated with 60 odd papers, but only in the capacity of a collaborator certainly not as the principal author.<br><br>I am certainly not the only service crystallographer around the world, and we are many, who would fall into the category of "prolific authors". X-ray crystallographic analysis is essential to determine the structure of molecules and the demand for our expertise and knowledge is extremely high in chemistry, physics and molecular biology.<br><br>I am not ashamed to claim over 600 papers to my name published during my career; I retired in 2009. The work we did for all of these groups helped them to further their research and knowledge.<br><br>Hence, I suggest you consider only the "corresponding or principal author(s)" of an article for your survey. In that way it will not be biased and will reflect the true situation. |

Stubbs, Brendon

Brief explanation of how you fall into this productivity class

During my PhD, I dedicated an enormous amount of time learning new meta-research and independently forged multiple productive collaborations with other International, dedicated and bright colleagues. As a group, for the past few years we have worked very long hours to answer important research questions and more recently I have also been assisted by inputs from students and junior colleagues. Without a strong focus on meta-analyses, which eliminates the enormous time required to obtain funding, enroll, collect, analyse and publish primary data, I would not have been able to attain the level of publications achieved. In summary, science is a group endeavour and by linking up with multiple highly productive, independent research groups around the world and utilising meta-research has enabled higher numbers of publications than would have been achievable in the past.

How you feel about belonging to this class

Whilst all metrics have limitations, I am enormously proud to have been very productive over the past few years and able to contribute to a variety of important research topics. This would not have been possible without dedicated collaborators around the world to whom I owe a great deal of gratitude for their hard work, encouragement and dedication.

Any other brief comments

In my limited short term experience of being very productive, many personal sacrifices are necessary to produce multiple papers over relatively short time periods and the opportunity to do so may only be possible during limited periods.

Tiekink, Edward

I have been called many things before but, never an "hyperprolific author"! I am happy to send a few comments that might shed some light on my productivity – I hope I do not ramble on too much. I am currently in a research-only position at a Private University in Malaysia and am approaching 60 years old.

My discipline and professional passion is small molecule X-ray crystallography. Here, the three-dimensional structure of a small molecule is determined and each result is potentially publishable in one form or the other.

From the outset, I probably should mention my publication profile includes substantial papers reporting research conducted in my own laboratories, papers published with colleagues where I contribute crystallographic results and small, structural reports reporting a single structure. It is likely that the latter contributes to any "hyperprolific" activity.

Traditionally, people like me have worked with chemists and included the crystallographic result in a joint publication where, probably more often than not, while providing key insight to the study being described in the paper, the crystallographic portion is a minor component of the overall paper. In this way, crystallographers traditionally have larger numbers of papers than, say synthetic organic chemists.

With huge improvements in technology, to measure and refine to publication standard a crystallographic result is an almost trivial pursuit for an expert. It is possible to produce many 100's of datasets in a crystallographic laboratory per year.

I suspect many laboratories have many, many unpublished structures in their archives. Me? Why do I go to the trouble of publishing these structures that do not form part of a more substantial chemistry paper in Journals such as Zeitschrift für Kristallographie – New Crystal Structures, Journals I term archival Journals. In other words, what makes me a hyperprolific author?

There are several answers to this which might explain my motivation for this, especially in more recent years.

Historically, to collect crystallographic data was a relatively major undertaking, requiring careful monitoring, after hours/weekend work, etc. Having a publishable result that remains unpublished was always troubling for me. Hence, the generation of small structural papers.

More recently, working in Malaysia, administrators wished to have large numbers of papers to enhance the reputation of their University - people like me serve this purpose admirably. {To be sure I have always made it clear that any University can not build a reputation on such publications}

Not all projects result in publication and it is nice for students, including undergraduate student, to see something for their efforts, even a small structural paper – I am always happy to oblige.

Public money is used to fund laboratories, as was the case when I was employed at the University of Malaya, results should be published.

My more detailed scientific passion revolves around the how and why crystals are formed. To answer this question, one needs data – each published structure is included in the Cambridge Structural Database (CSD) – and can be interrogated by subscribers to the Database.

Yes, it is possible to directly deposit data in the CSD but, I am quite firmly of the view the data must be reviewed by an expert before inclusion in the CSD.

While all of the above are (perhaps) legitimate reasons for publishing these sorts of archival papers, on a more personal note, I enjoy writing these sorts of papers as they allow me to delve into the structural detail, it is work I can do on the run: while waiting at airports/travelling, working with my children while they are doing their homework, etc. {As a general principle, I would not work on these archival papers while in the University; in the same way, I do not encourage members of my research group to work on such papers}

I hope the above might explain my motivations for publishing large numbers of archival-type papers. I take pride in each of these as well as other publications.

