

從性別統計看性別(不)平等與科技交 織：兼論性別主流化的必要性

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國家災害防救科技中心

關於我



- 國立臺灣科技大學通識教育中心助理教授兼人文藝術組組長
- 宜蘭縣政府性別平等促進委員會委員108年度迄今
- 花蓮縣政府職場霸凌申訴委員會委員112年度始
- 財團法人國家實驗研究院科技政策研究與資訊中心「STEM學術職涯中女性參與決策地位之初探性研究」計畫協同主持人 2023年2月至6月
- 荷蘭烏特列支大學性別研究所博士
2011/01/03~2015/07/10
- 教育部大學社會責任推動中心諮詢協作組博士後
研究員兼組長

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講座宗旨

- 性別統計：性別主流化的基本功
- 性別(不)平等與科技交織
- 長期以來在科技研究、應用與創新上習慣以男性樣本為研究唯一預設值，並以其單一生理性別研究結果設定操作或評核標準，導致性別資料缺口 (gender data gap) 始終存在，應用在人類全體社會各面向中，使得許多無辜的人付出代價，政府單位也因此多付出不必要的資源浪費與行政成本。

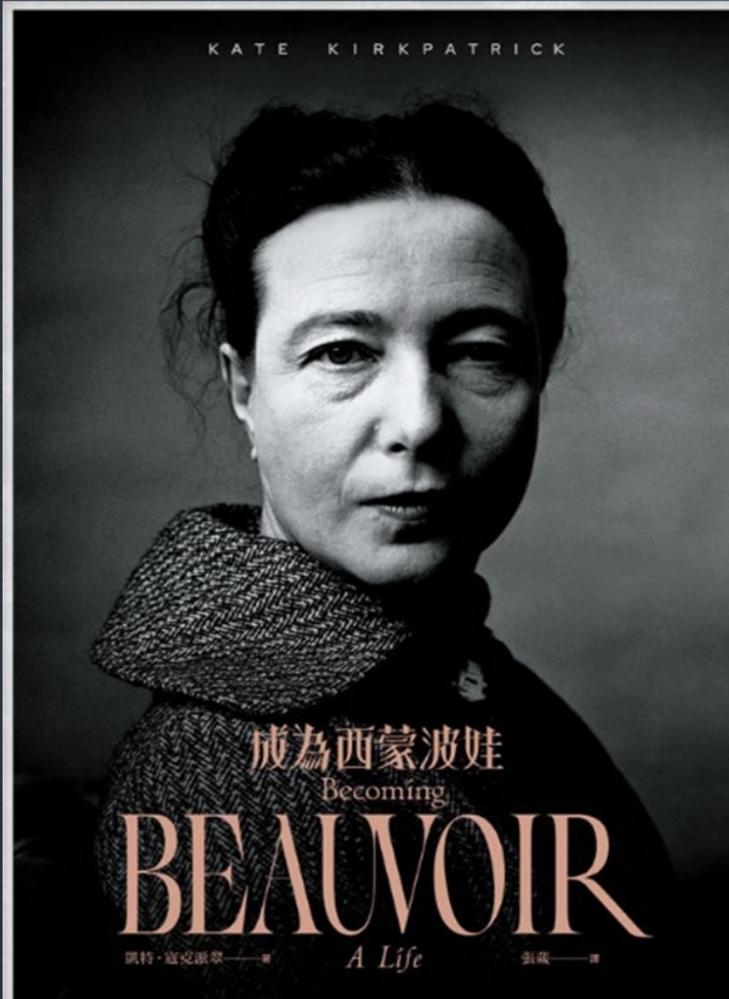
大綱

1. 性別統計為政策決定和現象推估的基本
2. 以男性為預設值(default)-消失的女性和多元性別
3. 醫學-洗手抗病、剷雪與用路傷患、診斷心臟病
4. 工業-汽車撞擊測試
5. 性別、天然災害與防災交織：以日本311大地震為例

人類=MAN概念 西方緣起

- 西元四世紀亞里斯多德
- 《動物的生殖》(*On the generation of animals*) 中論述道：
「當後代出現雌性而非雄性就是變異的開始…」
- 整整一千多年西方知識發展，皆將男性視為人類代名詞。
- FIY: 卵巢直到17世紀才有自己的名字喔，在那之前卵巢被視為女性的睪丸，子宮是女人的陰囊。。。。

對單一性別為標準的警告



Representation of the world, like the world itself, is the work of men; they describe it from their own point of view, which they **confuse with the absolute truth.**

Simone de Beauvoir

UN 推動性別統計(gender statistics) 演進

■ 國際性別統計發展歷程



Purposes for conducting gender

D

- 探究理解現況與差異

E

- 制定差異化政策相關依據和資源分配

M

- 監測與評估以便進行滾動式修正

A

- 民主政治之資訊透明與提高問責性

E

- 賦權不利處境族群與消彌社會不平等

例一：勤洗手是抵抗疾病的第一道防線

- 醫學是第幾世紀才發現這個看似常識的知識呢？
- 為何和性別有關？
- 誰為此付出代價？

勤洗手是最好的防疫方式



NEWS.HARVARD.EDU

Reducing the spread of coronavirus starts with basic hygiene

Health experts highlight basic hygiene measures to prevent infection spread ...

資料來源：https://news.harvard.edu/gazette/story/2020/03/preventing-the-spread-of-coronavirus-starts-with-basic-hygiene/?utm_medium=social&utm_campaign=hu-facebook-general&utm_source=facebook&fbclid=IwAR1iI-jPFXIWOTZDSMI6lUGsh2zmqaCPu-U_JgwtXwbR8zFxf5Dl8RChX44

拯救無數女性生命且勇於說出醫療現場的醫生



- 資料來源：Best, M.& Neuhauser, D. (2004) "Ignaz Semmelweis and the birth of infection control", *Qual Saf Health Care*, 13:233–234. doi: 10.1136/qshc.2004.010918

寧願在街上生產也不願進醫院生產的產婦們

- 奧地利維也納市中心有兩家診所，專門處理分娩。
- 婦科診所Allgemeine Krankenhaus：清一色為訓練醫學院男性學生的診所，屬於醫學院的教學診所。
- “產婆”診所：清一色為女性未受過“現代”醫學訓練的助產士所開設的診所
- 臨盆的孕婦們寧願排隊等待助產士，也不願意被送進醫院。
- 醫學院附設醫院產婦生產後得到產褥熱(puerperal fever or childbed fever)而死亡的比例為13%-18%；對照助產士接生的女性產褥熱死亡率只有2%。
- 醫學院學生多半接生前會先去協助解剖屍體
- 助產士不用解剖屍體，且接生前和過程中皆不斷用熱水洗手。
- Semmelweis博士開始實施強制洗手政策，針對醫學生和醫師。在使用chloride of lime solution (氯化鈣溶液)進行的一項對照試驗中，死亡率降至約2%。

說出真相的代價：伊格納茲·塞麥爾維斯 (Ignaz Semmelweis) 「感染控制之父」



Figure 1 Postage stamp of Ignaz Philipp Semmelweis, 1818–1865. Issued in Austria in 1965 on the 100th anniversary of his death.

