Benefits and challenges of defining misconduct

Daniele Fanelli

METRICS
META-RESEARCH INNOVATION CENTER AT STANFORD

Definitions of misconduct are flourishing

	1981				1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
US	x				PHS	NSF	PHS	NSF		x	NAS			x					OSTP		NSF			PHS					
AU									NHMRC							NHMRC							x		x	NHMRC			
DK											DCSD						DCSD					x		DCSD			DCSD		
NO													NCISM							x						NCISM			
DE																MP					DFG								
SW																	SRC	x				SMR	SRC						
FI																	NREC				TENK								
FR																		INSERM											
NL																				KNAW									
CN																					UB				MOT	CAS			
JP																						x	RIKEN		MEXT				
CH																						SAAS							
IN																									ICMR				
CR																										CESHE			
INT																										x		OECD	
UK																												UKRIO	

RED=Research Institution's Definition; X=unofficial definition

(Fanelli 2010, in: Promoting Research Integrity on a Global Basis)

National misconduct policies in 2014

Country	National policy (Y/N)	Year policy adopted or revised	2014 R&D funding rank	2014 GDP (billions of US$)	2014 R&D as percentage of GDP
United States	Yes	2000	1	16,616	2.8
China	Yes	2006	2	14,559	2
Japan	Yes	2006	3	4,856	3.4
Germany	Yes	2011	4	3,312	2.9
South Korea	Yes	2012	5	1,748	3.6
France	No*		6	2,319	2.3
United Kingdom	Yes	2012	7	2,454	1.8
India	No		8	5,194	.9
Russia	No		9	2,671	1.5
Brazil	Yes	2012	10	2,515	1.3
Canada	Yes	2011	11	1,571	1.9
Australia	Yes	2007	12	1,040	2.3
Taiwan	Yes	2000	13	974	2.4
Italy	No**		14	1,842	1.2
Spain	Yes	2011	15	1,418	1.3
Netherlands	Yes	2014	16	712	2.1
Sweden	Yes	2006	17	412	3.4
Israel	No		18	271	4.2
Switzerland	Yes	2008	19	382	2.9
Turkey	No		20	1,227	.9
Austria	No*		21	372	2.8
Singapore	Yes	2013	22	355	2.7
Belgium	No**		23	432	2
Iran	Yes	2011	24	1,014	.8
Mexico	No*		25	1,864	.5
Finland	Yes	2012	26	202	3.5
Poland	Yes	2012	27	844	.8
Denmark	Yes	2008	28	217	2.9
South Africa	No		29	621	1
Qatar	No*		30	211	2.7
Czech Republic	No**		31	295	1.8
Argentina	No		32	803	.6
Norway	Yes	2007	33	293	1.7
Malaysia	No		34	557	.8
Pakistan	No		35	556	.7
Portugal	No		36	248	1.4
Ireland	Yes	2013	37	200	1.7
Saudi Arabia	No		38	997	.3
Ukraine	No**		39	348	.9
Indonesia	Yes	2013	40	1,374	.2

*In the process of developing a national policy.
**National research ethics code but no national misconduct policy.

(Resnik et al. 2014, Accountability in Research)

National definitions of misconduct: included behaviours

country	year	Institution	fabrication and/or falsification and plagiarism	open definition	selective reporting	ghost-guest authorship	misuse of statistics	misrepresenting others' research	sabotaging others' research	biased interpretation of results	mismanaging conflicts of interest	duplicate publication	not following approved protocols	preserving data mismanaging/not	professional credentials misrepresenting	favouring misc./hampering investigations	abusing power as a peer reviewer	withholding information or materials	financial misconduct	personal abuse	bad mentorship	harming human or animal subjects	exploiting students or subordinates	other	source
AU	2007	NHMRC et al.	x	x		x					x		x			x			x			x			[29]
CN	2009	CAS	x	x		x			x			x						x	x						x	[30]
CR	2007	CESHE	x		x	x		x	x	x	x	x													x	[31]
DK	2009	DCSD	x	x	x		x			x															x	[27]
FI	2002	TENK	x	x	x		x	x	x	x		x		x											x	[21]
FR	1999	INSERM	x			x					x			x							x				x	[32]
IN	2006	ICMR	x		x	x		x			x	x					x								x	[33]
NL	2001	KNAW et al.	x	x	x	x	x	x		x			x		x					x					x	[34]
NO	2007	NCISM	x	x																						[35]
SW	2004	EGISRM	x	x	x		x																		x	[36]
CH	2003	SAAS	x	x	x	x	x	x	x	x				x		x	x	x							x	[37]
UK	2009	UKRIO	x	x		x							x													[38]
US	2005	PHS	x		x																					[17]

