

350 GODINA POTRAGE ZA UTJECAJEM U ZNANOSTI Je li došlo vrijeme za promjene?

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secondary structure that leads to a mosaic of highly conserved and extremely variable parts (Cech 1988; Michel et al. 1989; Cech et al. 1994; Kelchner 2002; Borsch et al.

ZNANOST DANAS

- 1.900 milijardi USD (2016 Global R&D Funding Forecast)
- 2 milijuna radova godišnje
- 25,2 milijardi profita godišnje STM izdavaštvo (The STM Report 2015)
- objavljivanje (za sada) oko 1.000 EUR (do 5.000 EUR) po radu

ZNANOST DANAS

- **80%** svih znanstvenih istraživanja financira se **javnim sredstvima**
- no, većina znanstvenih radova šalje se u časopise velikih komercijalnih izdavača koji objavom preuzimaju *copyright* od autora/znanstvenika
- 15%-80% ne bude nikada citirano
 - “Only” 12% of medicine articles are not cited, compared to about 82% (!) for the humanities. It’s 27% for natural sciences and 32% for social sciences ([cite](#))
- 50% ne pročita nitko osim autora/recenzenta/urednika
- 50%-80% **NE MOŽE SE REPRODUCIRATI!**

- samo mali postotak radova ima na raspolaganju istraživačke podatke na kojima se temelje, koji osiguravaju provjeru i koji bi se mogli ponovno koristiti

GENERIRALI SMO SUSTAV GDJE...



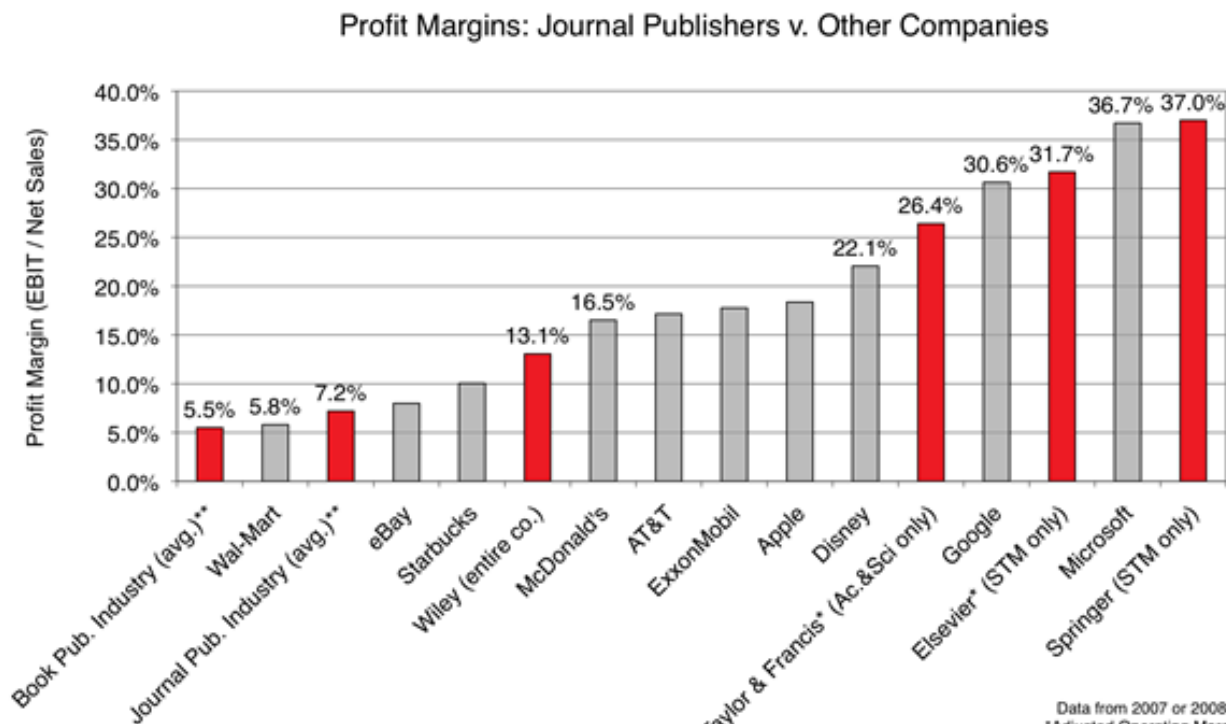
PROFITI IZDAVAČA

Elsevier: 1 mlrd. EUR na promet od 2,7 mlrd. EUR — 36%

Springer's Science+Business Media: 400 mil. EUR na promet od 1,2 mlrd. EUR — 33.9%

John Wiley & Sons: 84 mil. EUR na prihod od 224 mil. EUR — 42%

Informa: 64,5 mil. EUR na prihod od 199 mil. EUR — 32.4%



KOLIKO „PUBLISH OR PERISH” MENTALITET ŠTETI ZNANOSTI?



