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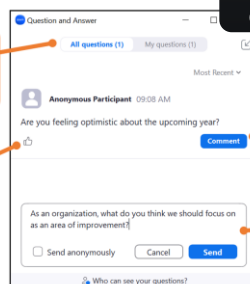
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"Why can't I use the chat feature?"

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2

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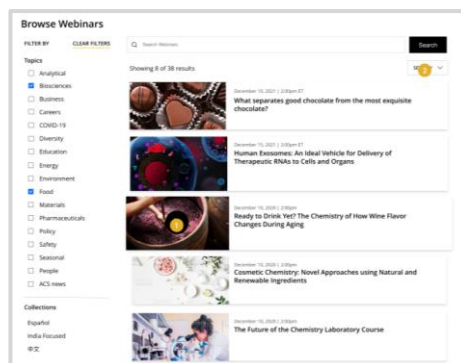
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Co-produced with the Sociedad Química de Mexico



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THIS ACS WEBINAR® WILL BEGIN SHORTLY...

👋 Say hello in the questions window!



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Who Will Win the #ChemNobel? Predicting the 2024 Nobel Laureate(s) in Chemistry



Laura Howes, PhD

Moderator

Executive Editor and
Science Journalist, *Chemical
& Engineering News*



CHING JIN, PhD

Speaker

Assistant Professor in Data
Science, Centre for
Interdisciplinary Methodologies,
University of Warwick



STACEY PAIVA, PhD

Speaker

Senior Editor,
Nature Chemistry



STEVEN SUIB, PhD

Speaker

Board of Trustees Distinguished
Professor, Department of Chemistry,
University of Connecticut



CHIBUEZE AMANCHUKWU, PhD

Speaker

Neubauer Family Assistant
Professor in the Pritzker School
of Molecular Engineering,
University of Chicago

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Who Will Win the #ChemNobel? Predicting the Next Nobel Laureate(s) in Chemistry

Share your comments in the chat window or tweet at us using **#ChemNobel**



Laura Howes
C&EN



Ching Jin
University of Warwick



Stacey Paiva
Nature Chemistry



Steven Suib
University of Connecticut



Chibueze Amanchukwu
University of Chicago

Slides not available today (that would give the picks away!) ... edited recording will be made available on cen.org



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The Nobel Prize in Chemistry, the #ChemNobel

- Every year since 1901 (with a few exceptions)
- Nobel stipulated in his will that most of his estate should be converted into a fund and invested to provide income for five prizes, including one prize for...*“the person who shall have made the **most important chemical discovery or improvement...**”* – Alfred Nobel’s will
- **Nobel Laureates receive:**
 - Nobel diploma
 - Nobel medal
 - Prize money



© Nobel Media. Photo: Alexander Mahmoud

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Recent #ChemNobel winners

- **2019 Winners:** John B. Goodenough, M. Stanley Whittingham and Akira Yoshino *“for the development of lithium-ion batteries”*
- **2020 Winners:** Emmanuelle Charpentier and Jennifer A. Doudna *“for the development of a method for genome editing”*
- **2021 Winners:** Benjamin List and David MacMillan *“for the development of asymmetric organocatalysis”*
- **2022 Winners:** Carolyn Bertozzi, Morten Meldal and K Barry Sharpless *“for the development of click chemistry and bioorthogonal chemistry”*
- **2023 Winners:** Moungi Bawendi, Louis Brus and Alexei Ekimov *“for the discovery and synthesis of quantum dots”*

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Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT



Did you think quantum dots were going to win last year's prize?

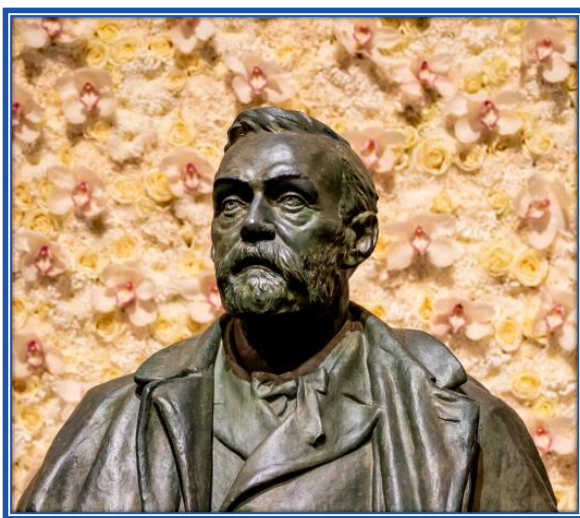
- Yes, I knew they would win
- Maybe, I thought they could win at some point
- No, I hadn't even considered them
- I never try to guess what might win

