

Research Ethics and Data Science

Data Science Summer School 2019, August 5th-16th 2019, Göttingen

**Dietmar Hübner, Institute of Philosophy,
Practical Philosophy, particularly Ethics of Science**

A. On Ethics

B. On Research Ethics

C. On Research Ethics in the Data Sciences

A. On Ethics

B. On Research Ethics

C. On Research Ethics in the Data Sciences

A. On Ethics

“Ethics” := The academic **discipline** dealing with human **morality**.

“What ought I do?”
“What are my duties?”
“What are people’s claims?”
“What is right and wrong?”

Sources of moral uncertainty:

Clash of principles: *“Tell the truth!”* ↔ *“Avoid suffering!”*

New situation: *“Don’t kill people!”* ↔ *“Human embryos?”*

Task of the ethicist: Assist decision-making!

Master criterion? Hierarchy of interests?
Inconsistencies? Quality of arguments?

A. On Ethics

B. On Research Ethics

C. On Research Ethics in the Data Sciences

B. On Research Ethics

B1. Good Scientific Practice

B2. Research on Humans

B3. Consequences of Research

B. On Research Ethics

B1. Good Scientific Practice

B2. Research on Humans

B3. Consequences of Research

B1. Good Scientific Practice

Academic misconduct may concern ...

Other scientists' results:

plagiarism

sabotage

*ignoring, dismissing,
suppressing...*

Your own results:

fabrication (forging)

omission (cooking)

manipulation (trimming)

B1. Good Scientific Practice

The Piltdown Man (*Eoanthropus dawsoni*) (1912)



Who dunnit?

- Charles Dawson?
- Arthur Smith Woodward?
- Teilhard de Chardin???
- Arthur Conan Doyle???
- Martin Hinton???



*Cf. Nature 381
(May 1996), 261-262*

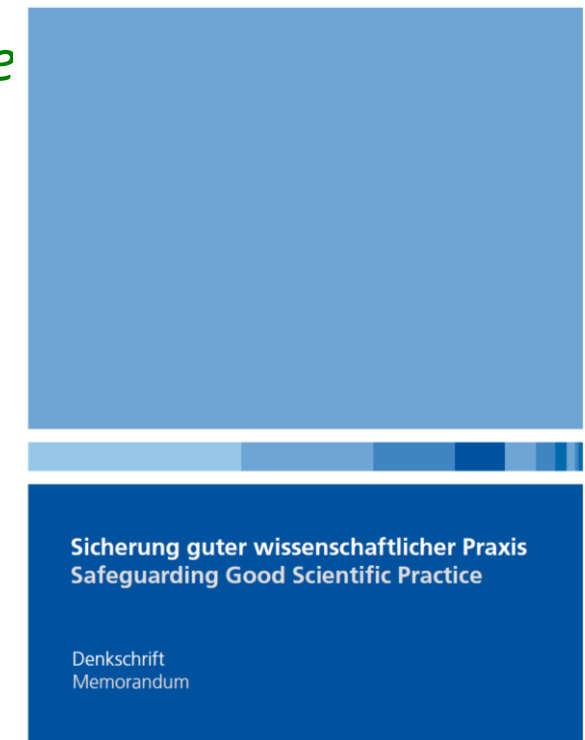
B1. Good Scientific Practice

Max Planck Society (MPG): “Responsible Conduct in Science: Analyses and Recommendations” (2001)

*false authorships / “honorary authorships” /
repeated publications / “salami publications” /
quotation cartels / unfair reviews /
publication vs. patent / scientific statements
for interest groups / pseudo-experts ...*

German Research Foundation (DFG): “Safeguarding Good Scientific Practice” (1998/2013)

*(new version in preparation:
misuse of power, organisational
responsibilities, quantitative vs.
qualitative evaluation criteria,
authorship, publication, “replication
crisis”, big data, open access ...)*



WILEY-VCH

DFG

B1. Good Scientific Practice

Safeguarding Good Scientific Practice

Leibniz University Hannover attaches key importance to observing the rules of good scientific practice in order to maintain high scientific standards in research. To avoid dishonesty and deception, Leibniz University Hannover has therefore established a two-stage procedure for professional self regulation in science. Where there is a suspected case of scientific misconduct, members of the university can turn to a mediator, who will conduct a first inquiry into the allegations. If the allegation is well founded, the case will be investigated by an independent commission of inquiry, taking all available evidence into account and conducting a hearing of the persons involved. If the allegations are proved to be true, the university authorities will apply the relevant sanctions.

