IN SEARCH OF MIND-BLOWING SCIENCE

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When was the last scientific talk you saw that totally blew your mind? You know, the kind of talk that you walk away from of thinking, “Wow—this changes EVERYTHING!” For me, I can clearly remember every detail of a talk I saw over 20 years ago in Strasbourg and the very moment I realised that my future research trajectory was going to change forever as a result of what was being presented. The talk in question was by Mihály Pósfai, who had been awarded the 1999 European Mineralogical Union Medal for Research Excellence and was presenting his work of applying the technique of electron holography to directly image the magnetic state of magnetite nanoparticles in bacteria. The impact on me was immediate for two reasons: not only would the opportunities afforded by this new technique completely revolutionise my own research, but I also discovered that one of the world experts in holography worked just across the street from me. (Indeed, I could write a whole other editorial on the subject of why we often have to travel to a conference halfway around the world to hear about the science that is happening just down the corridor.)

Such transformative moments are rare, which got me thinking about whether or not they are getting even rarer? It feels to me that they are, and I would struggle to identify another talk that had such a disruptive impact on me. (But perhaps I am just slowly turning into the grumpy old academic that sits at the back of every session mumbling “we did all this 30 years ago, don’t you know?! ”)

However, there is more than anecdotal evidence that this is the case. Following an analysis of 45 million papers, a recent study (Park et al. 2023) found (not without some heated online discussion, I might add) evidence to suggest that science is indeed getting less disruptive over time. In this case, “disruption” was defined by the way a paper breaks with the past, pushing science and technology in completely new directions, and was quantified by analysing how a paper changes networks of citations. The theory is that for a “disruptive” paper, subsequent work that cites it is less likely to also cite its predecessors compared with a “consolidating” paper that builds on what came before. Setting aside the pitfalls of boiling down such a complex issue into a single citation-based metric, the results tell a compelling story of how the proportion of published papers classified as disruptive has declined consistently and dramatically since the 1950s across all areas of science and technology. Interestingly, however, the absolute number of disruptive studies has remained essentially unchanged during that time. Disruptive science is alive and kicking, but is increasingly crowded out by the sheer volume of consolidating science being produced.

In searching for an explanation for the decline, the authors rule out any fundamental changes to citation practices or the quality of work, but rather identify a more fundamental shift in the way science now operates—scientists are encouraged to “publish, publish, publish” and must increasingly focus on a narrower range of specialised expertise, citing familiar older works as we struggle to keep up with the sheer pace of knowledge expansion. Is it time, then, to turn the tide on the relentless push for quantity over quality and give ourselves the time and space to make more transformative advances? Park et al. suggest that “to promote disruptive science and technology, scholars may be encouraged to read widely and given time to keep up with the rapidly expanding knowledge frontier.” Well, there is no better way to do that than with the latest issue of Elements—quantity and quality in abundance!

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REFERENCE
Park M, Leahey E, Funk RJ (2023) Papers and patents are becoming less disruptive over time. Nature 613, 138-144, doi: 10.1038/s41586-022-05543-x