Certainly, addressing more negative connotations:

i) I do not pay people to write papers for me,
ii) I do not have honorary papers where my name is placed on a paper for no good reason,
iii) I do not collect and send data to colleagues who write the papers and include my name as an author.

Thank you for allowing me to think about this issue and "scribbling" a few ideas on the matter.

I add that, quite coincidently, a write-up of my papers in specialist crystallographic Journals appears in the most recent issue of IUCr Newsletter, something I wrote –at least drafted - in September 2016! Please refer to

https://www.iucr.org/news/newsletter/etc/articles?issue=138200&result_138339_result_page=25

Tiemeier, Henning

Receiving a request to comment on being a hyperprolific author feels like stepping on the scale after holidays. Have I become too greedy, bloated with publications? Most of my publications come from two cohort studies, Rotterdam Study and Generation R. Over the years, together with colleagues I have introduced many novel in-depth assessments and the cohorts have become world-leading epidemiological resources. Lack of clinical duties, a modest teaching load, and numerous grants and collaborations have enabled me to build a group of more than 20 researchers, many of whom publish two manuscripts a year and have helped established an exciting research field: Population Neuroscience.

How can an author publish that much? I checked, I have few first authorships, I read and edit and correct nearly two manuscript a day (I counted 1.6/day for one year). This is a bi-modal curve, many co-author manuscripts I edit only once, many last-author manuscripts more than 10 times. And admittedly, a couple (I counted 3 in 2016) of manuscripts I probably never read. Interestingly, these were consortium papers. I trust others will comment extensively on this major development in the last 15 years: genome-wide-association studies have led to a profound change in collaborative science using genetic and non-genetic data. I have led some and co-authored other consortia papers, even the latter can at times be an enormous amount of work. So what do I feel about the hyperprolific author class? There is no class, we are the extreme of a distribution, the shift in distribution largely reflects hard work and longer author lists, which more often than in the past give all persons with a meaningful contribution credit.

| | |
|---|---|
| Tjønneland, Anne | My research career started in 1988, when I was hired to set up a pilot study on a prospective population based cohort study on Diet and Cancer in Denmark. I then used 14 years of my research career to prepare, collect and clean data for this cohort study. Very few publications was published during that period (<20 papers).<br><br>This is the nature of prospective cohort studies, a large investment in time and money, before the cohort is to be used for analyzing data and publish results. With such an investment, you do have the ethical responsibility to set up collaborations with as many relevant research groups around the world as possible, to make the most use of these data. This was done with many national collaborators in all Danish Universities as well as through the European EPIC study, with collaboration of more than 24 active groups around Europe. This has been an amazingly lot of work of coordination, planning and collaborative work, very inspiringly, but have also led to a lot of new research knowledge, and as you have noticed a lot of publications within the fields of diet, lifestyle and chronic disease development. |

| | |
|---|---|
| Tousoulis, Dimitris | During the last 5 years I am the director of 1st Cardiology Clinic of National and Kapodistrian University of Athens.<br>Before undertaking the direction of 1st Cardiology Clinic of National and Kapodistrian University of Athens I have an over 25 years scientific and research career. During these 25 years I have had substantial and uninterrupted scientific and research work with pioneering publications who have complied with the highest standards in the field of cardiovascular medicine and atherosclerosis.<br>The 1st Cardiology Clinic of National and Kapodistrian University of Athens is one of the most historic cardiology clinics and one of the major cardiology department in Europe with more than 20 Faculty/academic members and more than 15 staff members.<br>Moreover, the 1st Cardiology Clinic of National and Kapodistrian University of Athens host 3 MSc programs and more than 40 PhD students.<br>During the last 15 years the 1st Cardiology Clinic of National and Kapodistrian University of Athens contribute to the more highly standard cardiology congress (Annual congress of the European Society of Cardiology, American Heart Association and American College of Cardiology) with more than 150 Abstracts presentation per year in these 3 congresses. Therefore the high level research activities and collaborations as well as the high research level of academic and staff members of the 1st Cardiology Clinic of National and Kapodistrian University of Athens as well as the research orientations and directions of the fellows, researchers, PhD and MSc students has bare our Department among the most proliferative departments in original research abstracts.<br>Accordingly, all these efforts have make our department one of the most proliferative concerning original research publications in international peer review journals.<br>As the director of the department and due to my extensive experience I am involved in the design, analysis, writing and final acceptance of most of the protocols and research organized and published by our department.<br>Recently the European Heart Journal published a special article regarding the activities of 1st Cardiology Department (Tousoulis D. CardioAThena Meeting 2018: EHJ 2018;39:2123-2125)<br>To this point I would like to reassure you that I spend in research activities and authorship most of my working time every day to achieve the significant contribution of original and pioneering publications. |

