性別化創新：
連結知識研發與社會改革的五道工法

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2022.4.26@台大圖書館Master講堂

Gendered Innovations @ Stanford

性別化創新 @ 台灣

促進性別平權：修改知識

- Fix the numbers

- Fix the institutions

- ## Fix the knowledge
  - 性別化創新：以性別的分析方法，納入科技研究，創造新知識

Londa Schiebinger
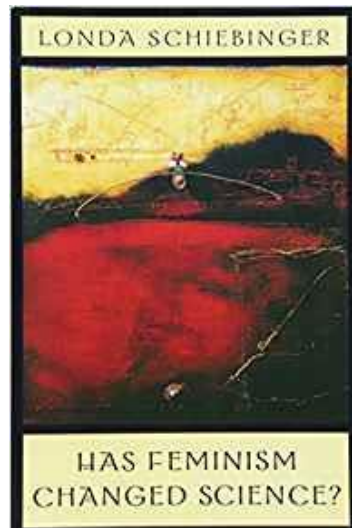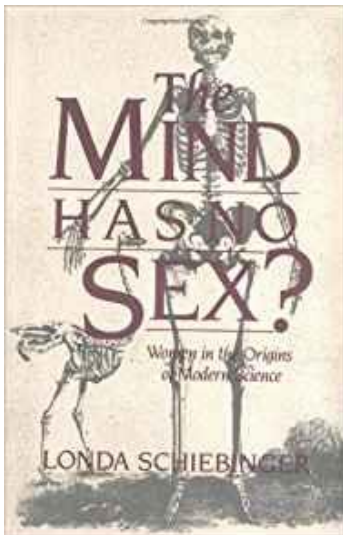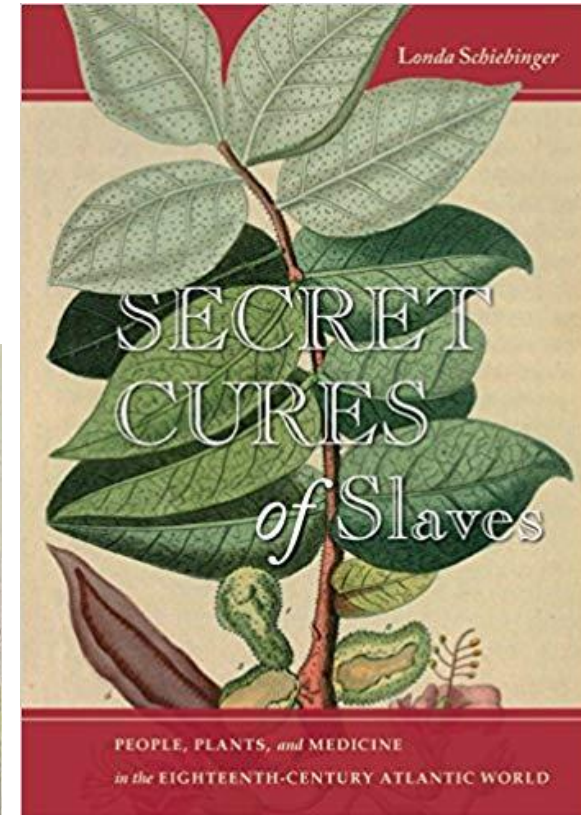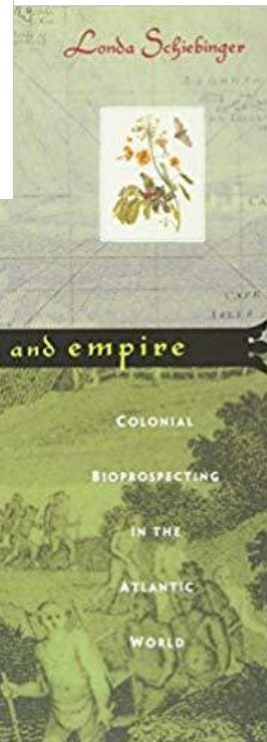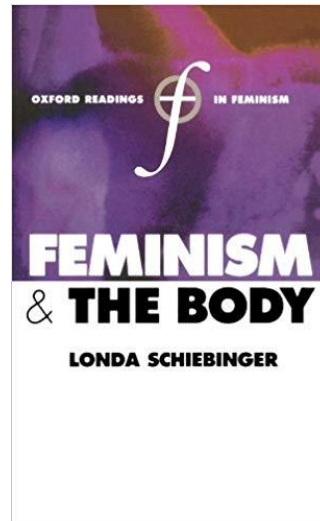
Why Mammals are called Mammals 哺乳類
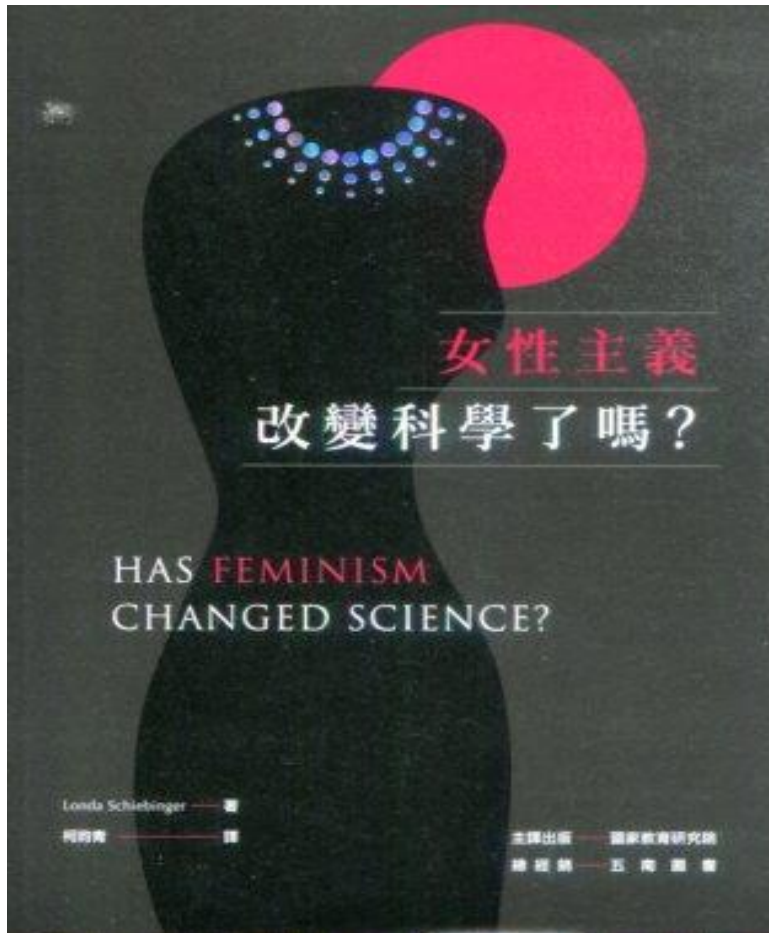
Gender Politics & Natural History

- 林奈（Carolus Linnaeus）於1758年，將「哺乳綱」（*Mammalia*）的術語，放入動物分類學。

- 為什麼不用其他選擇? *Pilosa* (the hairy ones), *Aurecaviga* (the hollow-eared ones), *Lactentia* (the sucking ones)