*“Ne smeta me ako razmišljaš
polagano. No, smeta me ukoliko
objavljuješ brže nego što razmišljaš.”*
The Nobel Laureates physicist Wolfgang Pauli

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and
developmental disorder in children

M A Thomson

OBJAVA LAŽNIH REZULATA

Andrew Wakefield, Lancet, 1998 – povezanost MMR cjepiva i autizma
 Haruko Obokata. Nature, 2014 – primjena matičnih stanica u
 liječenju bolesti (kaoutor Yoshiki Sasai počinio je samoubojstvo)
 Hwang Woo-suk, Science, 2004 i 2005 – kloniranje ljudskih matičnih
 stanica
 Jan Hendrik Schön, Science i dr. – poluvodiči
 Jon Sudbø, Lancet, 2009 – onkologija
 Yoshitaka Fujii, anesteziolog – fabricirao više od 172 rada!
 Diederik Stapel, psiholog – 54 radova povučeno!
 generiranje radova – SCIgen i dr.

Inflammatory Bowel Disease Study Group, University Departments
 of Medicine and Histopathology (A J Wakefield *msc*, A Anthony *msc*,
 J Linnell *msc*, A P Dillon *msc*, S E Davies *msc*) and the
 University Departments of Paediatric Gastroenterology
 (S H Murch *msc*, D M Casson *msc*, M Malik *msc*,
 M A Thomson *msc*, J A Walker-Smith *msc*), Child and Adolescent
 Psychiatry (M Berelowitz *msc*), Neurology (P Harvey *msc*), and
 Radiology (A Valentine *msc*), Royal Free Hospital and School of
 Medicine, London NW3 2QG, UK
 Correspondence to: Dr A J Wakefield

THE LANCET • Vol 351 • February 28, 1998

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copy (FBS),

1. Executive

External technical application in a...
 licensing agree...
 of commercializ...
 strategy (e.g., I... and I...
 firm (e.g., I... and I...
 external...
 This...
 the other...
 technology exploitation underlines the str...
 on the application of technological know...
 technology transactions, by contrast, has ma...
 front matter © 2007 Elsevier Inc. All rights reserved.

JOURNAL OF BUSINESS OF INVENTURING

Edward Cadaveric
Green Medical
China

Adam R. Miller,⁶
Angli Wang^{1,9}

students

the
 concerning
 Despite the
 in managing
 successful companies on
 successfully managing external
 technology exploitation has focused
 external technology. Research into
 external technology. Thus, external

American Journal
August 9, 2012
doi: 10.1097/PT
Retraction: PT

Ventricular
Consider

PAP

ZNANSTVENO IZDAVAŠTVO DANAS

- nije više samo tekst
- pristup nije više najvažniji problem (iako ne možemo pristupiti kao niti prije)
- promjene koje su očite – cijene skaču, distribucija se promijenila digitalnim medijem
- brza mreža snažnih računala čini naša očekivanja puno većim

NEFUNKCIONALNA ZNANSTVENA LITERATURA

- ograničen pristup
- nema globalne tražilice, uvijek nađemo samo dio
- nema funkcionalnih poveznica koji vode na opis eksperimenta ili na podatke
- nema prilagodljive vizualizacije podataka
- nema standarda prijave radova, stalno prilagođavanje propisima uredništva
- ne znamo tko (i da li čita) ono što smo napisali
- nema rudarenja teksta/podataka, teško odabiremo što trebamo pročitati
- nema učinkovitog načina redanja, filtriranja i otkrivanja
- nema analize znanstvenog utjecaja
- nema umreženosti
- itd.

PAPIROCENTRIČNO
ZNANSTVENO IZDAVAŠTVO

PROSUDBA ZNANOSTI JE VAŽNA

- promatranje i nadzor razvoja istraživačkih aktivnosti, kako bi se one poboljšale, te opravdali troškovi istraživanja
- koga ćemo zaposliti?
- tko će dobiti sredstva na projektu?
- koji je časopis uspješan?
- objavljujemo li uopće radove u časopisima?
- imamo li uvida u strukturu znanstvene komunikacije?
- hoćemo prosuditi **sada i odmah**, pa posežemo za prosudbom koja se zasniva na kontejneru koji objavljuje rezultate istraživanja



**IMPACT
FACTORS**

EUGENE GARFIELD I IRVING H. SHER

inicijalna ideja 1955.

produkcija (Science Citation Index) 1961.

poslužio je za odabir časopisa

„Like nuclear energy, the impact factor is a mixed blessing. I expected it to be used constructively while recognizing that in the wrong hands it might be abused.”