Tufik, Sergio

Thank you for your contact and congratulations for your efforts on this new field. Focusing on hyperprolific authors is an interesting way to understand the actual dynamics of scientific publishing.
I do acknowledge I pertain to this class of researchers, and that I am an outlier in terms of scientific output, mainly if considered the reasonable narrowness of the field I work on and the country I come from. In any case, as requested, I hereby list a few reasons why and how I have achieved such a high number of articles published.

Long Career and Pioneering in Sleep Medicine

I have been working on the field of sleep medicine and biology for more than five decades now. More specifically, my first work on the field was published in 1977, exactly 51 years ago. Back in those days, sleep medicine was an incipient field and the knowledge on the area was scattered across different medical specialties. The field only gained some representativeness by the work of some pioneers, who in different research centers across the world embraced sleep medicine as a relevant field of research and medical/clinical practice. As Sudhansu Chokroverty (former president of the World Association for Sleep Medicine) acknowledges in his Sleep Medicine (Springer, 2015 – chapter 18), I took this pioneering role in Brazil and Latin America and was responsible for its regional development.

A proof of that can be seen on some early achievements of the field of Sleep Medicine in Brazil. I was the founder and remain the president of the Sleep Institute, one of the bigger and most reputable sleep research centers worldwide; was the founder of the Brazilian Sleep Association and the founder of the Latin American Federation of Sleep Societies. On the position of a pioneer and an advocate 006Fn the field, my research output increased proportionally to the establishment of sleep medicine as a relevant medical field.

Efforts in Education and Research

I have been a professor at the Federal University of São Paulo (UNIFESP), Brazil, since 1982, and currently am Full Professor at the Department of Psychobiology, Discipline of Sleep Medicine and Biology. This position was determinant to establish my line of research on the early days of my career and currently sustains the scientific output I have.
Considering my aforementioned pioneer activities on the field and my position as professor in one of the most relevant medical universities in Brazil, I have always received many students looking for further guidance and knowledge on the field of sleep medicine. During these years, I have been involved with the education in both undergraduate and graduate levels, and have supervised hundreds of fellows and students. As of today, I have advised/supervised 32 master and 38 PhD students. I have always been an enthusiast of medical research. Likewise I use to

stimulated my students to pursue a solid academic record as well, presenting to their peers across the world the results and research achievements they have acquired on their graduate studies. As a consequence, most of the students I have advised/supervised ended up their periods under my guidance with a significant number of articles published. One example worth mentioning is Dr. Monica Levy Andersen, who I have advised in both her Master and PhD. During her doctoral studies she published 34 original articles, dealing with the effects of sleep deprivation on behavior and hormonal profile. Like her, many other students under my responsibility also had strong research outputs, which in last instance contributed to the overall research output I have.

Collaborators

Some of the students I have advised throughout my career became professors as well, both at UNIFESP and in other universities in Brazil and abroad. Those who remained at UNIFESP became colleagues and collaborators. In partnership with them we built a solid research group, headed by me. As can be seen on my Scopus profile and research record, eight out of the ten most frequent co-authors I have were former graduate students under my supervision (exceptions for Frussa-Filho R and Tock L). Among these co-authors I highlight Monica Levy Andersen, Lia Rita Bittencourt, Marco Tulio de Mello and Dalva Poyares, who are or have been professors at the Sleep Medicine and Biology discipline. With each of them I have at least 70 co-authored research records (333 with Monica Andersen).

Obviously, none of these individuals have any formal requirement or obligation to include me as co-author of their articles. Actually, co-authorship only happens when I am able to contribute somehow with their research and articles, usually providing my experience and supervision.

Epidemiological studies

Since 1987 I am interested in understanding sleep in a population level, reason why I have been investing on epidemiological studies. These efforts went into a new level in 2007, when I idealized the EPISONO (São Paulo Epidemiological Sleep Study), still today the bigger polysomnography-based population-wide epidemiological sleep study ever conducted. As it is common to such large studies, it generated a large database, which has been used for several studies since then. As of today, more than 60 articles have been published using EPISONO's dataset. A follow up of the previous study was conducted in 2015 and a new transversal study is currently being conducted and in both cases I am the principal investigator. These articles based on EPISONO's data are the source of most of my publication record in recent years.