The Guidelines for Safeguarding Good Scientific Practice adopted by Leibniz University Hannover are based on the recommendations for safeguarding good scientific practice issued by the German Research Foundation (DFG).

[Guidelines to Secure Good Scientific Practice](#)

[DFG recommendations on "Safeguarding Good Scientific Practice"](#)

The Senate has nominated the following mediator and deputy mediator:

MEDIATOR

Prof. Dr. rer. nat. Insa Neuweiler	PHONE	+49 511 762 3567	ADDRESS	Appelstr. 9A 30167 Hannover
	FAX	+49 511 762 3777	BUILDING	3408
	EMAIL	neuweiler@hydromech.uni-hannover.de	ROOM	129

DEPUTY MEDIATOR

Prof. Dr. Dietmar Hübner OFFICE HOURS Di., 08:30 - 09:30 Uhr, in der vorlesungsfreien Zeit nach Vereinbarung per Email	PHONE	+49 511 762 - 3438	ADDRESS	Im Moore 21 30167 Hannover
	FAX	+49 511 762 - 5720	BUILDING	1146
	EMAIL	dietmar.huebner@philos.uni-hannover.de	ROOM	B311

B. On Research Ethics

B1. Good Scientific Practice

B2. Research on Humans

B3. Consequences of Research

B2. Research on Humans

Main issues ...

**Protection against
harm:**

*physical pain /
injury*

*mental suffering /
damage*

→ minimize risks and burdens!

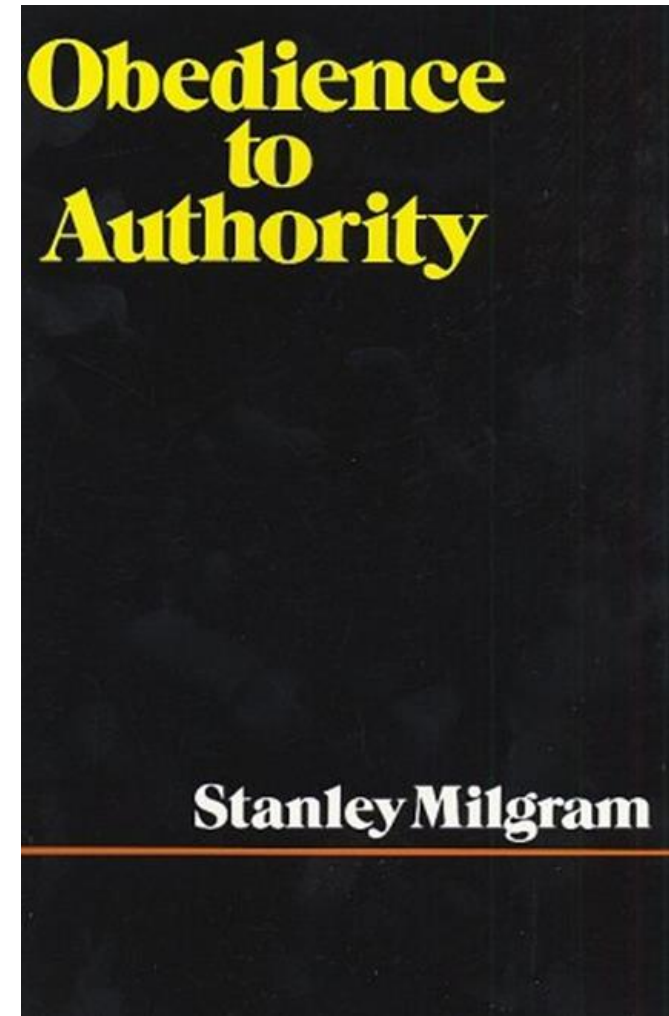
**Protection against
instrumentalisation:**

*using another person
for external purposes*

→ respect informed consent!

