Nature, Science, and PNAS: disciplinary profiles and impact

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Abstract
Nature, Science, and PNAS are the three most prestigious general-science journals, and Nature and Science are among the most influential journals overall, based on the journal Impact Factor (IF). In this paper we perform automatic classification of ~50,000 articles in these journals (published in the period 2005–2015) into 14 broad areas, to explore disciplinary profiles of these journals and to determine their field-specific IFs. We find that in all three journals the articles from Bioscience, Astronomy, and Geosciences are over-represented, with other areas being under-represented, some of them severely. Discipline-specific IFs in these journals vary greatly, for example, between 18 and 46 for Nature. We find that the areas that have the highest disciplinary IFs are not the ones that contribute the most articles. We also find that publishing articles in these three journals brings the prestige for articles in all areas, but at different levels, the least being for Astronomy. Comparing field-specific IFs of Nature, Science and PNAS to other top journals in six largest areas (Bioscience, Medicine, Geosciences, Physics, Astronomy, and Chemistry) these three journals are always among the top seven journals, with Nature being at the very top for all fields except in Medicine.

Keywords Journal impact · Multidisciplinary journals · Disciplinary structure

Introduction

The publication of the first two scientific journals, Journal des Scavans and Philosophical Transactions, in France and England, respectively, almost simultaneously in 1665, marked the beginning of fundamental changes in the way that burgeoning scientific research was communicated. The first journals were not only quite different from the ones we are familiar with today, in numerous ways, but they also differed from each other in terms of “contents and their intentions” (Meadows 1998, p. 6). The proliferation of journals, which started in the late nineteenth century and continues to this day, has led to the establishment

This paper is dedicated to the memory of Judit Bar-Ilan (1958–2019), an outstanding scholar and an inimitable friend and colleague.

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of different roles for this genre and, more importantly, has been instrumental in shaping scientific norms (Zuckerman and Merton 1971).

Contemporary science has witnessed an exponential growth in both the number of papers (Fortunato et al. 2018; Price 1961, 1963) and in the number of journals (Meadows 1998; Price 1961, 1974), leading to close to 100,000 scientific journals covering all the scientific and scholarly fields across the world (Ioannidis 2006). The exponential growth in scientific literature has been accompanied by increased specialization (Meadows 1998; Price 1961). As the knowledge became more specialized, we saw the proliferation of specialized journals meeting the needs of the communities around these specialized topics (Ziman 1969). This has led to a wide variety of journals when it comes to the level of their specialization (Glänzel et al. 1999a). However, a relatively small number of journals still cover a wide range of topics (general science journals). Several of those journals are considered particularly prestigious and they tend to publish what the scientific or broader community sees are important breakthroughs or new ideas (Ackerson and Chapman 2003; Palmer 1996).

Journals are not only the vehicles to communicate the latest findings or to serve as archives of cumulative past claims—a “relatively robust archive of humanity’s scientific knowledge” (Csizsar 2018, p. 1). Publication of original research in a scientific journal has also been used to: (a) establish priority of findings (Johns 1998); (b) signal belonging to certain intellectual communities; (c) establish relative standing within scientific communities; and (d) differentiate professional scientists from “laypeople” (Csizsar 2018). It is therefore not surprising that journals have played a pivotal role in academic rewards and professional recognition of individuals. Namely, prestige of a journal has often been used, implicitly if not explicitly, as an assessment of the quality of research (De Rijcke et al. 2016; Ravetz 1971).

In the complex landscape of science communication, career pathways, rewards, and research funding highly prestigious journals, Nature and Science, and to a lesser extent PNAS, play an important role. There is an intricate relationship between audience, authors, and perceived journal prestige that has the potential to lead to positive feedback loops, giving disproportionate advantage to certain journals. Meadows (1998) has identified “the regard in which a journal is held by its research community” (p. 164) and “the audience reached by the journal” (p. 164) as two basic factors driving submission decisions for authors across all disciplines. And, these publishing practices “seem to be the nerve center where issues of reward, responsibility, and status merged on an everyday basis” (Csizsar 2018, p. 11).