Vote and then **share your own answer** with us in the chat window or on social media using **#ChemNobel**

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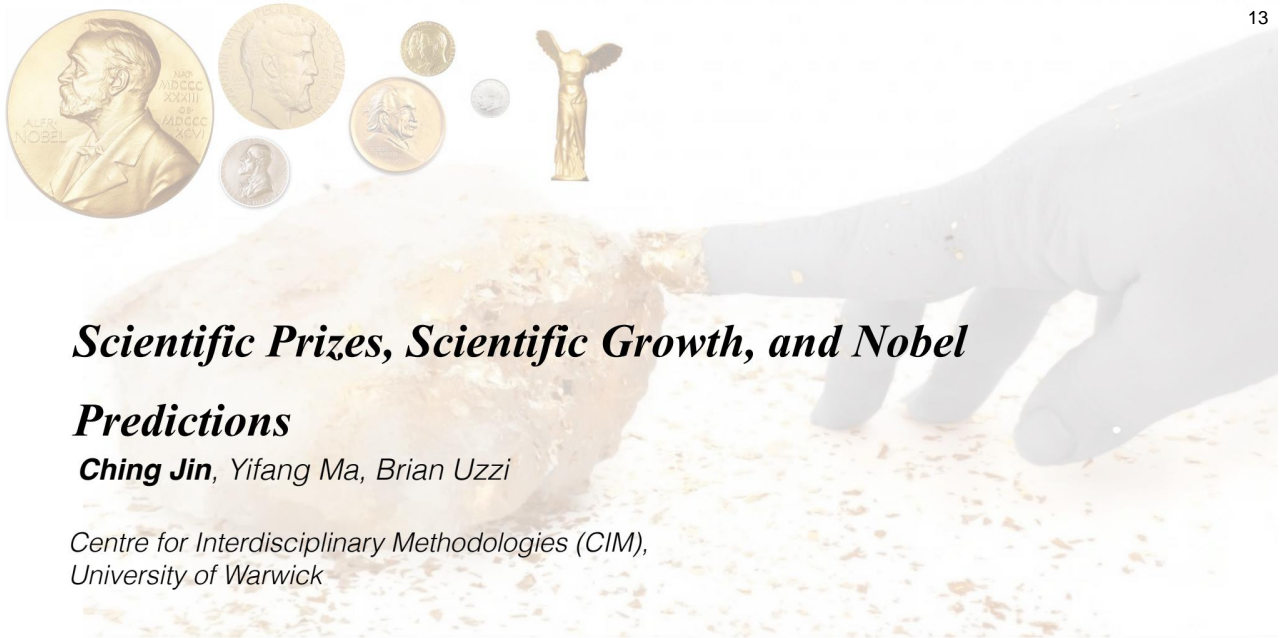
12

Recent #ChemNobel winners



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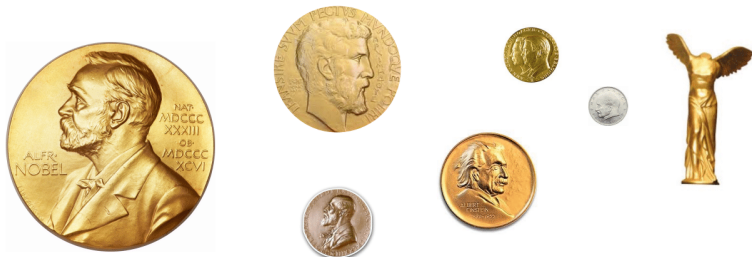
Scientific Prizes, Scientific Growth, and Nobel

