How common is it, and why?

(how can we best find out?)

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How common is it? Where? Why? Is it growing? How can we prevent it?

We still don't know!

Here, quickly overview current and potential data and tools for RRI

- The perfect ones that we largely don't have
- The ones we mostly have: survey data
- What we might have in the future
- Considerations

The perfect experiment: data audit

- Select researchers at random, find out
  - Avoid most biases/problems
  - Help to prevent misconduct
  - Limitated only by our ability to detect
  - In practice, difficult and ethically questionable
- US FDA Bioresearch Monitoring program!
  - 1977-1990: 10-20% questionable research, 2% researchers barred from grants (Glick 1993)
  - (more recent?)
- Perfect, but only one field, only detectable RM

Over the years, many surveys have asked scientists directly…

…different things, in different ways!

Question	Form of misconduct	Outcome
"Since entering medical school have you…?"	"Fabricated data"	Yes No
"Have you participated in research involving […] during the last 10 years?"	"Modified research or experimental results to improve the outcome"	Never Sometimes Frequently
"Indicate the number of […] members you have observed/experienced exhibiting […] within the last 5 years"	"Failing to present data that contradict one's own previous research"	0 1-5 >5
	"Seriously misleading interpretation of results"	

Results appeared inconclusive and difficult to compare

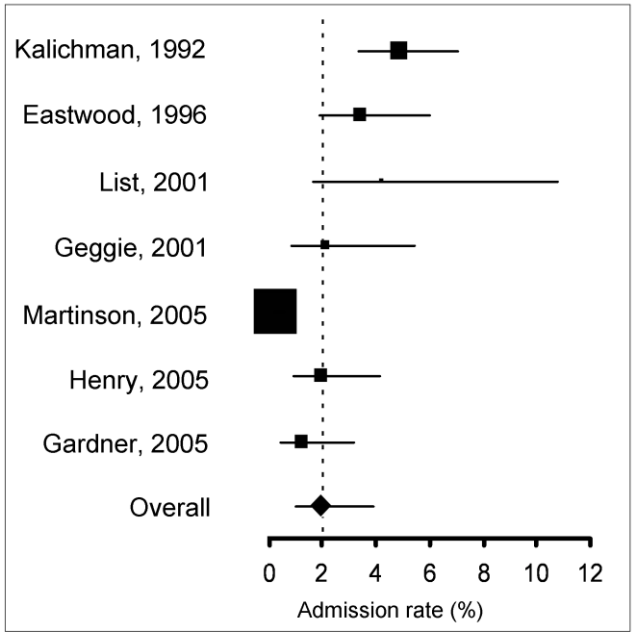
“Tricks” in my meta-analysis

(Fanelli 2009)

- How many committed or observed X at least once
- Only questions on fabrication, falsification, alteration and QRP that distort scientific knowledge. No plagiarism, professional misconduct etc…

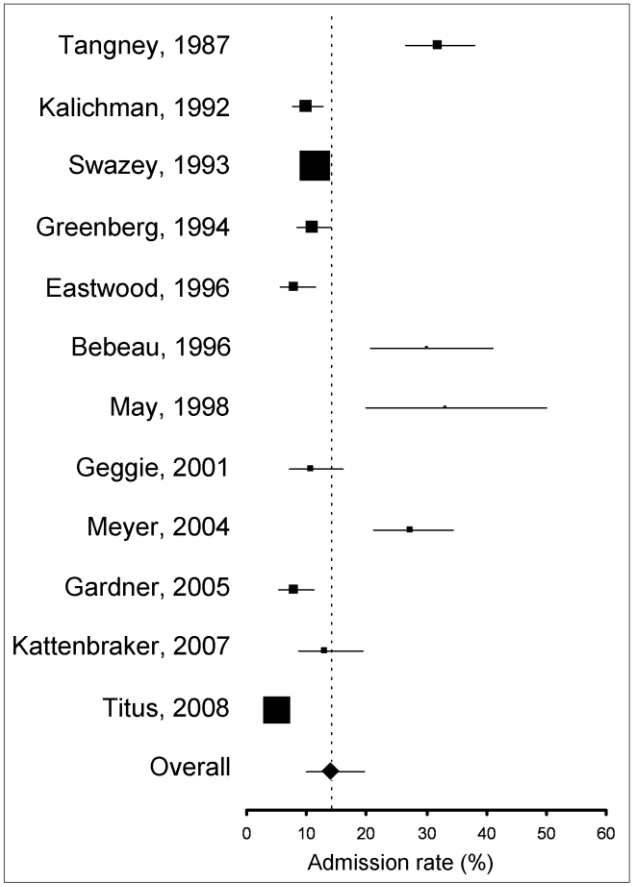
- All surveys conducted between 1986-2005
  - USA (15), UK (3), multinational (2), and Australia (1)
  - Medical/clinical (8), biomedical (6), multidisciplinary (6), economy (1)
- In total 85 questions:
  - about fabrication, falsification, alteration, modification (meta-analysis)
  - Questionable research practices (systematic review only)

