

Admiring a scientific jewel — Visiting Galilei’s residence

inspires to a natural measure of scientific merit

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August 2023

A while ago, I attended a scientific meeting in Villa il Gioiello (the Jewel), a magnificent building in the green hills just outside of Florence that served as Galileo Galilei’s residence from 1631 until his death in 1642. This glorious scientific heritage inspires the villa’s current use by the local university. During one of the lunch breaks, we – the meeting attendees – were given access to the upper floor wooden terrace, from whereupon Galileo performed his pivotal night sky observations with one the first telescopes ever built. Driven by curiosity, however, I left early and took the liberty to explore the villa’s many chambers on the same level. Somewhat tucked in a corner towards the western end of the L-shaped building, I found a small sign next to a plain wooden door that read “Biblioteca” and left me baffled. Was I really entering the master’s library, where he contemplated the Copernican worldview nearly four centuries ago? The lightful room, with several small windows along two adjacent walls, was completely emptied, but what a wonderful feeling it was to wander around and consider oneself at the heart of the Scientific Revolution. Yet after having marveled there for a few minutes, I accidentally overheard a discussion between two fellow visitors in the garden below, which, reconstructing from memory, sounded as follows [with some additional references to where I think they may have gotten their inspiration]:

- Something is rotten in the state of science, Simplicio.
- Com’on, not again, Salviati.
- How can you sleep with our giant father having an h-index of only about ten, putting him

on the same level as the average postdoc?

— Well, it doesn't sound right, I agree, but that doesn't mean it keeps me up at night.

— I does to me, I can tell, and I've been thinking a lot about this lately

— The are some alternative AIMS [author impact metrics]; don't they work to rightfully assess his enormous scientific impact? [Bihari, et al., 2021]

— I've heard about that, yes. They're all supposed to work for a standard career, but overall don't differ that much [Bornmann, et al., 2011] and become less and less relevant nowadays, apparently [Koltun & Hafner, 2021]. And it's clear they even become useless when taking a historical perspective as well, since the dawn of the scientific method from father's seminal work!

— Would you have a better idea then?

— Well, what we would need is a metric that properly credits personal efforts, while at the same time correcting for the many differences between research fields and careers – past, present, and future.

— Okay, I could agree in theory, but doesn't that sound a bit over-ambitious? How would you consider field-specific or even lab-specific publication and referencing practices? Not to mention sometimes-dubious coauthoring and self-referencing. And what about career-changes? That's a lot to account for in a single number, Salviati.

— I know, yet I believe there's an obvious candidate: the number of non-self-references to your work as first author, say "first author reference tallies", as a direct measure of the appreciation of your very own scientific writings by peers.

— Sounds good, but a bit long, no?

— Well, abbreviated that becomes [brief pause] FARTs! [laughter]

— At least it would stick with the community, and father's farting would rightfully go into the ten-thousands! [laughter again]

[pause]

— Long ago since we've had such fun together, Simplicio, that feels good.

— Pity Sagredo is not with us anymore.

— Well, we both know how he became a victim of social media, but he might be hearing us from somewhere. I'm sure he would love a proper scientific appraisal, though comic, instead of being too serious about existing impact metrics. [silence]

— So, Salviati, how’s your farting these days? [hilarity]

— I cannot complain about my output and others’ appreciation thereof, thank you.

And while the wind took off around the house, I heard their laughter faint away. Time to get back to the publication discussion downstairs...

Clarification

My parents once gave me a copy of Galilei’s original text (in Italian) of the “Dialogo” [Galilei, 1632] for my anniversary. The book is presented as a series of discussions, over a span of four days, among two philosophers and a layman [cf. wiki]:

- Salviati argues for the Copernican position and presents some of Galileo’s views directly. He is named after Galileo’s friend Filippo Salviati (1582-1614).
- Simplicio presents the traditional views of Ptolemy and Aristotle and arguments against the Copernican position. He is supposedly named after Simplicius of Cilicia, a sixth-century commentator on Aristotle, but the name was a double entendre, as the Italian for “simple” is “semplice”.
- Sagredo is an intelligent layman who is initially neutral. He is named after Galileo’s friend Giovanni Francesco Sagredo (1571-1620).

Hence the naming in this fictional conversation, which starts with a wink to Shakespeare’s Hamlet of course. The introductory part, however, really happened, until “Yet after having marveled there for a few minutes...” Even without any acquaintance with the University of Florence, visiting Galilei’s Jewel is possible through the Sistema Museale di Ateneo Firenze (<https://www.sma.unifi.it/>).

The FART metric proposed by Salviati essentially answers one main question: How are your peer-reviewed publications – no matter how many or in which domain(s) – appreciated by the global research community? This sounds like a motivational self-assessment for scientists to me, and can be argued to be a fair impact measure to be used by (academic) employers or position evaluators as well. In contrast with the h-index and its derivatives, it is fully based on quality in the eyes of peers instead of quantity, and as such eliminates the ineffective and quantitative “publish or perish”, which

spoils resources [Moosa, 2018]. By focusing on first authorship, FARTs moreover largely correct for publication practices, (self)referencing practices, and coauthoring practices within each research field. This makes them suitable for intercomparisons between fields and facilitates continuance upon career changes. Nevertheless, a temporal gauge, cf. yearly or decadal FARTing, could be added to assess professional evolution. Another variation is to allow fractional FARTs, by sharing a single reference to one of your publications between multiple first authors. This approach has the additional benefit that ‘first authors’ would be well-considered, because sharing the FART pie, instead of having name-adding for a free referencing ride (and h-index increase). And for those who are worried that their research supervision efforts would no longer count, an analogy can be created for Back Author Reference Counts, or BARCs. For some, that acronym would even rightfully convey their daily job behavior too.

Dedication

This text is dedicated to the French philosopher Michel de Montaigne (1533-1592), a contemporary of Galileo Galilei (1564-1642). He was the first to acknowledge that people of merit are merely humans too, with animal bodies and needs, and to write unreservedly about this in his groundbreaking essays. I deeply admire both.

References

- Bihari A., Tripathi S. & Deepak A. (2023) A review on h-index and its alternative indices. *Journal of Information Science*, 49(3):624–665, <https://doi.org/10.1177/01655515211014478>.
- Bornmann L., Mutz R., Hug S. E. & Daniel H.-D. (2011) A multilevel meta-analysis of studies reporting correlations between the h index and 37 different h index variants. *Journal of Informetrics*, 5(3):346-359, <https://doi.org/10.1016/j.joi.2011.01.006>.
- Galilei G. (1632) *Dialogo sopra i due massimi sistemi del mondo*. Batista Landini, Florence, Italy.
- Koltun V. & Hafner D. (2021) The h-index is no longer an effective correlate of scientific reputation. *PLoS ONE*, 16(6):e0253397, <https://doi.org/10.1371/journal.pone.0253397>.
- Moosa, I. A. (2018) *Publish or Perish: Perceived Benefits versus Unintended Consequences*. Edward Elgar Publishing, Cheltenham, United Kingdom. ISBN 978-1-78643-493-7.