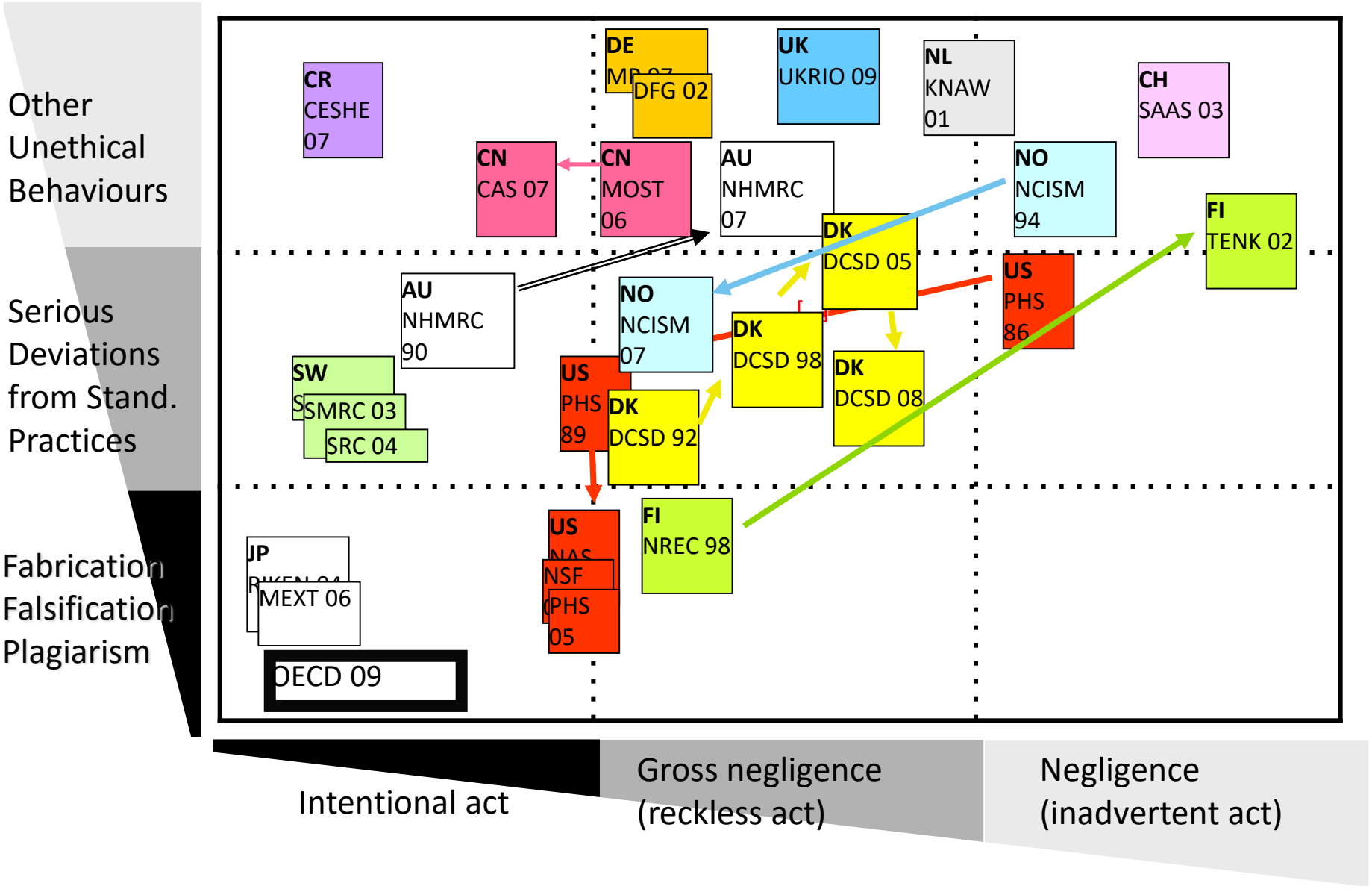
(Fanelli 2010, in “Promoting Research Integrity in a Global Environment”)