Scientists who admit fabrication, falsification, or alteration of results



1.97% (N=7, 95%CI: 0.86-4.45)

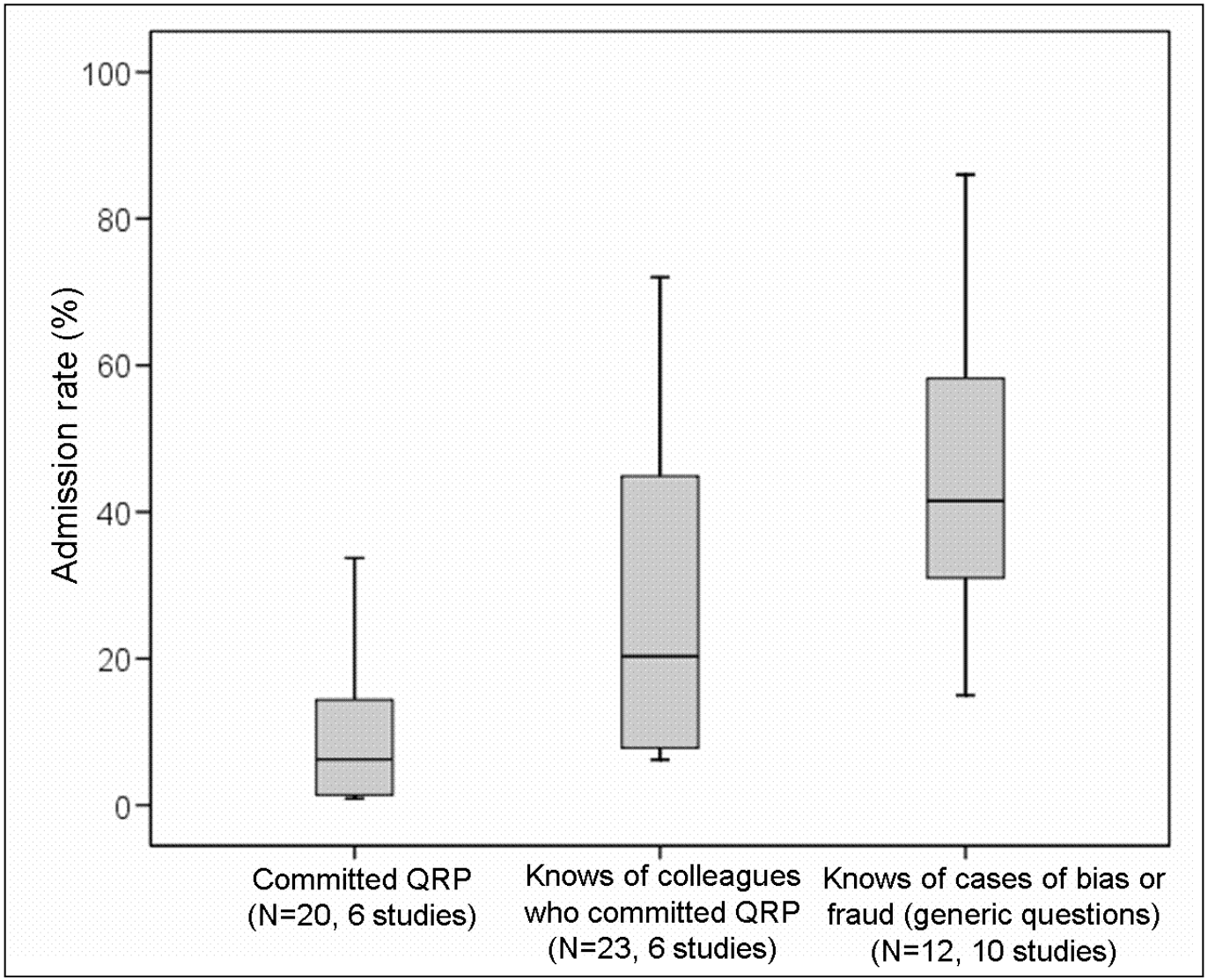
Scientists who know a colleague who fabricated, falsified, or altered results



