

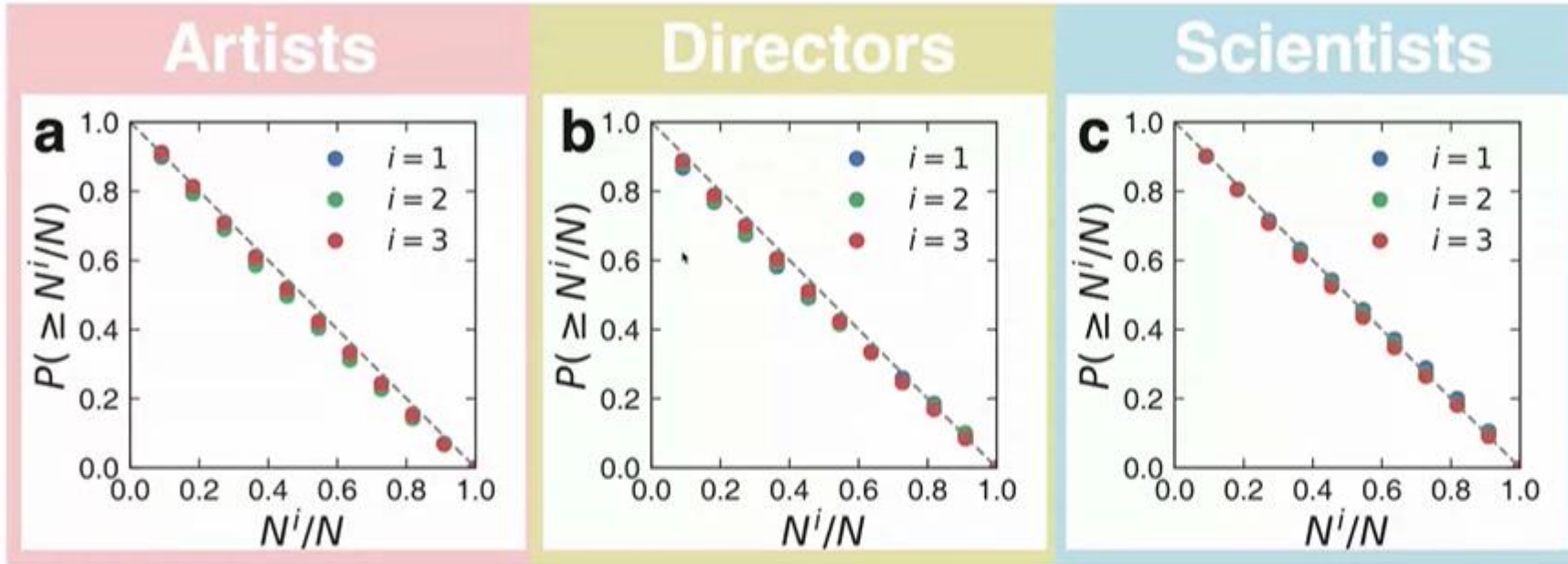


Initial Progress on the Science of Science

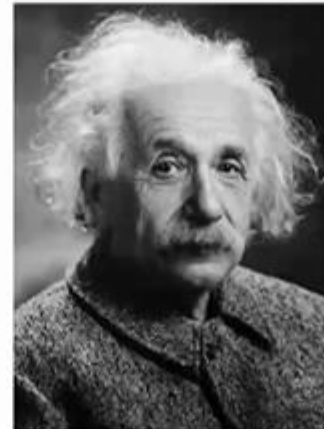
Dashun Wang

Northwestern University, Illinois

Hot streaks in artistic, cultural, and scientific careers

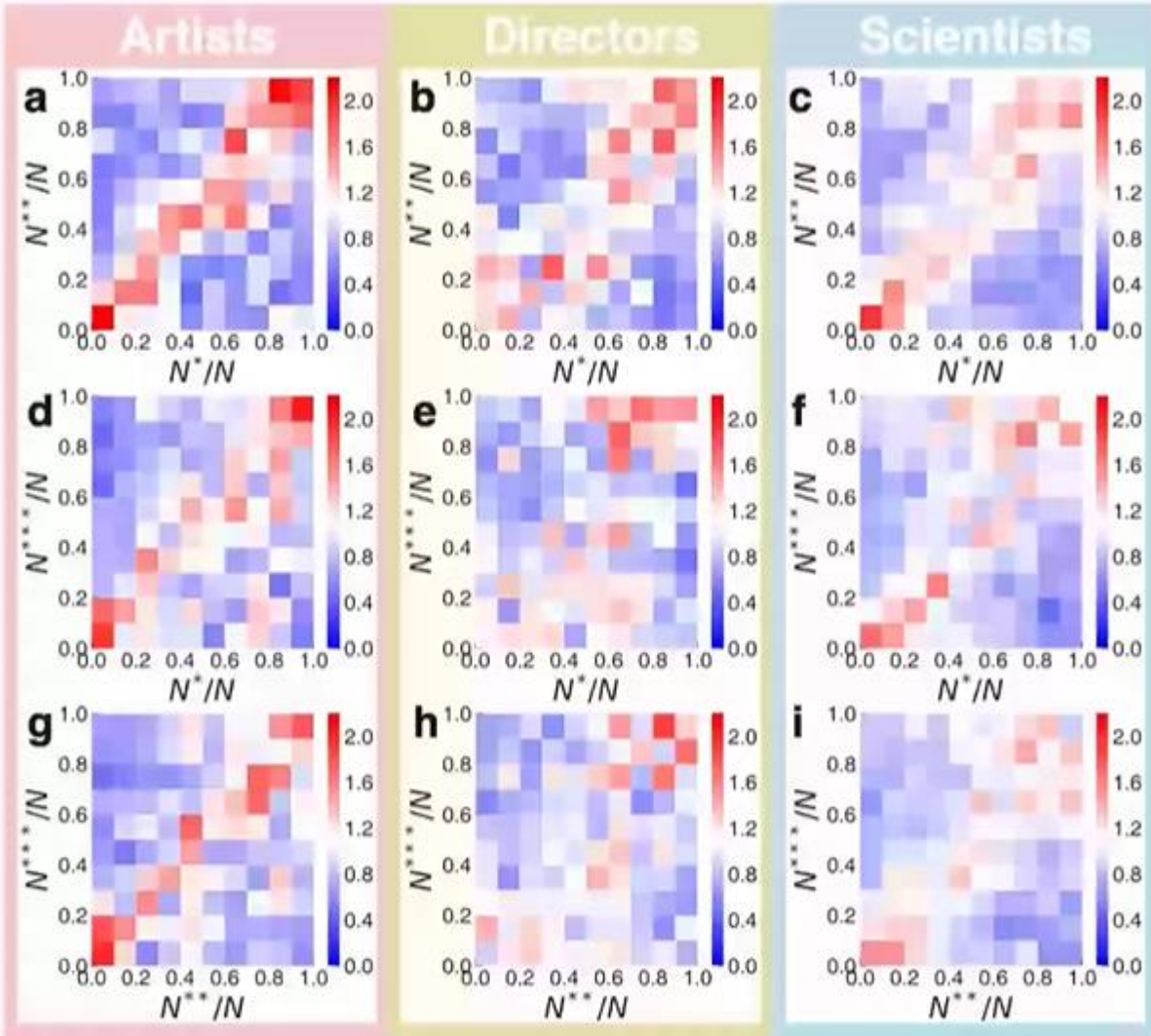


Random Impact Rule
Biggest hit
2nd Biggest