Based on the four main factors listed above, I think my publication

record becomes justifiable and plausible. This is the result of years working on and advocating for the field of sleep medicine. In any case, if you have any further questions, do not hesitate to contact me once again.

| | |
|---|---|
| Tünnermann, Andreas | many thanks for your information. I feel honored to be added to the list of extremely productive and highly cited scientists - it demonstrates the importance of the addressed topics and the high impact of the work.<br>Just a short comment concerning the total number of „publications“. In fact roughly half of the in Scopus under my name listed publications are conference proceedings – I strongly encourage my PhD-students and even master students to participate in (international) meetings as an active author to promote their personal development. |

| | |
|---|---|
| Uitterlinden, André | *A brief explanation of how you fall into this extremely productive class:<br>The very high number of papers on which my name appears in the author list is due to my membership in multiple networks giving rise to large collaborative GWAS studies. This represents the participation of the Rotterdam Study team delivering a) data of this particular human study population, b) analytical support with the analyses of the phenotype and genotype data of the Rotterdam Study, and c) for particular traits also analytical help running the larger meta-analysis data.<br>These GWASs result in large multi-author papers with many contributing datasets of medium/large size epidemiological studies where intricate schemes have been designed how to recognize everybody's contribution to the end result. It has become customary early on in the GWAS field to do this with authorships of the paper rather than, for example, mentioning such contributions in the acknowledgements. This stems from the opinion that generating such voluminous and precious datasets in humans, especially longitudinal cohort studies, requires substantial efforts and scientific scrutiny regarding setup and design of the study, obtaining funding, and supporting the analysis of the data. In view of my leading role in obtaining funding for the GWAS datasets, in generating the GWAS data for the Rotterdam Study in my lab, in establishing and maintaining the (long lasting) collaborations in the GWAS, in obtaining funding for personnel generating the data and doing the analyses, and my supervisory role for more junior personnel doing the analysis and writing manuscripts, I usually appear somewhere in a more senior position in the author list. Another contributing factor is that initially not the complete Rotterdam Study was genotyped and that additional samples were genotyped and additional GWAS data was added to the Rotterdam Study at several occasions leading to an increasing sample size which the Rotterdam Study contributes over the years. Similarly, multiple grants have been obtained by me to fund PhD's and postdocs to analyze the data with sometimes big grants covering almost all research lines within the Rotterdam Study.<br>Apart from sometimes making long hours, an important contributing factor to my very high production is in particular the availability of data on very many phenotypes/diseases in the Rotterdam Study (each of which are then the focus of each of the GWASs resulting in a paper) as a result of this study being a longitudinal cohort study which has been running for >25 years among elderly looking at all aspects of ageing including all age-related diseases and phenotypes. For each of these phenotypes/diseases basically the same GWAS genotype datasets in the Rotterdam Study are used as a determinant (albeit varying each time due to the availability of the phenotype data and the changing SNP arrays used for generating the GWAS over the years) and thus involve the data generated by my group based on funding I obtained and involving people I supervise. Further, for some specific traits (i.e., those pertaining the musculoskeletal and reproductive systems) we have also championed multiple working groups leading the GWAS meta-analyses. |

*how you feel about belonging to this class:
On one side I have some mixed feelings because of competitive sentiments with colleagues in other (biomedical) disciplines who view these multi-author papers differently. They compare it, for example, with generating a single paper on a new protein/pathway involving dozens of experiments in cells and mice by a much smaller number of scientists and which takes 3 years to finish. This is then compared with us generating publications in high profile journals almost every week.
But overall I feel very happy with the great scientific and social advances we made by working together in international consortia, where it is very rewarding and gratifying to meet and overcome the challenges set by generating and working with Big Data. It is also big fun and inspiring to interact with so many international colleagues on the scientific problems we are addressing. That this comes with (long) multi-author lists and a large number of papers which I co-author, is something I do not see as a "problem" but more a reflection of the magnitude of the network and input required to make these scientific discoveries. Yet, for comparing these authorships across different scientific disciplines (biomedical and beyond) I think we should revisit this issue with a critical appraisal to create better understanding among fellow scientists.