- 醫學權威不容質疑。貶抑女性專業知識、他者歧視
- 沒有得到教授職續約黯然離開奧地利
- 有毒男性氣概(toxic masculinity)與無知扼殺一名偉大醫生-BBC評論(2006)
- 英年早逝47歲死於精神病院
- 1930年代後蔡司公司 (Zeiss) 發明可以觀察到微生物的顯微鏡後，Ignaz Semmelweis對人類醫學貢獻才被肯認，被追封為father of infection control。
- 影響後世對於消毒SOP、設備、環境與無菌技術發展

例二：剷雪與用路傷患



- *“At least snow-clearing was something those ‘gender people’ can keep their noses out of”* an official in Karlskoga, Sweden, was reported to remark. (2011)

性別歧視的剷雪政策？

- 回溯1958-2011年瑞典北部急診傷患資料
- 當道路結冰或濕滑時，行人送醫為汽車駕駛的3倍。
- 所有道路意外的傷患中，行人佔一半，受傷傷患中大部分為女性。
- 以瑞典城市於莫歐(Umeå)行人傷患為例
 - 79%於冬天受傷
 - 69%傷患為女性
 - 2/3受傷行人在結冰和積雪的路面滑倒、摔跤
 - 48%傷患傷勢為中度到重度
 - 傷勢骨折或脫臼
- 瑞典斯堪尼郡(Skåne County)2011年針對過去五年研究發現，一個冬季救治行人滑倒所投入的醫療資源是3,600萬克朗(相當於1.08億)台幣，高出剷雪維護車用道路順暢2-3倍。

男性偏誤造成歧視性傷害-該維護哪類用路人權益？



Snow is cleared outside of the Stockholm Royal Palace. In 2015, Stockholm brought a gender analysis to its snow-clearing policy, which ultimately helped make it easier for pedestrians, mainly women, to move around the city after snowfalls. (Associated Press)

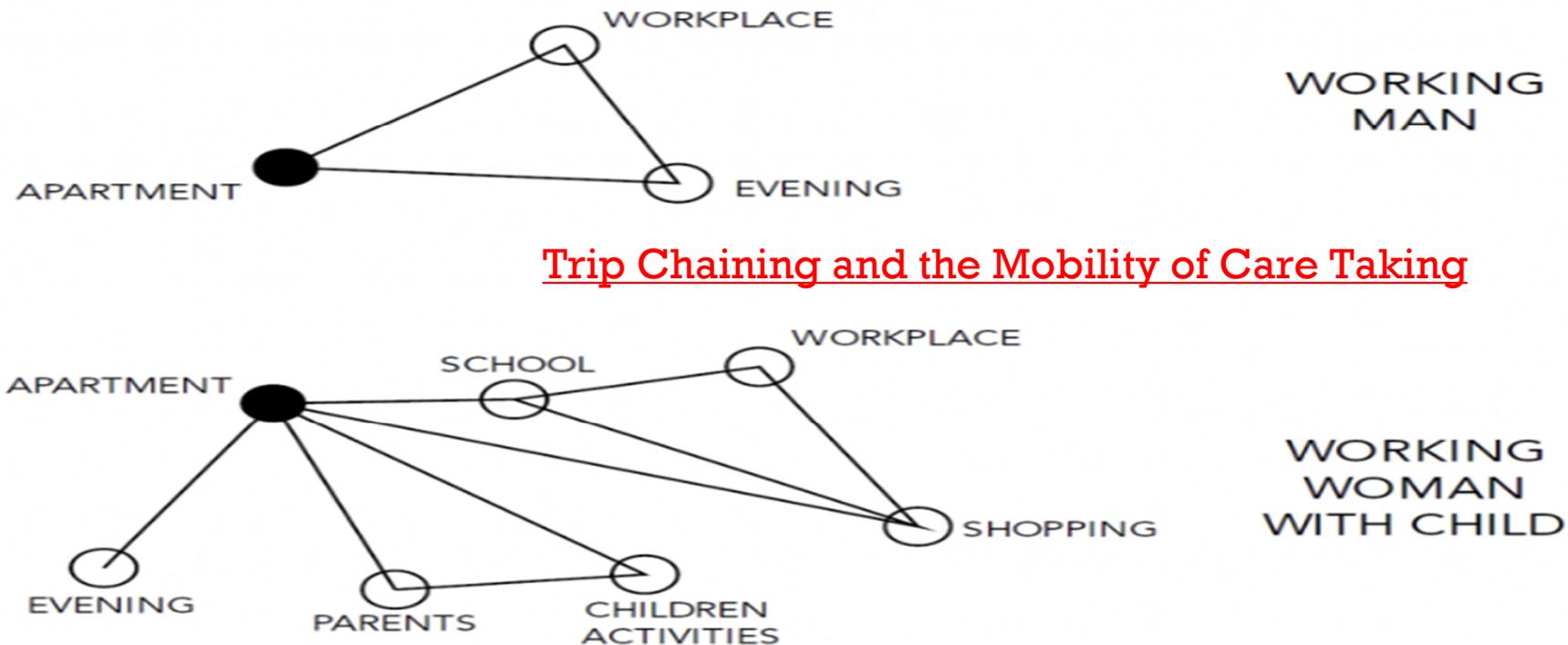
測試一下(完備gender data)
“... it's easy for a car to go in 10 centimetres of snow than for women, or men for that [matter], who are walking.”

“...more pedestrians than motorists are injured when there is snow and ice on the road, so it made economic sense to clear those pathways first.”

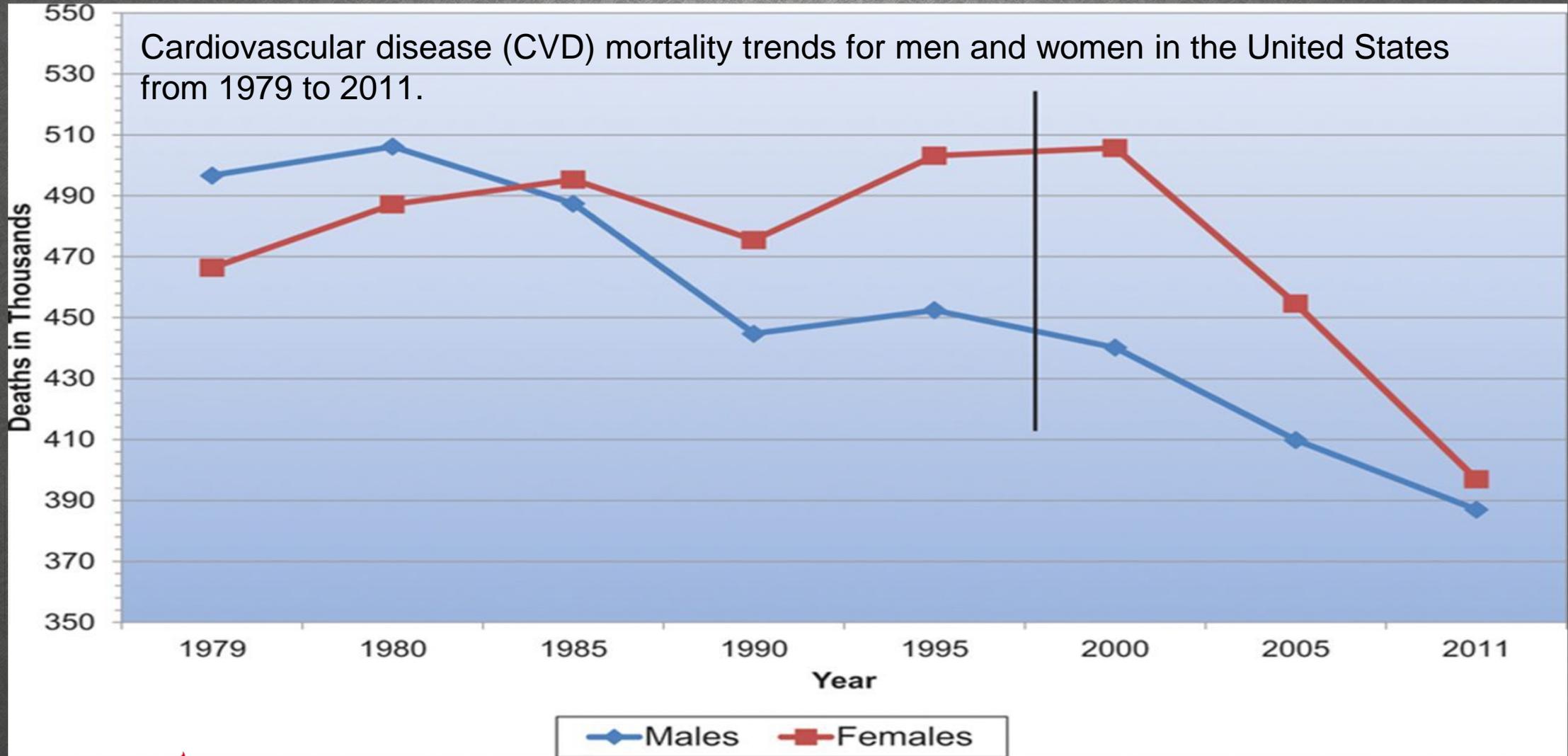
瑞典經驗傳給世界-重新思考用路人

- 2018年世界經濟論壇所舉辦的Davos高峰會-歐美國家表示認同與跟進

RELATION OF MOVEMENTS



例三：診斷心臟病



醫學界又深又寬的性別資料缺口-(NYT, 2022)