3rd Biggest



3,480 Artists
6,233 Movie directors
20,400 scientists

Hot streaks in artistic, cultural, and scientific careers



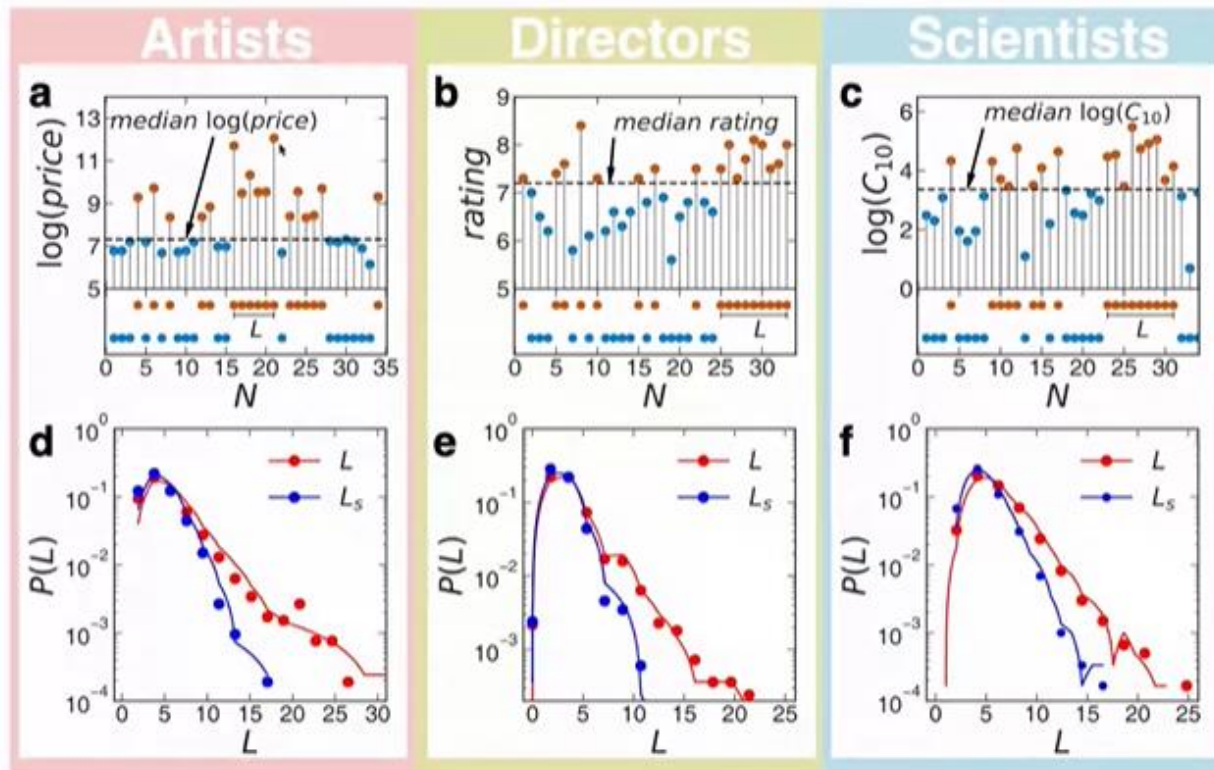
1st vs 2nd

1st vs 3rd

2nd vs 3rd

While the timing of each scientific hit appears random, their relative timing follows predictable patterns