14.12% (N=12, 95% CI: 9.91-19.72)

Questionable Research Practices

(e.g. “failing to publish data that contradicts one’s previous research” “dropping data points based on a gut feeling”)



“Repairing misconduct” ?

ID	N cases	Action taken	%
Tangney, 1987	78	Took some action to verify their suspicions of fraud or to remedy the situation	46
Rankin, 1997	31 (incl. Plag.)	In alleged cases of scientific misconduct a disciplinary action was taken by the dean	32.4
		Some authority was involved in a disciplinary action	20.5
Ranstam, 2000	49	I interfered to prevent it from happening	28.6
		I reported it to a relevant person or organization	22.4
Katte 2007			
		Reported to supervisor	36.4
		Reported to Institutional Review Board	12.1
		Discussed with colleagues	36.4
Titus, 2008	115 (incl. Plag.)	The suspected misconduct was reported by the survey respondent	24.4
		The suspected misconduct was reported by someone else	33.3

Around half of recalled cases had no action whatsoever taken against them

What influences admission rates?

Inverse variance-weighted regression

		B	SE	P
Asking about self vs colleagues:	−	-4.53	0.81	<0.0001
Using "fabrication" or "falsification" vs "alteration" or "modification":	−	-1.02	0.39	0.0086
Handed-out surveys vs mailed:	+	1.17	0.4	0.0032

82% of variance explained (N=15)

Controlling for these factors, tested for differences between:

Year

USA / other *

Researcher / other

Biomedical / other

Social Sc. / other

n.s.

Medical / other B=0.85 0.28

P= 0.0022

Summary of key findings

- Overall, survey data is coherent:
  - Data fabrication, falsification and alteration was
    - admitted on average by around 2% (1% - 4%)
    - directly observed by 14% (10% - 20%)
  - Questionable Research Practices were
    - admitted on average by up to 34%
    - directly observed by up to 72%
  - Around 50% discovered but not dealt with
- admissions =>probably conservative
- Higher in some disciplines (e.g. medical/clinical research)

Limitations:

-Methodology of survey had the greatest influence

-Just what people think/say

Future: studying bias/misconduct in the literature

- In biomedical and increasingly in other fields, correct meta-analyses for "publication bias"
- Excess of "positive" results in most fields
  - Simplistically, "file-drawer"
  - In practice combination of biases
- Meta-analyses detected "funding effect" and others

- Ideally, try to do that without meta-analysis

A simple proxy of bias

- Take papers that declare in the abstract to have “tested a hypothesis”
- Read them and determine the authors’ conclusions:
  - “positive” (full or partial support)
  - “negative” (null or negative support)