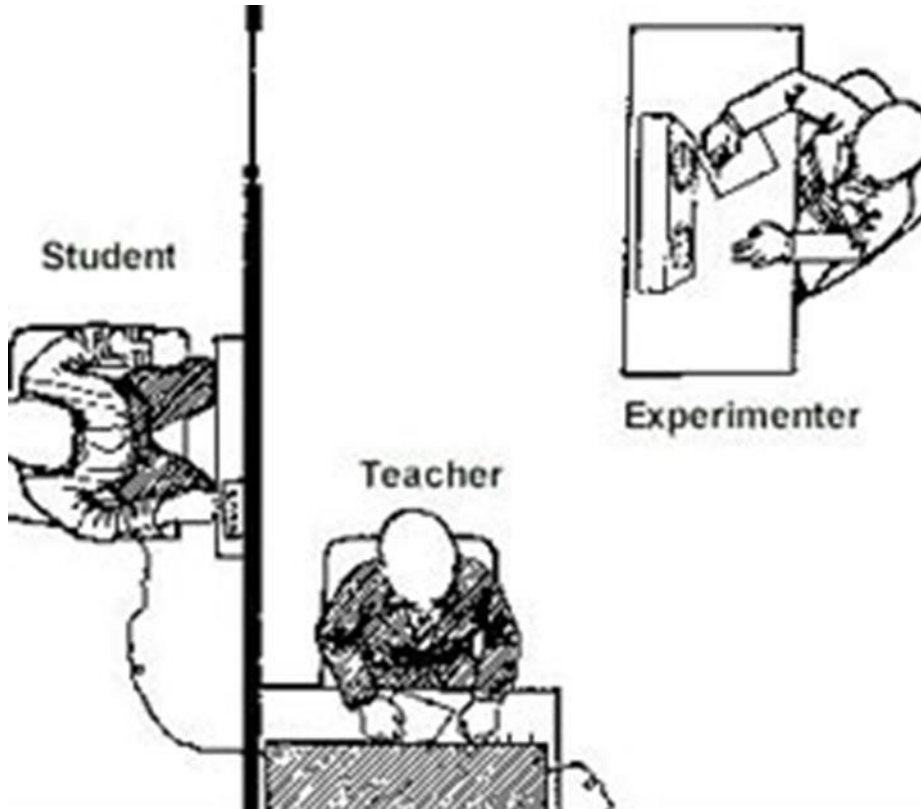
B2. Research on Humans

Stanley Milgram (1933-1984)

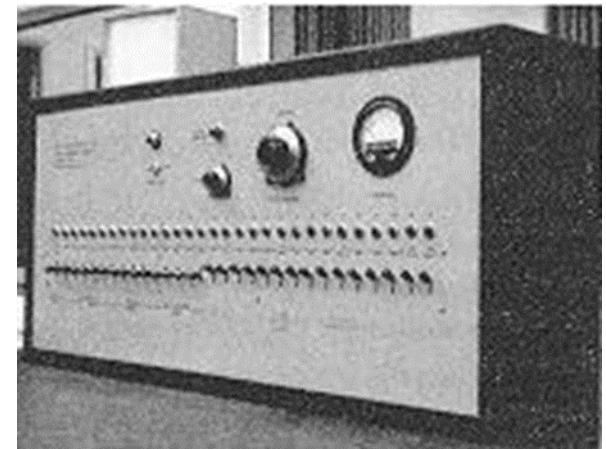


B2. Research on Humans

The Milgram Experiment (1961)



“Shock generator”



B2. Research on Humans

<u>Voltage</u>	<u>"Student's" behaviour</u>	<u>Drop-outs</u> (out of 40)
15 ... 60	—	
75 ... 105	growled	
120	<i>"It's getting painful!"</i>	
135	groaned	1
150	<i>"Get me out! I refuse to continue!"</i>	5
165		1
180 ... 255	<i>"I can't stand it any more!"</i>	1
270	screamed	
285		1
300	<i>"I won't answer any more!"</i>	1
315	<i>"I insist to be freed!"</i>	3
330	silence	
345	—	1
360 ... 435	—	1
450	—	25 = 62.5%