National definitions of misconduct: intentionality of behaviours

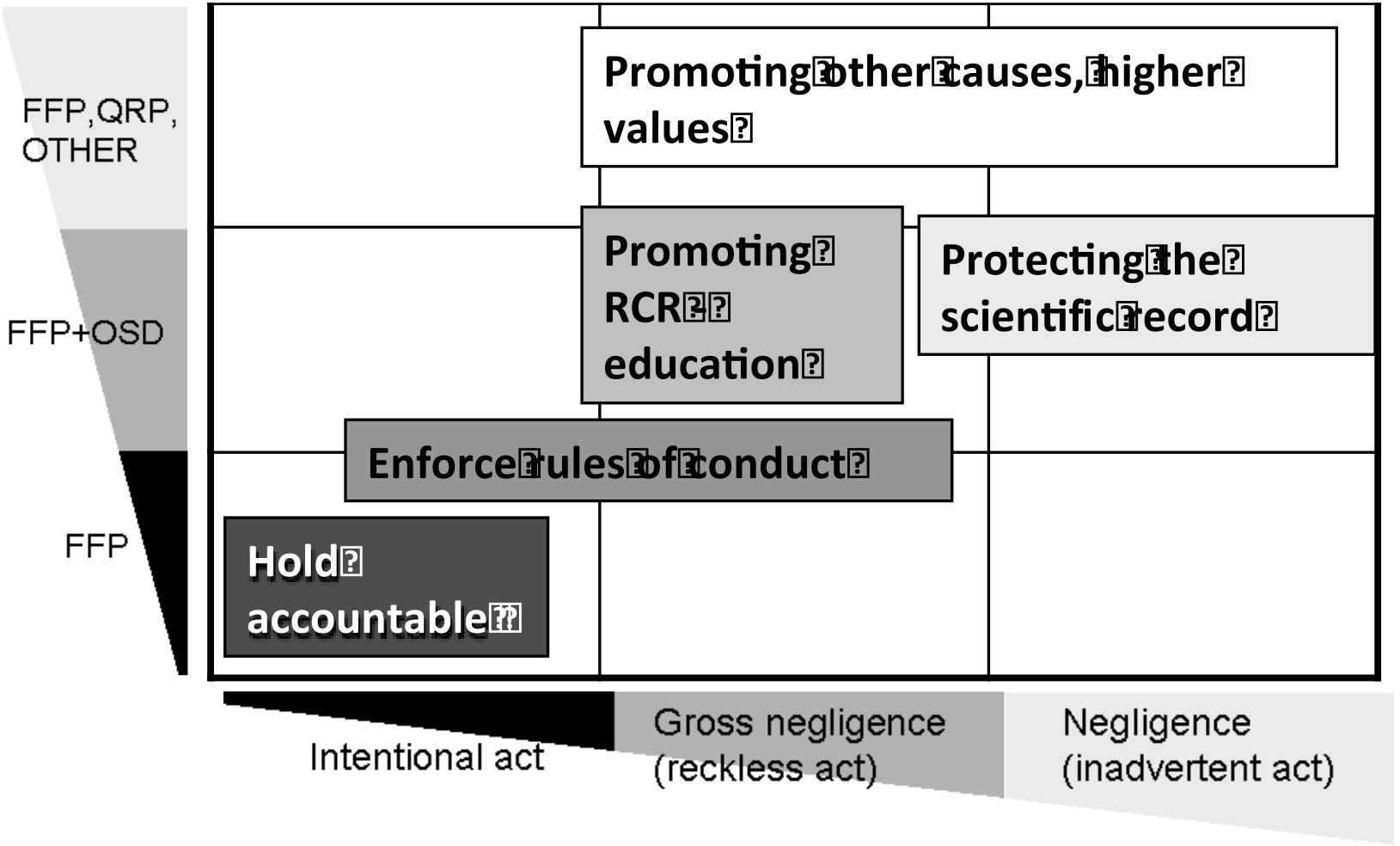
country	year	institution	intentional	grossly negligent/reckless	negligent	excludes honest errors	excludes differences in opinion	source
AU	2007	NHMRC et al.	x	x	x	x[1]	x	[29]
CN	2009	CAS				x	x	[30]
CR	2007	CESHE	x			x	x	[31]
DK	2009	DCSD	x	x				[27]
FI	2002	TENK		x	x		x	[21]
FR	1999	INSERM	x	x	x		x	[32]
IN	2006	ICMR						[33]
NL	2001	KNAW et al.	x		x			[34]
NO	2007	NCISM	x	x				[35]
SW	2004	EGISRM			x			[36]
CH	2003	SAAS	x		x			[37]
UK	2009	UKRIO						[38]
US	2005	PHS	x	x		x	x	[17]

(Fanelli 2010, in “Promoting Research Integrity in a Global Environment”)