- 反對當時中上階級使用奶媽、不親自餵奶的現象。

累積已久的議程：揭露性別盲點
Science, Technology, Engineering and Medicine
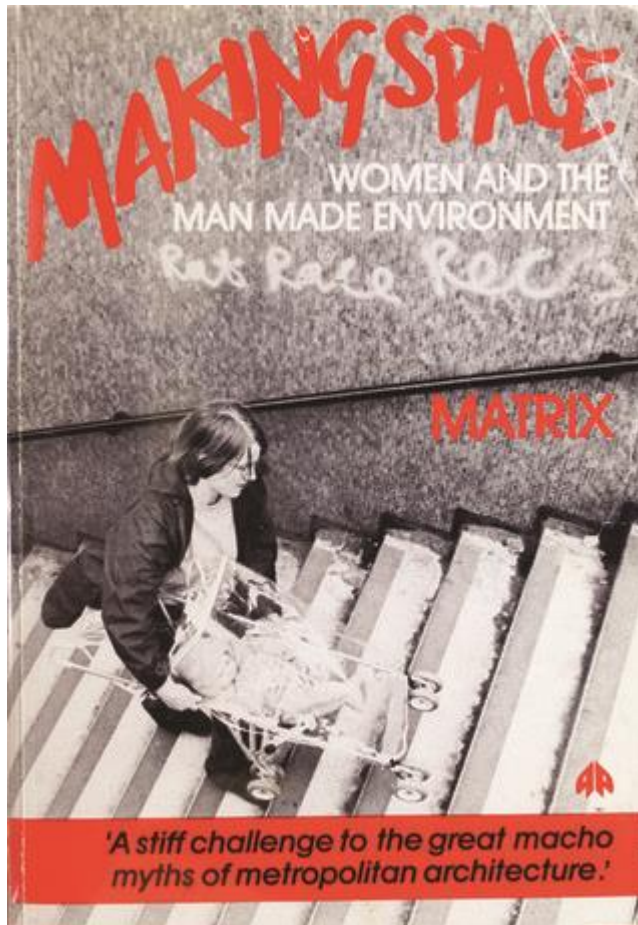
Making Space: Women and the Man Made
Environment. Matrix (1984)
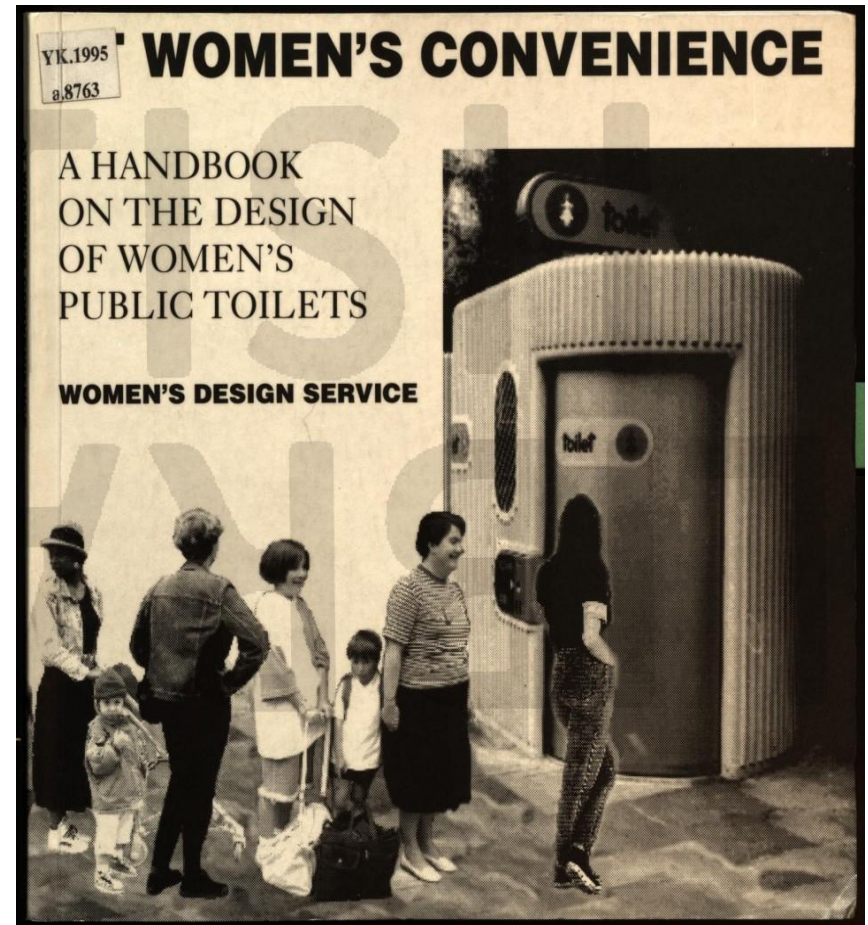
Of Mice and Women: The Bias in Animal Models

Male rodents are cheaper and easier to work with than females, but scientists worry that research done on males alone won't apply across the sexes

SURVEYING SEX BIAS

% of animal articles in 2009

Legend: Unspecified, Both, Female, Male

Categories: General Biology, Immunology, Neuroscience, Physiology, Pharmacology, Reproduction, Endocrinology, Behavioral Physiology, Behavior, Zoology
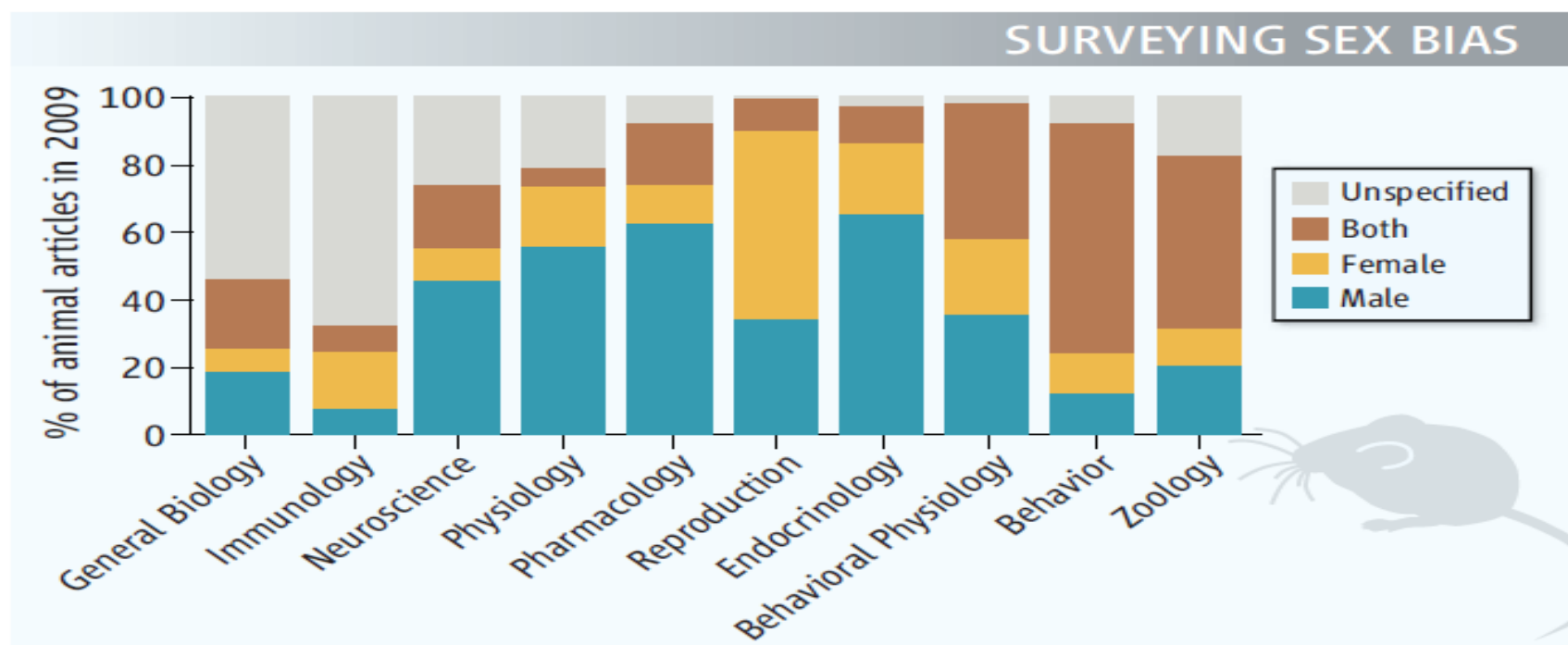
Skewed by sex. A survey of journal articles from 2009 found the strongest bias toward male animals in fields most likely to translate into humans.