„od mjerenja utjecaja časopisa, proširio se na mjerenje utjecaja autora” ☹

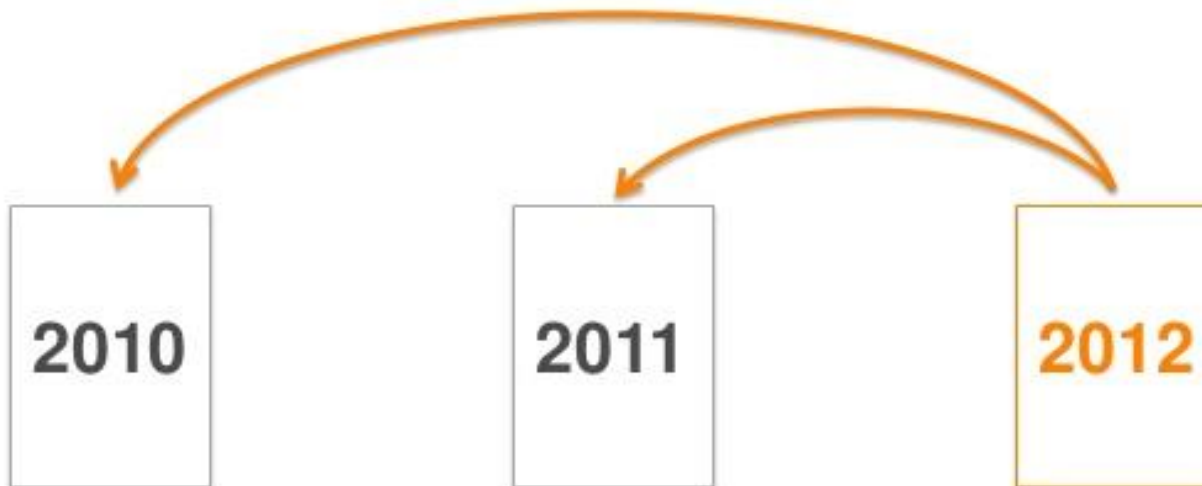
METRIKA ZA PROSUDBU - RAZINE

- časopis (IF, *impact factor* ili čimbenik utjecaja)
 - pojedini objavljeni rad
 - autor
 - projekt
 - ustanova
 - ...
-
- ZNA LI NETKO KAKO SE RAČUNA IF ČASOPISA ZA GODINU 2012?

Impact factor

Impact factor is a mean citation count of an article in a journal

$$IF_{2012} = \frac{\text{citation count in 2012}}{\text{number of papers from 2010 \& 2011}}$$



ŠTO JE ZAPRAVO IF

$$IF = \frac{\text{Citati iz časopisa koje indeksiraju TR bp u 2012}}{\text{Broj **citabilnih** radova u 2011 i 2012}}$$

- citati se ne mogu reproducirati iz WoS-a
- interpretacija citabilnih radova je proizvoljna (izvorni znanstveni i pregledni radovi)
- TR baze podataka su komercijalne (WoS i JCR - \$600k)
- broj časopisa je ograničen (WoS 12.500)

Table. Distribution of Citable (Countable) Content and Citations for Items Published in 2000 and 2005

	Total Items (Citable + Not Citable)	Item Count (% of Total)	
		Citable	Not Citable
Indexed in 2000			
All in SCIE and SSCI ^a	1 090 333	793 395 (72.8)	296 938 (27.2)
<i>Annu Rev Med</i>	33	33 (100.0)	0
<i>BMJ</i>	3335	612 (18.4)	2723 (81.6)
<i>JAMA</i>	1785	377 (21.1)	1408 (78.9)
<i>Lancet</i>	3395	821 (24.2)	2574 (75.8)
<i>NEJM</i>	1562	379 (24.3)	1183 (75.7)

PROBLEMI S JIF

- može se pregovarati
 - ne-reproducibilan
- matematički neodrživ

PREGOVARANJE

PLOS Medicine

- strategije uredništva: „*increase the numerator in the ... (JIF)... equation by **encouraging authors to cite** articles published in the journal or **by publishing reviews** that will garner large numbers of citations”*”
- „*editors may decrease the denominator by attempting to have whole article types removed from it (by making such articles superficially less substantial, such as by forcing authors to cut down on the number of **references** or **removing abstracts**) or by decreasing the number of research articles published”*”
- pregovaranje oko toga koje će radove TR računati kao citabilne: JIF je mogao varirati **od 3 do 11**, ovisno o nazivniku
- urednici: „*Something that affects so many people's careers and the future of departments and institutions cannot be kept a secret any longer.*”
- „dogovorili” su **8.4** (sada je 14.0)

PREGOVARANJE

ISI Web of Knowledge™

Journal Citation Reports®



2002 CR Science Edition

Journal: CURRENT BIOLOGY

Mark	Journal Title	ISSN	Total Cites	Impact Factor	Immediacy Index	Citable Items	Cited Half-life	Citing Half-life
<input type="checkbox"/>	CURR BIOL	0960-9822	20020	7.007	2.713	341	3.5	3.7

[Cited Journal](#) [Citing Journal](#) [Source Data](#) [Journal Self Cites](#)

Journal Impact Factor

Cites in 2002 to items published in: 2001 = 3314 Number of items published in: 2001 = 528
 2000 = 3917 2000 = 504
 Sum: 7231 Sum: 1032
 Calculation: $\frac{\text{Cites to recent items}}{\text{Number of recent items}} = 7.007$
 $\frac{7231}{1032} = 7.007$

ISI Web of Knowledge™

Journal Citation Reports®



2003 CR Science Edition

Journal: CURRENT BIOLOGY

Mark	Journal Title	ISSN	Total Cites	Impact Factor	Immediacy Index	Citable Items	Cited Half-life	Citing Half-life
<input type="checkbox"/>	CURR BIOL	0960-9822	22589	11.910	2.683	331	3.8	4.0

[Cited Journal](#) [Citing Journal](#) [Source Data](#) [Journal Self Cites](#)

Journal Impact Factor

Cites in 2003 to items published in: 2002 = 3628 Number of items published in: 2002 = 334
 2001 = 3923 2001 = 300
 Sum: 7551 Sum: 634
 Calculation: $\frac{\text{Cites to recent items}}{\text{Number of recent items}} = 11.910$
 $\frac{7551}{634} = 11.910$

stvarni broj objavljenih radova je bio veći!