Studies have shown that disproportionate number of highly cited papers tend to concentrate in the top general science journals, especially the Nature and Science (Ioannidis 2006). At the same time, we know that these journals do not cover all areas of science equally (Ackerson and Chapman 2003; Ding et al. 2018; Kaneiwa et al. 1988)—they tend to publish papers from the fields that have the highest number of average citations per paper (Ioannidis 2006). These journals may also exhibit a “chaperone effect” (Sekara et al. 2018), making it difficult for the authors who have not published in these journals before to do so. In any case, there is a consensus that these journals represent good vehicles to disseminate work to broader audiences (Ackerson and Chapman 2003) and potentially increase its impact. In the era when science is experiencing an exponential growth in number of publications leading to “attention deficit”, journals are used for helping researchers locate relevant information leading to disproportional relying on general science and high-impact field journals (De Rijcke et al. 2016; Rushforth and De Rijcke 2015).

Today, the prestige of a journal is almost exclusively measured and discussed based on the Journal impact factor (IF). The IF is essentially an average number of citations recently published in some journal. IF has been developed by Garfield (1972) as a measure designed to select journals to be included in the newly founded citation databases.
(Reedijk and Moed 2008). Selection of specific journals was important because at the time the computing resources were limited and expensive. The measure soon left the realm of information retrieval, and moved to science evaluation circles. However, despite widely spread usage of an IF as a measure of journal success, a large body of research has argued that IF does not capture all the complexity of evaluating the impact of journals (Bar-Ilan 2012; Bornmann et al. 2012; Haustein 2012; Rousseau 2002; Thelwall 2012). The most contested application of IF has been using it as a proxy for evaluating authors, via the IF of journals in which their papers have appeared (Archambault and Larivière 2009; DORA 2012). This practice was justified by the need for “immediacy” in evaluation, when individual work is so recent that it hasn’t had time to accrue citations, but it is often used even when citation data on individual articles are extensive. The principal deficiency of the IF is twofold: citation distributions are right skewed with power laws (Seglen 1992, 1997) and citation distributions are also very broad and overlapping even for journals with very different IFs (Larivière et al. 2016; Milojević et al. 2017; Stringer et al. 2008). These two characteristics make IF a poor predictor of the number of citations that an individual paper will receive, that is, its actual impact.

Despite these known limitations of the IF, there are some indicators that authors rely on the impact of the journal when deciding where to submit their work (Garfield 2006; Rousseau and Rousseau 2012), with many authors believing that having their work published in a higher-impact venue will lead to more rewards, via increased visibility and potentially more citations (Calcagno et al. 2012) and ultimately higher values of performance measures such as an h-index. Since some of the general science journals tend to have very high impact factors, the authors often opt for them rather than the more specialized journals (Verma 2015). These pressures are occasionally leading to the “cascading” of the submissions, with the authors starting with the highest-impact journal and getting down the hierarchy until their paper is accepted (Gordon 1984), adding burden to the system.

While we do know that general science journals such as Nature and Science have among the highest IFs of all journals (Fang 2015) (IF of around 30), for the high IF to potentially translate into increased impact one should ask whether the papers published in those high impact journals fair equally well regardless of the discipline of the article, or do different disciplines have different impacts? More specifically, are high impact factors driven by high rates of citations in specific disciplines? Because we deal only with an IF of an entire journal, the answer to the question what individual “impact factors” different disciplines in these journals have is not straightforward. Related to that, there is a question, of how much “benefit”, in terms of citation, is there in publishing in general-science high profile journals, rather than in top disciplinary journals? And, if there is, are the benefits universal, or discipline dependent?

A principal obstacle to providing the answers to these questions lies in the fact that the large bibliographic databases only contain disciplinary classification at the level of journals, not articles. Performing a classification of tens of thousands of articles required for a statistically robust analysis is not trivial, and requires a use of automated methods. Specifically, in the Web of Science, one of the major bibliographic databases from the publisher of IF, the journals such as Nature, Science and PNAS are classified in a category called “multidisciplinary”. This name can be confusing, because it is not that the individual articles in those journals are necessarily multidisciplinary themselves, rather these journals carry disciplinary articles from a large number of disciplines (Hicks and Katz 1996; Katz and Hicks 1995; Waltman and van Eck 2012).