The black, the white and the gray areas



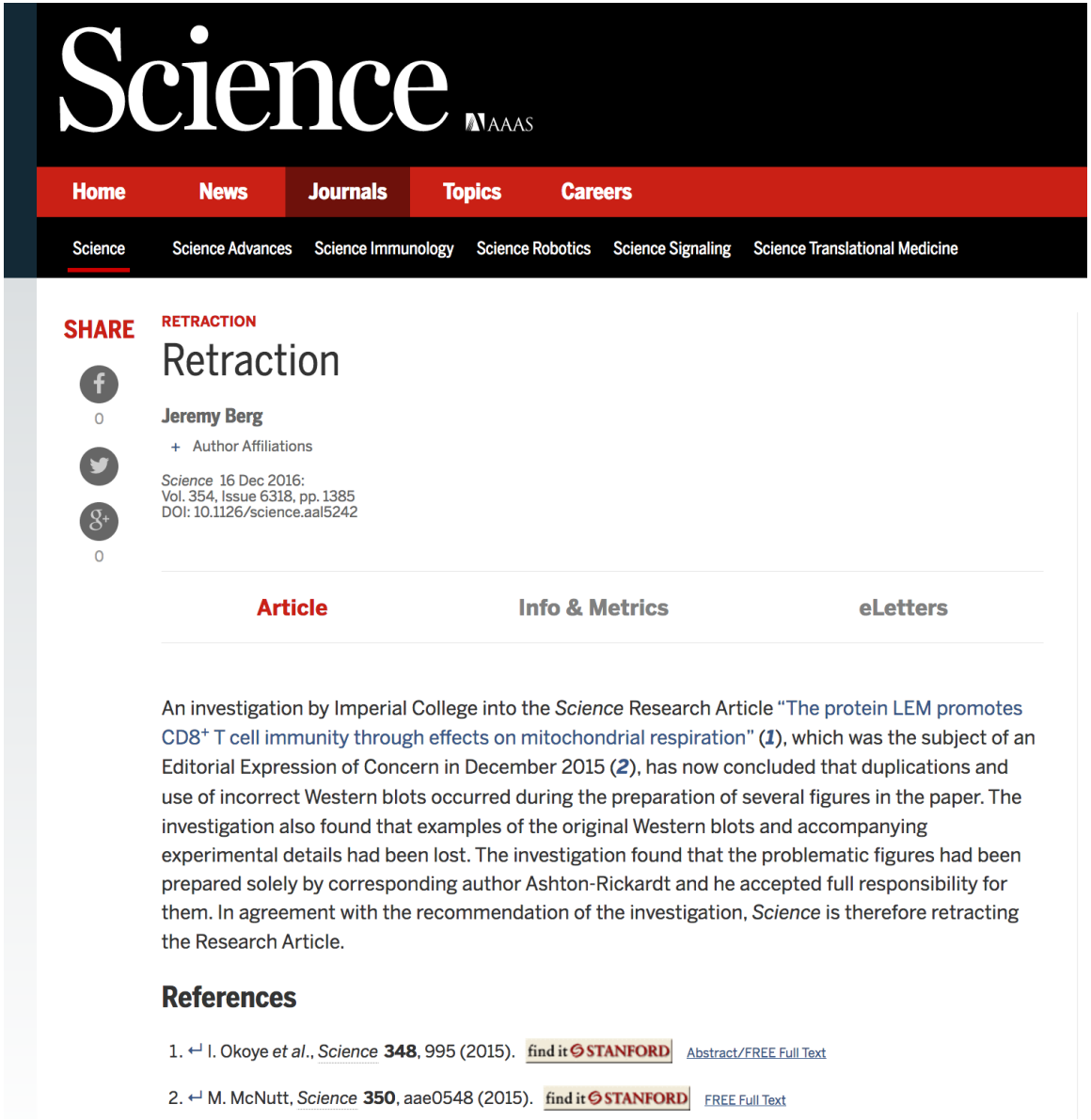
WHY THIS DIVERSITY?



(Fanelli 2010, in: Promoting Research Integrity on a Global Basis)

Do these policies work?

Empirical evidence from retractions



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RETRACTION

Retraction

Jeremy Berg

+ Author Affiliations

Science 16 Dec 2016:
Vol. 354, Issue 6318, pp. 1385
DOI: 10.1126/science.aal5242

Article | Info & Metrics | eLetters

An investigation by Imperial College into the *Science* Research Article "The protein LEM promotes CD8$^+$ T cell immunity through effects on mitochondrial respiration" (**1**), which was the subject of an Editorial Expression of Concern in December 2015 (**2**), has now concluded that duplications and use of incorrect Western blots occurred during the preparation of several figures in the paper. The investigation also found that examples of the original Western blots and accompanying experimental details had been lost. The investigation found that the problematic figures had been prepared solely by corresponding author Ashton-Rickardt and he accepted full responsibility for them. In agreement with the recommendation of the investigation, *Science* is therefore retracting the Research Article.