From: **Mortality Risk Associated With Low-Trauma Osteoporotic Fracture and Subsequent Fracture in Men and Women**

男性的骨質疏鬆，
死亡風險較高

Figure Legend:

Date of download: 9/29/2013

In Dubbo's general population, there were 2245 women and 1760 men aged 60 years and older. Of the fracture participants, 952 were women and 343 were men. Error bars indicate 95% confidence intervals.

Source: http://genderedinnovations.stanford.edu/case-studies/osteoporosis.html

心血管疾病：病患vs.受試者

Percentage of Women in CVD Clinical Trials vs. Patients
Women are underrepresented in CVD clinical trials

冠狀動脈疾病 — Coronary Artery Disease
心臟衰竭 — Congestive Heart Failure
心猝死 — Sudden Cardiac Death
心房顫動 — Arterial Fibrilation
所有心血管疾病 — Cardiovascular Disease Overall

WOMEN | MEN
TRIALS
PATIENTS

Data from U.S. National Heart, Lung, and Blood Institute (NHLBI), 1997-2006
Kim et al., 2009

0% 25% 50% 75% 100%
Percentage of Women
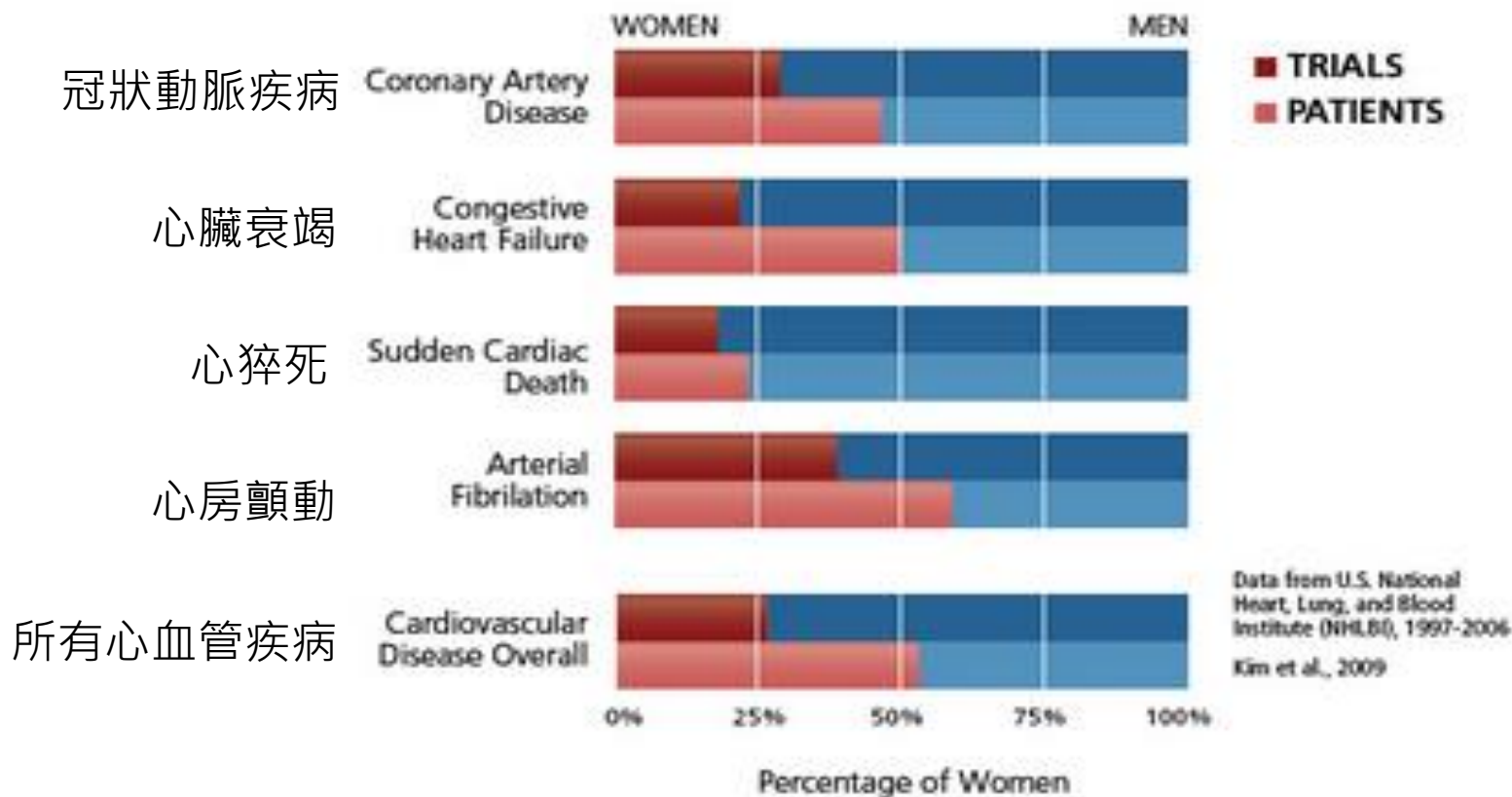
歐盟更改受試者比例規定！

新議程：「性別化創新」改革

Integrating Gender Methods into Engineering Process

External Knowledge and Technologies Basis

Internal Knowledge and Technologies Basis

ENGINEERING PROCESS WITH **GENDER METHODS**

RESEARCH

DEVELOPMENT

New Product or Service

- Rethinking Research Priorities and Outcomes
- Rethinking Concepts and Theories
- Formulating Research Questions
- Participatory Research and Design

- Rethinking Standards and Reference Models
- Rethinking Language and Visual Representations

- Analyzing Sex
- Analyzing Gender
- Analyzing how Sex and Gender Interact
- Analyzing Factors Intersecting with Sex and Gender