Classification of scientific literature is of utmost importance for both descriptive and evaluative science studies. A number of researchers suggested methods to reclassify
individual articles published in the general science journals [i.e., journals in the “Multi-
disciplinary sciences” subject category in Web of Science (WoS)]. Many of the proposed
solutions are based on the references of the articles (e.g., Glänzel and Schubert 2003;
Glänzel et al. 1999a, b; López-Illescas et al. 2009). A more recent solution to this problem
utilized both citing and cited publications as basis for reclassification (Ding et al. 2018).
Recently, we have developed a method to reclassify the entire WoS database at a level of
articles, regardless of the subject category assigned to the journal in which the article was
published. Our reclassification is into the ~ 240 existing WoS categories, excluding the
non-specific ones labeled as multidisciplinary. Furthermore, for high-level studies such as
the present one, we also reclassify the articles into 14 broad areas (disciplines). In this
study we will explore disciplinary composition of Nature, Science, and PNAS across these
14 areas and derive individual “impact factors” in these disciplines and compare them to
some high-impact disciplinary journals.

Data and methods

In this paper we use reference-based classification which, similar to a number of previous clas-
sifications, employs an article’s references to infer its topic. To perform the classification we
initially use only the references that were published in journals that have a single subject cat-
egory which is not “multidisciplinary” (i.e., it is not published in multidisciplinary or general
disciplinary journals). We refer to such items as classifier references or classifiers. The tal-
yling of the subject categories of classifiers allows us to determine the unique WoS subject
category of items that were published in general subject journals. After the first reclassifica-
tion we repeat the process, but now using the newly assigned subject categories of references.
Reclassification is based on the full Web of Science (WoS) Core Collection database contain-
ing items published from 1900 through the end of 2017. The database contains a total of 69
million items (bibliographic entries), of which 55 million have at least one reference recorded
in the database. We perform the classification on (and using) all document types. The edi-
tion of WoS used in this work uses 252 subject categories. For higher-level classification, we
place each of 252 subject categories into 14 broad areas. Names of broad areas are taken from
NSF WebCASPAR Broad Field (Javitz et al. 2010). Details and classification algorithm are
described in (Milojević 2020). Evaluation of the classification showed a very high level of reli-
ability—errors do not exceed ~1% for classification in broad areas.

In this paper we introduce a new measure, which we call the prestige of a journal which
is defined as

\[ P = \frac{IF_{\text{journal}}}{IF_{\text{WoS}}} \]

or, the ratio of an IF-like measure for a single journal (or its disciplinary component) and
an IF-like measure for all WoS articles in a given discipline. This measure facilitates a nor-
malization for field dependent IFs in a way similar to the one undertaken for normalization
of citation distributions (Radicchi et al. 2008).

For this study, we focus on articles published in a 10-year period (2005–2015) in three
major general science journals Nature (9261 articles classified into individual fields), Science (8844 articles), and PNAS (39,169 articles) (Table 1). These articles received 571,371
(Nature), 451,013 (Science) and 706,945 (PNAS) citations over the period 2007–2016.
Parts of the analyses required comparisons to articles published in different fields from all
other sources (mostly journals). There were 14,076,076 such items and 59,284,270 citations they have received, over the same time periods. For the analysis we select items classified in WoS as articles. We do not include review papers that tend to skew the IFs and introduce an asymmetry in the analysis because some journals publish exclusively reviews, some published them to some extent and many not at all.

The purpose of this study is not to rank the journals, but to better understand the disciplinary profiles of the top science journals and how each discipline contributes to the impact of the journal as a whole. Earlier studies have shown (e.g., Milojević et al. 2017) that these three journals have quite similar citation distributions. This similarity is especially strong between *Science* and *Nature*. Furthermore, the pair-wise comparison of citation capacity of journals (“citation success index”) based on citation distributions has tight relation to the IF ratio of the journals being compared (Milojević et al. 2017). So, for simplicity and familiarity of the audiences, we will use an IF-like measure in this study.

The IF is a very simple metric. Namely, the IF of a journal in year $y$ equals the number of citations received in $y$ to all documents published in that journal in the preceding 2 years ($y - 2$ and $y - 1$), divided by the number of “citable documents” covered by the citation database (Moed and van Leeuwen 1996). Given that we are interested in the disciplinary contributions to the given IFs we cannot be using IFs reported in the Journal Citation Reports, but have calculated our own (IFe in Table 1). The correlation between the official IFs and IFe is very strong (Fig. 1) and the small discrepancies are

| Articles | Articles classified | Citations received | ⟨IF⟩ (JCR) | ⟨IFe⟩ |
|----------|--------------------|--------------------|-----------|-------|
| Nature   | 9327               | 9261               | 571,371   | 36.8  |
| Science  | 8873               | 8844               | 451,013   | 31.5  |
| PNAS     | 39,173             | 39,169             | 706,945   | 9.6   |
| All sources | 15,317,691       | 14,076,076        | 59,284,270| –     |