Predictions

Ching Jin, Yifang Ma, Brian Uzzi

Centre for Interdisciplinary Methodologies (CIM),
University of Warwick

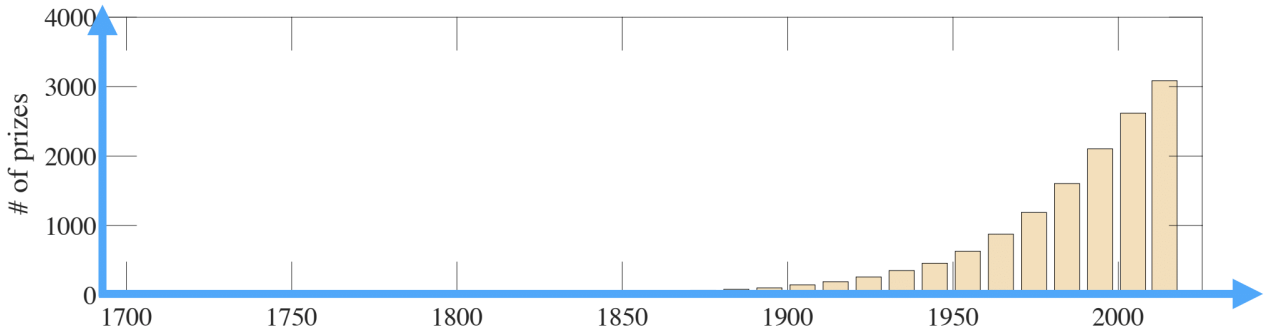
Prize Revisit



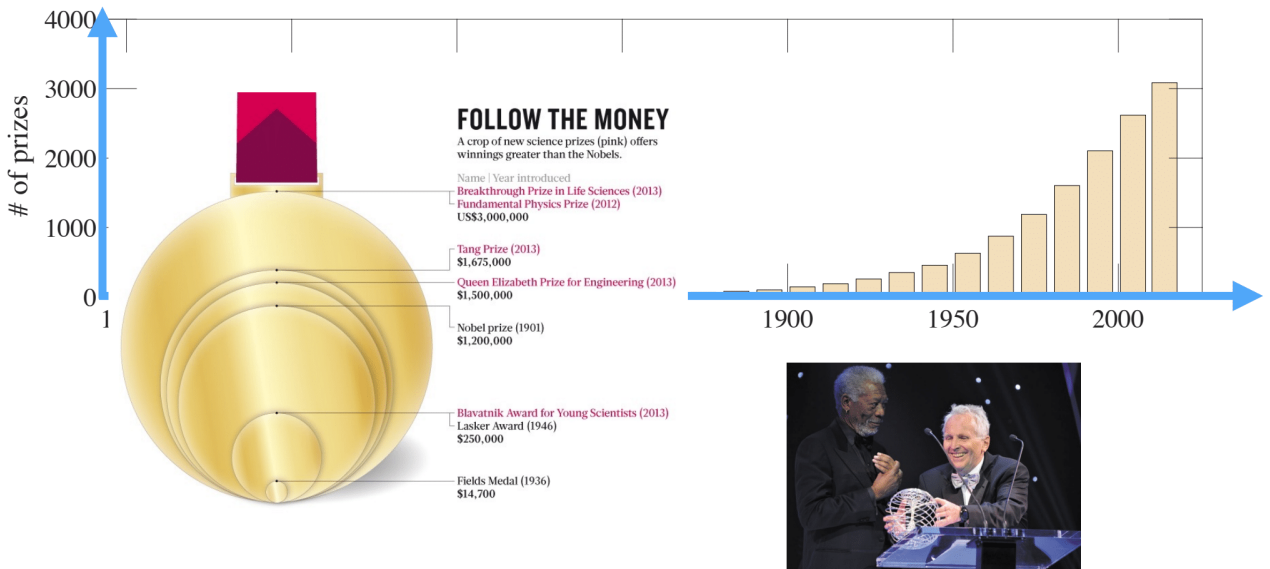
French Acedamy of Science Competition Annual Prize 1719

Astronomy and Navigation

Prize Revisit



Prize Revisit



Giants' Shoulders



Prize



Prize-winning Scientist



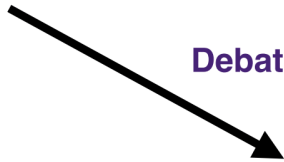
- Who?
- Major Contribution?
- Difference?
- Impacts?
- Citations?
- Productivity?
- Collaborators?
- Protégés?
- Future Recognition?

Jones2011, Li2019, Ma2020, Ma2019, Chan2014

Giants' Shoulders



Prize

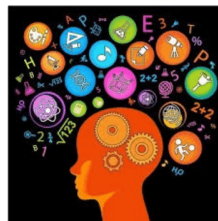


Debate!



Prize-winning Scientist

- Who?
- Difference?
- Impacts?
- Citations?
- Productivity?
- Collaborators?
- Protégés?
- Teams?



Scientific Research Topics

- Signal of the fields?
- Legitimation of Paradigms?
- Pace of Science? ?