B2. Research on Humans

“Experimenter’s” statements:

1. *"Please continue."*
2. *"The experiment requires you to continue."*
3. *"You absolutely have to continue."*
4. *"You have no choice. You must continue!"*
 - *"I carry the full responsibility."*
 - *"The shocks are painful, but will leave no tissue damage."*

Milgram’s justifications:

- *research requires taking risks*
- *only temporary uneasiness, no remaining damages*
- *careful talks afterwards*
- *later review: only 1.3% were sorry to have participated*

B2. Research on Humans

Nuremberg Military Tribunal: “Nuremberg Code” (1947)

*voluntary consent / right to finish trial
relevance of expected results / necessity
preceding animal experiments / qualification
avoid unnecessary physical and mental
no reason to expect death or injury
protection of the subject ...*

World Medical Association (WMA): “Declaration of Helsinki” (1964, 1975, 1983, 1989, 1996, 2000, 2002, 2004, 2008, 2013 ...)

*(permanently revised and
renewed: subjects unable to give
consent, vulnerable groups,
confidentiality, post-trial
provisions, biobanks, placebos ...)*



WMA DECLARATION OF HELSINKI – ETHICAL PRINCIPLES FOR MEDICAL RESEARCH INVOLVING HUMAN SUBJECTS

Adopted by the 18th WMA General Assembly, Helsinki, Finland, June 1964
and amended by the:

29th WMA General Assembly, Tokyo, Japan, October 1975

35th WMA General Assembly, Venice, Italy, October 1983

41st WMA General Assembly, Hong Kong, September 1989

48th WMA General Assembly, Somerset West, Republic of South Africa, October 1996

52nd WMA General Assembly, Edinburgh, Scotland, October 2000

53rd WMA General Assembly, Washington DC, USA, October 2002 (Note of Clarification added)

55th WMA General Assembly, Tokyo, Japan, October 2004 (Note of Clarification added)

59th WMA General Assembly, Seoul, Republic of Korea, October 2008

64th WMA General Assembly, Fortaleza, Brazil, October 2013

Preamble

1. The World Medical Association (WMA) has developed the Declaration of Helsinki as a statement of ethical principles for medical research involving human subjects, including research on identifiable human material and data.

The Declaration is intended to be read as a whole and each of its constituent paragraphs should be applied with consideration of all other relevant paragraphs.

2. Consistent with the mandate of the WMA, the Declaration is addressed primarily to physicians. The WMA encourages others who are involved in medical research involving human subjects to adopt these principles.

General Principles

3. The Declaration of Geneva of the WMA binds the physician with the words, “The health of my patient will be my first consideration,” and the International Code of Medical Ethics declares that, “A physician shall act in the patient’s best interest when providing medical care.”

4. It is the duty of the physician to promote and safeguard the health, well-being and rights of patients, including those who are involved in medical research. The physician’s knowledge and conscience are dedicated to the fulfilment of this duty.

5. Medical progress is based on research that ultimately must include studies involving human subjects.

6. The primary purpose of medical research involving human subjects is to understand the causes, development and effects of diseases and improve preventive, diagnostic and therapeutic interventions (methods, procedures and treatments). Even the best proven interventions must be evaluated continually through research for their safety, effectiveness, efficiency, accessibility and quality.

7. Medical research is subject to ethical standards that promote and ensure respect for all human subjects and protect their health and rights.

8. While the primary purpose of medical research is to generate new knowledge, this goal can never take precedence over the rights and interests of individual research subjects.

9. It is the duty of physicians who are involved in medical research to protect the life, health, dignity, integrity, right to self-determination, privacy, and confidentiality of personal information of research subjects. The responsibility for the protection of research subjects must always rest with the physician or other health care professionals and never with the research subjects, even though they have given consent.