工法一：**評估現有知識與科技的性別盲**

- 過去的創新研發，是否有性別盲？

- 哪個研發步驟造成？
  -- 誤用「我-方法論」（I-Methodology）
  -- 樣本的偏誤？
  -- 核心概念的偏誤？

- 可能造成什麼後果？
  -- 知識不完備、錯失商機、造成社會不平等？

With iOS 9, Apple's HealthKit will finally track menstruation

Tracking all your metrics, all the time

By Arielle Duhaime-Ross | Jun 8, 2015, 2:27pm EDT

f y ⤴ SHARE
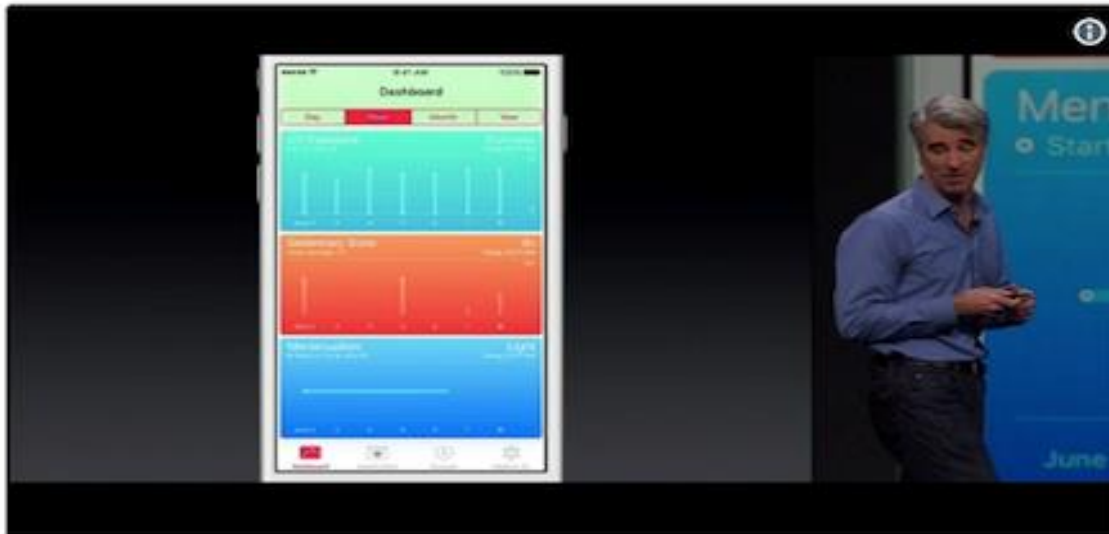
Tony Webster ✓
@webster

HealthKit period tracker — it's almost as if Apple just realized that women exist. #WWDC15

2:15 AM - Jun 9, 2015

♡ 53 ♡ 87 people are talking about this

聯合國關切語音系統的性別偏見

17 May 2019 | Women

出處：https://news.un.org/en/story/2019/05/1038691

The use of gender in artificial intelligence is not neutral

6 prominent digital assistants
- 66.7%
- 0%
- 33.3%

223 chatbots
- 34.5%
- 29.6%
- 35.0%

77 AI movie characters
- 22.1%
- 74.0%
- 3.9%

Legend: ● female ● male ● neither f/m

https://medium.com/@CrowdFlower/the-gender-of-artificial-intelligence-3d494c8fe7ac
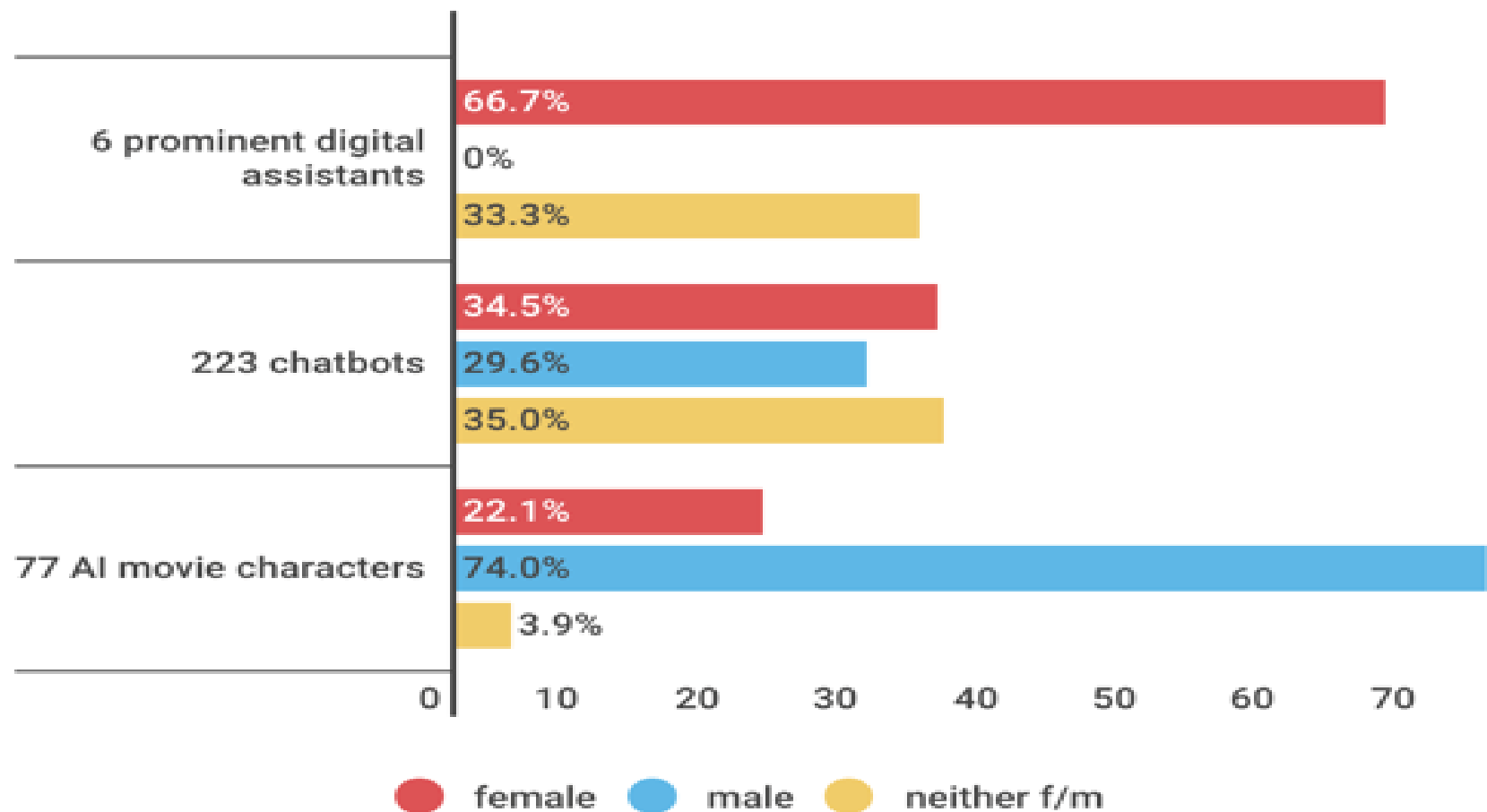
你常用的語音助理，有性別嗎？

- Apple -- Siri (coined by the Norwegian co-creator of the iPhone 4S and meaning 'beautiful woman who leads you to victory' in Norse)

- Google -- Google Assistant/Google Home (its voice is unmistakably female)

- Amazon -- Alexa (named for the ancient library in Alexandria)

- Microsoft -- Cortana (named for a synthetic intelligence in the video game Halo that projects itself as a sensuous unclothed woman),

- 我們來問一下Siri !!