*Any other brief comments:
*The authorships of such large collaborative GWAS papers is an agreement between the many contributing individuals and groups to such studies. This assignment of authorships and the number of contributing authors has quickly evolved after the start of the GWAS era around 2005, into the schemes mentioned earlier with groups of first authors, last authors (which usually are shared first/last authorships) and co-authors in the middle usually ordered alphabetically and sometimes grouped by separate contributions (such as providing replication data vs. discovery data, and/or providing functional data, etc.). However, over the years it has become more and more so that the first and last (shared) authors are recognized and the middle authors are regarded as contributors that might also have been better placed in the acknowledgement section of the paper.
Yet, the process of setting up a working group and finally reaching publication, is a matter of years of hard and very dedicated work, usually involving weekly telephone conferences during these long periods. This is not only during the setup and running of the meta-analysis, but also involves the downstream analysis that happens there after. This involves for example bio-informatics of identified loci and planning/execution of functional wet-lab experiments of identified genes. Such more organizational efforts can also contribute to establish authorship of a publication describing such a big study.
Authorship lists have also increased as the GWAS field embraced other fields of expertise such as in developing new methodologies (other types of genetic variation, other genomics methods, other analytical methods, novel phenotypes)

and those working on functional characterization. This is to say that the networks are progressively becoming even more multidisciplinary and is fair to recognize their contributions. When functional work is conducted for hundreds of leads it is natural to see and also fair to recognize the large number of contributors to the advance of knowledge.

*Compared to the more "classical authorships" based on (much) smaller studies involving usually just one group or laboratory, individual contributions are difficult to compare between such different ways of doing scientific discoveries (apples and pears….). Another factor of importance in this context is the social system of recognition of individual contributions in science, and the measures and awards we use for that. With these large collaborative studies this is now moving away from the system of individual heroism (this is the person who discovered X,Y or Z!) to large group efforts with more diffuse and remote contributions.
Important factors leading to such large lists of GWAS authorship are a) the need to have large datasets because of the relatively small effect size of the SNPs, and b) the built-in replication data in a single publication. An crucial issue in this context is that –by collaborating with so many groups (including what used to be your competitors!)- the genetic GWAS papers produce very robust evidence of scientific discoveries. Unfortunately, this cannot be said of other biomedical disciplines where collaboration is not customary and competition is seen as a good thing to promote progress. These scientists rather just publish their own discoveries and simply leave it for others to replicate their findings (or not). That this competitive behavior has unwanted consequences can be seen on the website retraction watch (https://retractionwatch.com) where such scientific disciplines are frequently represented (e.g., see also the recent Eler case and simtuzumab). More in general this behavior underlies what we call "the reproducibility crisis", and leads to research funding being wasted. This could have been prevented by just collaborating with colleagues and publish the independent replication in one and the same publication. It should be standard procedure for all scientific journals to request such replications for all manuscripts describing original experimental data.

van der Heijde, Désirée

I am not amused by the content of your email.

Your apology upfront that 'you have no evidence' reads like a waiver and suggests that you are convinced that hyperprolific authors are doing inappropriate things. Being an author that always fulfils the authorship requirements, this feels very unfair. I do understand that every hyperprolific author will say the same thing and I admit from previous experience that this is often not true. However, it will be impossible to proof 'innocence' to your accusation. In fact, you should check at the individual author level and case-by-case, and such an approach is obviously not in your interest. I invite you to contact all my co-authors of any paper you want in order to check about my contribution.

The sad thing is that I even think (when writing I have not seen your paper yet) that I understand what you are trying to make clear about authorship and I will admit that I probably largely agree. But your generalizations may harm individual authors and cause collateral damage. I find it the more painful to be (an unintended) part of your criticism, since I read many of your papers, use them for educational purposes and often agree with their content.

I want to provide a few explanations for my hyperprolific output:

- I have an academic affiliation and I spend 80% of my time (more than fulltime hours) to clinical research. This is uncommon in many countries but definitely not in the country I live and work in (the Netherlands)

- My field of expertise is methodology of outcome measures. These outcome measures are widely applied, and I am often asked to consult about their application in clinical studies, be involved in the study subsequently, and this is finally leading to co-authorships.

- I have a large network, spanning academia, professional organisations and pharmaceutical companies, leading to many collaborations that result in many co-authorships.

- I have always published many papers: 2010-2016 an average of 55 per year

- As far as I could see I hit your cut-off (n>70 per annum) in 2014 only (n=81). This was even artificial since the Annals of Rheumatic Diseases, a journal I often publish in, had extra pages in 2014 to publish the backlog of ePub-ahead papers from 2013. In 2013 my number of publications was 38 and the average of 59, within my normal range, would not even have been noticed by you.

- I am afraid your criticism pertains to pharmaceutical industries' 'key-opinion-leaders' that piggyback on the work of medical writers from industry and get their publications for free. I can assure you that -in my case- you have made a

mistake: 53 of my publications in 2014 were academic papers without pharma influence (own and collaborative research); 12 publications were in collaboration with professional organizations, not being industry (such as guidelines); and 16 publications were in collaboration with pharmaceutical industry.