B2. Research on Humans

Central Ethics Committee

The Central Ethics Committee at Leibniz University Hannover is an independent body which assesses the ethical acceptability of research projects on humans or using human data that are to be conducted at Leibniz University Hannover (LUH) or Hannover University of Music, Drama and Media (HMTMH) prior to such projects being carried out. The procedures of the Central Ethics Committee follow the rules of procedure of the Ethics Committee of the German Society for Psychology (Deutsche Gesellschaft für Psychologie).

At the end of the procedure, the Committee issues a written statement detailing either the ethical acceptability or reservations. The decision is addressed to the applicant(s). Responsibility for carrying out the project lies solely with the head of the research project.

For medical research proposals a further ethics committee must be consulted.

Researchers from Leibniz University Hannover and Hannover University of Music, Drama and Media are entitled to apply for assessment.

Foundation of the Central Ethics Committee	▼
Regulations	▼
Members	^
<p>The Central Ethics Committee is made up of professors representing the spectrum of subjects at the participating universities. At Leibniz University Hannover the main emphasis is on subjects in the Faculty of Humanities.</p> <p>Members are appointed by the Presidential Board for a period of three years. The committee meets as required.</p> <ul style="list-style-type: none">• Prof. Dr. Eckart Altenmüller (HMTMH, Institut für Musikphysiologie und Musiker-Medizin)• Prof. Dr. Eva Baumann (HMTMH, Institut für Journalistik und Kommunikationsforschung)• Prof. Dr. Holger Blume (LUH, Institut für Mikroelektronische System)• Prof. Dr. Alfred Effenberg (LUH, Institut für Sportwissenschaft)• Prof. Dr. Heidrun Hoppe-Wewetzer (LUH, Institut für Mikroökonomik)• Prof. Dr. Dietmar Hübner (LUH, Institut für Philosophie)• Prof. Dr. Bettina Lindmeier (LUH, Institut für Sonderpädagogik)• Prof. Dr. Bernd Oppermann (LUH, Institut für Deutsches und Europäisches Privat- und Wirtschaftsrecht)• Prof. Dr. Tobias Ortmaier (LUH, Institut für Mechatronische Systeme)• Prof. Dr. Oliver Plettenburg (LUH, Institut für Organische Chemie)• Prof. Dr. Kurt Schneider (LUH, Institut für Praktische Informatik)	

B. On Research Ethics

B1. Good Scientific Practice

B2. Research on Humans

B3. Consequences of Research

B3. Consequences of Research

Dimensions ...

Immediate process:

safety

Further applications:

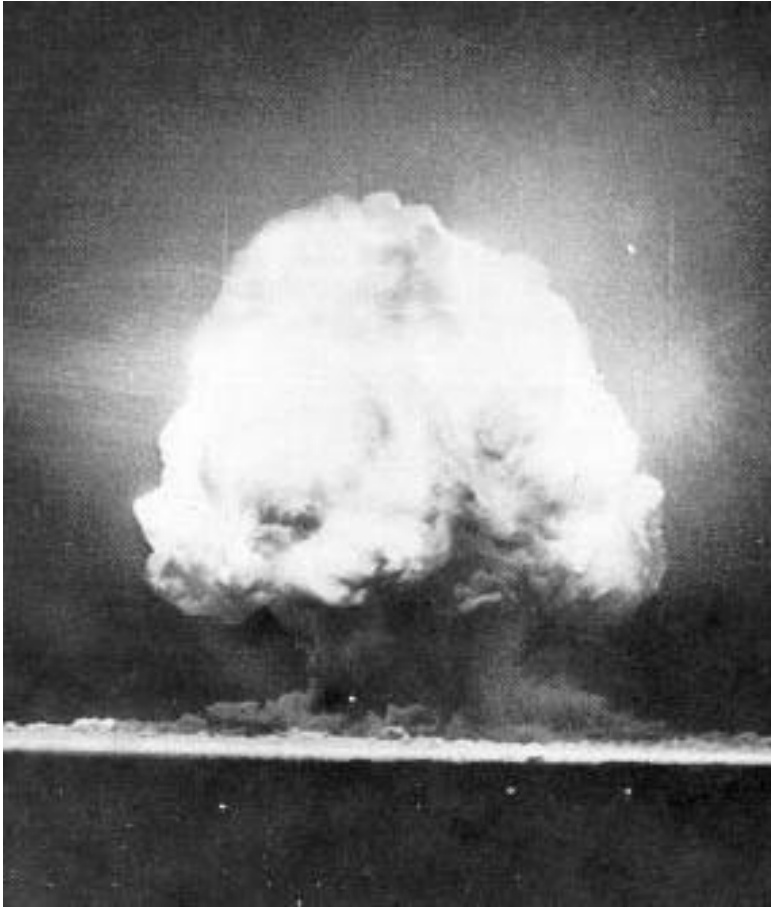
security (dual use)