NE-REPRODUCIBILAN

Show me the data

- Rockefeller University Press je kupio podatke od TR
- 19% više citata računa TR
- radovi krivo razvrstani u nazivnik
- diskrepanciju su u TR objasnili „postojanjem dvije baze podataka – jedne za njihovu „research group” i druge za JCR”



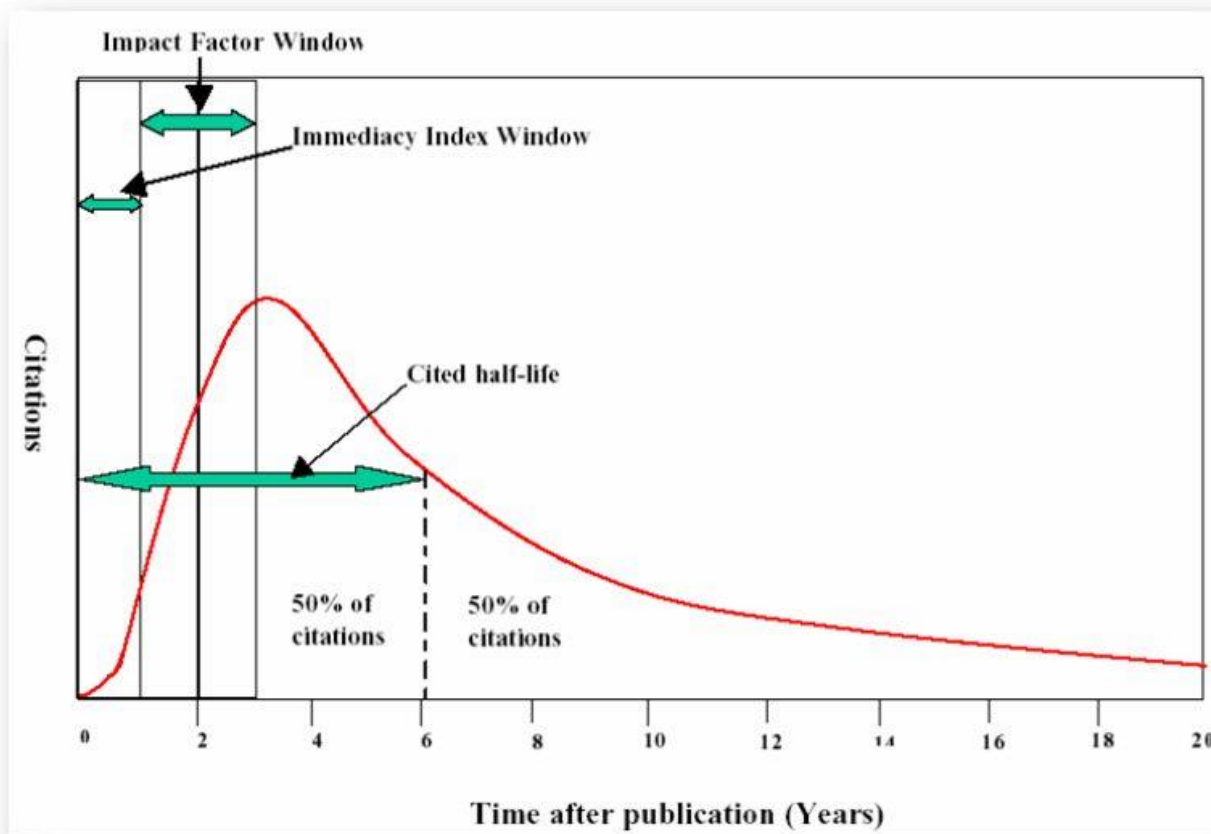
“My question is: Are we making an impact?”

MATEMATIČKI NEODRŽIV

- osnovnu statistiku kojoj učimo naše studente, ne primjenjujemo na vlastite kriterije objavljivanja i prosudbe
- distribucija citata je neravnomjerna, mali broj radova odgovoran je za veliki broj citata
- npr. rani radovi o ljudskom genomu u časopisu Nature bili su citirani oko 6.000 puta – u samoanalizi JIF za 2005. Nature je zaključio da je bilo citirano samo 25% objavljenih radova
- distribucija radova kroz vrijeme različita je u različitim područjima

DVOGODIŠNI CITATNI PROZOR

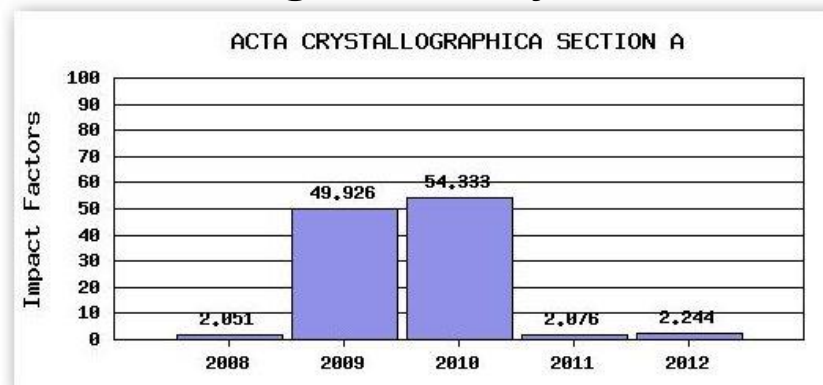
Impact Factor and other bibliometric parameters