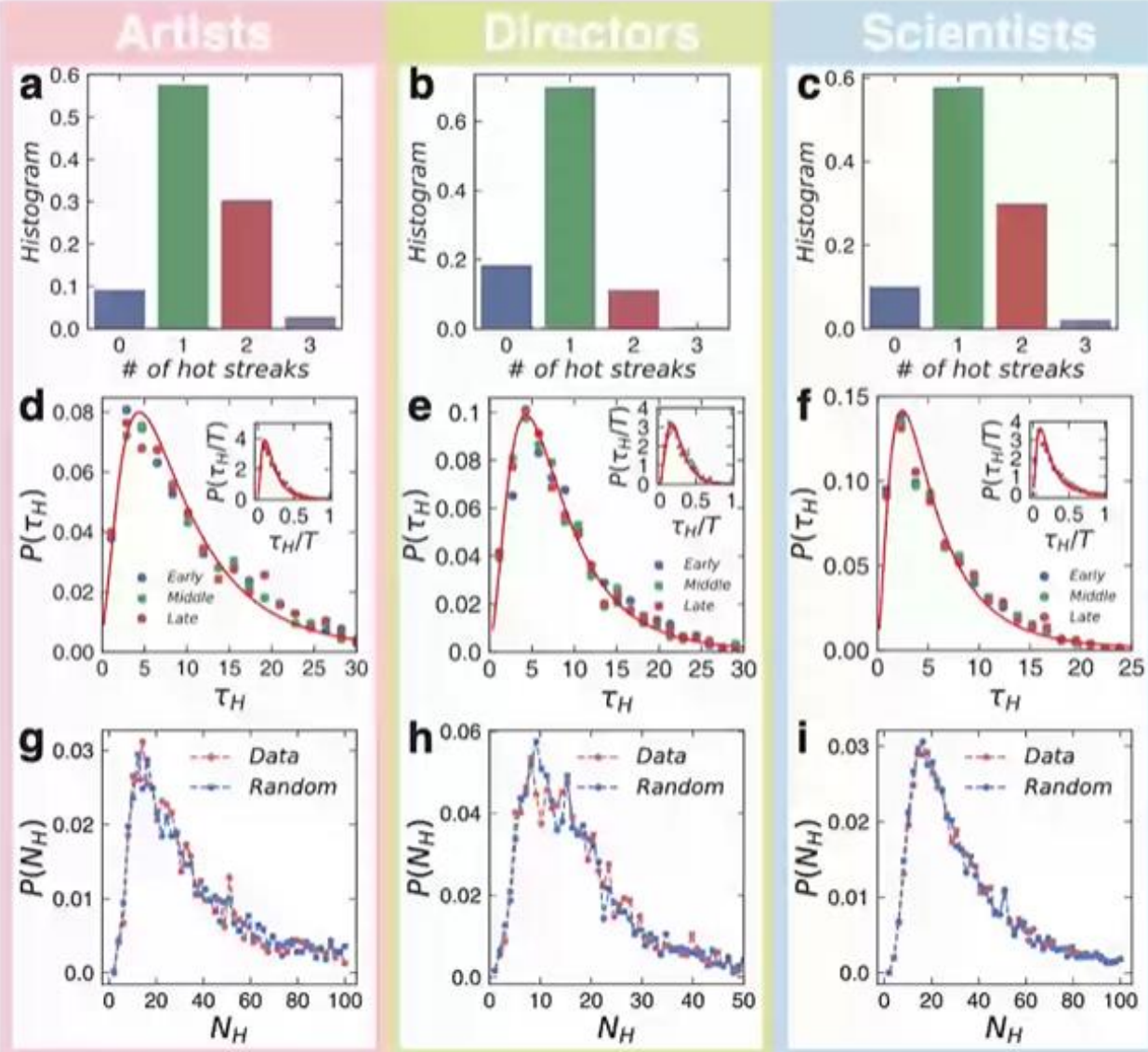
Hot streaks in artistic, cultural, and scientific careers



winning streaks:
High-impact works occur in sequence.

What mechanisms are responsible for the observed cluster of hits in real careers?