- 西方醫學診療基準：“a typical 70 kg man” (Perez, 2019: 158)
- 根據Platadorma SINC (2008)檢視歐美20幾所頂尖醫學院指定教科書，多達16,329張圖片中”male bodies were used three times as often as female bodies to illustrate ‘neutral body parts’”，結論是“Medical Textbooks use white, heterosexual men as a ‘universal model’ ”
- 同年Verdonk et al檢視荷蘭醫學院推薦教科書發現，幾乎所有教科書對於同一疾病發生在女性身上的性別差異症狀，往往非常含糊，且篇幅狹小(通常為1句話)
 - 以心臟病為例：「女性比較容易出現非典型的胸腔不適」
- 實際情況是，心臟病病患當發病時，女性每8名病患只有1名會出現典型教科書所說(男性)症狀-胸痛chest pain

亡羊補牢 2017年開始 視覺化公共宣導

The infographic features a central banner that reads "Watch for THE SIGNS". To the left of the banner, under the heading "Most common IN MEN...", are four blue icons: a man holding his back/neck, a man holding his chest, a man with a hand to his mouth, and a man with a hand to his chest. To the right of the banner, under the heading "Additional symptoms, most common IN WOMEN...", are five red icons: a woman with stars around her head, a woman holding her chest, a woman with a hand to her forehead, a woman yawning, and a woman with a hand to her forehead.

Discomfort or tingling in arms, back, neck, shoulder or jaw

Sudden dizziness

Heartburn-like feeling

Most common IN MEN...

Watch for THE SIGNS

Additional symptoms, most common IN WOMEN...

Chest pain

Cold sweat

Shortness of breath

Nausea or vomiting

Unusual tiredness

YAWN!

例四：性別化的生活型態使得性別統計有其意義

HOUSEHOLD AIR POLLUTION

3.8 million

die prematurely every year from household air pollution from cooking (2016). Household air pollution is mostly created by using kerosene and solid fuels such as wood with polluting stoves, open fires and lamps.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



3 GOOD HEALTH AND WELL BEING



Women and children are the most at risk.



18%
from stroke



27%
from ischaemic heart disease



20%
from chronic obstructive pulmonary disease (COPD)

8%
from lung cancer

27%
are due to pneumonia

CLEAN AIR FOR HEALTH

#AirPollution



例五：塑膠汙染產生之性別化危害

- 2020年，國際內分泌協會(the Endocrine Society) 出版 Plastics, Health and Endocrine Disruptors (EDs)報告
- 目前已知，約有144種塑膠所含化學物質從人類的血液、尿液與體內驗出。
- 直\間接影響：癌症、糖尿病、性早熟、不孕、心臟病、環境賀爾蒙引發內分泌失調

QA: 可以有人告訴為何這份報告下了這個結論?



**WOMEN ARE
THE FIRST VICTIMS
OF PLASTIC**

PLASTIC POLLUTION **IS** INEQUALITY

The female metabolism is more sensitive than men's 新陳代謝

- “The higher levels of estrogen (雌激素) in women, the greater volume of fat (脂肪) that will store the toxins, but also the rate of these toxins more sensitive and important during puberty, pregnancy, lactation and menopause (青春期、懷孕期、哺乳期和更年期).”



性別化的勞動與塑膠汙染

Gender roles in our societies expose more women to toxic substances.



**WOMEN DO
TWO AND A HALF TIMES
AS MUCH HOUSEWORK
AS MEN**

They are therefore more exposed to chemicals.

Poor women in developing countries often rely on waste picking job to survive. They tend to have less access to safety equipment and to be more exposed to chemicals hazards.



**WOMEN
REPRESENTS
2/3 OF THOSE
KILLED IN
LANDFILL
ACCIDENTS**

例六：汽車撞擊測試與性別資料缺口

Male

50th percentile dummy

171 lb.

5'9" tall

Based on
the average
American man
in the 1970s

約等於**77.6**公斤，
175.26公分。



“crashing in a car whose safety tests don't account for women's measurements.”

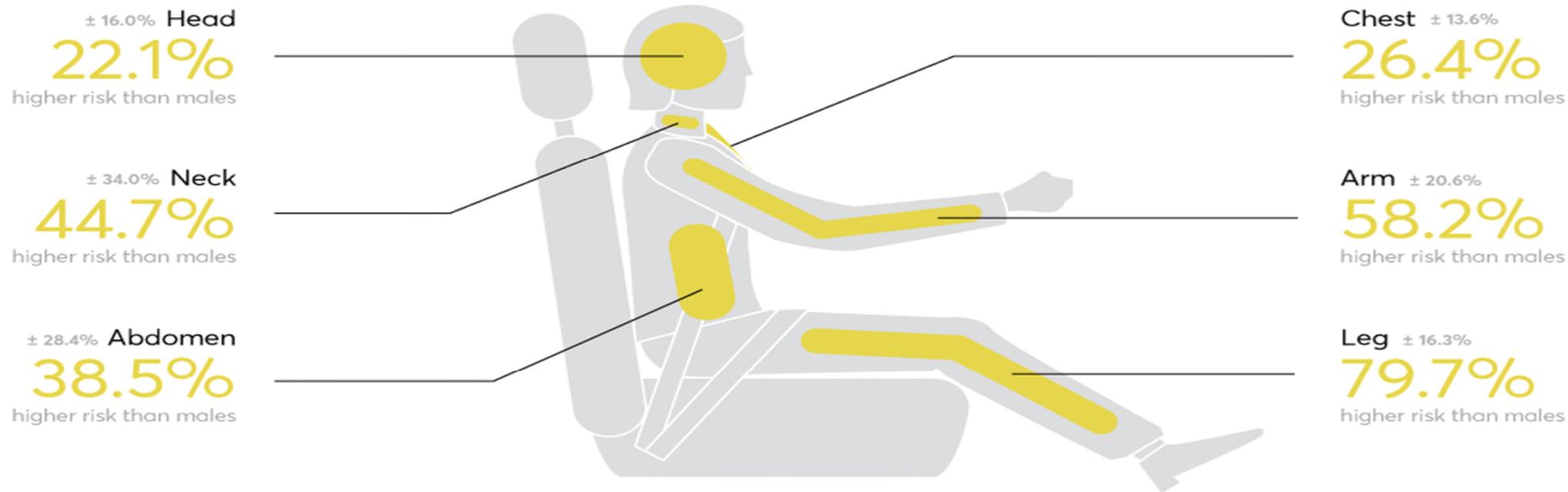
Consumer Report (2019) The Crash Test Bias: How Male-Focused Testing Puts Female Drivers at Risk

- 撞擊測試應該根據身高和體重的不同代表不同的人口。
- 通常使用1970年代美國中位數身高體重的男性偶（模擬平均男性身體）。
- 第5分位數女性撞擊測試偶（代表女性成人人口中最小的5%）於1966年推出，不過這個偶只是50%男性體型的縮小版，沒有模擬女性身體，而且幾乎很少被拿出來使用。
- 長期以來，汽車撞擊測試缺少一個代表女性中位數女性人偶，模擬女性典型的耐受傷害程度，生物力學，脊柱對齊，頸部強度，肌肉和韌帶強度，對創傷的動態反應以及其他女性典型特徵。
- 後果：女性在相似的撞擊情況下比男性蒙受更嚴重的傷害。