Both values are the means for 2007–2016

![Fig. 1](image) Correlation between the official Impact Factors reported in the 2016 Journal Citation Reports and Impact Factors estimated (IFe) in the Web of Science using citations received in 2016. IFe data here include review articles, but the ones we use in the analyses do not
well-known and reported in the literature (e.g., Bar-Ilan 2010). Specifically, we have applied a small correction factor of 1.04 (Milojević et al. 2017) to account for the fact that the official measure includes citations to all items in the numerator, but only certain document types (articles, reviews) in the denominator. Since we are not including reviews in our analysis, our IFs will in some cases be smaller than the official ones because review articles tend to be cited more highly on average than research articles.

Results

Relative contribution of different disciplines to high impact general science journals

As stated in the introduction, it is well known that the general science journals do not have equal coverage of all the scientific fields. For example, in a study that examined articles published in Nature and Science over the period 1981–1983, Kaneiwa et al. (1988) found Nature and Science to exhibit similar disciplinary coverage, with around 50% of articles covering Medical science and Bioscience research. In a more recent study, Ding et al. (2018) used WoS data to analyze disciplinary profiles of Nature, Science, and PNAS in two periods (2004–2006 and 2014–2016). This study found Bioscience to be dominant in all three journals, followed by Medicine. In addition, it found Science and Nature to be more inclusive in their coverage as compared to PNAS, which had a higher concentration of Bioscience and Medicine articles than the other two.

In this study, we looked at the relative contribution of 14 broad areas of science to the research being published in Nature, Science, and PNAS. As can be seen in Fig. 2, which shows the contributions of different disciplines in the three journals (average percentages for the three journals), most of the articles published in all three journals come from Bioscience (53%), followed by Medicine (17%), Geosciences (9%) and Physics (9%). Only two more areas rise above 1% (Astronomy and Chemistry). All other areas, including Mathematics, Computer science, Humanities, Agriculture and Professional fields have very low coverage.

![Disciplinary composition of articles published in Nature, Science, and PNAS (NSP) belonging to 14 broad areas. Contributions in each of the three journals was averaged](image-url)

Fig. 2 Disciplinary composition of articles published in Nature, Science, and PNAS (NSP) belonging to 14 broad areas. Contributions in each of three journals was averaged
The interpretation of this quite uneven distribution as a preference to publish certain areas cannot be made based on these data alone. We would not expect the fractions to be uniform because different areas do not necessarily produce the same number of articles in general, and the fields that are most represented may simply be the largest. To test this we took into account the size of each of the broad areas based on all articles in the WoS. Interestingly, the disciplinary composition of the papers published in the top three general science journals is not representative of their relative contribution in scientific literature (Fig. 3). Three areas are over-represented, with Bioscience being the most over-represented by a factor of 4, followed by Astronomy by a factor of 2 and to a smaller extent Geosciences (30%). Two other areas that show up as the top contributors are both under-represented, with Physics being more under-represented (70%) than Medicine (40%). Unsurprisingly, the areas that suffer from most underrepresentation are those for which we have seen very little presence among the reported research: Professional fields, Humanities, Computer science and Engineering, among others, which are underrepresented by factors of between 10 and 50.

While the disciplinary composition of *Nature*, *Science*, and *PNAS* is generally similar, there are some interesting differences between them (Fig. 4). All three journals have very strong presence of Bioscience articles. *PNAS* has the highest fraction (62%) and *Science* the lowest of the three (45%). *Nature* and *Science* are very similar in terms of their coverage of Medicine, while *PNAS* has significantly higher coverage of this area (almost two times) than the other two. *Science* and *Nature* are also very similar in their coverage of Geosciences and Physics, whereas *PNAS* has significantly lower coverage of these areas (~3 times). This is especially true for Astronomy, where *PNAS* has close to no coverage at all.