- I can also assure you that I have never accepted co-authorship solely for my contribution of patients or data to studies or trials; When being co-author it is because of involvement in the design, analysis and interpretation of the study (in addition to the manuscript drafting and final approval).

I understand the definition of hyperprolific author you have used, and I understand the need to set a cut-off. At first sight, 'one paper every 5 days' sounds impossible, but you should realize that this is a 'frame'. Indeed, if I had to write all these papers by myself, it would have been impossible. Many of the papers have been written by people I supervise or by other co-authors. Only the papers in collaboration with industry have been written by medical writers, and this is always mentioned in the paper. If so, I contribute extensively to various drafts (after the phase of design, analysis and interpretation of data).

If it is your intention to criticize scientifically inappropriate authorship, you have missed many that are indeed inappropriate authors (for instance since they have only contributed by including patients in trials) but did not meet your artificial threshold for being hyperprolific (these authors will never publish too many papers as they cannot be part of too many trials).

What you are also unable to judge is how many authorship-offers I refuse, either immediately as I judge the study insufficiently sound or not interesting, or during the process, when I disagree with the content of the paper.

To answer your question on 'how I feel about belonging to this class': I can safely tell you that belonging to your 'exceptional class' does not give me any satisfaction, and I do not need it for maintaining or improving my academic position.

To this end, for me scientific success is not based on how other people judge my output quantitatively, but rather on its quality and the pleasure I have in my daily work. I do enjoy my work, and I vouch for its integrity. I will try to accept your frames by referring to a Dutch saying: 'High trees catch a lot of wind' (such as 'Big trees fall hard' or 'Big ideas make a loud noise when they land' by Shawn).

| | |
|---|---|
| Vasilakos, Athanasios | A brief explanation:<br>-hard work<br>-supervision or co-supervision of a number of graduate students<br>-collaboration with the best international research teams in my area of expertise |

Weiner, Michael

The number of publications on which I was an author in the years prior to and following 2010 were:
2008: 21
2009: 38
2010: 73
2011: 53
2012: 36

As can be seen from my publication record, 2010 was an outlier year because of a large number of manuscripts which were produced during the years prior to 2010. I am the Principle Investigator of the NIA funded Alzheimer's Disease Neuroimaging Initiative (ADNI) which makes all data available to all qualified scientists in the world, without any embargo, on our websitehttp://adni.loni.usc.edu/. More than 1800 publications have used ADNI data during the past 12 years. I am not an author on most of these. It's not required that users of ADNI data include any of the ADNI leaders as authors on papers. However, many investigators using ADNI data have asked for guidance concerning their analyses, and sometimes I have been asked to review/edit manuscripts prior to submission and to be included as an author on publications. As can be seen from my publication record, 2010 was an outlier year because of a large number of manuscripts which were produced during the years prior to 2010.

Wichmann, Erich

According to SCOPUS (access 20. August 2018), I have published 840 papers in the period 1978 to 2016, reached 77,329 citations and an h-index of 141. In 2009, 2010 and 2011 (the year I have retired) I have published more than 70 paper per year, which indeed corresponds to more than 1 papers every 5 days. In contrast I have to admit that I have published only less than 10 papers per year from 1978 to 1994. In 1991 I was appointed as Director of the large Institute of Epidemiology at Helmholtz Center Munich and in 1995 as Chair of Epidemiology at the University of Munich. This step in my career allowed me to establish - over the years – several larger epidemiological cohorts – on neonates, school children and adults, among a broad spectrum of other epidemiological research (Wichmann 2017).

Especially the KORA cohort of 18.000 adults with meanwhile more than 30 years of follow-up shall be mentioned here (KORA 2018). KORA was the main basis for the increase of the number of my publications reaching 40 per year in 2005, and 89 published papers in 2011.

The main reason for the large number of papers is that KORA has investigated many endpoints (as – to a smaller degree - the other population-based cohorts), and that we finally were able to publish a lot on Genome-Wide Association Studies (GWAS). Of all 77,329 citations of my 840 papers, about one third (26,000 citations) is based on only 33 papers on GWAS with KORA, mainly published in Nature and Nature Genetics from 2006 to 2014.