女性司機或前座女性乘客，比男性死亡的機率高出17%。

Female Increased Risk of Injury

Estimated increase of risk for moderate injuries in a car crash compared to a male driver or right front passenger of the same age



Source: NHTSA Injury Vulnerability and Effectiveness of Occupant Protection Technologies for Older Occupants and Women



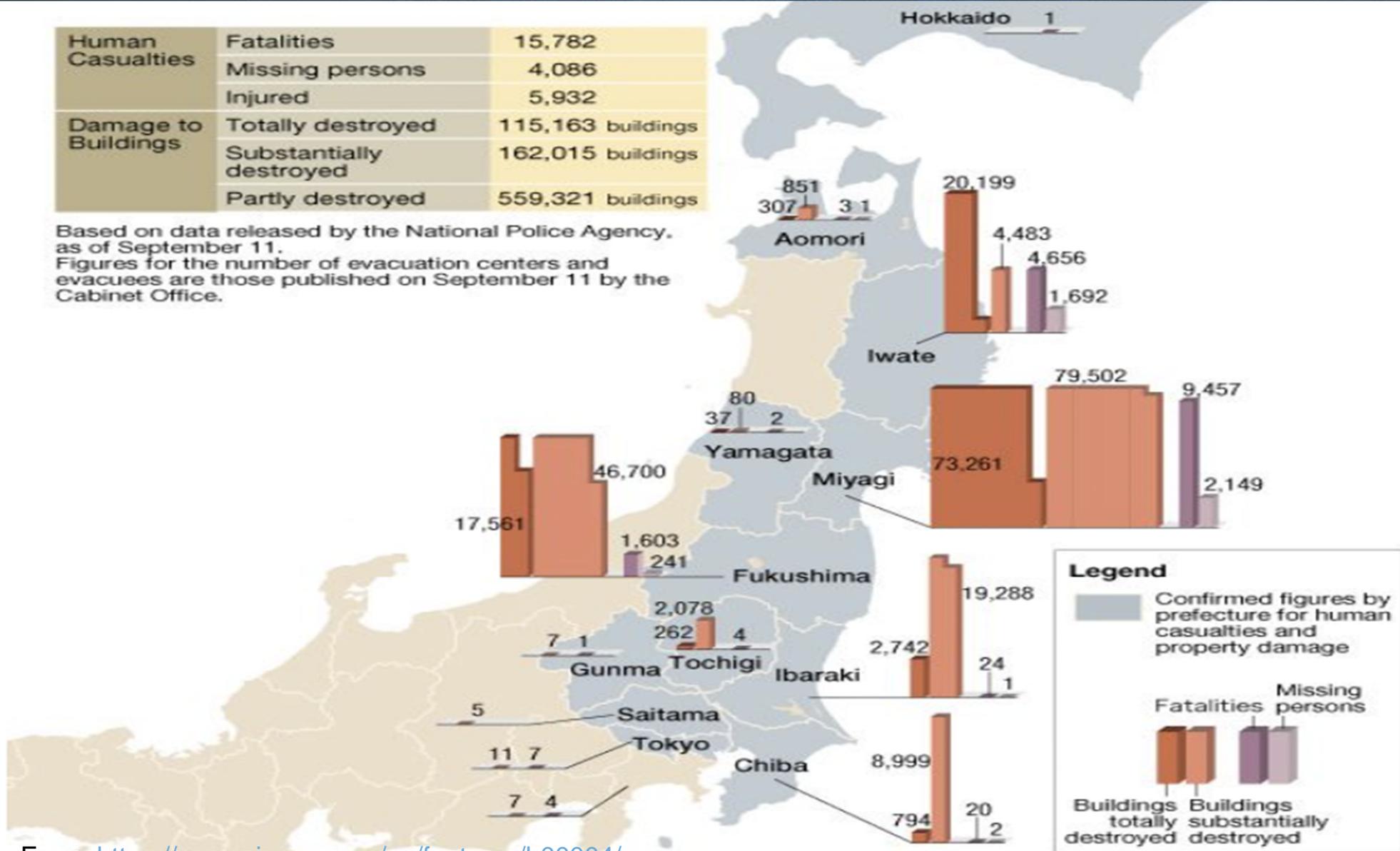
重新思考用車人多樣性

- 直到2011年，美國才開始使用女性撞擊試驗假人。
- 在2018年至2021年期間，研究人員開發了一個以中位數女性身高體重開發遭受低嚴重度撞擊假人的電腦模型——EvaRID，以及以中位數女性身高體重女性假人的物理原型——BioRID 50 (Carlsson等人，2021)。
- <https://genderedinnovations.stanford.edu/case-studies/crash.html#tabs-2>

例七：日本311大地震-交織性防災教訓

Human Casualties	Fatalities	15,782
	Missing persons	4,086
	Injured	5,932
Damage to Buildings	Totally destroyed	115,163 buildings
	Substantially destroyed	162,015 buildings
	Partly destroyed	559,321 buildings

Based on data released by the National Police Agency, as of September 11. Figures for the number of evacuation centers and evacuees are those published on September 11 by the Cabinet Office.

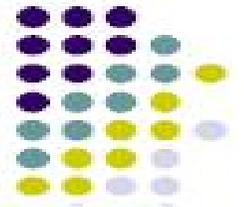


- 猜猜看死亡率最高的族群在哪邊？
- 性別
- 年齡層

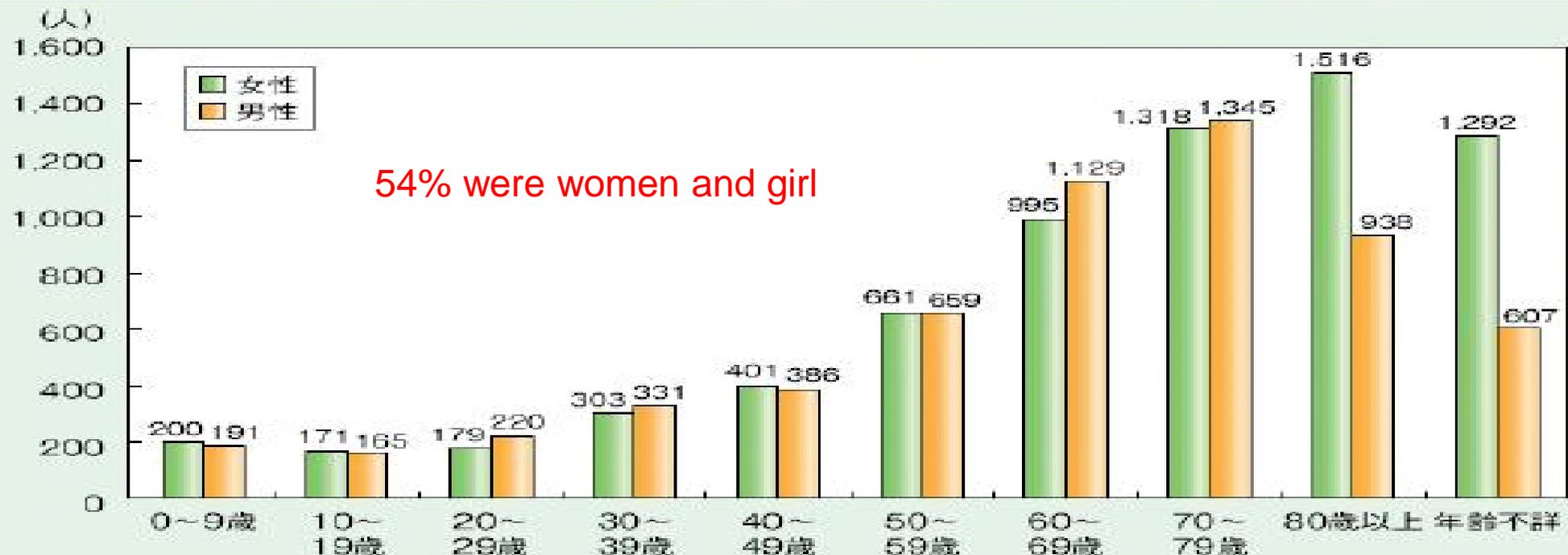
Tell me why?