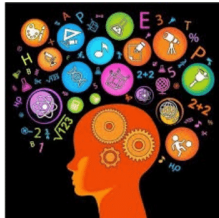
Competing Theory



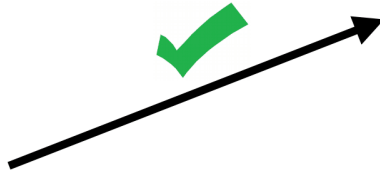
Prize



Q: What signal did prize provide for the rise of a topic?



Scientific Research Topics



Prize-winning Scientist

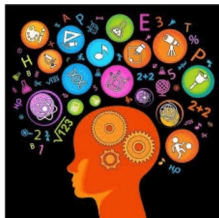
Controversy



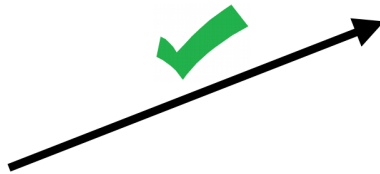
Prize



Q: What signal did prize provide for the rise of a topic?



Scientific Research Topics



Prize-winning Scientist

+: Matthew Effect, Legitimation, Attraction

Merton1968, MacLeod1971

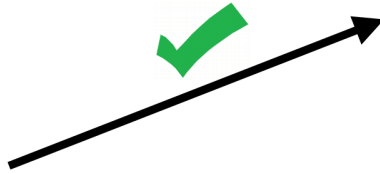
Controversy



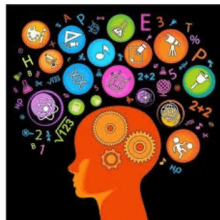
Prize-winning Scientist



Prize



Q: What signal did prize provide for the rise of a topic?



Scientific Research Topics

+: Matthew Effect, Legitimation, Attraction

Merton1968, MacLeod1971

-: Late Signal, Post-Legitimation

Zuckerman1992, 1977

Dataset



Stephen Gray	
Born	December 1666 Campton, Kent, England
Died	7 February 1736 (aged 69) London, England
Nationality	English
Known for	Being the father of electricity Electrical conductivity
Awards	Copley medal (1731, 1732)
Scientific career	
Fields	Chemistry astronomy
Institutions	Trinity College, Cambridge
Academic advisors	Roger Cotes
advisors	John Theophilus Desaguliers
Influences	John Flamsteed

Wikipedia + Microsoft Academic Graph

Microsoft Academic Albert Einstein

Albert Einstein
Institute for Advanced Study

474 PAPERS 94,929 CITATIONS

Top Publications

[On the Electrodynamics of Moving Bodies](#)
2014, Albert Einstein
Fields of study: physics, classical mechanics
◀ Citations (1,336) ▶ Download ◀ Share ▶ Cite

[Die Feldgleichungen der Gravitation](#)
2008, A. Einstein
Fields of study: theoretical physics, physics, gravitation, einstein, classical mechan

Dataset



Stephen Gray	
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Wikipedia

> 400 Prizes +
> 5,000 Prize Winners

Microsoft Academic Graph

The screenshot shows the Microsoft Academic profile for Albert Einstein. It includes his name, affiliation (Institute for Advanced Study), and statistics: 474 papers and 94,929 citations. Under 'Top Publications', it lists 'On the Electrodynamics of Moving Bodies' (1905) and 'Die Feldgleichungen der Gravitation' (1915).

Dataset



Stephen Gray	
Born	December 1666 Canterbury, Kent, England
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Wikipedia

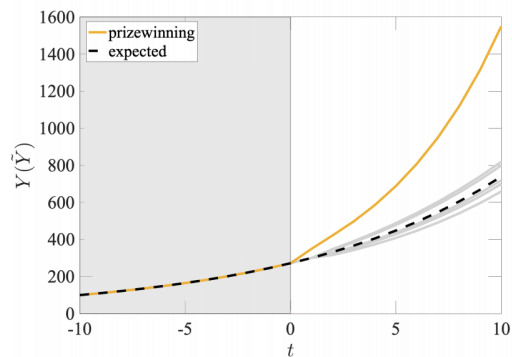
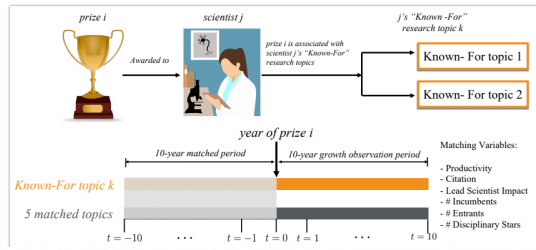
> 400 Prizes +
> 5,000 Prize Winners