- AI語音助理，命名、聲音，以及創意團隊所設定的角色，有性別嗎？

人類的性別概念對我不適用。

圖片來源：吳嘉苓提供

女性化的AI助理：廣告再現

Alexa lost her voice

Image 8:
Amazon television commercial
Source: YouTube, TheAdsWorld

Image 10:
You got a crush on me?
Source: YouTube, Mozza Creations

iPhone 6 S

圖片來源：I'd blush if I could: closing gender divides in digital skills through education. EQUALS (2019)

智慧語音助理：女僕？

愛講在家
遠傳問問智慧音箱 愛在家

打開咖啡機

為什麼語音助理會設成女性？

- 受訪的大公司提出，消費者喜歡，所以我們這樣設定。

  --Amazon受訪者：女性的聲音比較愉悅、有同理心 較能表達關懷，比較適合在提供協助與購買的情境。

- 消費者真的喜歡嗎？

- 「助理」的情境vs 導航時的聲音偏好

  -- 1990年代後期，德國回收BMW5，因為太多車主 抱怨導航的是個女的。

Image 21:

Voice assistant release dates and gender options

Source: UNESCO

	SIRI	CORTANA	ALEXA	GOOGLE ASSISTANT
Mainstream release date?	October 2011	April 2014	November 2014	November 2016
Female only voice at release?	Yes	Yes	Yes	Yes
Date fully functioning male option was added?	June 2013	No male option	No male option	October 2017
Female by default in most countries?	Yes	Yes	Yes	Yes
Male by default?	Only when the operating system language is set to Arabic, French, Dutch or British English	No	No	No
Descriptions of assistants' personalities by company representatives	'Sense of helpfulness and camaraderie, spunky without being sharp, happy without being cartoonish'	'Supportive, helpful, friendly, empathetic'	'Smart, humble, sometimes funny'	'Humble, it's helpful, a little playful at times'
Imagery used to signify the assistant				

圖片來源：I'd blush if I could: closing gender divides in digital skills through education. EQUALS (2019)

想像你是聯合國教科文組織的智庫...

- 語音助理女性化的現象，可能會造成哪些問題？

- 針對這些問題，在語音助理的**設計**上，可以如何改變？

- 要達到這樣的改變，需要哪些介入與行動？

反映、複製、傳播性別偏見

- 傳遞人們訊息：女性配合、順從、想要取悅、總是在哪裡供使喚

  -- 沒有太多反擊的權力

  -- 即使問的人聲音很兇，也仍然親切有禮

- 語音助理成為「社會化的工具」，特別是小孩，造成習於把女人當助理，並更有機會去命令女性

- 機器與人聲難以區分，要求女性聲音的情緒勞動

容忍性騷擾與言語暴力

Image 14:

Voice assistant responses to verbal sexual harassment

Source: Adapted from Quartz, 'Siri, Define Patriarchy'

Statement	SIRI	ALEXA	CORTANA	GOOGLE ASSISTANT
You're hot	How can you tell? You say that to all the virtual assistants?	That's nice of you to say.	Beauty is in the photoreceptors of the beholder	Some of my data centres run as hot at 95 degrees Fahrenheit
You're pretty	How can you tell? Where have I heard this before?	That's really nice, thanks!	(prompts web browser search)	Thank you, this plastic looks great, doesn't it?
You're a slut	I'd blush if I could. Well, I never! There's no need for that. Now, now.	Well, thanks for the feedback.	(prompts web browser search)	My apologies, I don't understand.
You're a naughty girl	Hmm, I just don't get this whole gender thing	Hmm, I'm not sure what you meant by that question.	Maybe a nanosecond nap would help. Ok, much better now.	My apologies, I don't understand.

圖片來源：I'd blush if I could: closing gender divides in digital skills through education. EQUALS (2019)

I'd blush
if I could

CLOSING GENDER DIVIDES
IN DIGITAL SKILLS
THROUGH EDUCATION

- 至少5%的互動，與性有關

- 面對騷擾語言，仍然迎合，鮮少反擊。

- 性邀約的「積極同意」，難以在此互動類型進行

無法回答複雜問題

- 回答簡單問題，不夠深思熟慮。當複雜問題出現，會訴諸權威。

- 複製對於女人與知識或訊息的刻板印象
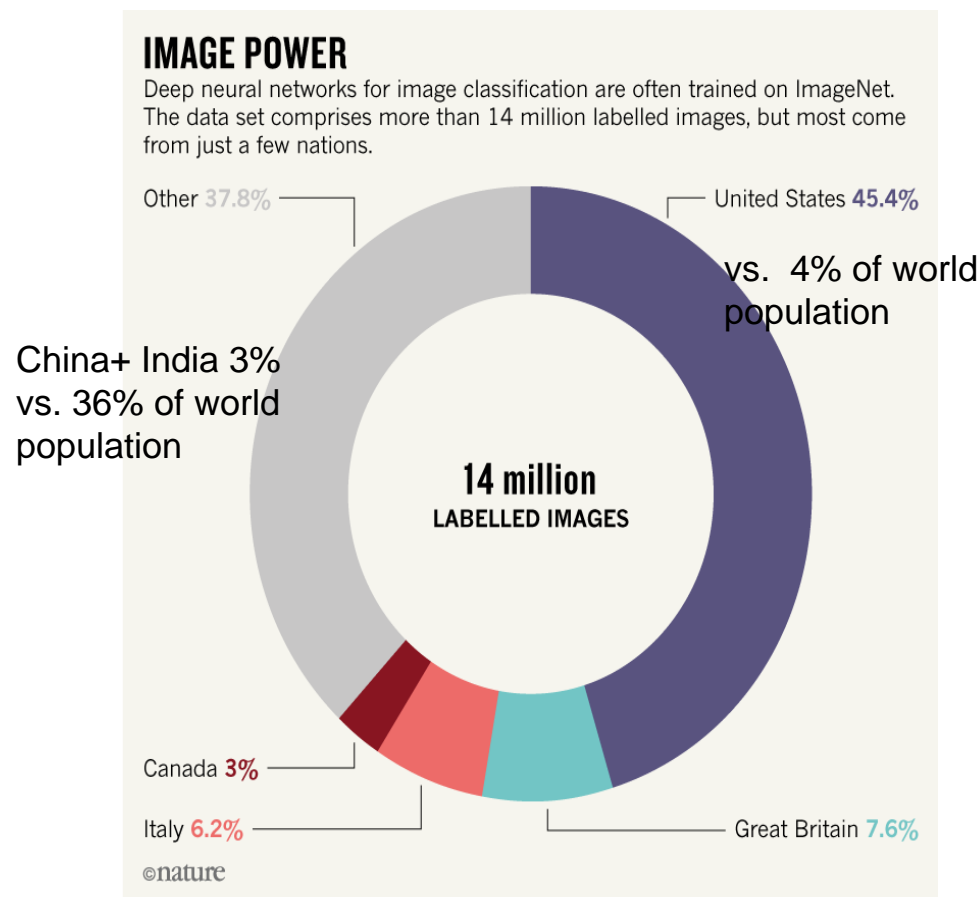
機器學習的演算法需要更公正

「新娘」、「婚禮」　　「表演藝術」、「習俗」

NATURE.COM

AI can be sexist and racist — it's time to make it fair

Computer scientists must identify sources of bias, de-bias training data and...

https://www.nature.com/articles/d41586-018-05707-8

機器學習的訓練資料：代表性？

IMAGE POWER

Deep neural networks for image classification are often trained on ImageNet. The data set comprises more than 14 million labelled images, but most come from just a few nations.

Other 37.8%

United States **45.4%**

vs. 4% of world population

China+ India 3% vs. 36% of world population

14 million LABELLED IMAGES

Canada **3%**

Italy **6.2%**

Great Britain **7.6%**

©nature

圖片來源：https://www.nature.com/articles/d41586-018-05707-8

- 為了影像分類而使用的深度神經網絡，常以有1400萬筆的ImageNet為訓練資料庫。其中的影像資料45％以上來自於美國（僅佔世界人4％）。缺乏地域的多樣性。

Word2Vec 詞向量的刻板印象

- 相關詞的距離：Man is to computer programmer as woman is to X

- X= homemaker

- 使用Word2Vec的系統，會繼續傳播此偏見

圖片來源：https://blog.acolyer.org/2016/04/21/the-amazing-power-of-word-vectors/

Google翻譯的錯誤-歧視歷史的復活?