Sex and age group disaggregated victims in Great East Japan Earthquake

[2011 White paper on disaster management]



第2-13-1図 東日本大震災の男女別・年齢階層別死者数（岩手県・宮城県・福島県）



54% were women and girl

- (備考) 1. 警察庁発表資料「東北地方太平洋沖地震による死者の死因等について【3/11～4/11】」より作成。
2. 4月11日時点で検視を終えて性別が判明している者について掲載している。

一年後，UN的分析

- 54 % were women and girls;
- 56.1 % were also aged 65 or over;
- women and elderly people were among the most affected during the disaster
- 防災政策制定要特別針對死亡率最高兩群
- **Jerry Velasquez, head the UNISDR Asia Pacific office.**

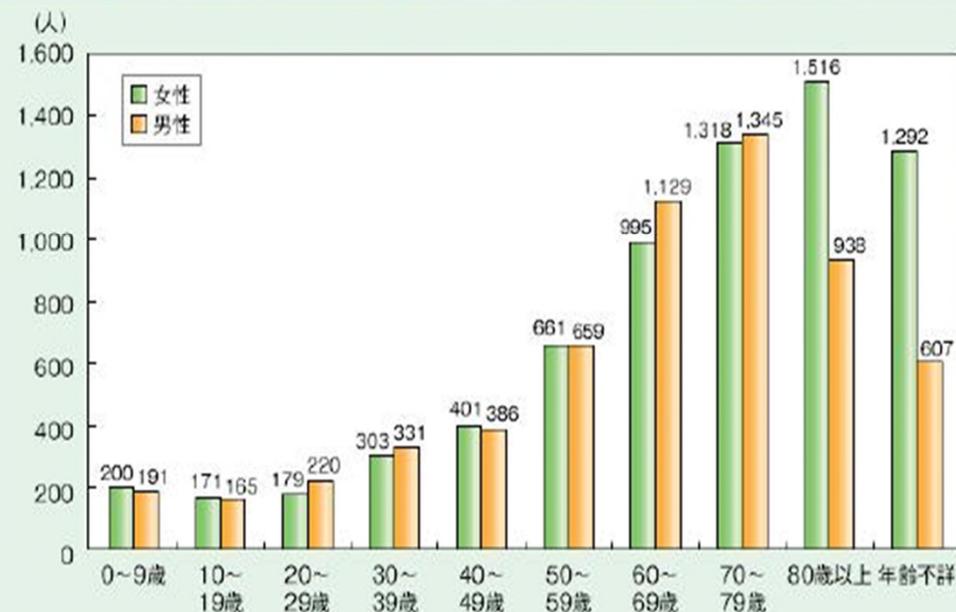
"We really need to factor in the specific vulnerabilities of these two groups into all the disaster management processes"

<https://www.undrr.org/news/japan-quake-took-toll-women-and-elderly>

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Women's engagement and decision-making in reconstruction

- Professor Kenji Okazaki from Japan's National Graduate Institute for Policy Studies (GRIPS)

The imbalances in decision-making in the national reconstruction committees in Iwate, Miyagi, and Sendai where there are only **9 women members out of a total 61 members** (2012, March)

Prevention and policymaking

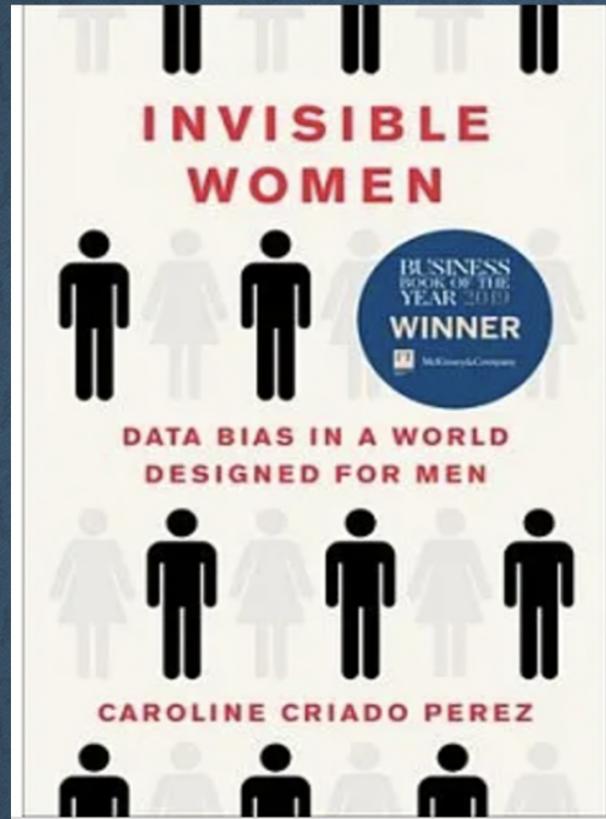
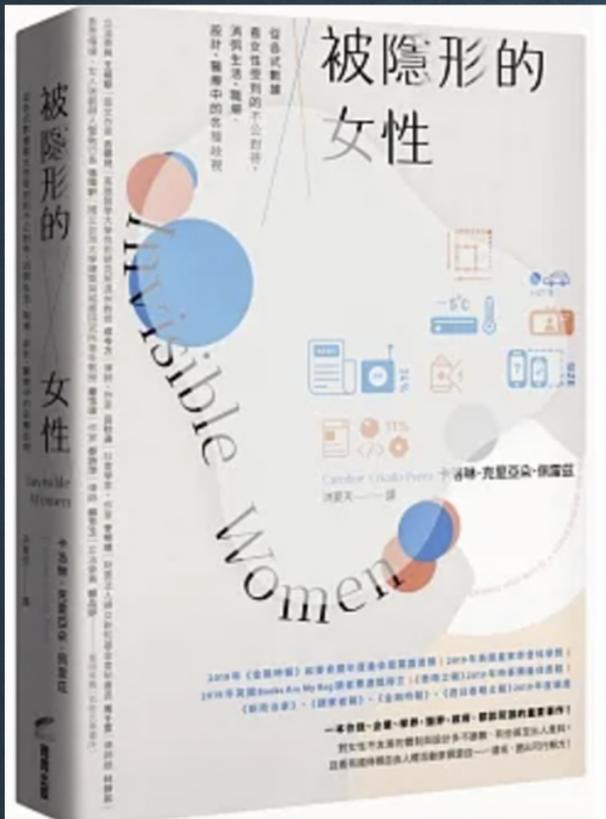
Community
empowerment

Evacuation
education

Evacuation
drills

Gender equality
(women's
engagement)

Better land use
planning



推薦書籍

The gender data gap has impact on women's everyday lives.