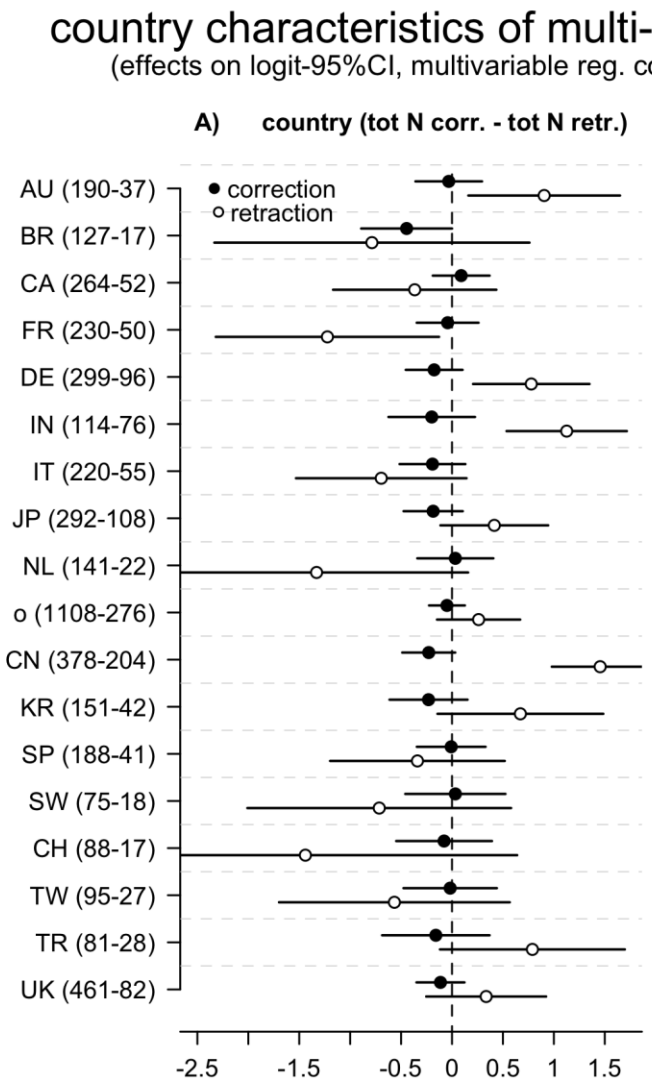
References

1. ↵ I. Okoye *et al*., *Science* **348**, 995 (2015). find it STANFORD Abstract/FREE Full Text

2. ↵ M. McNutt, *Science* **350**, aae0548 (2015). find it STANFORD FREE Full Text

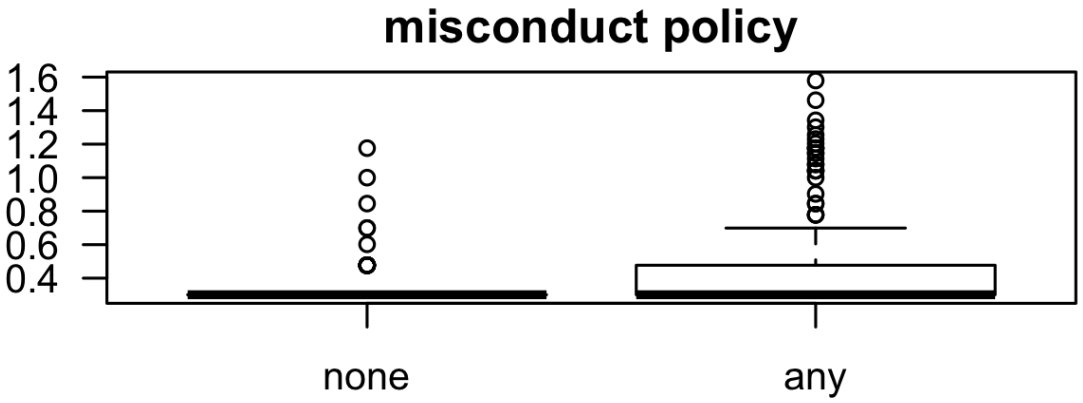
Matched-control analysis of retractions (mostly bad) and corrections (m. good)

(611, 2226, plus 2 controls each)



(Fanelli, Costas & Larivière 2015, PLoS ONE)

Number of retractions <u>per retracted author,</u>



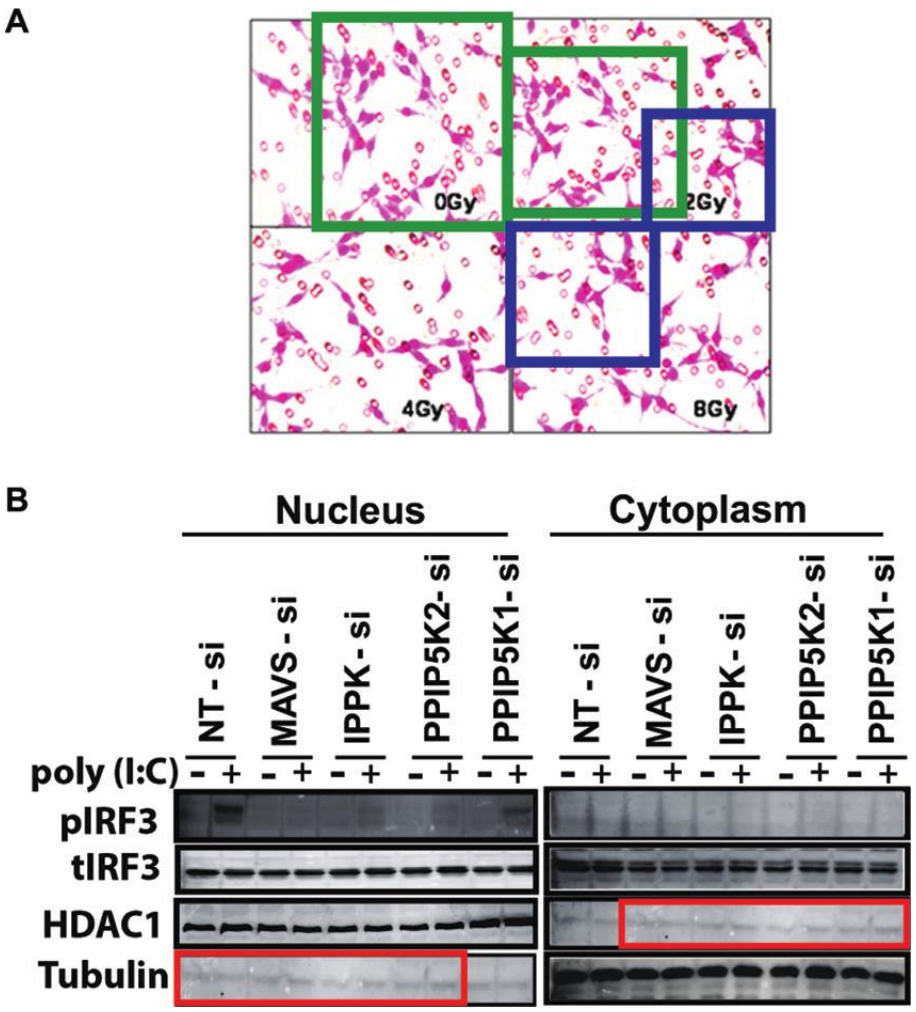
(b=0.63±0.18, P<0.001)