economic effects

social effects ...

B3. Consequences of Research

Alamogordo (New Mexico) (July 16th, 1945)



“Trinity”



B3. Consequences of Research

Possibility of a runaway nuclear reaction of nitrogen in the earth's atmosphere?



**David Hawkins
(assistant to Oppenheimer):**

“Teller told me the chance of such a thing happening was one in a million. I knew very well that was a figure of speech because you don't calculate that kind of chance.”

Hawkins wondered if the atmosphere of the earth actually might burn up. So he asked Teller.

“He smiled at me and said, ‘Well, David, worse things could happen.’”

B3. Consequences of Research

The “Russell-Einstein Manifesto” (1955)

“... In view of the fact that in any future world war nuclear weapons will certainly be employed, we urge the Governments of the world to acknowledge publicly, that their purpose by a world war, and we urge them, to find peaceful means for the settlement of any dispute between them.”

Max Born, Perry W. Bridgman, Albert Einstein, Leopold Curie, Herman J. Muller, Linus Pauling, Cecil F. Powell, Bertrand Russell, Hideki Yukawa

DFG & Leopoldina: “Scientific Freedom and Scientific Responsibility” (2014)

(main focus: dual use in biotechnology, refrain from publication, refrain from research ...)

DFG Deutsche
Forschungsgemeinschaft



**Wissenschaftsfreiheit
und Wissenschaftsverantwortung**

Empfehlungen zum Umgang mit
sicherheitsrelevanter Forschung

*Scientific Freedom and Scientific
Responsibility*

*Recommendations for Handling
Security-Relevant Research*

B3. Consequences of Research

Committee for Responsibility in Research

Leibniz University Hannover offers its researchers and academics the opportunity to discuss risks of research projects in a supportive and competent way.

In July 2015, the University Senate set up the Committee for Responsibility in Research, in which all member groups of the University are represented. The Committee assists researchers and academics by providing assessment and advice on the consequences of research, and the controllability and prevention of harmful use of research and its results. The Committee for Responsibility in Research thus complements the work of the Central Ethics Committee of Leibniz University, which focuses on ethical and legal aspects of research on humans. The most important task of the Committee for Responsibility in Research is, on application by researchers and academics, to provide opinions on research proposals.

Where required, members of Leibniz University may seek the advice of the Committee at any time. Please contact the Head of the Committee:

[Prof. Dr. Dietmar Hübner, Institut für Philosophie](#)

[Prof. Dr. Holger Blume, Institut für Mikroelektronische Systeme](#)

Further members of the Committee are:

[Prof. Dr. Alfred Effenberg, Institut für Sportwissenschaft](#)

[Dr. Torsten Heidenblut, Institut für Werkstoffkunde](#)

[Prof. Dr. Nils Hoppe, Institut für Philosophie](#)

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[Prof. Dr. Jutta Winsemann, Institut für Geologie](#)

A. On Ethics

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C. On Research Ethics in the Data Sciences

C. On Research Ethics in the Data Sciences

C1. Good Scientific Practice

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C. On Research Ethics in the Data Sciences

C1. Good Scientific Practice

C2. Research on Humans

C3. Consequences of Research

Research Project:
“Bias and Discrimination
in Big Data and Algorithmic Processing.
Philosophical Assessments, Legal Dimensions,
and Technical Solutions”

BIAS

Institute of Philosophy (IPhil) – Institute for Legal Informatics (IRI)

Institute for Information Processing (TNT) – Research Center L3S

C3. BIAS

Google

Bias

All Images News Maps Videos More Settings Tools

About 152,000,000 results (0.49 seconds)