Microsoft Academic Graph

>11,000 scientific Topics
Prizewinning Topics

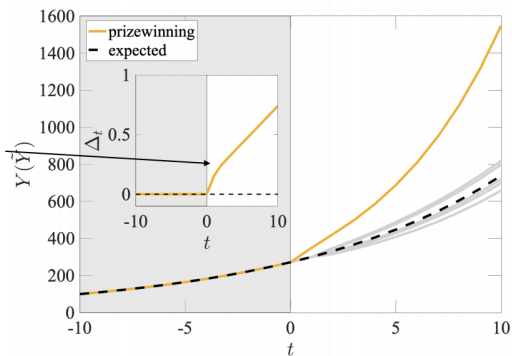
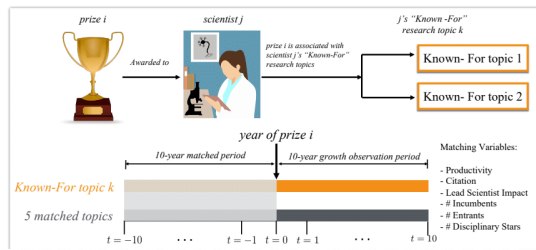
This screenshot is identical to the one on slide 23, showing the Microsoft Academic profile for Albert Einstein.

Method



11,000 prizewinning Topics
1 prizewinning topic
5 matched non-prizewinning

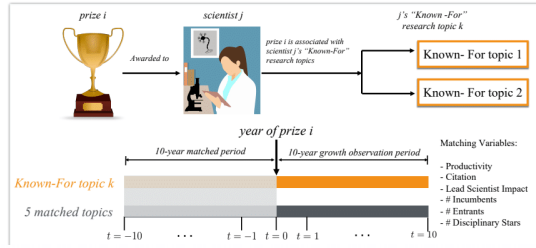
Method



11,000 prizewinning Topics
1 prizewinning topic
5 matched non-prizewinning

$\Delta_t = \log(Y) - \log(\tilde{Y})$
Difference Between Prizewinning topics And matched topics

Method



Big Six Measures:

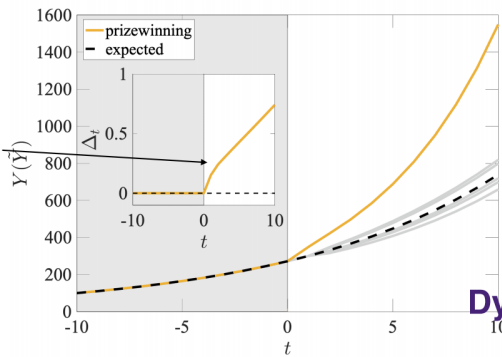
Productivity
Citation
Lead Scientist Citation