Table KORA – publications 1998-2016

Publications from KORA based on OMICs techniques (mainly Genomics), most as part of international Consortia 1998-2016

Nature Genetics 105

Nature 19

Science 3

New England Journal of Medicine 5

All KORA Publications 1440

The following phenotypes have been used for genetic analyses in KORA: CVD risk factors, including blood pressure, BMI, height, weight, body fat, lean body mass, fasting glucose and lipids, oral glucose tolerance test, insulin, Hba1c, smoking, nicotine, alcohol, CRP, fibrinogen, lpPAL2, MCP-1, leptin, adiponektin, uric acid, liver enzymes, Fe, BNP, kidney function, type A, type D, cognitive function, dementia, and medication use; measures of subclinical disease, including electrocardiography (QT, PQ, QRS), carotid ultrasound, echocardiography, pulmonary function tests, ankle-brachial index, Holter monitoring, pulse pressure, endothelial function; cardiovascular events, focusing on myocardial infarction and stroke, diabetes and mortality; and other measures, including depression, restless legs.

KORA has participated in several hundred national and international collaborations and in consortia like CARDIOGENICS, CARDIOGRAM, CHARGE, DIAGRAM, EAGLE, EGG, ENGAGE, GIANT, GLGC, GlobalBPgen, GUGC, HAEMGEN, IQWANA, IRLC, MAGIC, MIMOMICS, MOLPAGE, MORGAM, NGFN (German National Genome Network),

SPIROMETA.
Fig. 1 Genome-wide association studies (GWAS) of international scientific consortia, where leading authors were from the KORA team

The International committee of Medical Journals Editors (ICMJE 2018) recommends that authorship be based on the following 4 criteria:
1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved
During the first periods of my scientific career, in most of the published papers I was first author or last author. However, with increasing activities especially using population studies I became more and more one of the participating (but not leading) authors.
Although my contribution as author was according to the criteria of ICMJE, my role changed over time more from “drafting the manuscript” to “substantial contributions to the conception of the work; or the acquisition”. In other words, my authorship was more often based on the concept and organization of the epidemiological work and the genetic analysis rather than the detailed analysis of the scientific questions.
This seems to be quite typical for authors publishing in fields of research with up to hundreds of co-authors, which often are dominated by large international collaborations. However, this is not only a development in biomedicine but also eg in physics.
In conclusion, in most of my recent publications my role has been supportive and thus is not comparable to the contributions of the first (and sometimes the last) authors, who deserve most of the scientific credit.
I have been asked, how I feel belonging to this ”extremely productive class”? Of course I am proud but I know the modest role I have played in most of the highly-cited publications.

Acknowledgement
I would like to acknowledge the scientific achievement of the leading authors of a large number of papers published in the last 20 years where I have be one of multiple authors. Furthermore, I would like to acknowledge the collaborators of my former institute for their contribution to epidemiological field work and analysis, especially Annette Peters (responsible for KORA) and Christian Gieger (responsible for GWAS).

References

ICMJE (International Committee of Medical Journals Editors)

Recommendations for authorship
http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html access 20. August 2018
KORA (Cooperative Health Research in the Augsburg Region). Summary of data https://www.helmholtz-muenchen.de/en/kora/index.html and Overview of KORA Studies https://www.helmholtz-muenchen.de/en/kora/for-scientists/overview-kora-studies/index.html access 20. August 2018
SCOPUS Abstract and Citation database of peer-reviewed literature https://www.scopus.com/term/analyzer.uri access 20. August 2018
Wichmann HE Epidemiology in Germany-general development and personal experience. Eur J Epidemiol. 2017 Aug;32(8):635-656 https://www.ncbi.nlm.nih.gov/pubmed/28815360

| | |
|---|---|
| Willett, Walter | Part of this is a result of having worked for 40 years on building several major resources including data and biological sample, and the other is having the good fortune to work with many amazing doctoral students and postdoctoral fellows. |

Wiwanitkit, Viroj

## Being extremely productive author

I feel glad to share ideas on “being extremely productive author” as invited by Prof John Ioannidis. The production of academic work in any forms, either short or long, should be the target for any academic persons. The attempt (regular continuous working) and collaboration are the two main key points for the success. Good observation and reporting of any interesting finding is the starting point for getting success in writing any report [1]. To be a productive author, there should be no doubt for your writing attempt. The quality of your work will be judged by your readers, not yourself. PLEASE WRITE, REPORT AND SHARE for the community. As already mentioned, I feel glad to collaborate with any colleague for sharing of ideas or collaboration.