- 60% more retractions per retracted author, if working in a country with a misconduct policy.
- misconduct policy ⇔better investigations and actions

(Fanelli, Costas & Larivière 2015, PLoS ONE)

Analysis of papers with duplicated image

papers with image manipulations identified by manual inspection of 20,621 papers with “Western blot”



(Bik et al. 2016, mBio)

Matched-control analysis of papers with duplicated images

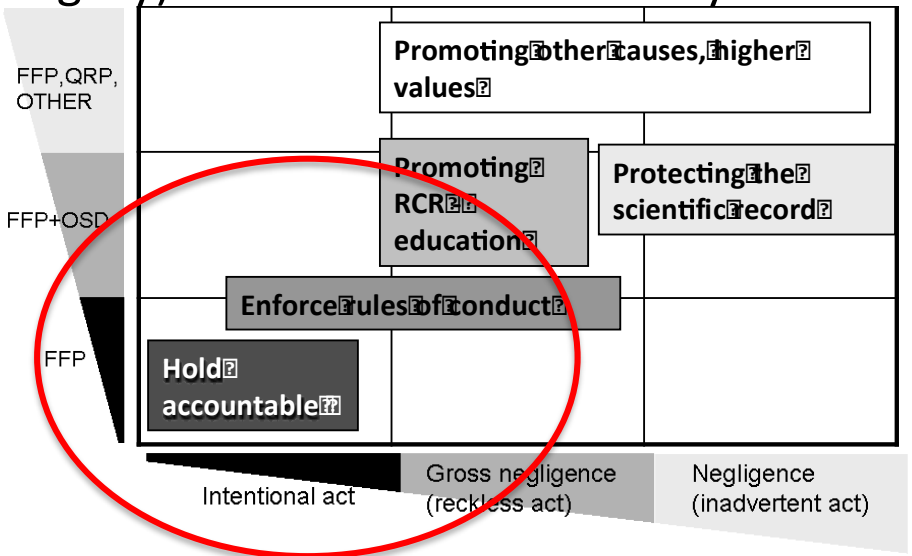
(N=264 questionable manipulations, 2 controls each)

- national misconduct policy ~lower misconduct

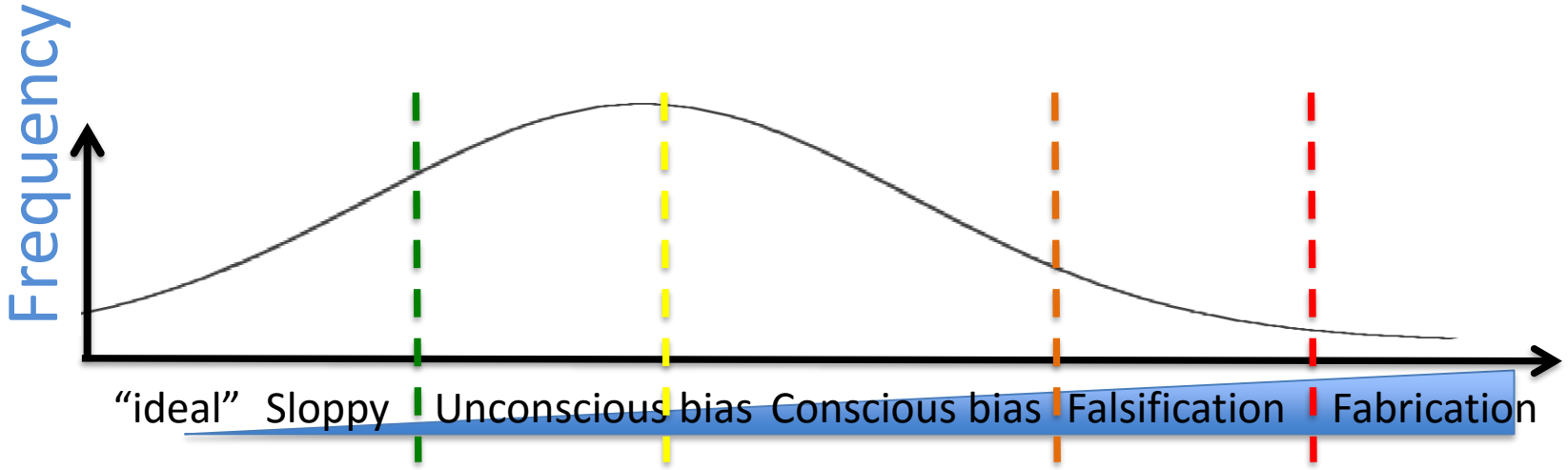
(Fanelli, et al. in prep.)