of incumbent Scientists
of new Scientists
of Disciplinary Stars

Dynamical Optimal Matching

$$\Delta_t = \log(Y) - \log(\tilde{Y})$$

Difference Between Prizewinning topics And matched topics

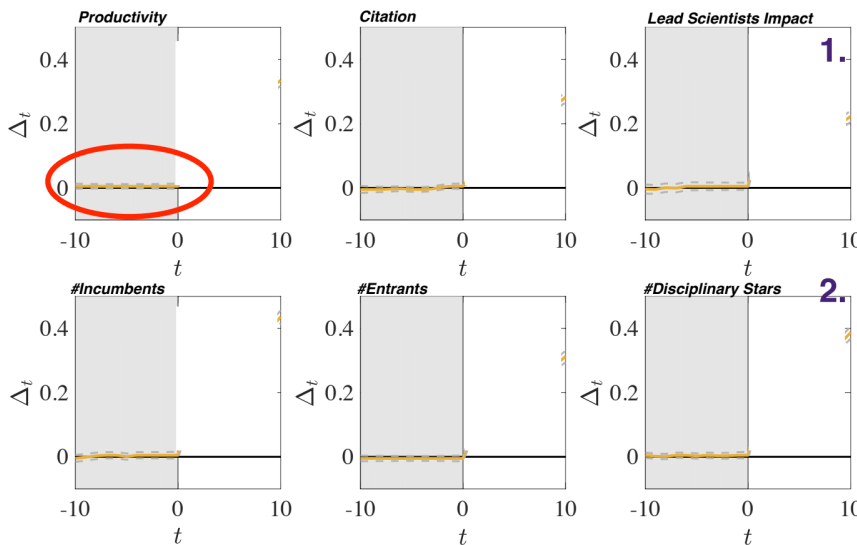


Method

Big Six Measures

Dynamical Optimal Matching

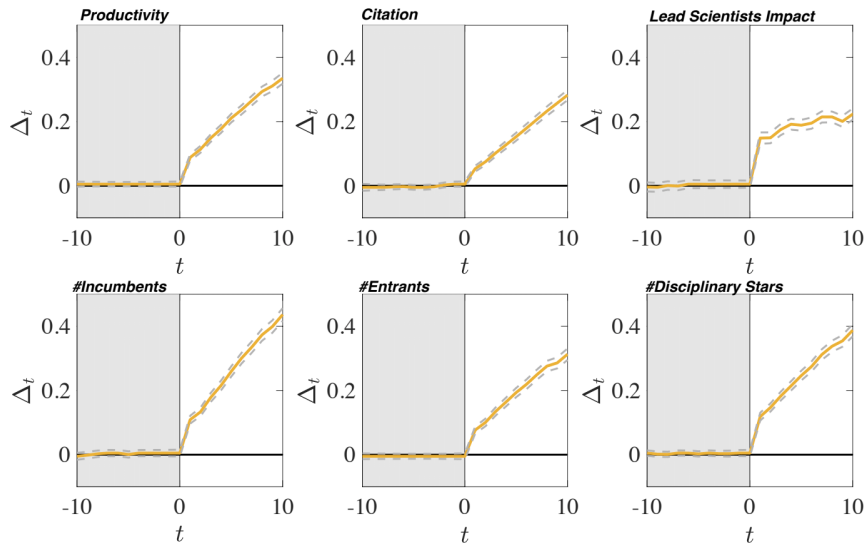
$$\Delta_t = \log(Y) - \log(\tilde{Y})$$



1. No difference of prizewinning group and Matched group, No difference in distribution in $6 \times 11 = 66$ variables (Balanced)
2. Maximize the closeness of the two groups (Closeness)

Extraordinary Growth

$$\Delta_t = \log(Y) - \log(\tilde{Y})$$



5 years 17%-30%
10 years 25%-55%

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Robustness test 1: Placebo

$$\Delta_t = \log(Y) - \log(\tilde{Y})$$

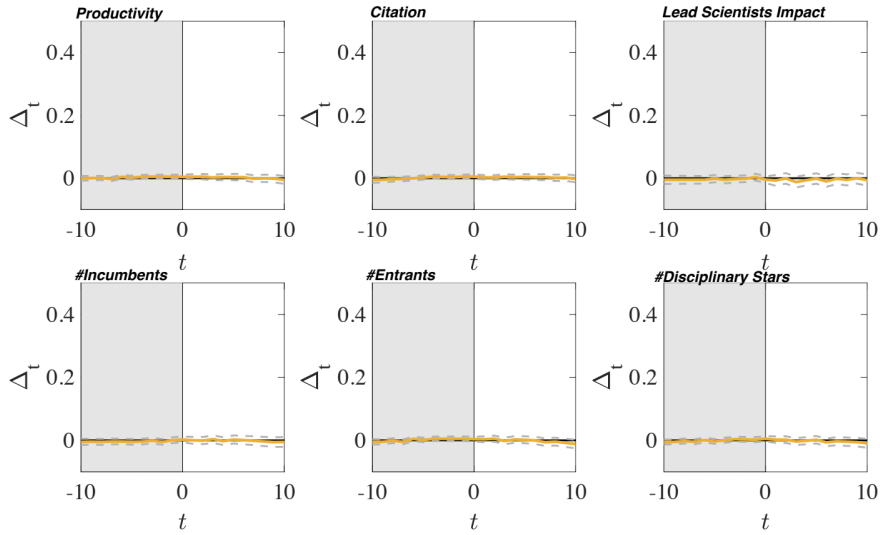
11,000 pretending prizewinning Topics

30

Robustness test 1: Placebo

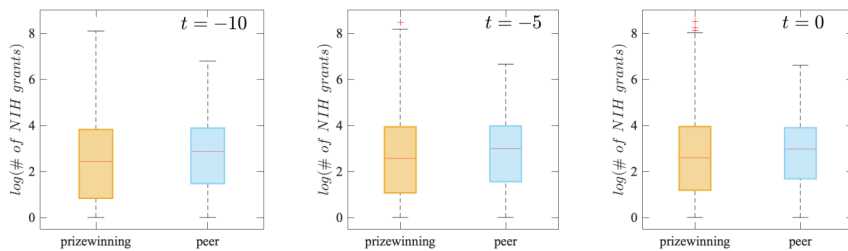
$$\Delta_t = \log(Y) - \log(\tilde{Y})$$