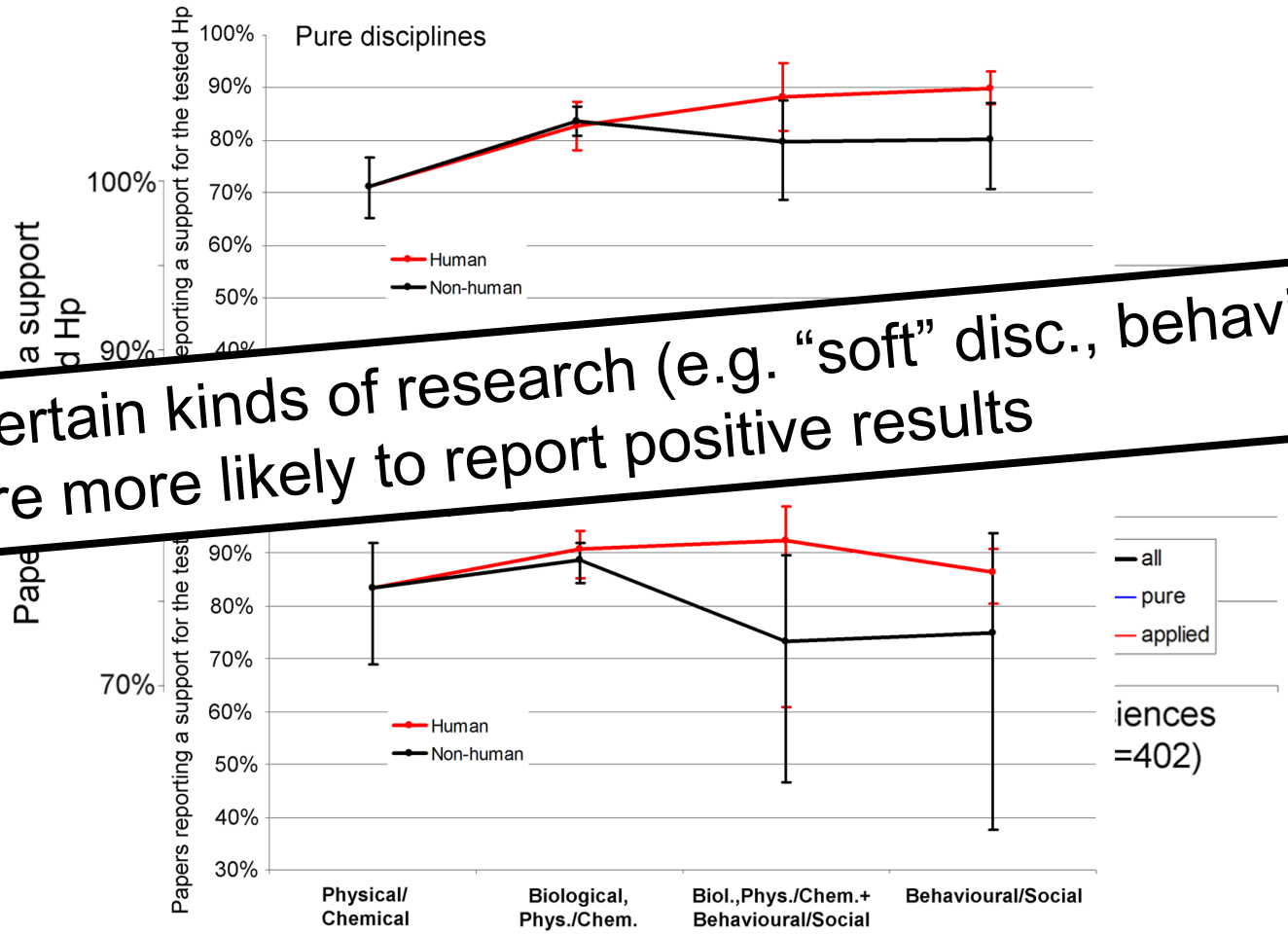
- Verify if non-scientific factors affect the likelihood of reporting a positive
- Not a direct measure of bias, but a proxy: logically connected to bias but needs interpretation
- (More refined methods to come…)

Does bias vary by discipline/methodology?)

(Fanelli 2010a)