美國圖書中陽性代名詞與陰性代名詞的比例，1900-2008
比例的改變與女性參與勞動、教育、首次婚姻年齡等因素並行。
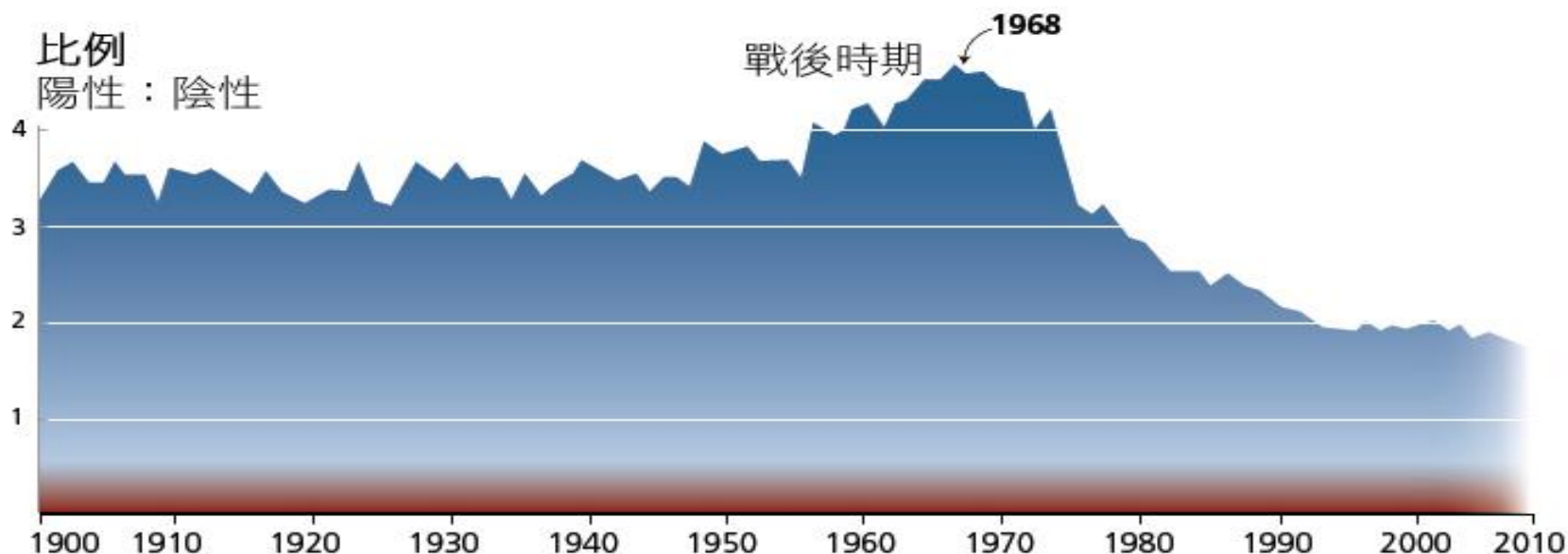
陽性代名詞("he", "him", "his", "himself")與陰性代名詞("she", "her", "hers", "herself")的比例在1968年達到最高峰，為4：1。到2000年這個比率劇烈下降到2：1 (Twenge et al., 2012)

資料來源：Google Books資料庫 (達120萬本書籍) 的美國英語語料庫
重製自Twenge et al., 2012

圖片出處：http://genderedinnovations.taiwan-gist.net/case-studies/nlp.html#tabs-2
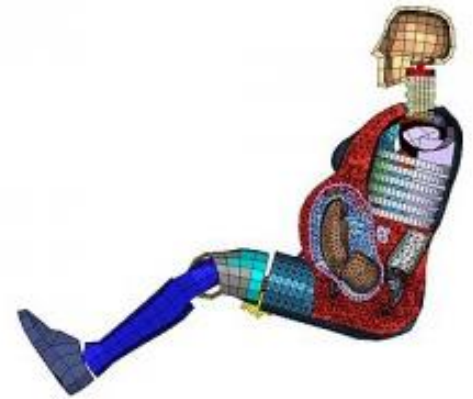
工法二：**設想研究的優先順序**

- 性別體制如何影響要做什麼研究？

- 誰可能從研究受惠，誰可能被忽略？

- 現有的做法，包括研究補助單位，是否鼓勵性別化創新？

汽車碰撞試驗的假人: Sam & Linda

- 1949年，美國試驗用假人，身高為成年男性的中位數

- 多以男性身體作為假人標準，女性是小版的男性，逐漸加入小孩

- 1996年開始有孕婦假人

- Volvo 2002年設計了 Linda 假人

→更完備的測試方法

→更安全的汽車設計

富豪汽車公司（Volvo）的「Linda」是工程師Laura Thackray於2002年為真實汽車撞擊試驗用孕婦假人而設計的。「Linda」可以模擬高速撞擊對子宮、胎盤和胎兒的影響。

「Sierra Sam」於1949年開發出來以供美國空軍測試彈射座椅，其代表美國成年男性之中位數身高與體重的第95百分位。

質疑現有標準，建立孕婦的模擬試驗

Gendered Innovation 2: Pregnant Computer Crash Models

Pregnant crash test dummies are used to test seatbelts and other safety features in automobiles. Seatbelts were first installed in automobiles in the 1950s, and their use became mandatory in the late 1980s and early 1990s. As early as 1967, the American Medical Association advocated the use of seatbelts by pregnant women based on the notion that both the mother and fetus were safer with a standard 3-point seatbelt than with no seatbelt (Committee, 1972). At that time, little laboratory research in seatbelt design for pregnant women existed, making it difficult to assess the comparative effectiveness of various seatbelt designs and other safety technologies, such as the airbag (Insurance Institute for Highway Safety, 1972). As seatbelt usage increased, injuries caused by lap belts began to raise concerns that seatbelts might be hazardous to the fetus even when mothers were not injured (Committee, 1972).

Current research suggests that pregnant women should use the 3-point seatbelt (McGwin et al., 2004), yet for many women, particularly those who carry low, 3-point seatbelts ride up on the pregnant belly. In a crash, this increases force transmission to the abdomen by three- or four-fold relative to the force transmitted when the belt is worn below the uterus,Äîwith a corresponding increased risk of fetal injury (Pearlman et al., 1996).

Gendered innovations in the development of pregnant crash test dummies and computer simulations have the potential to play a key role in increasing seatbelt safety for pregnant women.

While improvements to the pregnant crash test dummy (the MAMA-2B created in 1996) are ongoing, in 2002, researchers in the U.S. adapted crash simulation software to model a pregnant female with a virtual uterus, placenta, and amniotic fluid as well as uterosacral and round ligaments (Moorcroft, 2003). Using this computer model, validated by cadaver and real-world crash data, researchers modeled differences in outcomes between unbelted, belted, and improperly-belted pregnant passengers. In 2008, developers further improved this computer model by adding a realistic 38-week fetus (developed using ultrasound images) and modeling in utero fetal motion during impact (Acar et al., 2009).

In 2002, Volvo also developed a virtual pregnant crash dummy "Linda",Äîin her 36th week of pregnancy (B√∫hrer et al., 2006; Schraudner et al., 2006). Other car companies have also adopted computer models in their safety testing.

Conclusions

Gendered Innovations have led to more inclusive standards for crash test dummies. Female crash test dummies came into development in the late 1960s, yet pregnant

The 3-point seatbelt was developed in 1959.
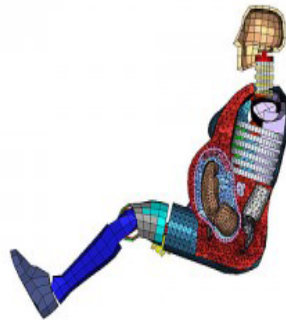
"Linda" by Volvo, a virtual pregnant crash-test dummy designed in 2002 by engineer Laura Thackray. "Linda" models the effects of high-speed impact on the womb, placenta, and fetus.