Hot streaks in artistic, cultural, and scientific careers



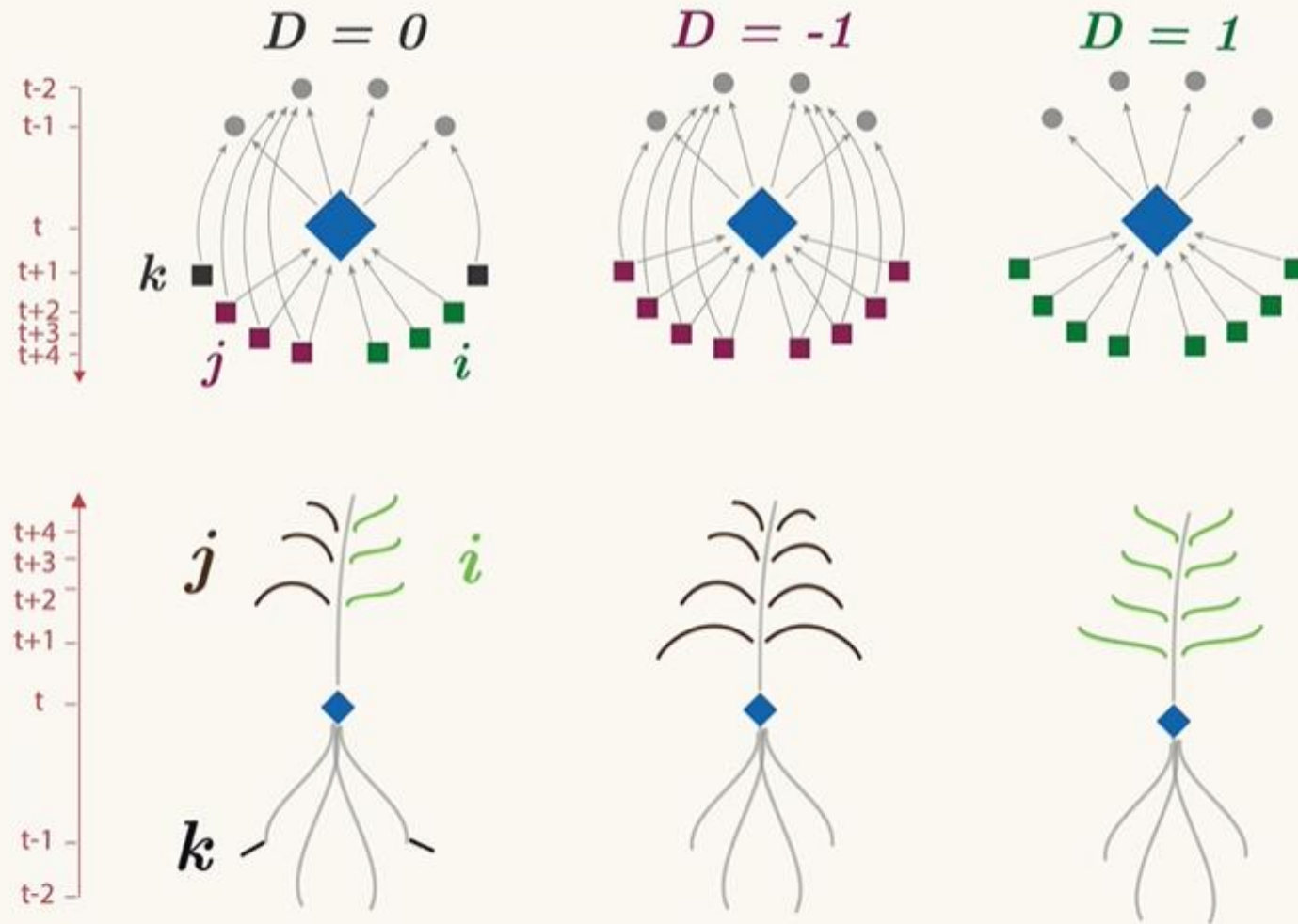
Hot streaks are

- 1) Ubiquitous yet usually unique
- 2) Temporally localized (~5 years)
- 3) Unassociated with productivity change

