

## Achieving research excellence and citation success: What's the point and how do you do it?

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Citations of published articles are increasingly important to individual scientists, the journals in which they publish, and the institutions at which they are based. Citations, for example, form the basis of the *h*-index, by which scientists are being judged; journal impact factor scores; and institutional rankings, such as the Academic Ranking of World Universities. Positions, prestige, and funding are all at stake. This is our new reality, whether we like it or not.

This development assumes that citation frequency measures the influence or impact achieved by an article, and so the numbers of citations achieved by individuals, journals, and institutions provide associated measures of scientific performance. Although citations are clearly not the only such measure, this logic seems hard to deny, and computer technology automates the tracking of citations. Our new reality is therefore hardly surprising.

Changing are the traditional research evaluations, that were based primarily on the number of publications and peer assessments. The publish or perish dictate, coupled with peer review, has ruled academia for a very long time. It is therefore hardly surprising that these changes are meeting strong criticism, because a citation focus may lead to biased, unfair, and discriminatory evaluations and may shift research focus away from things that are simply exciting. Of course, the previous system has suffered similar problems, compounded by high subjectivity. In any case—perhaps sadly—it may no longer be sufficient to pursue a research interest just because you love it.

However, I can recommend a strategy that should simultaneously improve research quality and enhance citation success. I have accumulated a large number of citations (about 7000), have been designated as a *highly cited author* in the Highly Cited Research database, have compared notes with similarly designated colleagues, and have analyzed the numbers of citations of my published journal articles on the basis of the criteria in my strategy.

As you will see, my recommended strategy is simple and straightforward, largely a matter of common sense, and yet rarely adopted. This is apparently because it involves components that must work together, and the implementation of these components may be difficult, requiring focus and determination not easy to achieve.

My strategy has three components: an approach (or mindset), tools to make it work, and feedback. My approach consists of several goals or guiding principles, designed to lead to high-quality research and to help put existing research in the best possible context. The tools are procedures that can assist in the pursuit of the goals, and feedback can indicate goal achievement and suggest improvements.

My recommended approach includes three major goals: maximal **significance**, maximal **influence**, and excellent **presentation**. **Sustained effort** may also be necessary, hence the combined acronym *SIPS*. These goals may be applied both where future areas of scientific inquiry are being considered and where research has already been carried out. They are subjective but quantifiable and, therefore, actionable. I shall briefly discuss each in turn.

In general, significance would increase with an increasing number of interested scientific colleagues but would be context dependent, because some broad research areas have more scientists than others, and originality may enhance research significance.

Seeking to influence, through changing what people think, say, and do, seems the most important goal, because that is really what both research quality and citation success are all about. This too will be context dependent.

An excellent presentation will be captivating, compelling, and memorable. An article should be captivating, in the sense that it attracts and maintains a reader's attention; only then will its story be told. An article, through which the author seeks to have some influence, must be compelling in its presentation of arguments; otherwise, its message will be lost. An article must also be memorable; otherwise, colleagues will not take note and think to cite it.

These four goals must be simultaneously pursued in order for research excellence and the associated citation success to be achieved. The questions or issues that are addressed need to have a high level of interest to many people; otherwise, one cannot expect much influence. Influence must be actively pursued; otherwise, one cannot expect to achieve it. Such influence will be achieved, if it is achieved at all, through presentation. All of this effort generally needs to be sustained. This probably all seems most reasonable.

However, translating these goals into action and outcomes requires more than simply adopting the mindset; it requires tools such as the one illustrated by the following example.

The significance of a research study increases with both the fundamental significance of its basic research question and the relevance of the study to this question, but also depends on the

context at the time the results are published. A basic question should set the stage for ensuing research. For example, my basic question throughout much of my research has been “Why do organisms forage in the ways they do?” (Pyke et al. 1977), and, given the importance of foraging for individuals, populations, and ecosystems, this question has high fundamental significance. However, a researcher rarely—if ever—attempts to answer such a question in a particular study but ultimately considers a lower-level question, and the higher the relevance of this ultimate question is to the initial question, the higher will be the study’s overall significance. Such a lower-level question could, for example, be “Is foraging by bumblebees for nectar within patches of a particular plant species consistent with the hypothesis that they are maximising their net rate of energy intake and, therefore, foraging optimally?” (Pyke 1978). Clearly, this question is highly relevant to my basic question.

However, the significance of a particular study will depend on the context of both questions when the results are published. When I began to study bumblebee foraging, Optimal Foraging Theory was in a relatively early stage of development; there had been few attempts to evaluate it, especially involving field studies; and bumblebees were ideal animals for pursuing such studies. The context therefore enhanced the significance of my study, especially relative to the significance of a current similar study. Considering the context at the time and combining fundamental significance with relevance, my bumblebee research obviously had high overall significance. Of course, situations are unlikely to always be so obvious.

Assessing and enhancing overall significance can be facilitated by adopting a simple—albeit subjective—scoring system. It is possible, for example, to invent numerical scales for fundamental significance, relevance, and the context factor and to combine them into an overall significance score.

Tools for maximizing influence and developing excellent presentations can be similarly developed along the following lines. Influence can be thought of as the product of targeted audience size and the per capita influence level that is sought, and it, too, is context dependent. For an article to be captivating, compelling, and memorable, it needs, more fundamentally, to be simple, concise, logical, and clear. It must be simple, because complexity may confuse and distract a reader. It must be concise, because readers will generally have short attention spans and many competing time demands. It must be logical, because a reader is unlikely to be convinced by an illogical argument. And it must be clear, because ambiguity and uncertainty will

also confuse the reader. Feedback from friends and colleagues can facilitate the implementation of these tools.

Achieving research success—and, therefore, citation success—requires certain personal traits in combination. Significant influence, for example, which is fundamental to both research quality and citation success, requires a mission, passion, a level of arrogance or self-worth, and confidence. The mission is to target influence for the target audience, and achieving such a mission requires a commensurate level of passion. It is somewhat arrogant to believe that the desired influence is warranted, but this sense of self-worth is essential. Furthermore, without appropriately high confidence, the desired outcome is unlikely. In addition, the adoption and implementation of my recommended tools require significant commitment and determination; otherwise, they do not happen.

My recommended strategy has worked well for me and my colleagues, although none of us has adopted it explicitly; it can help almost anyone.

You should be able to state, “I do my research because I love it and am determined to make a positive difference within my subject area.” For both me and my highly cited colleagues, the first part of this has always been explicit, with the second part implicitly operating in the background, with us hardly or never recognizing it. However, this statement, which embodies both passion and ambition, conveys how we have all felt. It is, I believe, the secret to success as a research scientist and the essence of my recommended strategy.

I would be happy to send further details to anyone who is interested.

### **References cited**

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