MATEMATIČKI NEODRŽIV

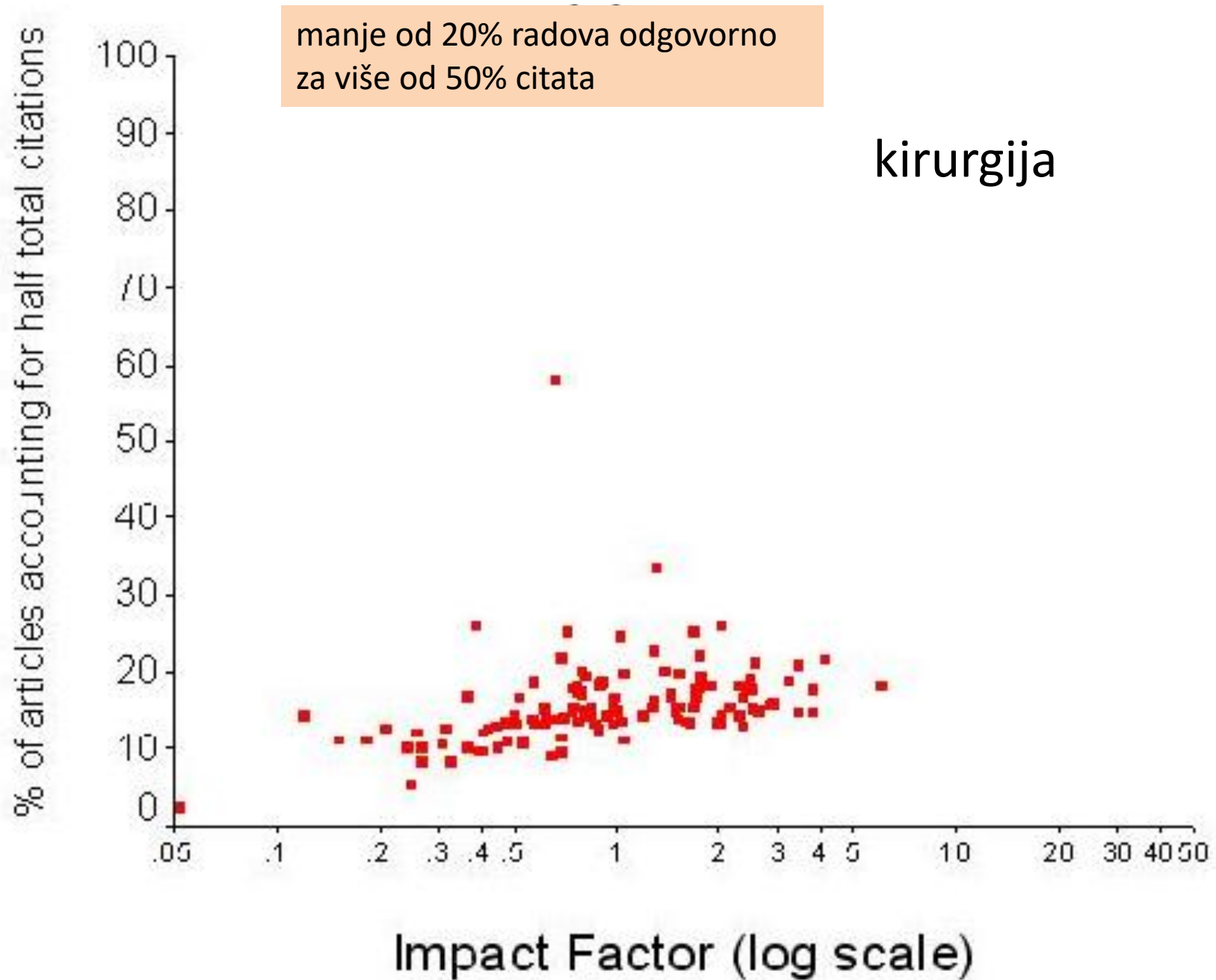
Acta Crystallographica Section A

- 2009. i 2010. vrlo visoki JIF
- rad o softveru koji koriste kristalografi i za koji su dobili uputu da ga moraju citirati prilikom svakog korištenja
- 2011. JIF se vratio u normalu