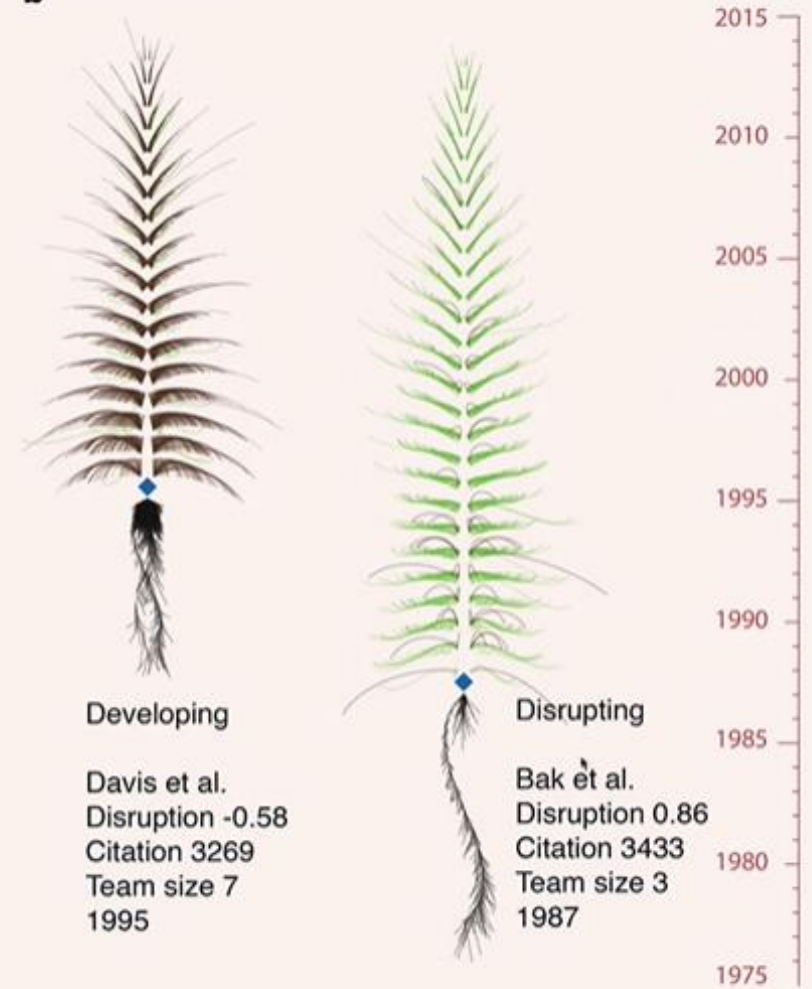


Disruption Index

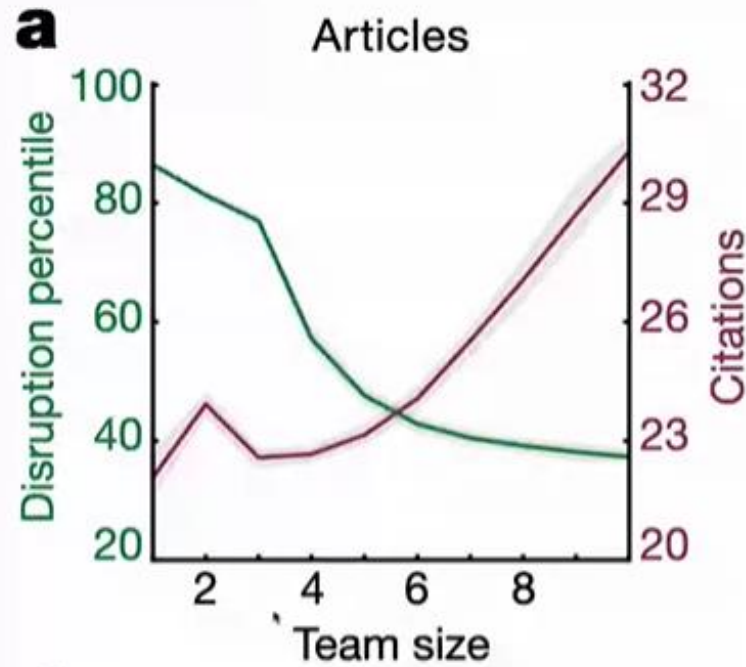
a



b

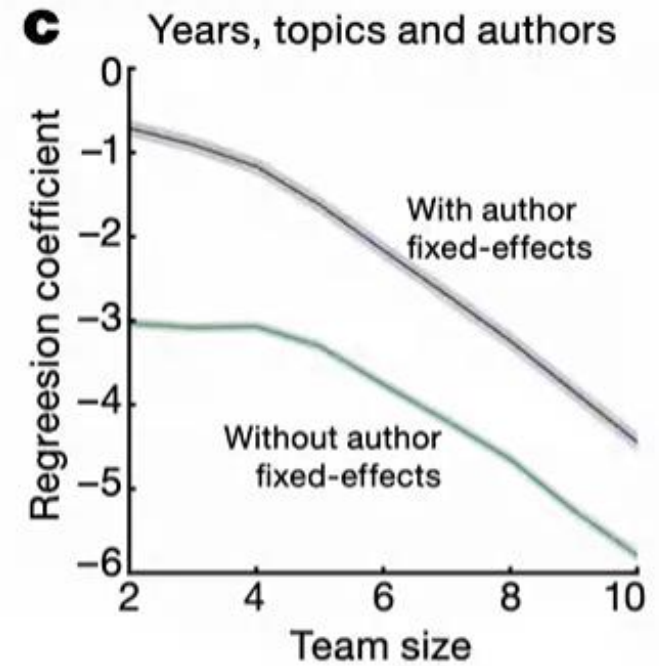


Large teams develop, and small teams disrupt, science and technology



Is it really small vs large?

- Disciplines
- Topics
- Reviews vs non-reviews
- Theoretical vs empirical
- People are different
- ...

