Abstract Submitted
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Scientific impact: the story of your big hit[1] ROBERTA SINATRA[2], CCNR and Physics Dept., Northeastern University, Boston, DASHUN WANG, IBM Watson Research Center, New York, PIERRE DEVILLE, Université Catholique de Louvain, Belgium, CHAOMING SONG, University of Miami, Miami, ALBERT-LASZLO BARABASI, Northeastern University, Harvard Medical School and Dana Farber Institute — A gradual increase in performance through learning and practice characterize most trades, from sport to music or engineering, and common sense suggests this to be true in science as well. This prompts us to ask: what are the precise patterns that lead to scientific excellence? Does performance indeed improve throughout a scientific career? Are there quantifiable signs of an impending scientific hit? Using citation-based measures as a proxy of impact, we show that (i) major discoveries are not preceded by works of increasing impact, nor are followed by work of higher impact, (ii) the precise time ranking of the highest impact work in a scientist's career is uniformly random, with the higher probability to have a major discovery in the middle of scientific careers being due only to changes in productivity, (iii) there is a strong correlation between the highest impact work and average impact of a scientist's work. These findings suggest that the impact of a paper is drawn randomly from an impact distribution that is unique for each scientist. We present a model which allows to reconstruct the individual impact distribution, making possible to create synthetic careers that exhibit the same properties of the real data and to define a ranking based on the overall impact of a scientist.

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