Editor's LETTER

ACS chemical biology

My *h*-index Turns 40: My Midlife Crisis of Impact

If you have not checked your *h*-index, it is about time you do so. If you do not know what the *h*-index is, it is about time you found out. It will change your life!

The *h*-index, or Hirsch index, is a sort of personal impact factor, based on citations of published work. In a seminal publication, Hirsch analyzed many different metrics and proposed the number *h*, where *h* papers have been cited at least *h* times as a useful metric of the cumulative impact of an individual scientist's work (*1*). The *h*-index squashes the effects of a few jackpot papers, as well as the effects of large numbers of uncited publications, compared to more simple metrics such as number of citations or number of papers. A sustained quality effort is required to make your *h*-index grow.

I was oblivious to the awesome power of the *h*-index as a self-assessment tool, in part because it was pretty difficult to calculate. Who's going to do an exhaustive literature search, sort the papers by number of citations, and count down? Then one magical day, I was using Web of Science, and a link appeared: "Create Citation Report". I clicked. *Mirabile dictu!* The sorted list of publications appeared, with the *h*-index calculated and prominently demarcated in the publication list by a horizontal Green Line through the publication list. I immediately used the "Author Finder" feature to search myself, and Created my Citation Report. The result: My *h*-index was 40. Green Line at 40. Forty papers, cited forty times.

OK! OK? So is this good? Is it bad? Two lines of inquiry emerged. First, I quickly Created Citation Reports for my peer group (and you know who you are...). I was pleased to be ahead of some but surprised to be behind others. It was kind of a wash in the satisfaction department. So much for the relative metric, but how about the absolute metric? Second, I consulted the original Hirsch paper to learn that a Nobel-worthy *h*-index was on the order of 100, and it also appears that 50-ish is National Academy territory. Stockholm seemed a bit far off at that moment, but perhaps the Academy was within striking distance. My career was basically half over at this point in my life, and as I approached year 50, I was at $h = 40$. Midlife Crisis. I needed a plan.

The brilliance of the *h*-index is that it provides a single, easy to compute, quantitative measure of your cumulative impact. You want your impact to go up! So, it follows directly and easily that all decisions in your career should be considered in terms of their potential to boost your *h*-index. I now have a plan, as follows.

1) *Switch fields*. One of the things I study is RNA folding, and although many of the papers contributing to my current *h*-index were in this area, there is a problem. It turns out that RNA folding is a small field. Not that many people study RNA folding. Sure, you can get 20 or 30 citations pretty easily, but I am now swinging for 50, and it is clear that I need a bigger audience. Let us say, signaling. Possibly transcription. Stem cells? Wait, no...it has to be RNAi! Any satisfaction I might have had for moving into a relatively unexplored area of inquiry is now safely buried in my *h*-index as history. I need to move into an area that is a scientifically Important Field to have a prayer of significantly upping my *h*-index. The RNA-folding thing has pretty much played itself out *h*-wise.

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2) *Write more reviews.* I turn down a lot of offers to write reviews, and I now see clearly that this is a big mistake. Reviews and Research papers count equally toward the *h*-index, and it is a no-brainer to stop wasting my time watching people in my lab do experiments, when I can rack up a few easy points from the comfort of my desk. Actually, they can keep doing the experiments, and I just will not watch because I'll be writing reviews. It is like shooting fish in a barrel, especially if you write a catchy review in an Important Field.

3) *Implement the Discreet System of Self Citation (DSSC).* This one is pretty obvious. Although I briefly considered just writing a review of my own work, updated annually, I decided this strategy might backfire. I have decided to be a bit more sneaky, well, more discreet. There is no need to cite those papers safely in the *h*-zone, but there are a few nascent-*h*'s that might be stalled or slowly approaching that Green Line. For example, my lab published a very elegant paper that examined the thermodynamic cooperativity in binding of five ribosomal proteins to rRNA (*2*), yet inexplicably, it is lacking citations and could use a little boost. Another example is a technical paper that we published concerning NMR assignments of the HIV Rev-Response Element RNA (*3*), which was highly cited in its day but is now parked just below the Green Line. The key here is to be discreet.

4) *h-index Projections*. Anyone who has a retirement account left responsibly evaluates the performance of their portfolio in terms of their goals at the age of retirement. When you Create your Citation Report, you get additional key information about the trajectory of each of your publications, which is the number of citations per year. This is like getting stock quotes on your portfolio of publications, and this information deserves some serious meta-analysis to maximize long-term returns on your *h*-index. So, if you have a paper that has 20 citations and it is earning 10 citations per year, you can count on a bump in your *h*-index in a few years. Clearly, such a publication represents an Important Field in which it is worth investing more publications. Parenthetically, unlike your 401k, your *h*-index can *never* go down, which is another reason that your *h*-index is a sound long-term investment that should be diligently managed.

5) *Impact Caching.* Lastly, there will be no more bread and butter publications. There is no point in publishing anything unless it has a significant chance of upping your *h*-index. What then to do with all of this un-Important data? This is where the impact cache concept comes in (you heard it here first...). Journals now allow for the inclusion of almost unlimited data in the form of Online Supporting Information. Rather than publish one magazine-style paper with a high citation rate and one methods-style paper with all of the details, the details should be cached in the online Supporting Information of the higher impact paper. That way, the modest number of citations that would be enjoyed by the methods paper get accumulated with the primary citation-earning paper. Start caching!

The strategy I have outlined can be generally applied with great profit to a variety of situations for the general manipulation of impact and impact factors, which we can all agree is necessarily a central guiding principle in academia. Although it probably has not occurred to them, Journal Editors would certainly profit from active impact management. Department Chairs should be actively managing the impact of their junior faculty members, as soon there will be an *h*-bar set (seriously no pun intended...) for evaluating tenure cases. The world is changing rapidly. There is too much information. There simply is not time to read papers in any meaningful way. Concise and quantitative metrics are coming at you like an avalanche. Adapt or Perish!

As of this writing, I am at *h*-42. I've written a *perl* script that will Twitter me when my *h*-index goes up a point. Hang on!

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