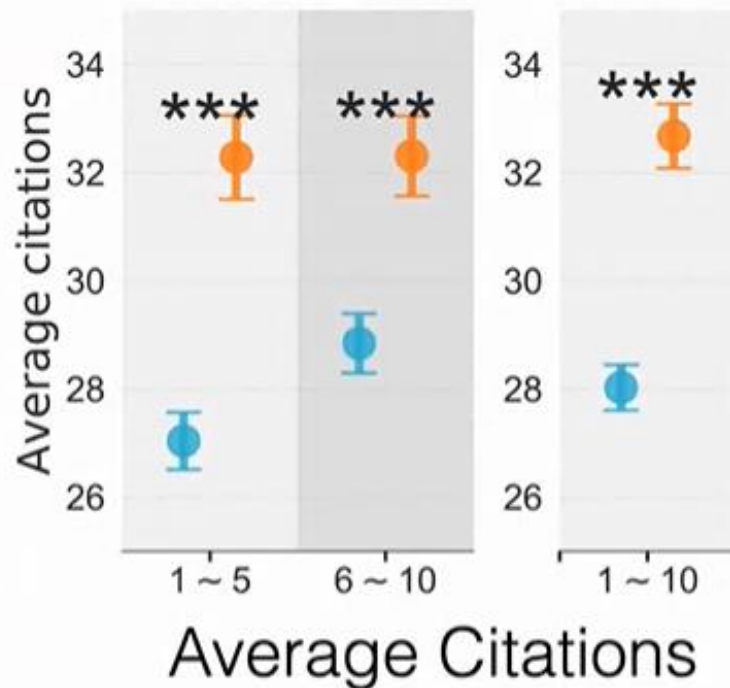
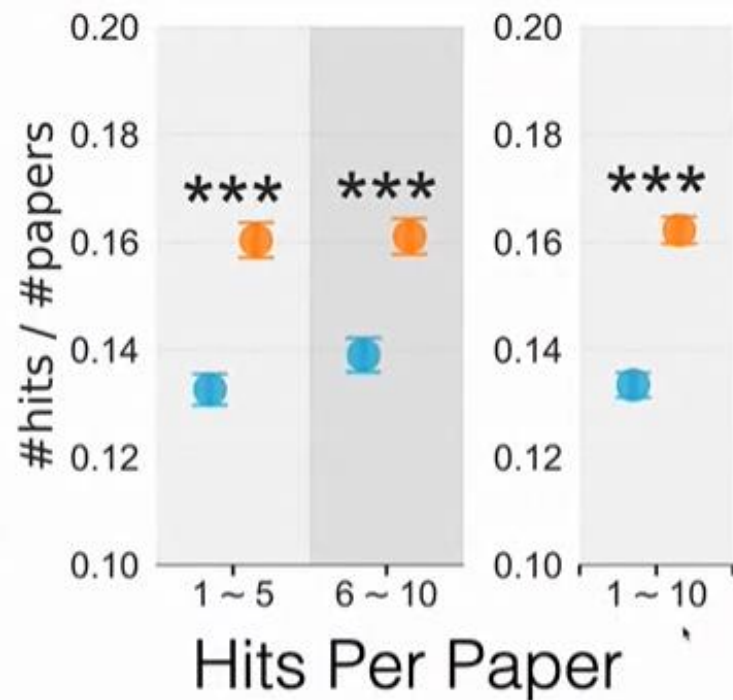


Both small and large teams are essential to a flourishing ecology of science and technology

- Ringelmann 1913; Mullen et al, 1991; Steiner 1972
- Common knowledge effect (Gigone & Hastie, 1993)
- Getting the floor (Shaw, 1981)

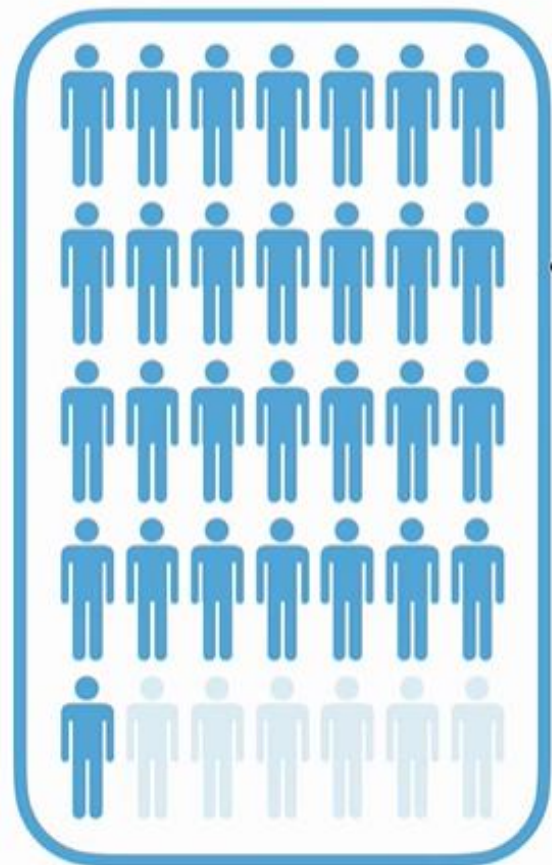
- Relational loss (Mueller 2012)
- Social loafing (Latané et al, 1979)
- Multi-team system (DeChurch et al., 2006, 2010)