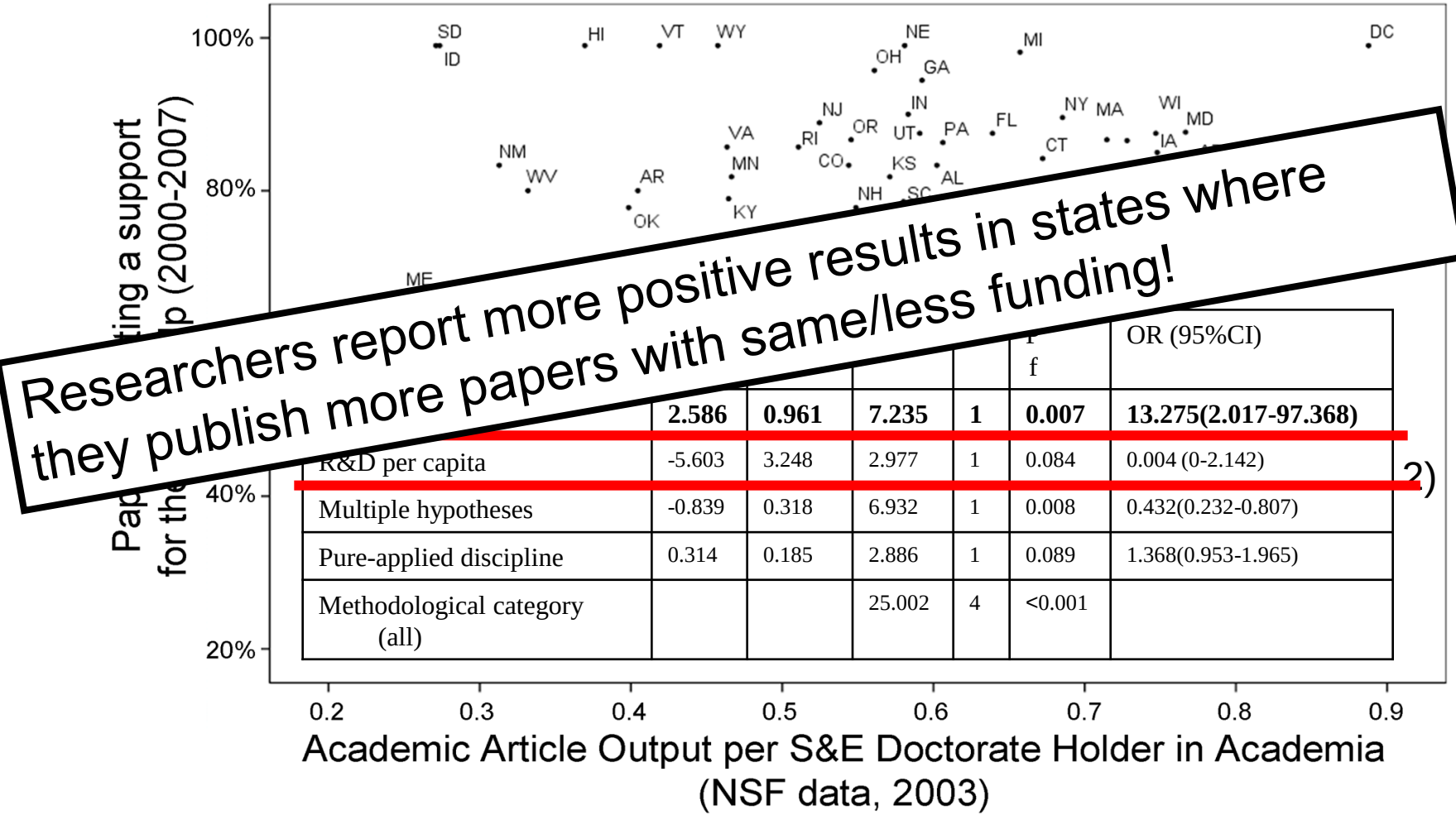
Searched all 10,837 journals in the 22 disciplines of the Essential Sciences Indicators database

Over 2,500 papers, 150 per discipline, (2000-2007), at random



Certain kinds of research (e.g. “soft” disc., behavioural) are more likely to report positive results

Do pressures to publish increase bias? A support with NSF data on US states



Researchers report more positive results in states where they publish more papers with same/less funding!

					f	OR (95%CI)
	2.586	**0.961**	**7.235**	**1**	**0.007**	**13.275(2.017-97.368)**
R&D per capita	-5.603	3.248	2.977	1	0.084	0.004 (0-2.142)
Multiple hypotheses	-0.839	0.318	6.932	1	0.008	0.432(0.232-0.807)
Pure-applied discipline	0.314	0.185	2.886	1	0.089	1.368(0.953-1.965)
Methodological category (all)			25.002	4	<0.001	

Conclusions for RRI

- Research on RI usually identified with surveys (i.e. to compare EU-US)
  - Little scope for doing more, unless we standardize methodology
  - Funding should encourage the development of a standard survey tool.
- A promising approach: analyses of the literature (meta- or not)
  - Independent, precise data on various kinds of biases
  - Potential tool for monitoring of research
- Have data audits a role too?