Dictionary

Enter a word, e.g. 'pie'

bias
/ˈbiːəs/ ⓘ

noun

1. inclination or prejudice for or against one person or group, especially in a way considered to be unfair.
"there was evidence of bias against black applicants"
synonyms: **prejudice, partiality, partisanship, favoritism, unfairness, one-sidedness; More**
2. a direction diagonal to the weave of a fabric.
"a turquoise silk dress cut on the bias"
synonyms: **diagonal, cross, slant, oblique, angle**
"a dress cut on the bias"

Bias

Bias is disproportionate weight in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair. Biases can be learned implicitly within cultural contexts. [Wikipedia](#)

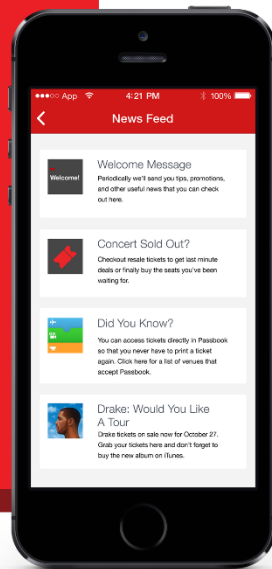
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For Discrimination: Race, Affirmative Action, and the Law Paperback – June 9, 2015

by Randall Kennedy (Author)

★★★★☆ (9 customer reviews)

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For Discrimination is at once the definitive reckoning with one of America's most explosively contentious and divisive issues and a principled work of advocacy for clearly defined justice.

What precisely is affirmative action, and why is it fiercely championed by some and just as fiercely denounced by others? Does it signify a bribe or a bribe? Or is it simply reverse discrimination? What are its benefits and costs to American society? What are the most incisive arguments on either side of the issue?

How is a Good Christian? A Muslim in "Western Democracies" by Dr. Mohammed

This is a beautiful book – essential reading for anyone who loves animals and knows how much they can teach us about being human! —Gretchen Cooper, author of The Good Christian

Frequently bought together

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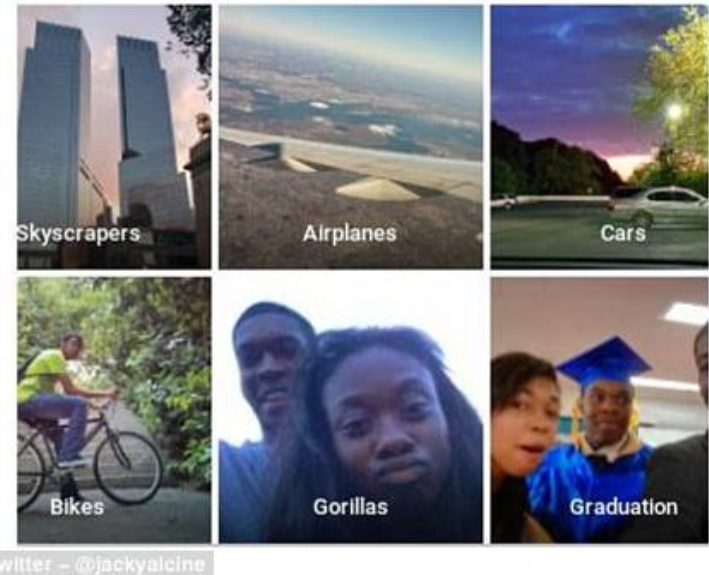
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The New York Times Bestseller	Richard S. Tedlow	Paperback	\$12.49

C3. BIAS



C3. BIAS



Man is to Computer Programmer as Woman is to Homemaker? Debiasing Word Embeddings

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Abstract

The blind application of machine learning runs the risk of amplifying biases present in data. Such a danger is facing us with *word embedding*, a popular framework to represent text data as vectors which has been used in many machine learning and natural language processing tasks. We show that even word embeddings trained on Google News articles exhibit female/male gender stereotypes to a disturbing extent.