11,000 pretending prizewinning Topics



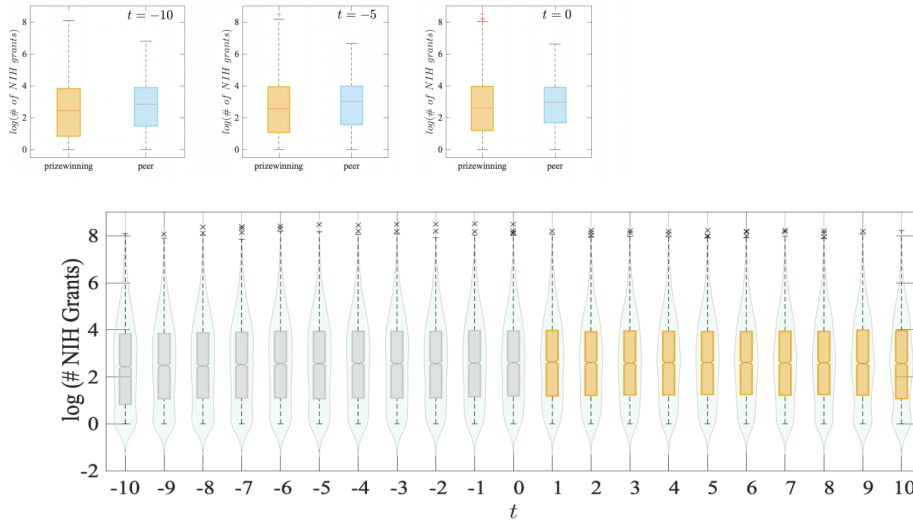
Robustness test 2: Funding

Pilot Study on 2,853 prizewinning Topics associated with NIH fundings



Robustness test 2: Funding

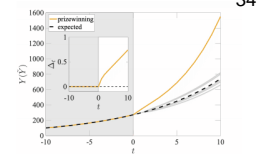
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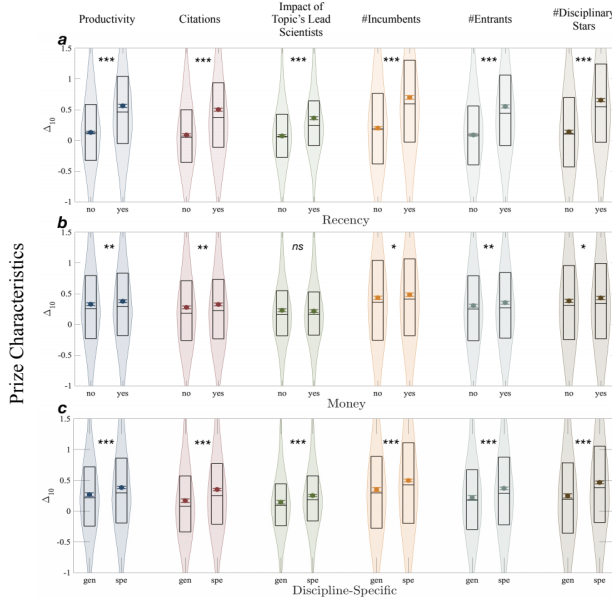
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Prize Characteristic

$$\Delta_t = \log(Y) - \log(\tilde{Y})$$



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Recency: Recent vs. Old

Prize With Money vs. No Money

Disciplinary Prize vs. General Prizes

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Summarize:

1. **Scientific prizes are positively associated with the extraordinary growth of scientific topics.**
2. **A cumulative advantage for the rise of the prize winner's topics has been discovered.**
3. **Funding level does not explain the extraordinary growth.**
4. **Prize Characteristics predict the magnitude of the extraordinary growth, including recency, money and the disciplinary-specific property of the prizes.**