We now come to the areas where even *Science* and *Nature* depart in their coverage. *Science* has the highest coverage of Chemistry articles, with *Nature* and *PNAS* being similar at close to third of *Science*’s coverage of the area. Looking at the filed with small overall contribution in any journal, we see that *Science* and *PNAS* are very similar in their (limited) coverage of Psychology, which is significantly higher (6 times) than in *Nature*. *Science* has the highest coverage of Engineering, with much lower, but mutually similar coverage of this area by *Nature* and *PNAS*. Finally, *PNAS* has the highest coverage of Mathematics of
the three, with *Nature* not covering this area at all and *Science* only sporadically (3 articles in 10 years). The remaining four areas have such small contributions that no meaningful comparison is possible.

**Impact-factor-like measure by field**

Like other citation-based measures, IF is discipline/field dependent. It is affected both by the number of papers and by the number of references and it is known that both of these vary significantly by field. So, given the variety of areas present in a general science journal, a relevant question is what an IF-like measure for each individual broad area of research would be, and how it would compare to the overall IF of that journal. Furthermore, it would be informative to see whether broad areas exhibit similar tendencies across three journals.

Figure 5 shows the IF-like values (we’ll refer to them as IF, for short) of 9 areas with non-negligible contribution in *Nature*. The order of rows follows the share of articles, from
highest to lowest. First, we see that there is a significant range in individual disciplines: from IF = 18 for Geosciences and Psychology, to IF = 46 for Medicine and Chemistry—a span of a factor of 2.5. Disciplinary IFs tend to cluster in two groups: low, around 20 and high, around 40. There is no correlation between the IF and the level of contribution of that field in the journal. For example, Chemistry contributes only 3% of articles, whereas Medicine, contributes 14% of articles, but both have the similarly high IF. Two other fields have disciplinary IFs above the overall IF: Physics, which contributes 11% of articles and Bioscience, which is the largest contributor to articles with 53%.

Moving on to Science (Fig. 6), we again have a wide range of disciplinary IFs, spanning a factor of 2.4. The split into which areas have similarly higher and lower IFs is the same as for Nature, except that Engineering is closer to the higher IF group. Interestingly, Chemistry, which in Science has much higher presence than in Nature (Fig. 4), also has the highest IF, followed by Physics and Medicine (Fig. 6). Otherwise, as in the case of Nature, there is no correlation between IF and contribution. Nature and Science have similar IFs, and Nature, which has a slightly higher IF, is outperforming Science in all broad areas except in Engineering and Geoscience.

PNAS has ~3 times lower IF than the other two journals and it also differs in terms of relative IFs between the disciplines (Fig. 7). Furthermore, in PNAS we can make meaningful estimates for the IFs of the remaining 5 areas (Mathematics, Computer science, Humanities, Agriculture and Professional fields). Amongst the 9 areas in common with Nature and Science, there is a much smaller range of IFs (factor of 1.7). The relative range expands greatly when including the five lesser areas in terms of contribution—Agriculture has 6× higher IF than the Humanities. The broad areas that have the highest IF-like measure in PNAS are Agriculture and Professional fields, two fields with only a very small contribution—20 articles each over the 10 years. Other broad areas whose IFs are above the IF for the whole journal (though not by much) are: Medicine, Geosciences, and Chemistry.

While the results presented above are informative, and we see that Nature and Science follow similar trends in disciplinary IFs, they lack the larger context. To provide the context, we use the measure called prestige, which is the ratio of the IF of a broad area in multidisciplinary journal and the IF of the same area in all articles in the WoS. Interestingly, the prestige varies both across the fields and across the three journals. Publishing
an article in *Nature* is actually most prestigious for Social sciences papers ($P = 19$, i.e. 19 times the typical IF) (Fig. 8). This is followed by Medicine ($P = 17$ times), and Physics ($P = 16$ times). Astronomy papers published in *Nature* have the smallest level of prestige ($P = 5$), the reason for which is that in Astronomy the typical IF of all articles is already relatively high (IF = 4.1) and since we have seen that Astronomy is overrepresented in *Nature*, the papers that get published there fail to be that much more exclusive.

Turning to the prestige of different disciplines in *Science* (Fig. 9), articles there tend to again follow similar patterns to those of *Nature* since they have similar IFs by discipline. Still there are differences, Social sciences articles enjoy the highest level of prestige ($P = 17$), followed by Engineering (16 times), followed by Physics, Medicine and Chemistry with $P = 14$, 13 and 12, respectively. Again, Astronomy articles would have the smallest prestige coefficient of only 4.