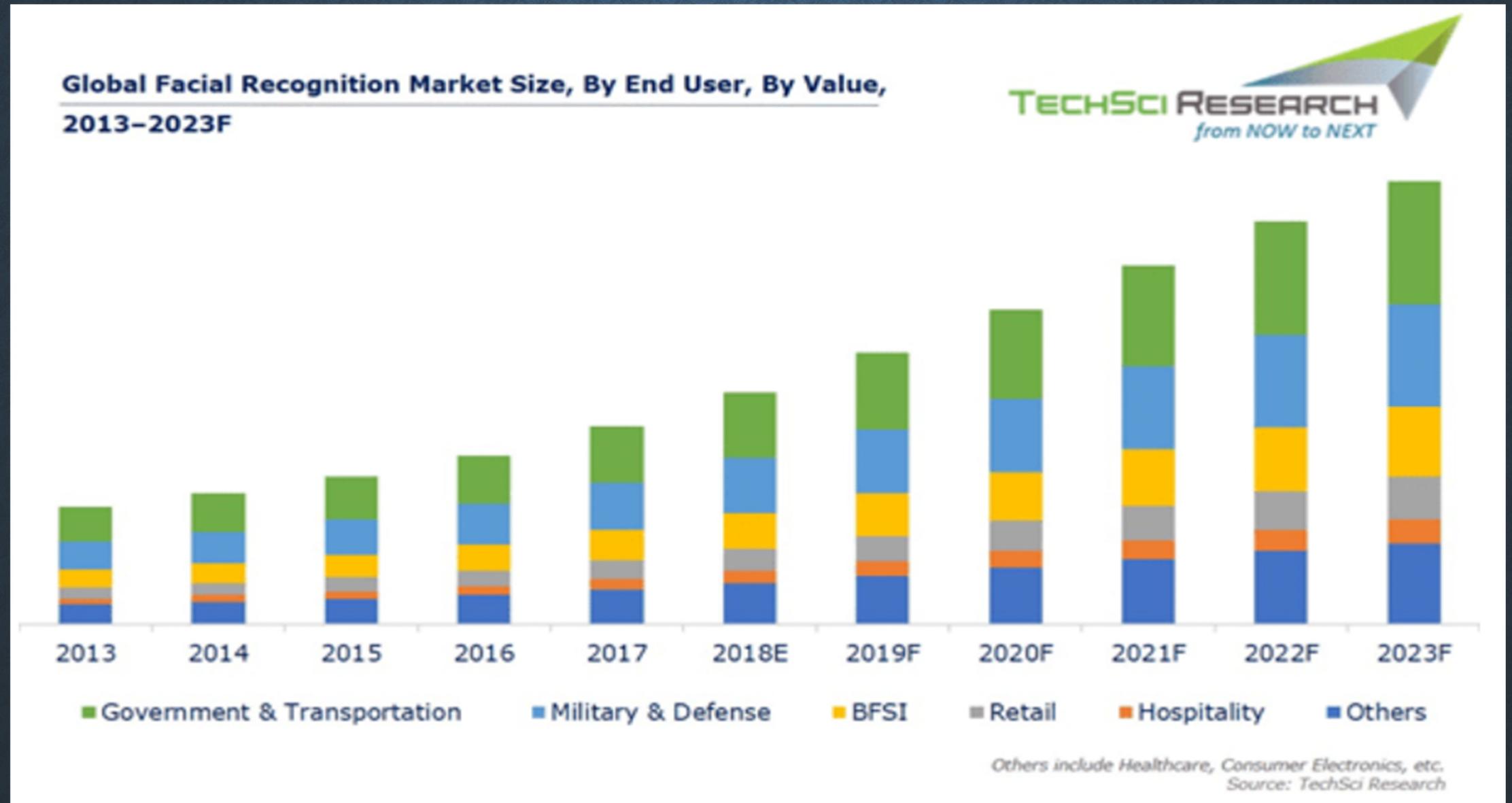
The consequences of living in a world built around male data can be deadly.

By the author of *Invisible women*, Caroline Criado Perez (p.11).

推薦網站

- UNECE Statistical Database Population and Gender
https://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT_30-GE/
- 行政院性別主流化專區：性別統計
<https://gec.ey.gov.tw/Page/3F1901613DDCF12F>
- OECD Dashboard on Gender Gaps
<https://www.oecd.org/en/data/dashboards/gender-dashboard.html>
- Eurostat - Gender statistics
https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=Gender_statistics

例X：人工智慧-臉部辨識系統 (FriSS) if we have time



A real case about iPhone X's FR

“The first time it happened, she called the Apple hotline, but the staff would not believe her. She then went with her colleague to the nearest Apple store, where her colleague used facial recognition on the phone to demonstrate the issue to staff.”

“The store said the camera might be faulty and gave Yan a refund. But the new iPhone X that she bought also had the same problem, prompting the shop to offer another refund, the report said. No details were given about whether the woman decided to purchase a third iPhone X.”



2017 Dec. News

THREE BASIC STEPS OF FR- DEEP LEARNING

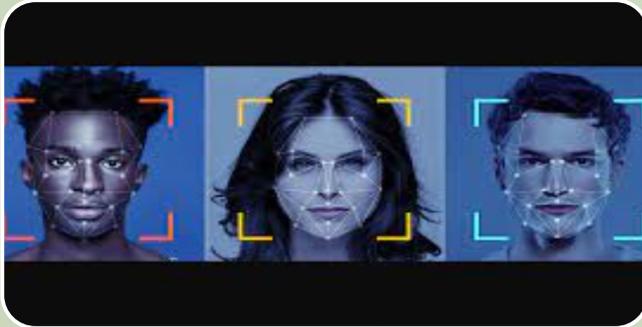
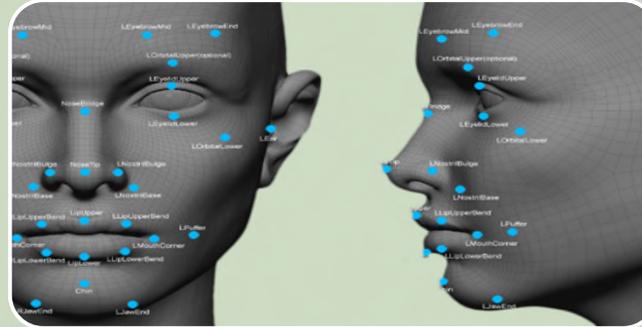


Photo the face
With your permission
Without your permission
real-time facial photo

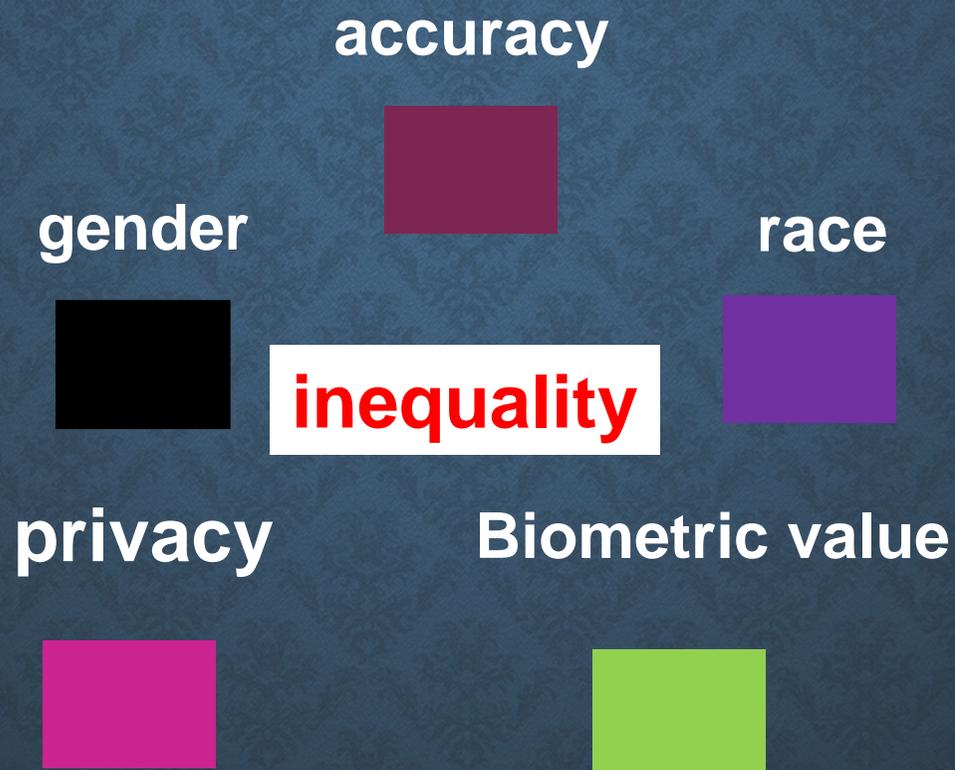


Software catches facial features (landmarks and nodal points)



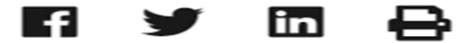
Up to 80 different measurements transform into an individualized mathematical formula and store in a database (training data)