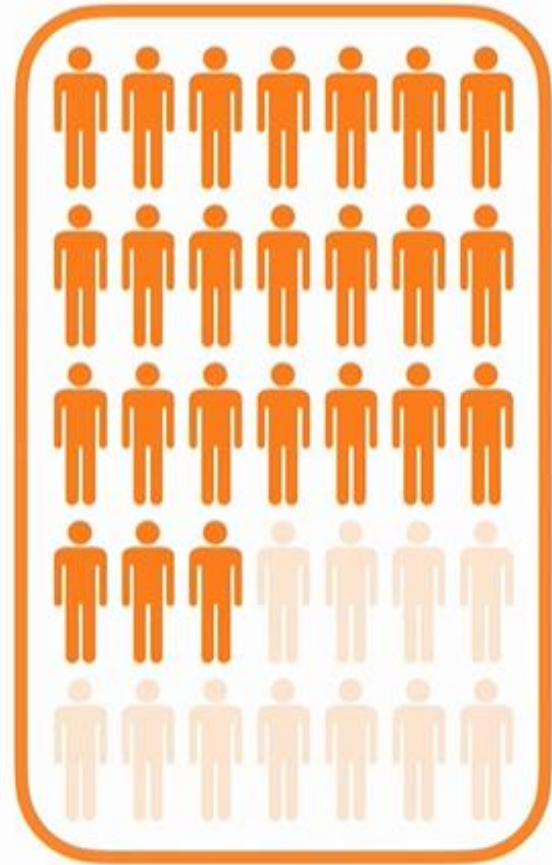


- Varying definition of hits, from top 1% to 15% of citations
- Average normalized citations adjusted by field and time
- Per capita measures of hit papers
- Varying definition of fields
- Alternative definitions of junior PIs
- Varying measurement time periods
- Excluding papers “in the pipeline”
- Varying name disambiguation methods
- Counting lead/last author publications only

