



# Dr. Strangelove: Or How I Learned to Stop Worrying and Love the Citations

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In ancient times, citations in research papers were meant to allow readers to know two things: firstly, the cited paper was somehow relevant to the research done in the paper, and secondly, the cited paper was recommended to the interested reader for further elucidation of some point.

But in the last ten to fifteen years, citations have come to serve a completely different function: to measure the quality and significance of the author's work. The more citations, the better the paper (or researcher, or group of researchers, or journal, or department, or university).

Highly cited papers, individual and collective  $h$ -index, sheer number of citations, all these became a clear and "objective" measure of a researcher's intellectual net worth.

For example, in order to habilitate in Italy—that is, to be allowed to compete for professorial positions—one must be approved by the national scientific habilitation board in order to obtain the *Abilitazione Scientifica Nazionale*. Here are the rules:

1. The candidate must surpass a threshold value in at least two out of three areas:
  - (a) number of citations,
  - (b)  $h$ -index,
  - (c) number of published papers.<sup>1</sup>

The last time I applied for habilitation to full professorship in geometry, these numbers were as follows: thirty-five citations,  $h$ -index of four, and publication of at least eight papers in the past ten years. It is only after the candidate has satisfied such "objective" criteria that the committee considers other factors such as whether the candidate "has been an organizer of or a participant in international meetings." There are six such conditions, three of which the candidate must satisfy, all subject to the committee's subjective judgment. In 2018, for example, I passed four out of the six, but in 2020, under examination by a new committee, I passed only two. In sum, it is only after jumping through two out of three hoops<sup>2</sup> and over three out of six hurdles that the committee actually looks at your individual accomplishments and contributions and evaluates them.

But Italy is just one example of how the supposedly objective numbers of citations (and publications) play a central role in a researcher's funding and career. While once academia was about "publish or perish," now things are tougher: it is publish (preferably in highly ranked journals) and get cited (a lot) or perish.

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<sup>1</sup>Everything must be certified by Scopus or the Web of Science (previously run by the Institute for Scientific Information (ISI) and currently operated by Clarivate, a publicly traded American company that markets scientific and academic research analytics), which is a great idea, since these are private companies over which the academic community has no control and that have no vested interests other than making a profit.

<sup>2</sup>It is worth noting that the cutoff numbers of the three hoops are updated every two years to the median value over all professors in the relevant sector and position. Which creates a sort of feedback loop, and the numbers increase every time they are recalculated.

One might object that this use of citations fails to correspond to the purpose for which they were originally intended and further, that in the end, citations might actually not have all that much to do with a researcher's merit.

## When the Going Gets Tough ...

Of course, the objection that the purpose of citations may have changed is completely frivolous: we cannot hope to live in the past and determine for ourselves what citations are for. We must change our point of view completely, accept the rules as they are, and play according to those rules. After all, rules are made to encourage people to behave in a particular—positive, of course—way. And in this case, the rules are working: more citations indicate more valuable research and a better researcher, do they not? And indeed, lately, the number of citations is increasing. We must be witnessing the creation of increasingly better research and researchers, year after year.

Since we are dealing with rules and players, we must be in the realm of game theory. Game theory always supposes the players to be rational actors. And who can be more rational than a researcher? The rules and the rationality of researchers totally accounts for the rise in citations we are experiencing.

So tough (and rational) researchers get going by learning how to influence—in the optimal and most honest and ethical way, of course—the citations in their papers. The optimum—maximal citations-to-content ratio—would be a paper with no text and citations to all of your previous works [1, 2, 4, 9, 12, 13, 18, 19, 33, 38–42, 44, 47, 48, 55–61, 65–70], but somehow some old-schoolers who control the levers of publication have exhibited some resistance to this desideratum and do not allow such perfect papers to be published.

In this paper, we want to propose a method to get as close as possible to the optimum, keeping in mind that if your paper does not get published, you are getting zero citations immediately and zero citations afterward.

## All You Need Is Love (and Citations)

Obviously, the more citations of your own work you are able to include in the bibliography—no matter whether already published, preprint [43, 62–64], or “to appear” [5, 10, 11, 20]—the better. And please note that citations to preprints or future papers are fine: you just have to remember to show the citation to Scopus or Web of Science. Many universities have staff members whose job is to raise the citation numbers of their researchers, so make sure you tell them about your future citations.

In sum, make sure you cite everything that you have ever written or are writing or will write that is (even if only marginally) relevant to your paper.