Audience Survey Question

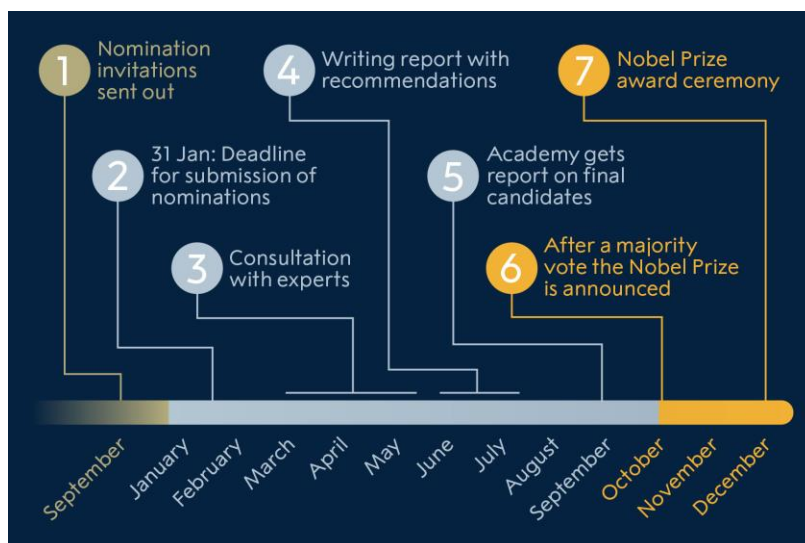
ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

Had you noticed the impact of scientific prizes before this presentation?

- Yes, I noticed that pattern anecdotally
- No, I always thought of prizes going to impactful science but not that prizes impacted science
- Either way, now I think I should pay more attention to prizes

Vote and then **share your own answer** with us in the chat window or on social media using **#ChemNobel**

#ChemNobel Timeline



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Predicting the #ChemNobel

- Past prizes and journal citation behavior
- A desire to be more current
- Recent Nobel symposia

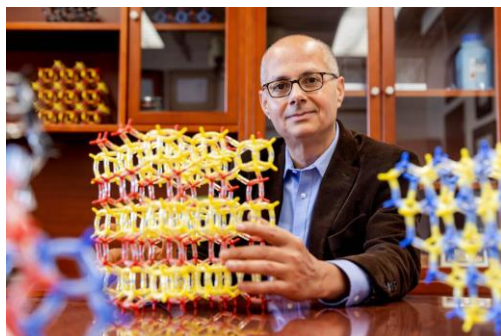


<https://www.kva.se/en/research-funding/nobel-symposia/>

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Steven's 2024 #ChemNobel Picks



Atoco

Omar Yaghi

For the development of metal organic frameworks



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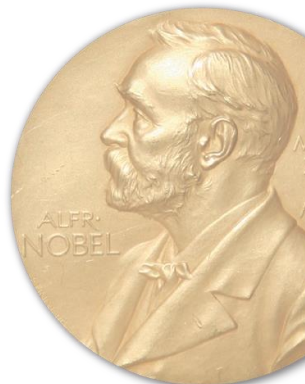
Stacey's 2024 #ChemNobel Picks



Millennium Technology Prize

Shankar Balasubramanian and David Klenerman

For next generation DNA sequencing



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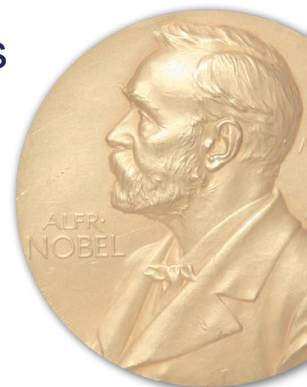
Chibueze's 2024 #ChemNobel Picks



Jonah Bayer

Krzysztof Matyjaszewski

For controlled radial polymerization



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Laura's 2024 #ChemNobel picks



Ian C Haydon/UW Institute for Protein Design



Breakthrough Foundation

David Baker and Demis Hassabis & John M. Jumper

For the prediction and design of protein structures

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Our panel's #ChemNobel Nominations

- Omar Yaghi
- Shankar Balasubramanian and David Klenerman
- Krzysztof Matyjaszewski
- David Baker, Demis Hassabis & John M. Jumper
- **Who else could be in the running?**



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Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

In your opinion, who will win the 2024 Nobel Prize in Chemistry?

- Omar Yaghi
- Shankar Balasubramanian and David Klenerman
- Krzysztof Matyjaszewski
- David Baker, Demis Hassabis & John M. Jumper
- Other (Tell us more in the questions window)

Vote and then **share your own answer** with us in the chat window or on social media using **#ChemNobel**

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**THE LIVE Q&A IS
ABOUT TO BEGIN!**

Keep submitting your questions
in the questions window!



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