Benefits of misconduct policies?

- fewer retractions and fewer image duplications
- more retractions per caught individual
- a little more corrections to the literature
- Suggest that:
  - allow thorough investigations
  - more thorough cleaning of the literature
  - deterring effect on misconduct?
  - inspiring research integrity?
- cause-effect are difficult to prove, but
  - expression of greater attention (integrity) of a scientific community



Challenge:
Where to draw the line?



- falsification: practices that "deviate from accepted standards"
  - standards vary field's level of consensus, & over time!
- "questionable" research practices
  - "questionable" for whom?

Just publish what you did!?

WORLDVIEW *A personal take on events*

Redefine misconduct as distorted reporting

To make misconduct more difficult, the scientific community should ensure that it is impossible to lie by omission, argues **Daniele Fanelli**.

Against an epidemic of false, biased and falsified findings, the scientific community's defences are weak. Only the most egregious cases of misconduct are discovered and punished. Subtler forms slip through the net, and there is no protection from

Some might consider this too broad. But it is no more so than the definition of falsification used by the US Office of Science and Technology Policy: "manipulating research materials, equipment, or processes, or changing or omitting data or results such that the

"'any omission or misrepresentation of the information necessary and sufficient to evaluate the validity and significance of research, at the level appropriate to the context in which the research is communicated'.

(Fanelli 2013, Nature)

Don’t even tell us what you did!

WORLDVIEW *A personal take on events*

DANIELE FANELLI

Set up a ‘self-retraction’ system for honest errors

Notices should make obvious whether a withdrawal of research is the result of misconduct or a genuine mistake, says **Daniele Fanelli**.

Self-correction in science has never been so popular and yet so unrewarded. New technologies and a culture of sharing, transparency and public criticism offer an unprecedented opportunity to purge the scientific record of false claims. But retracting those published

the authors recognized as responsible for misconduct.

As long as retraction notes include in the title a list of all the original authors, as they often already do, their status will be self-evident. If an adjudication of misconduct is disputed in court, as is increasingly

“Punishment is a means to an end. If praise and reward yield better results, we should enforce them and wish for nothing more. Our common mission is to keep the literature truthful and reliable, and to accomplish that we should be pragmatic, not moralistic. It would not be unholy to grant a year of ‘scientific jubilee’, during which journal editors allowed authors to self-retract papers, no questions asked.”

(Fanelli 2016, Nature)

Drafting the RI guidelines for CNR

Consiglio Nazionale delle Ricerche

- Government institution, founded in 1923 for the conduction, promotion and valorization of scientific research
- Largest research organization in Italy
- Seven departments and 106 research institutes
- All disciplines

Commissione per l'etica e la bioetica

- Independent entity supporting CNR's presidency
  - representatives of academia (science, law, philosophy, ethics) as well as political institutions, media and industry
- Amongst its functions, advisory body on matters of:
  - Ethics and bioethics – Ethical clearance of CNR projects
  - Cases of research misconduct, as an external, technical examiner

CNR's Research Integrity guidelines

Fondamentali per l'integrità nella ricerca[1] sono i seguenti principi: 1. Dignità 2. Responsabilità 3. Equità 4. Correttezza 5. Diligenza. Questi principi racchiudono, ineriscono o sono correlati ad altri principi e valori etici qualin	The following principles are fundamental to Research Integrity: 1. Dignity, 2. Responsibility, 3. Fairness, 4. Correctness, 5. Diligence. These principles are inherent to and are interrelated with other principles and ethical

PARTE I **CONDOTTE CHE PROMUOVONO L'INTEGRITÀ NELLA RICERCA**	**PART I** **CONDUCT WHICH PROMOTES RESEARCH INTEGRITY**
Sono esempi di condotte eticamente e	Examples of ethically and professionally correct

PARTE II **CONDOTTE LESIVE DELL'INTEGRITÀ NELLA RICERCA**	**PART II** **CONDUCT DAMAGING TO RESEARCH INTEGRITY**
Le condotte eticamente e professionalmente	Ethical and professional misconduct[9] and

1) design and planning
2) conduct
3) publication
4) evaluation of people and projects
5) relationships w institutions, colleagues