Reference

1. Wiwanitkit V. CASE REPORT: what, why and how to report? Case Study Case Rep. 2012; 2(1): 1-3

| | |
|---|---|
| Yupapin, Preecha | Plenty of new things in nature that we can pick up to investigate, writing and publishing. The standard source of publications must be the Scopus materials. My motivation for all creative works is working and leaving the new ideas and works for the world (World Heritage). |

| | |
|---|---|
| Zetterberg, Henrik | In my case, I think the hyperprolific (it almost sounds like a disease!!) nature of my authorship is a combination of my specialty (laboratory medicine, subspecialty clinical neurochemistry, which is suitable for collaborations; samples can be shipped from all over the world), timing (biomarkers are such a hot topic in neurology/psychiatry but doing it well requires quite a high level of standardization, routine and organization; additionally, some of the tools we have developed have turned out to be quite useful), having been able to be part of successful team building (I co-direct a big lab here in Gothenburg together with Kaj Blennow, who invited me to the field when I was rather young, and run another lab at UCL in London), and enjoying collaborations. From a scientific perspective, we have learnt a lot from the many collaborations. Some markers that we thought were specifically related to Alzheimer's disease, were more related to neurodegeneration in general (or neuroinflammation, or even neurodevelopment), other markers are surprisingly disease-specific; the lack of disease focus has been a blessing. I work very hard to fulfil authorship criteria, which means I spend most of my weeks discussing projects, looking at data and reviewing papers. I enjoy it, but it is a lot of work, of course, and I wonder how long I will be able to keep up with this pace. |

Zhang, John

I have a lab with about 30-40 researchers and we publish about 20 some original articles per year. I also have several hundreds past students and postdocs and sometimes we publish together, but originated from their labs.

To train students and postdocs, we publish in meeting proceedings, journal special issues, many of them are review or commentary types articles and some editorials. Acta Neurochirurgica published meeting proceedings and those are the meeting brief reports, NOT peer reviewed, and we do not even need to report to NIH, because those are not regarded as “formal” publications because they are limited within 3 pages with maximum two figures. But they do appear in PubMed. Since you have my full publication list, you can see that we do not have meeting proceedings every year, and we happened to have two meeting proceedings in 2011, if you use a different year, such as 2013-2014, then we do not have meeting proceedings. I chaired and attended many international conferences on intracerebral hemorrhage and subarachnoid hemorrhage and brain injury meetings and we published many meeting proceedings, some are negative studies, some are preliminary reports, some are review articles, upon the requested by the meeting organizations.

Now I counted 17 original articles from my lab, 8 original articles from my collaborator labs, 6 review articles. The rest are meeting proceedings.

Zio, Enrico

Below are some brief (but very sincere) comments on why I am extremely productive (in terms of publications):

how you fall into this extremely productive class: I am in charge of two large research groups of Master and PhD students and Post-Docs, assisted by 2-4 collaborators (Associate/Assistant Professors). All the people I work with are very good and active. I also have a large network of individual and group collaborations. The research we perform is based on modelling and simulation, which can provide results much faster than experimental research. Within this large community, the sole objective is to perform research that has the dignity to be published (for example, all our Master and PhD theses are "paper-based", meaning that for each phase of the work completed the student is asked to write a scientific paper, which then becomes a chapter of the thesis and is sent for conference for journal publication, depending on the quality of the research: this is very educative to the students and also gives them motivation and satisfaction). This is fundamental, for having a fair evaluation of our research by peers and for the development of the careers of my young collaborators. On the other hand, we are not at all focus on funded research projects, besides what is needed to support our group. I think (hope) I contribute to all the papers published: this comes in the form of deciding the research topics to be developed, contributing to the critical analysis and consequent shaping of the advancements of the research work, contributing to the critical analysis of the results and outcomes, editing and correcting several times the manuscripts before licensing them for publication.
how you feel about belonging to this class: I feel comfortable as long as I am "sufficiently" contributing to each specific work. When I am invited by a colleague to join in a work for future publication, I always ask to decide only at the end whether to put my name as co-author or not. On the other hand, although it is interesting to participate to many activities and related publications, there are periods in which I feel a little "trapped" because I feel I am spending a lot of time on this, and I get "frustrated", especially for a lot of work of papers revisions (which many times amount to basically re-writing the papers).
and if you have any other brief comments: Of course, I have different feelings about my many publications and regard some more exciting/relevant/satisfactory than others. To me, some are very good (for my level) and some are "normal". Unfortunately, I feel that the "business of publishing" has got a little "carried away". I also feel that at times my large productivity has damaged my career in certain "selections", exactly because peer colleagues evaluate this as "implausible".

## Acknowledgments

We are grateful to all the scientists who contributed to the two surveys for providing their extremely valuable insights. The Meta-Research Innovation Center at Stanford (METRICS) has been funded by the Laura and John Arnold Foundation.