臉部辨識除了靠節點確認， 還有什麼要考慮？



GENDER STEREOTYPE + FR=

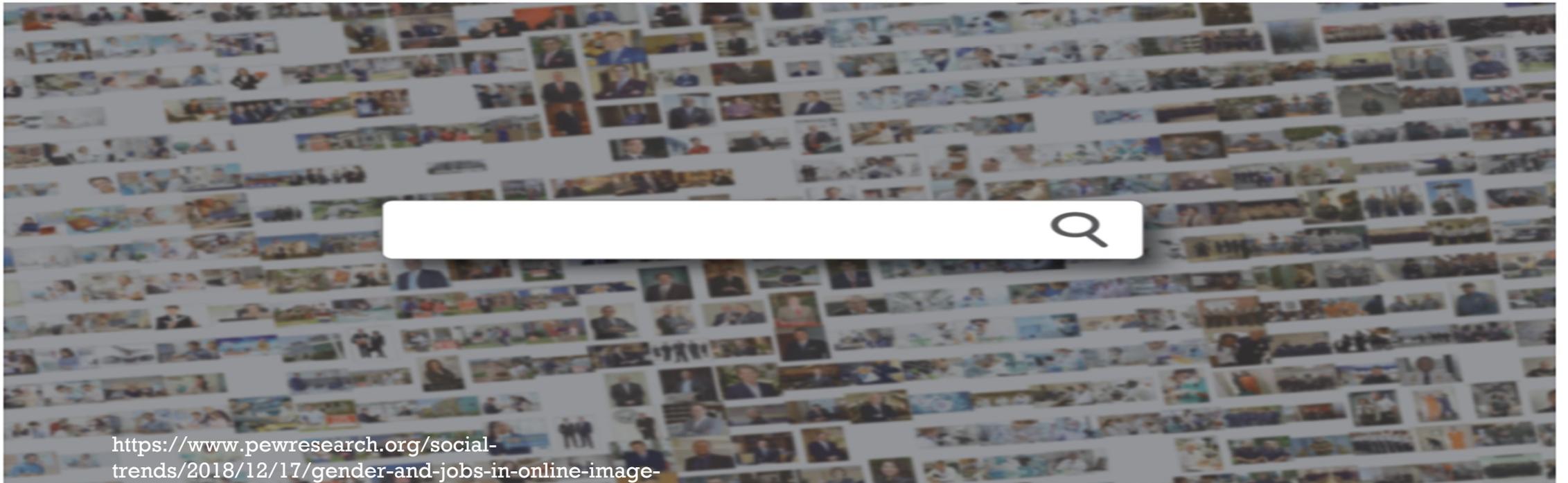
DECEMBER 17, 2018



Gender and Jobs in Online Image Searches

Men are overrepresented in online image search results across a majority of jobs examined; women appear lower than men in such search results for many jobs

BY ONYI LAM, BRIAN BRODERICK, STEFAN WOJCIK AND ADAM HUGHES



<https://www.pewresearch.org/social-trends/2018/12/17/gender-and-jobs-in-online-image->

The percentage of women in image search results for common jobs often differs from reality

Difference between estimated % of women in image search results and the actual % in each occupation who are women, according to BLS (selected jobs)

WOMEN UNDERREPRESENTED IN IMAGE SEARCH RESULTS

Job	Actual	Image search	Difference
Bill collector	71%	20%	-51
Medical records technician	92	57	-35
Bartender	57	29	-28
Probation officer	64	43	-21
General manager	34	15	-19
Chief executive	28	10	-18
Security guard	24	15	-9

WOMEN OVERREPRESENTED IN IMAGE SEARCH RESULTS

Flight attendant	73	77	4
Physician	40	48	8
Model	78	88	10
Police	14	24	10
Computer programmer	21	34	13
Mechanic	2	24	22
Singer	38	62	24

Note: These estimates are rounded. See Methodology for more precise estimates. Source: Pew Research Center analysis of U.S. Google Image Search data; Bureau of Labor Statistics data. Image searches were conducted July 7-Sept. 13, 2018. Images returned by searches conducted at other times may differ. "Gender and Jobs in Online Image Searches"

臉部辨識技術中的種族議題

s Freedom VOA News on Iran COVID-19 Pandemic

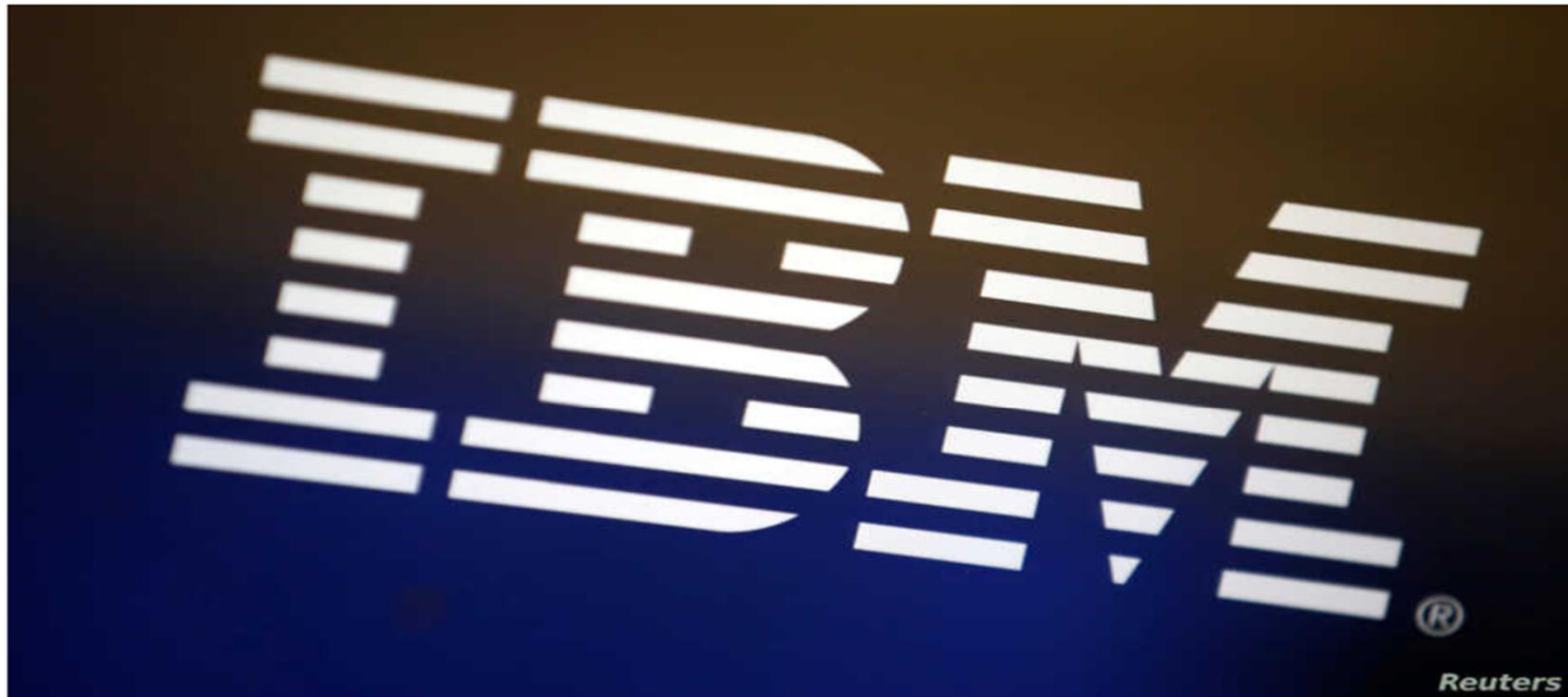


Q Search La

Silicon Valley & Technology

IBM Quits Facial Recognition, Joins Call for Police Reforms

By Associated Press
June 09, 2020 08:57 PM



IBM'S REASON-BLACK LIVES MATTER

- the death of George Floyd
- racial injustice
- racial profiling
- mass surveillance

Official Statement

- "We believe now is the time to begin a national dialogue on whether and how facial recognition technology should be employed by domestic law enforcement agencies," wrote CEO Arvind Krishna in a letter sent Monday to U.S. lawmakers.