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**Fig. 7** Impact factor-like measure (IF, for short) for all 14 broad areas in *PNAS*. Vertical dotted line shows the IF for the whole journal

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**Fig. 8** Prestige of articles for 9 broad areas published in *Nature*. Prestige is determined by dividing the Impact Factor for the *Nature* articles belonging to a broad area by the Impact Factor of all articles in that area indexed in the Web of Science
Similar to the results looking at IF by broad area, *PNAS* is different from *Nature* and *Science* in terms of the areas whose articles have the highest prestige. First, the overall $P$ numbers are smaller because the IFs are smaller in *PNAS*. Top areas in terms of prestige are Professional fields ($P = 14$), Agriculture ($P = 12$) and Humanities ($P = 11$) (Fig. 10). High levels of prestige in these areas that rival the values for some areas in *Nature* and *Science* may be because *Nature* and *Science* do not publish articles in these areas, so the articles that would otherwise be *Nature* or *Science* “worthy” get published in *PNAS*. On the opposite end of the spectrum, similar to *Nature* and *Science*, Astronomy articles published in *PNAS* have the smallest level of prestige ($P = 1.6$) or just 60% above the IF for the whole area.

![Fig. 9](image-url) Prestige of articles for 9 broad areas published in *Science*

![Fig. 10](image-url) Prestige of articles for 14 broad areas published in *PNAS*
Impact in general science journals as compared to impact in top disciplinary journals

The above analyses have shown that there are clear citation advantages for all the broad areas to publish articles in the top general science journals compared to a typical disciplinary venue. However, one would like to know to what degree this holds when one focuses on the most prominent specialized/disciplinary journals. To test this we have compared IFs of different broad areas in Nature, Science, PNAS and top disciplinary journals (Fig. 11). We selected journals that are relatively broad in coverage while not publishing mostly reviews. We focus on six areas that are the greatest contributors to Nature, Science and PNAS. Altogether there are only few journals that rival Nature and Science, and some dozen ones that rival PNAS. In the overall landscape of journals this is still a small number.

In all but one instance Nature is the top venue. Only in Medicine, that place is taken by New England Journal of Medicine, with Nature taking the second place. In six fields (Geosciences, Physics, Astronomy, and Chemistry) Science is ranked second. It is ranked third in Bioscience and fourth in Medicine. PNAS is ranked third in Geosciences and Astronomy. It is ranked 5 in Physics, 6 in Chemistry, and 7 in Bioscience and Medicine.

Fig. 11 Ranking of journals based on the Impact Factor, with Science, Nature, and PNAS Impact Factors calculated only for the specified broad research area.
Discussion and conclusions

The study has investigated disciplinary composition of articles published in top three general science journals (Nature, Science and PNAS) and has calculated several measures to ascertain the impact of those papers, including the popular IF. All three journals tend to publish disproportionate number of Bioscience papers. When one takes into account the production of papers in different fields in the entire database, Bioscience papers are indeed overrepresented, as well as those from Astronomy and Geosciences. All other areas are underrepresented, with Professional fields, Humanities and Engineering being the most under-represented of all the areas. Interestingly, even though severely underrepresented, papers from Professional fields and Engineering are among the highest-impact areas in PNAS and their measure of prestige (how many times the IF is higher than that of the entire field) rivals that of articles from some areas published in Nature and Science. Also, while Astronomy, has come up at the bottom when it comes to the prestige because Astronomy papers from the entire field already have a relatively high IF, the three general science journals are highest ranked in terms of the impact factor. It is interesting that Chemistry papers are only a small percentage of the papers in all three journals, but they have the highest IF in both Science and Nature. Also, Medicine papers are attracting citations above the overall IF for their respective journals. Bioscience, on the other hand, which is the most prevalent in all three journals, has IFs that is the closest to the IFs of the whole journals. Does it mean that editors of these journals are a little bit less selective when it comes to Bioscience papers, so papers from this area are doing comparable to their citation performance in the disciplinary venues? On the other hand, in the areas where the editors are more selective, and where there is probably much higher competition to get the publication accepted, published papers are doing significantly better, not only compared to the papers in their respective fields, but compared to papers from other fields published in these top venues.

To conclude, the answer to the question by which we motivated this study: do different areas have different impacts in these journals, is a resounding yes, with the ratio between highest and lowest IFs being 2.5 times in Nature and Science and ~ 6 times in PNAS.

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