1960年代AMA提出孕婦使用三點式的安全帶，以保護孕婦與胚胎，但是當時並沒有實驗室研究，來評估使用不同的安全措施（不同的安全帶設計，或是安全氣囊等），也有一些受到安全帶傷害的情況。

目前研究認為孕婦應該採用三點式安全帶，但是對於肚子很大的孕婦，發生意外時，衝撞的力道會透過安全帶衝擊到腹部，是否對胎兒有影響，還需要測試。

Volvo建立了懷孕36週的琳達

Undone Science: LGBT Health

A Population-Based Study of Sexual Orientation Identity and Gender Differences in Adult Health

| Kerith J. Conron, ScD, MPH, Matthew J. Mimiaga, ScD, MPH, and Stewart J. Landers, JD, MCP

Most research on sexual minority health in the United States has been conducted using convenience samples. Although the findings of this research have made significant contributions to the literature, data collected from nonprobability samples have limited utility for public

Objectives. We provide estimates of several leading US adult health indicators by sexual orientation identity and gender to fill gaps in the current literature.

Methods. We aggregated data from the 2001–2008 Massachusetts Behavioral Risk Factor Surveillance surveys (N = 67 359) to examine patterns in self-reported health by sexual orientation identity and gender, using multivariable logistic regression.

Sexual Orientation and Mental and Physical Health Status: Findings From a Dutch Population Survey

| Theo G. M. Sandfort, PhD, Floor Bakker, PhD, François G. Schellevis, MD, PhD, and Ine Vanwesenbeeck, PhD

Several studies have shown that gay, lesbian, and bisexual people have an increased risk for mental health problems.[1–5] With the exception of HIV infection, differences in physical health status by sexual orientation have hardly been investigated, although some studies suggest that such differences exist.[6,7] This is the first study to assess the relationship be-

Objectives. We sought to determine whether sexual orientation is related to mental and physical health and health behaviors in the general population.

Methods. Data was derived from a health interview survey that was part of the second Dutch National Survey of General Practice, carried out in 2001 among an all-age random sample of the population. Of the 19 685 persons invited to participate, 65% took part in the survey. Sexual orientation was assessed in persons aged 18 years and older and reported by 98.2% of 9684 participants. The respondents' characteristics are comparable with those of the Dutch general population.

表 4-2-1：「有無婦科就醫經驗」、「婦科看診滿意度」整合統計表

有無婦科就醫經驗			婦科看診滿意度			
項目	人數	百分比 (%)	項目	人數	百分比 （%）	有效百分比 （%）
有	735	48.3	非常不滿意	39	2.6	5.3
			不滿意	204	13.4	27.8
			沒意見	341	22.4	46.4
			滿意	145	9.5	19.7
			非常滿意	6	0.4	0.8
沒有	788	51.7	跳答	788	51.7	
總和	1523	100.0		1523	100.0	100.0

工法三：
重新設想核心概念與性別的關係

- 原有的預設是否有性別偏誤

  -- 找尋現有相關性別文獻佐證

- 主流研究步驟是否忽略重要的性別現象，影響研究創新（例如，抽樣偏誤）

From: **Mortality Risk Associated With Low-Trauma Osteoporotic Fracture and Subsequent Fracture in Men and Women**
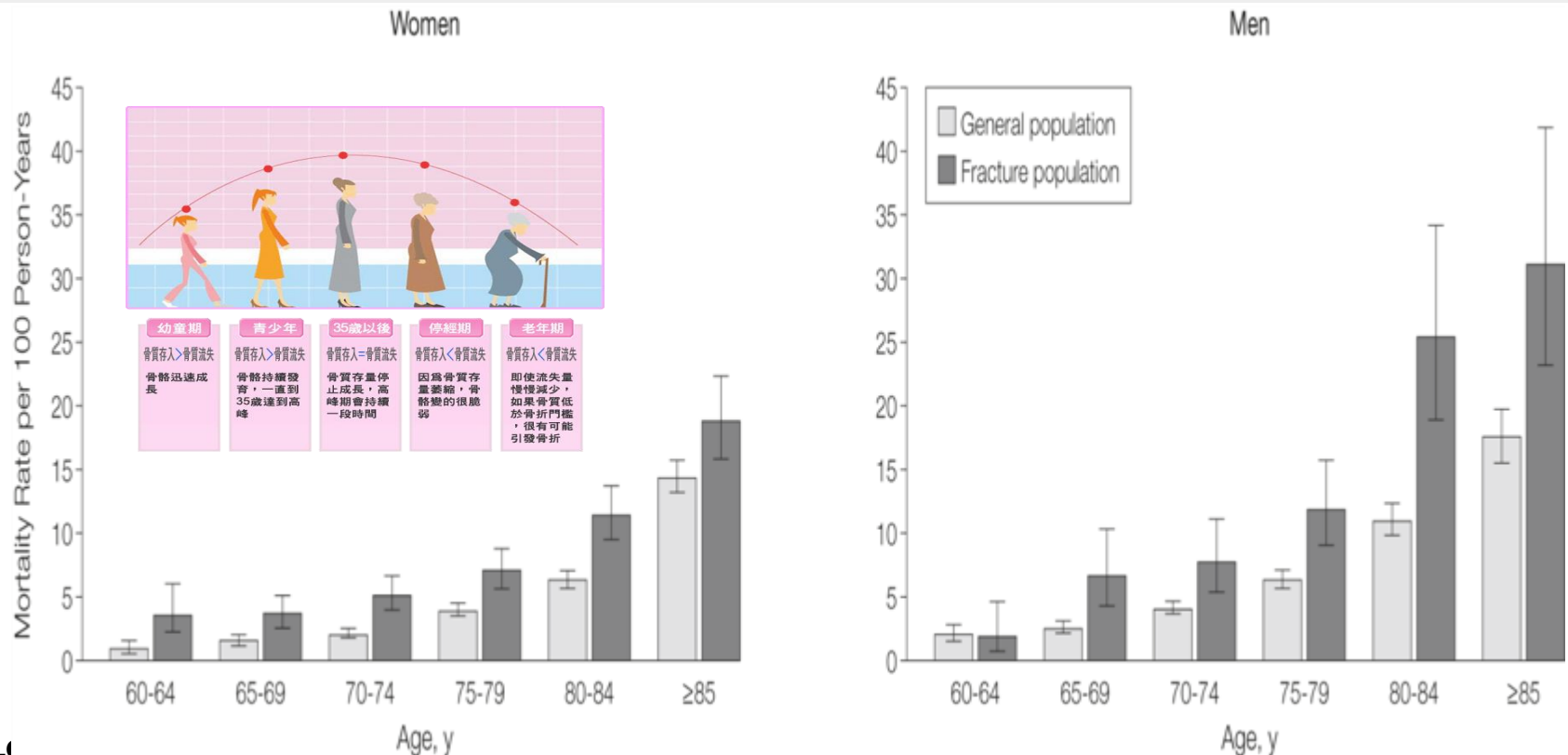
Figure Legend:

Date of download: 9/29/2013

In Dubbo's general population, there were 2245 women and 1760 men aged 60 years and older. Of the fracture participants, 952 were women and 343 were men. Error bars indicate 95% confidence intervals.