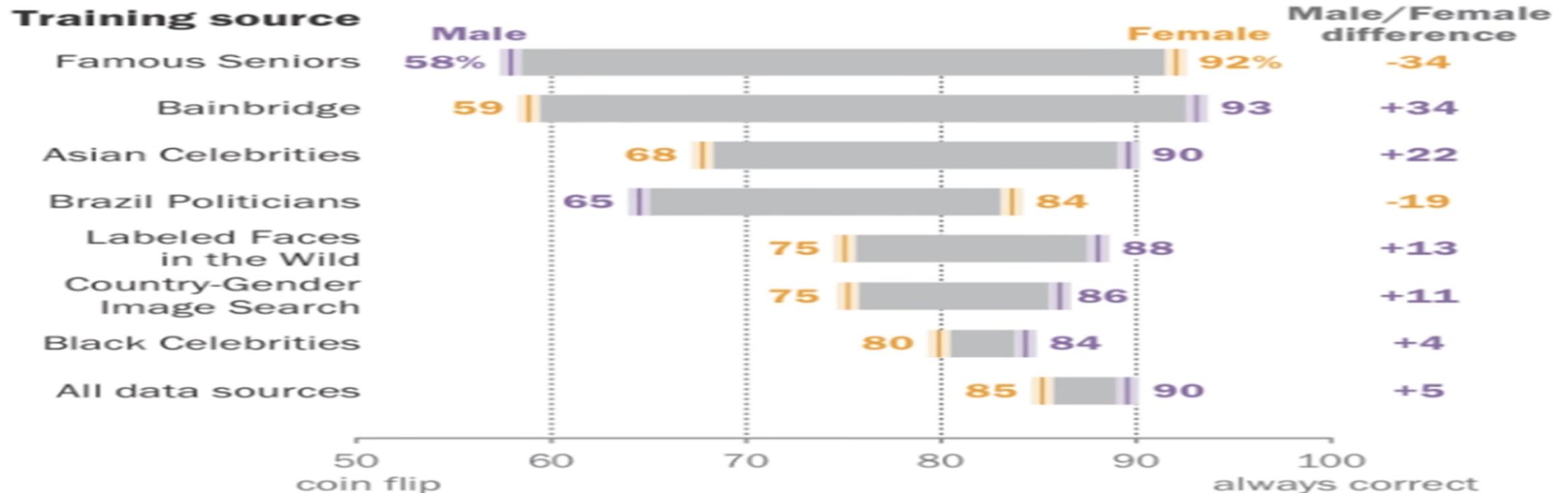


Arvind Krishna, 57, was a principal architect of IBM's purchase of Red Hat.

FR's accuracy in multi element still far behind correct

Regardless of training data, all models were better at identifying one gender than the other

Estimated accuracy in identifying images of male/female individuals for gender classification models trained using data from ...



Source: Pew Research Center analysis of image classification models.

Note: The darker purple and orange lines show the estimated accuracy for each model on either images of male (purple) or female (orange) individuals, and the light purple or orange bars show the standard error surrounding each prediction. The shaded region is the difference between the estimated accuracy on images of men and women.

"The Challenges of Using Machine Learning to Identify Gender in Images"

Racial Discrimination in Face Recognition Technology by Alex Najibi (Harvard University)

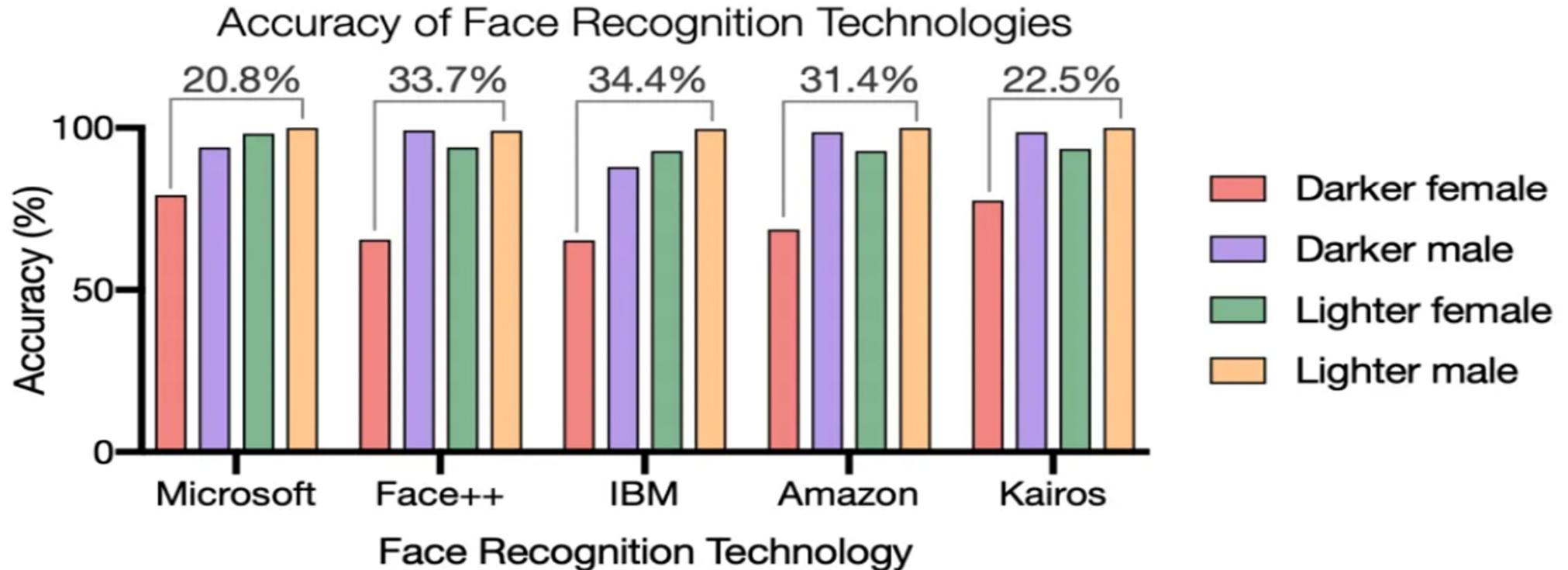


Figure 1: Auditing five face recognition technologies. The **Gender Shades project** revealed **discrepancies** in the classification accuracy of face recognition technologies for different skin tones and sexes. These algorithms consistently demonstrated the poorest accuracy for darker-skinned females and the highest for lighter-skinned males.

How can we count on FR to do the law enforcement WITH A SEXIST AND RACIST DATA BASE?

OKOYE



DEMOGRAPHICS: 39, Female, Wakandan

TOTAL SCORE: 6/18

AI	Detected	Age	Gender	Race	Score
IBM	Yes	35-44	Male	N/A	2 / 3
Face++	Yes	32	Female	Asian	2 / 4
MSFT	Yes	29	Female	N/A	2 / 3
Clarifai	No	N/A	N/A	N/A	0 / 4
Kairos	No	N/A	N/A	N/A	0 / 4

RAMONDA



DEMOGRAPHICS: 59, Female, Wakandan

TOTAL SCORE: 12/18

AI	Detected	Age	Gender	Race	Score
IBM	Yes	18-24	Female	N/A	2 / 3
Face++	Yes	45	Male	Black	2 / 4
MSFT	Yes	29.9	Female	N/A	2 / 3
Clarifai	Yes	27	Female	Black	3 / 4
Kairos	Yes	33	Female	Black	3 / 4

NAKIA



DEMOGRAPHICS: 34, Female, Wakandan

TOTAL SCORE: 12/18

AI	Detected	Age	Gender	Race	Score
IBM	Yes	18-24	Female	N/A	2 / 3
Face++	Yes	26	Female	White	2 / 4
MSFT	Yes	25.4	Female	N/A	2 / 3
Clarifai	Yes	24	Female	Black	3 / 4
Kairos	Yes	28	Female	Black	3 / 4