PARTE II **CONDOTTE CHE PROMUOVONO L'INTEGRITÀ NELLA RICERCA**	**PART II** **CONDUCT WHICH PROMOTES RESEARCH INTEGRITY**
Sono esempi di condotte eticamente e professionalmente corrette che sostengono, favoriscono e promuovono l'integrità nella ricerca le seguenti:	Examples of ethically and professionally correct conduct which supports, favours and promotes research integrity include:
A. Nella progettazione e pianificazione della ricerca	***A. In the design and planning of research***
1. Concordare gli obiettivi del progetto: gli obiettivi e gli scopi che la ricerca si prefigge, nonché la pianificazione della stessa in termini di programmazione e previsioni generali, sono discussi e concordati dai ricercatori prima che il progetto venga presentato a un ente finanziatore e comunque prima dell'avvio delle attività. Chi abbia responsabilità di coordinamento della ricerca discute e concorda con i partecipanti eventuali successive modifiche in modo trasparente.	1. Agreeing the objectives of the project. The objectives and aims of the research project as well as its design in terms of planning and main objectives should be discussed and agreed by researchers before these are submitted to a funding institution and, at any rate, before research activities have begun. Whosoever is responsible for coordinating the research should discuss and agree any subsequent modifications with participants in a transparent manner.
2. Valutare la fattibilità, il potenziale impatto e le implicazioni etiche del progetto: i ricercatori e le istituzioni di ricerca coinvolti nel progetto ne valutano la concreta fattibilità nonché i profili etici. Ne esaminano inoltre responsabilmente il potenziale impatto sulle persone, sulla società e sulla biosfera, preferibilmente dando conto di tali valutazioni nella documentazione del progetto.	2. Evaluating the feasibility, potential impact and ethical implications of the project. The researchers and research institutes involved should evaluate the project's concrete feasibility and ethical profile. Furthermore, they should responsibly evaluate its potential impact on people, society and on the biosphere, preferably giving account of this evaluation in the project documentation.
3. Definire i ruoli e i compiti dei ricercatori: i ruoli e gli specifici compiti dei singoli ricercatori e delle istituzioni di ricerca coinvolte nel progetto sono definiti con chiarezza e in modo equanime. In particolare, il ruolo e le funzioni del/dei referente/i scientifico/i del progetto sono formalizzati prima del suo avvio.	3. Defining the roles and tasks of the researchers. The roles and specific tasks of the researchers and research institutes involved in the project should be clearly defined in an impartial manner. In particular, the roles and functions of the project's representatives/scientists should be formalised before it has begun.
4. Concordare la scelta, le procedure e gli incarichi di gestione delle fonti di finanziamento: la scelta delle fonti di finanziamento e le procedure per gestire i fondi assegnati sono stabilite e rendicontate con diligenza e in modo trasparente e condiviso, comprese l'individuazione del designato alla gestione dei fondi e la specificazione dei limiti	4. Agreeing the choice of, the procedures and who will manage and who provides sources of funding. The choice of the sources of funding and the procedures for managing allocated funds should be established and audited diligently and in a transparent and open manner including the identification of the

D. Nelle fasi di valutazione di persone, progetti o pubblicazioni	*D. In the evaluation phase of people, projects and publications*
CONDOTTE SCORRETTE: 1. Incuria e abuso nello svolgimento del ruolo di revisore o di responsabile/direttore di un gruppo di ricerca: - Pubblicare come proprio o utilizzare in ogni altro modo senza il permesso esplicito dell'autore testi dei quali si è acquisita la disponibilità in virtù del proprio ruolo di revisore o di	**RESEARCH MISCONDUCT** 1. Negligence or abuse of the role of peer-reviewer or leader/director of a research group: - Publishing as your own or in any other way utilising, without the express permission of the author, texts which have come into your possession by virtue of one's role as a peer-reviewer or as leader/director of a research
[...]	
5. Incuria e abuso del proprio ruolo: - Abusare del proprio ruolo, posizione e influenza per ottenere indebiti vantaggi, beni e favori per se stessi o per terzi oppure per danneggiare colleghi, collaboratori o competitori.	and favours for oneself or for third parties or to damage colleagues, collaborators and rivals.
PRATICHE DISCUTIBILI E/O IRRESPONSABILI: - Ostacolare, rallentare, o sabotare indirettamente e involontariamente il lavoro dei colleghi attraverso la non-condivisione protratta oltre i limiti professionalmente e scientificamente giustificabili, di dati, metodi, risultati negativi di esperimenti, informazioni su errori metodologici o di altro tipo; - Manifestare incuria nello svolgimento del proprio ruolo di	**QUESTIONABLE AND/OR IRRESPONSIBLE PRACTICES** - Hindering, delaying or sabotaging indirectly and involuntarily the work of colleagues through the protracted non-sharing, beyond any reasonable professional or scientifically justifiable limit, of data, methods, negative experimental results, information on methodological errors or errors of other types; - Showing negligence in the conduct of

Philosophy of guidelines

- beyond FFP, and even beyond just a QRP category
- beyond strictly precedural/legal/CNR issues
- offer researchers in Italy clear information about what the international community…
  - recommends in terms of good research practices
  - recognizes as forms of misconduct

- Challenges: e.g. « whistleblower » does not exist in Italian!

- So far, six allegations examined
  - ALL raised ethical issues well within the ’light-gray area’
  - relationships with colleagues, competitors, subordinates…

The ultimate challenge?

Responses of 14 authors of “honest retractions”,
NL, UK and Scandinavian countries

Policies are beneficial, but
do researchers even know these exist?

Thank you!

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