Of course, a suite of good practices to maximize citations includes (but is not limited to) the “divide-and-conquer” technique (slice up your paper, like a chunk of baloney, into the largest number of publishable units you can get away with) and the “error-correcting code,” whereby you introduce a slight error into your paper that you will have to correct with an errata later on—yielding yet another opportunity for citation.<sup>3</sup>

## Spreading the Love

But remember: love (and citations) is about sharing, so don't be selfish and leave others out of the game. And don't be bashful. Be sure to cite your brother, whether consanguineous [30, 50, 71] or academical [34–36].

You can even cite papers recently published in your university's journal [6, 21, 32] in order to raise its citation score and ranking; or papers from your departmental colleagues [29, 31, 49] in order to raise the department's *h*-index. You will find those two gambits quite useful, since those numbers are used—and in the future, they may be used even more—to determine the quality of your department and consequently how much funding it will receive. So never miss an occasion to raise those numbers.

But also never forget that in order to get published, you will have to convince at least one referee and one editor. So carefully choose your editor and cite him or her [37, 45, 46] and try to suggest a referee by citing him or her a lot (referees are frequently chosen from among the researchers cited in the paper) [52–54].<sup>4</sup> Never forget that citations are love, and everybody likes to feel loved. An editor or referee who can feel your love is more likely to accept your paper.

Finally, cite some papers that were recently published in the journal to which you are submitting your paper [24, 28, 51]. This shows that you truly believe in the journal's importance. Moreover, if your paper is published, the journal's numbers will improve.

But of course, not all citations are equal. The most effective citations are those that will increment a researcher's *h*-index. Hence you should know how to cite in order to maximize the probability of getting to a certain *h*-index in a given amount of time. In this paper I have therefore chosen to give citations to other people in order to try to maximize their *h*-indices.

## Conclusions

To be sure, if you apply the suggestions outlined in this paper, it might happen that after adding the genuinely relevant citations to your paper—don't forget those!—you will end up with an extraordinarily long bibliography. But don't look at that as a problem, for the length is an objective index of how much high-quality research has been published lately.

<sup>3</sup>And if you are lucky, you might also introduce some unintentional errors. Believe it or not, the error in [40] that was corrected in [42] was unintentional and discovered after the paper was already published.

<sup>4</sup>In the submitted version of this paper, these three items were labeled “to be determined.” I kindly asked the referee to choose any three of his/her papers that he/she wanted me to cite for the final version. Unfortunately, the anonymous referee did not request any citations, so I kept the three items in their inchoate state.

And don't ever be distracted by emotionality or a false sense of integrity or morality. You are a tough researcher and should follow the rules: maximize your citations and spread the love.

Of course, never forget to cite this paper [62] whenever possible. Spread the love!

## Conflicts of Interest

The author declares that this paper, if published, will drastically increase his citation numbers, since he has cited all of his past, present, and some future works. This does not violate any ethical code, as explained in the paper itself, and it serves to exemplify the phenomenon we are studying.

## Getting Serious for a Moment

To be serious for a moment, all of the above suggestions are clearly to be avoided. Following them obscures the truly relevant citations in a sea of irrelevant ones.<sup>5</sup> Yet no one can deny that such behavior occurs. Researchers tend to self-cite or group-cite much more than in the past, and the referee often asks the author to add some very important citations, usually articles all by the same author.

No one can deny that the median number of citations per paper has risen dramatically in the last ten to fifteen years. Why? Of course for the reasons highlighted in this paper. Give a goal, and people will pursue it.

It does not matter whether citations are a good tool to measure the quality of research. What matters are the consequences of the rules. Rules should be chosen in order to encourage desirable behavior. The ranking mania with its accompanying extensive overuse of citations has had deleterious consequences. A better method has to be found.

As a side note, Dag Aksnes, Liv Langfeldt, and Paul Wouters have said:

It is argued that citations reflect aspects related to scientific impact and relevance, although with important limitations. On the contrary, there is no evidence that citations reflect other key dimensions of research quality. Hence, an increased use of citation indicators in research evaluation and funding may imply less attention to these other research quality dimensions, such as solidity/plausibility, originality, and societal value [3].

In order to make citations matter again, we should stop using them to evaluate papers, journals, departments, and researchers.

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their papers [8, 15–17, 22, 23]. The final form of this paper benefited from a cosmetic makeover by the copyeditor, David Kramer. Let me thank him by citing some of his papers [25–27]. Let's spread the love!

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