CA-A Cancer Journal for Clinicians

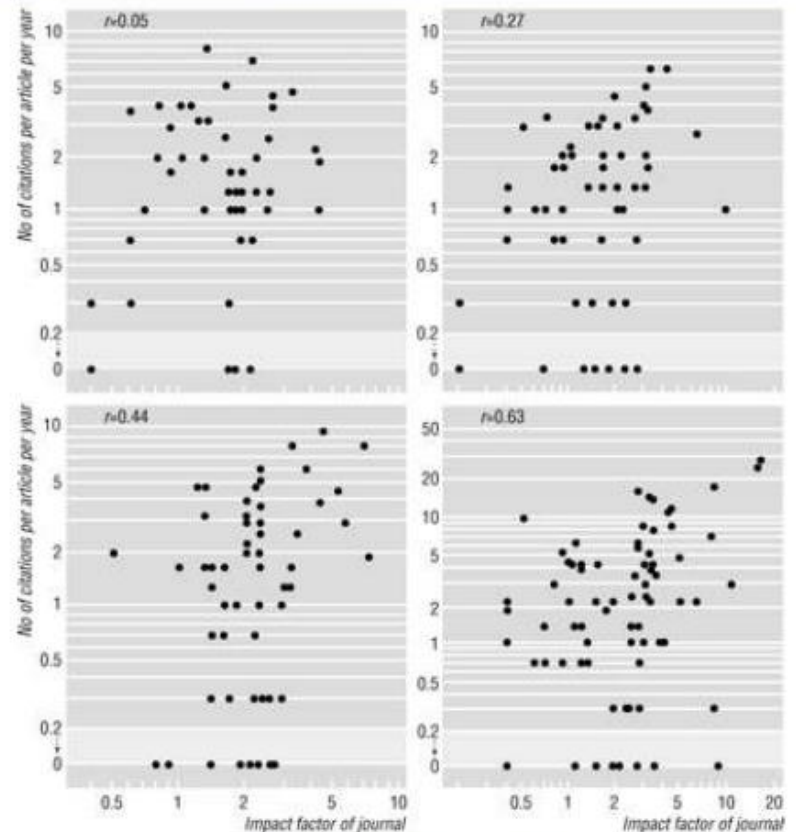
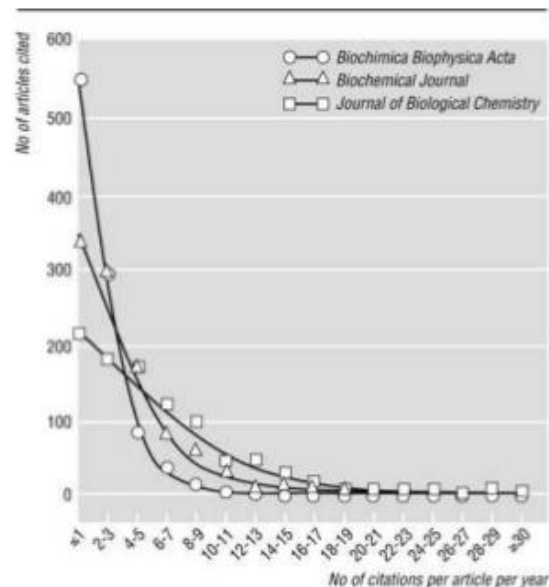
- visoki JIF zbog godišnjeg statističkog izvješća o oboljelima od raka koji objavljuju svake godine i koji svi citiraju



MATEMATIČKI NEODRŽIV

četiri znanstvenika i njihovi radovi

- Left-skewed distributions
- Weak correlation of individual article citation rate with journal IF



Seglen PO (1997): Why the impact factor of journals should not be used for evaluating research. *BMJ* 1997;314(7079):497 <http://www.bmj.com/cgi/content/full/314/7079/497>

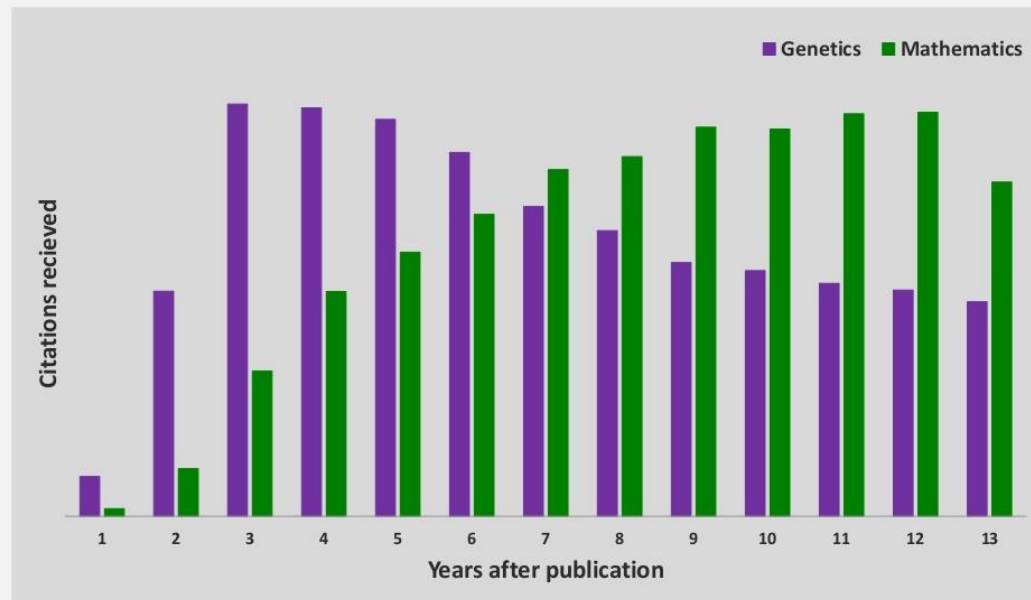
ZASTO OVAKAV SUSTAV ŠTETI ZNANOSTI?