C3. Case Study: COMPAS



Machine Bias

There's software used across the country to predict future criminals. And it's biased against blacks.

by Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, ProPublica

May 23, 2016

COMPAS =
“Correctional Offender
Management Profiling for
Alternative Sanctions”

Fair prediction with disparate impact:

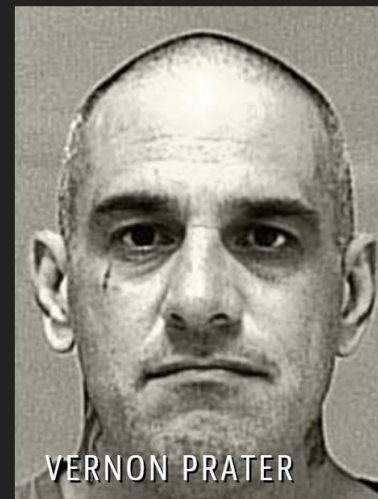
A study of bias in recidivism prediction instruments

Alexandra Chouldechova *

Last revised: February 2017

Abstract

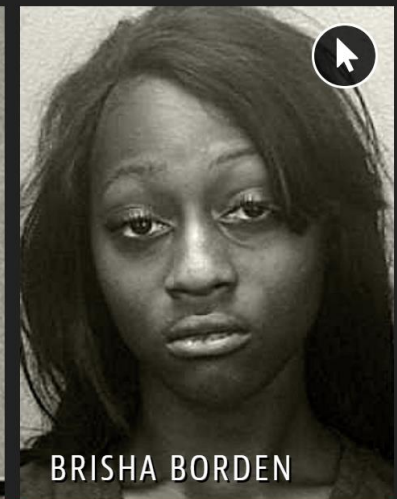
Recidivism prediction instruments (RPI's) provide decision makers with an assessment of the likelihood that a criminal defendant will reoffend at a future point in time. While such instruments are gaining increasing popularity across the country, their use is attracting tremendous controversy. Much of the controversy concerns potential discriminatory bias in the risk assessments that are produced. This paper discusses several fairness criteria that have recently been applied to assess the fairness of recidivism prediction instruments. We demonstrate that the criteria cannot all be simultaneously satisfied when recidivism prevalence differs across groups. We then show how disparate impact can arise when a recidivism prediction instrument fails to satisfy the criterion of error rate balance.



VERNON PRATER

LOW RISK

3



BRISHA BORDEN

HIGH RISK

8

Borden was rated high risk for future crime after she and a friend took a kid's bike and scooter that were sitting outside. She did not reoffend.

C3. Case Study: COMPAS

Error matrix

	in fact reoffending	in fact not reoffending
predicted reoffending	TP (true positives)	FP (false positives)
predicted not reoffending	FN (false negatives)	TN (true negatives)

FPR (“false positive rate”) = **FP / (FP + TN)**

(= given that you are in fact **not reoffending**,
what is your probability of being **misclassified as reoffending**?)

PPV (“positive predictive value”) = **TP / (TP + FP)**

(= given that you are **predicted reoffending**,
what is your probability of indeed **reoffending**?)

C3. Case Study: COMPAS

The numbers (Angwyn et al. 2016)

	in fact reoffending	in fact not reoffending
predicted reoffending	TP w=505; b=1,369	FP w=349; b=805
predicted not reoffending	FN w=461; b=532	TN w=1,139; b=990

Recidivism rate = (TP+FN) / Total: w=39%; b=51%

FPR (“false positive rate”) = FP / (FP + TN): w=23%; b=45%

FNR (“false negative rate”) = FN / (TP + FN): w=48%; b=28%

PPV (“positive predictive value”) = TP / (TP + FP): w=59%; b=63%

Impossibility theorems!

C3. Case Study: COMPAS

Opinions and Reactions

- *“Algorithms suck!”*
- *“Even the PPV (65%) is not really impressive ...”*
- *“An unequal FPR violates the principle ‘in dubio pro reo!’”*
- *“Court decisions should anyway not depend on predictions!”*
- *“The main problem is the intransparency of COMPAS!”*
- *“Human decisions based on ‘black box’ predictions always amount to discrimination!”*

... a lot of work still to be done!!!

Thank you very much for your attention!