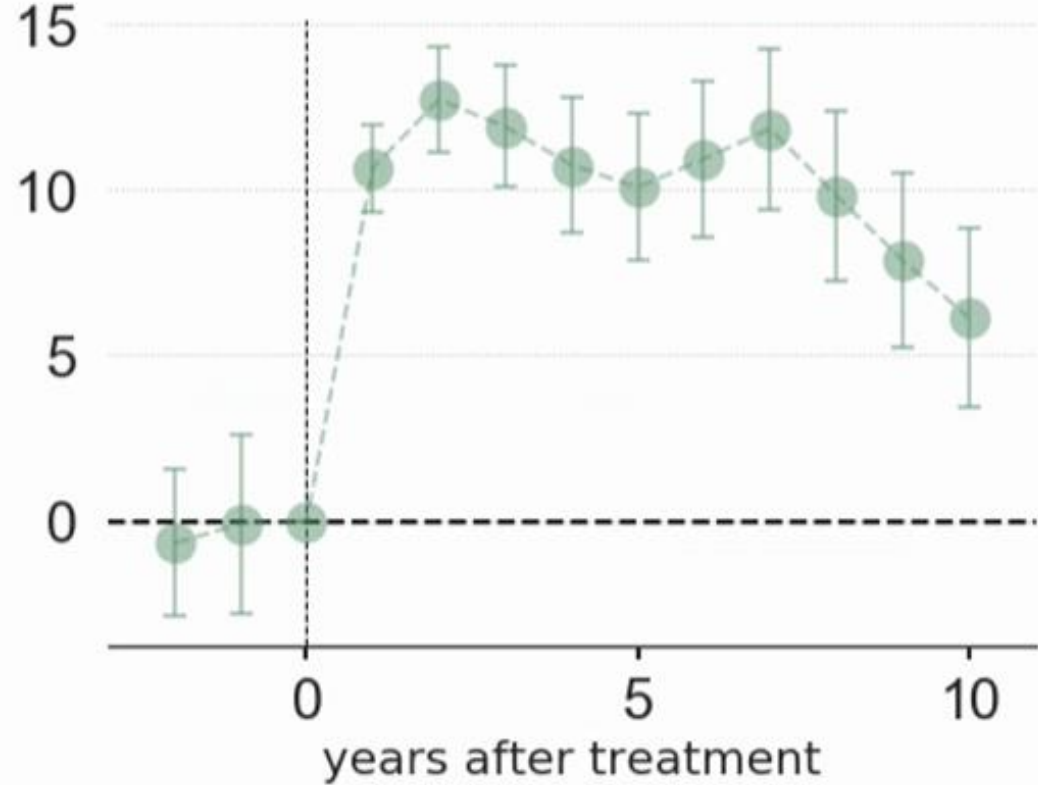
Narrow wins



Near misses

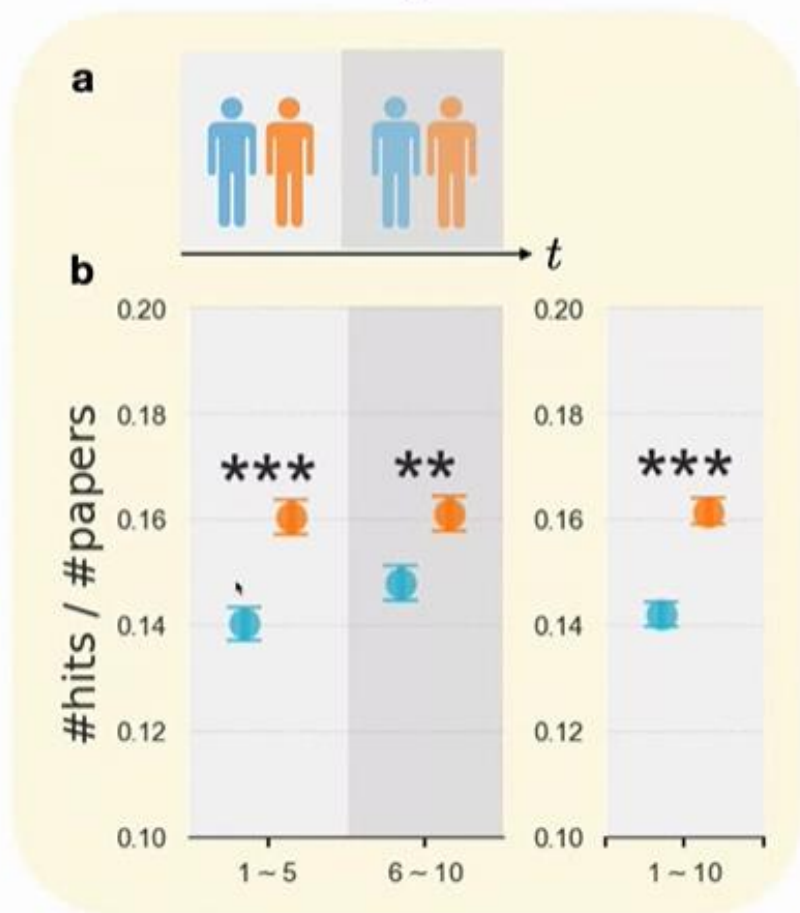
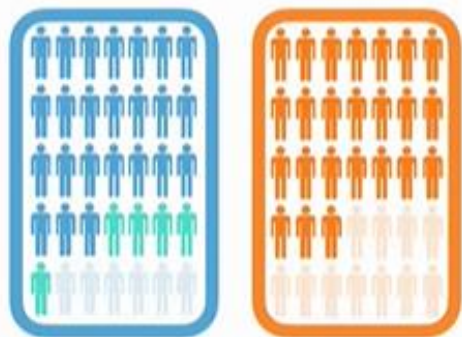


Attrition rate difference (%)



Quit vs Grit: Conservative Removal

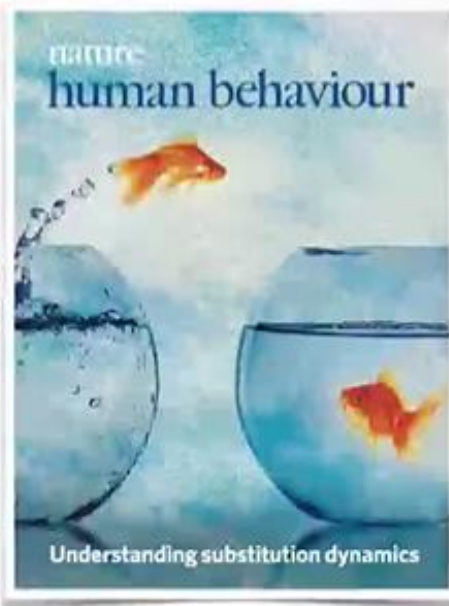
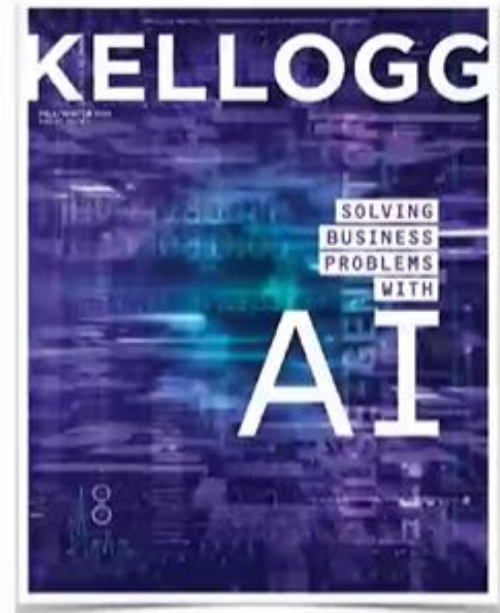
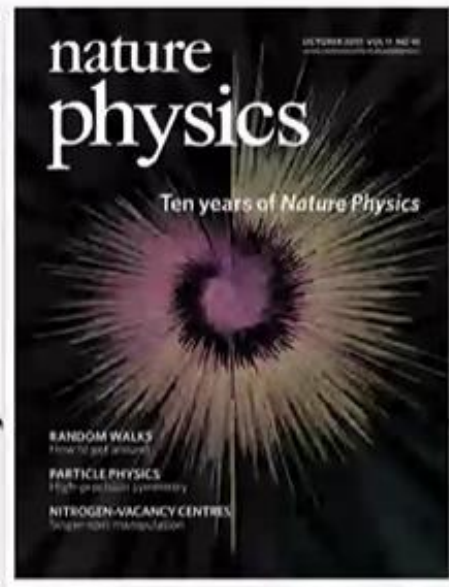
$$\frac{\# \text{ Hits}}{\# \text{ Papers}}$$



Average citations



Science of Science



More information:
<http://dashunwang.com>
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