- korištenje JIF stvara i podržava dvostruki Matthew effect (teorija kumulativne prednosti u znanosti): neproporcionalna pažnja koja se pridaje objavljenoj radovima u takvom časopisu
- možda je citiranje radova izbjegnemo komentare te radove i jesmo li ih
- velika konkurencija među časopisima i Article Processing Charge osiguraju indeksiranost, a potom što veći JIF – pritisci na autore da citiraju što više radova iz njihovog časopisa
- cijela citatna metrika je toliko pristrana da je teško ustanoviti uzroke i posljedice

Although association preferences documented in our study theoretically could be a consequence of either mating or shoaling preferences in the different female groups investigated ([should we cite the crappy Gabor paper here?](#)), shoaling preferences are unlikely drivers of the documented patterns both because of evidence from previous research and inconsistencies with *a priori* predictions. Our methods closely followed those of published mate choice experiments in this system (Tobler et al. 2009a,b; Plath et al. 2013),

DODATNI NEDOSTACI JIF

- ne podržava usporedbu između znanstvenih područja
- ne potiče interdisciplinarnost
- kasni
- pretjerano filtrira
- **samo jedna vrsta utjecaja**
- favorizira etablirane izdavače
- skupo
- zatvoreno



ALTMETRIJA

Koliko puta je neki

- članak, knjiga, zapis s bloga, *dataset*, siva literatura, softver i dr.

bio/bila:

- pogledan (web stranice izdavača, repozitoriji, Dryad)
- učitan (Slideshare, web stranice izdavača, Dryad)
- citiran (PubMed, CrossRef, Scopus, Wikipedia, DOI, Web of Science)
- ponovno korišten/prilagođen (Github)
- čitan (Mendeley)
- dijeljen (Facebook, Twitter, LinkedIn)
- označen / pohranjen (Mendeley, Zotero, CiteULike, Delicious)
- komentiran (Twitter, Mendeley, blog, web stranice izdavača, Wikipedia, Faculty of 1000)

GLASNE KRITIKE

San Francisco

DORA

Declaration on Research Assessment

- A) citation distributions within journals are highly skewed
- B) the properties of the Journal Impact Factor are field-specific: it is a composite of multiple, highly diverse article types, including primary research papers and reviews
- C) Journal Impact Factors can be manipulated (or “gamed”) by editorial policy
- D) data used to calculate the Journal Impact Factors are neither transparent nor openly available to the public

DORA

The outputs from scientific research are many and varied, including: research articles reporting new knowledge, data, reagents, and software; intellectual property; and highly trained young scientists.

Funding agencies, institutions that employ scientists, and scientists themselves, all have a desire, and need, to assess the quality and impact of scientific outputs. It is thus imperative that **scientific output is measured accurately and evaluated wisely.**



Neelie Kroes, potpredsjednica Europske Komisije:

„we are entering a new era of open science, which will be good for citizens, good for scientists, and good for society”

Carlos Moedas, povjerenik Europske komisije za istraživanja, znanost i inovacije:

„...I see three strategic priorities: Open Innovation, Open Science, and Openness to the World”

(cijeli govor je dostupan na http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm)

AMSTERDAM CALL FOR ACTION

Removing barriers to open science

1. [Change assessment, evaluation and reward systems in science](#)
2. [Facilitate text and data mining of content](#)
3. [Improve insight into IPR and issues such as privacy](#)
4. [Create transparency on the costs and conditions of academic communication](#)

Developing research infrastructures

5. [Introduce FAIR and secure data principles](#)
6. [Set up common e-infrastructures](#)

Fostering and creating incentives for open science

7. [Adopt open access principles](#)
8. [Stimulate new publishing models for knowledge transfer](#)
9. [Stimulate evidence-based research on innovations in open science](#)

Mainstreaming and further promoting open science policies

10. [Develop, implement, monitor and refine open access plans](#)

Stimulating and embedding open science in science and society

11. [Involve researchers and new users in open science](#)
12. [Encourage stakeholders to share expertise and information on open science](#)

CHANGE ASSESSMENT, EVALUATION AND REWARD SYSTEMS IN SCIENCE

*Open science presents the opportunity to radically change the way we evaluate, reward and incentivise science. Its goal is to **accelerate scientific progress** and **enhance the impact of science for the benefit of society**. By changing the way we share and evaluate science, we can provide credit for a wealth of research output and contributions that reflect the changing nature of science.*

CHANGE ASSESSMENT, EVALUATION AND REWARD SYSTEMS IN SCIENCE

The assessment of research proposals, research performance and researchers serves different purposes, but often seems characterised by a heavy emphasis on publications, both in terms of the **number of publications and the prestige of the journals in which the publications should appear (citation counts and impact factor)**. This emphasis **does not correspond with our goals** to achieve societal impact alongside scientific impact.

The predominant focus on prestige fuels a race in which the participants compete on the number of publications in prestigious journals or monographs with leading publishers, at the expense of attention for high-risk research and a broad exchange of knowledge. **Ultimately this inhibits the progress of science and innovation, and the optimal use of knowledge.**

RJEŠENJE:

Ensure that national and European assessment and **evaluation systems encourage open science practices**

Create incentives for an open science environment for individual researchers as well as funding agencies and research institutes.

Acknowledge the different purposes of evaluation and what 'right' criteria are. Amend national and European assessment and evaluation systems in such a way that the complementary impact of scientific work on science as well as society at large is taken into account.

Engage researchers and other key stakeholders, including communications platforms and publishers within the full spectrum of academic disciplines. Set up assessment criteria and practices, enabling researchers to exactly understand how they will be assessed and that open practices will be rewarded.

DRUGE ZEMLJE?

- UK prva uvela nacionalni okvir Research Assessment Exercise 1986
- dva osnovna principa, recenzija (Španjolska, Novi Zeland, UK, Italija i Portugal) i bibliometrijski pristupi (Norveška, Danska, Španjolska, Švedska, Novi Zeland i Belgija)
- složenost bibliometrijskih pristupa varira i razvija se od jednostavnog brojanja radova, preko nagrađivanja objavljivanja u određenim časopisima, do citatnih analiza
- transparentnost prosudbe
- otvoreni pristup publikacijama
- institucijski repozitoriji

NIZOZEMSKA

- od 1990. kombinira se recenzija i napredna bibliometrija, metrika samo u područjima gdje ima smisla obzirom na kulturu komunikacije područja – nema direktnih posljedica na financiranje
- paneli recenzenata oslanjaju se na bibliometrijske i druge kvantitativne pokazatelje, ali to je samo pomoć njihovoj prosudbi
- razmatra se relevantnost istraživanja za društvo i utjecaj istraživanja na društvo

- UK sveučilišta moraju prijaviti četiri „research outputs“, obično recenziranih radova, za svakog člana akademske zajednice
- u 2014. je 154 sveučilišta prijavilo 191,150 radova 52,061 znanstvenika
- svaki rad evaluira panel recenzenata (prema području) koji ih ocjenjuju: 4* (world-leading), 3* (internationally excellent), 2* (recognised internationally) or 1* (recognised nationally)
- recenzenti prilikom ocjenjivanja koriste i bibliometriju (bez određenih uputa)

AUSTRALIJA

- *Australian Research Council (ARC)* odgovoran za *Excellence in Research for Australia (ERA)*
- kombinacija pokazatelja i recenzije (međunarodno priznati eksperti)
- australska istraživanja uspoređuju se s međunarodnom zajednicom
- u obzir se uzima „*all eligible research outputs*”
- recenzija je najvažnija, dok se npr. u prirodnim znanostima uvažava citatna analiza
- prije su istraživači mogli objaviti samo u određenim časopisima svog područja – taj je koncept napušten od 2012.
- danas istraživači mogu objaviti radove u časopisima koji nisu iz njihovog područja

Australia

SciVal

Within: Medical and Health Sciences | Year range: 2010 to 2014

Publications	Citations	Authors	Field-Weighted Citation Impact	Citations per Publication
144,931 ▲	1,336,768	111,562 ▲	1.66	9.2

Performance indicators

Outputs in Top Percentiles ⚙️

Publications in top 10% most cited worldwide



Publications in Top Journal Percentiles ⚙️

Publications in top 10% journals by SNIP



International Collaboration ⚙️

Publications co-authored with Institutions in other countries



Academic-Corporate Collaboration ⚙️

Publications with both academic and corporate affiliations



AUSTRALIJA

5 - Outstanding performance well above world standard

4 - Performance above world standard

3 - Average performance at world standard

2 - Performance below world standard

1 - Performance well below world standard

- Relative citation impact (RCI) of the articles
- Number and proportion of articles in the world that are mostly highly cited for that discipline (top: 1%, 5%, 10%, 25% and 50%)
- Number and proportion of articles in seven citation classes: output with no citations, output with 0.01 to 0.79 RCI, output with 0.80 to 1.19 RCI, output with 1.20 to 1.99 RCI, output with 2.00 to 3.99 RCI, output with 4.00 to 7.99 RCI, and output with RCI above 8.00

AUSTRALIJA - USPOREDBA

- interne usporedne analize ova dva pristupa pokazale su da iako postoji povezanost između visokocitiranih radova i visokog ERA rangiranja (recenzenti), povezanost nije dovoljno jaka da bi se zamijenilo recenziju
- recenzija ostaje glavna komponenta ERA procesa prosudbe
- značajna uloga visokoškolskih i znanstvenih knjižnica – institucijski repozitoriji i bibliometrija

NATIONAL INSTITUTE OF HEALTH (NIH)

- 30 milijardi USD za istraživanja godišnje
- razvili novu analitičku metodu *Relative Citation Ratio (RCR)*
- „almost 90% of breakthrough papers first appeared in journals with relatively modest journal impact factors”
- „Using the JIF to credit influential work means overlooking 89% of similarly influential papers published in less prestigious venues”

PROSUDBA U HRVATSKOJ?

- što se želi postići?
- ne prate se učinci važećih kriterija
- temeljena na publicistici (i patentima)
- utjecaj rada se razmatra kroz pokazatelj primjeren časopisu
- citiranost se zanemaruje
- nema vanjske recenzije
- favorizira komercijalne izdavače
- zanemaruje otvoreni pristup
- zanemaruje ulogu znanosti u društvu
- mijenja se na način da znanstvenik ne zna što, gdje i kako treba objavljivati
- novi kriteriji ne zahvaćaju već stečena zvanja

- nema jedinstvene metrike koja može poslužiti svakoj svrsi
- „*there is no silver bullet in research evaluation*”
- kvalitativni prikaz (vanjski recenzenti) ostaje zlatni standard prosudbe

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