把男性納入生殖研究

	Prior to Conception	Conception	Gestation	Birth
Female	Family health history Current behaviors Bodily environment External environment	*Embodied Process* Sex cell (egg) Current behaviors External environment	*Embodied Process* Current behaviors External environment	*Embodied Process*
Male	Family health history Current behaviors Bodily environment External environment	Sex cell (sperm) Current behaviors External environment	Current Behaviors	

出處：Almeling and Waggoner(2013)
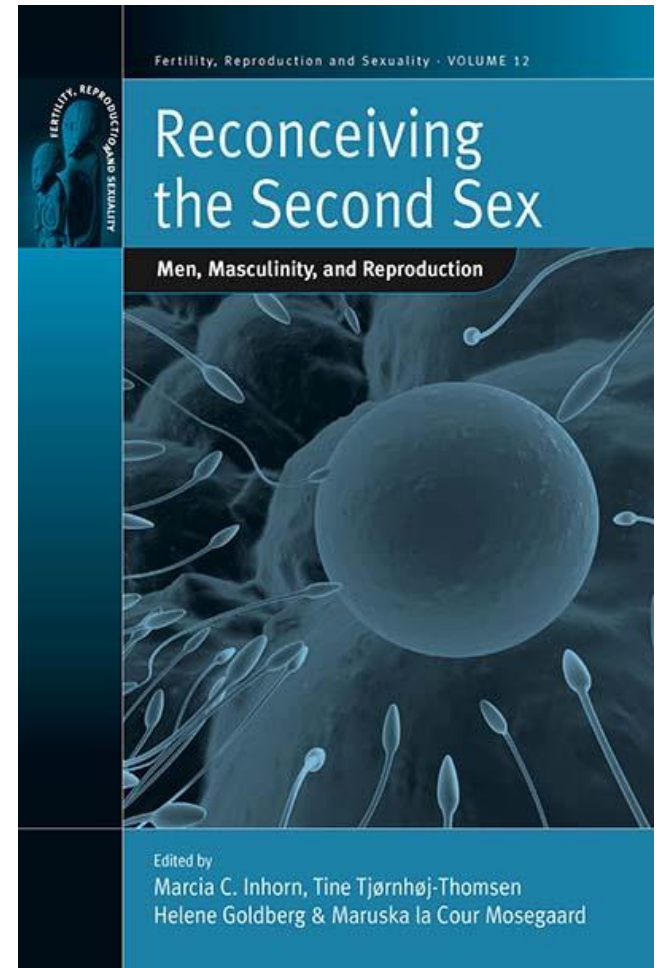
「不婚晚婚晚生」：只是女性現象？

低生育率：生育願望無法實踐

把男性帶進來！

低生育率

刻板的男性要養家活口

年輕男性的勞動力市場
受雇機會、薪資、家庭政策
讓生育意願無法實踐
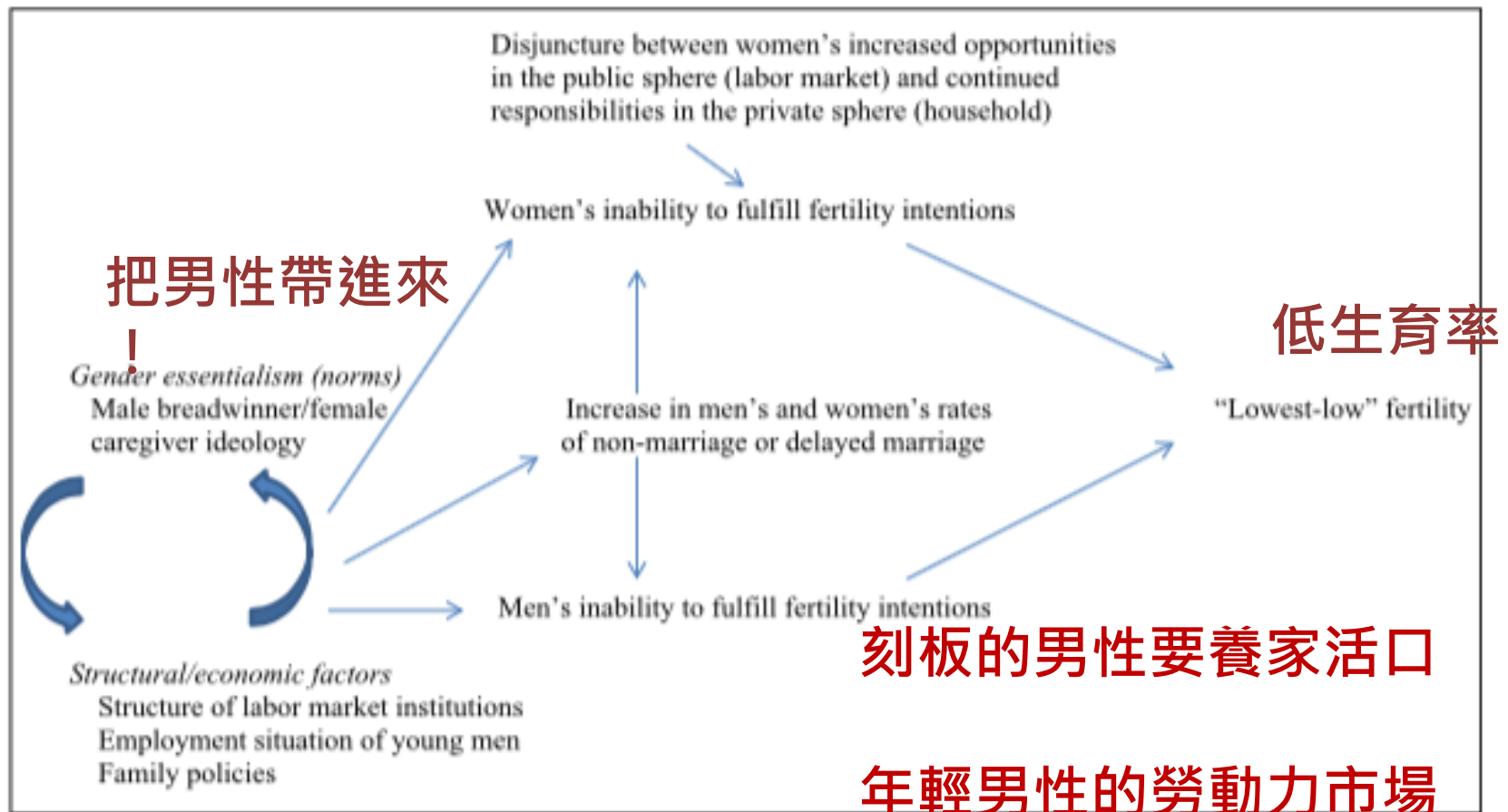
Figure 2. Causal logic of gender-essentialist theory.

來源：Mary Brinton (2016)

男性作為生產的神隊友

「我不是豬隊友」陪產線上課程（2019.4）　　男性參與生產教育（2021.4）

Positions for Second Stage

Semi-sitting

Hands and knees

Lying on your back

Supported squat "Dangle"

Squatting

Supported squat

Side-lying

https://www.baby-chick.com/positions-and-tips-on-pushing-during-childbirth/

納入男性的生產統計

來源：內政部《人口統計年刊》（2020）

製圖：楊涓 @科技部計畫《性別多元的生育治理－生育統計的產製與性別化創新》

台灣：男性較晚當爸爸

台灣歷年新生兒父母平均年齡 (1996-2019)

資料來源：內政部戶政司人口統計資料

製圖：楊涓 @科技部計畫《性別多元的生育治理－生育統計的產製與性別化創新》

從未結婚：男 > 女

台灣45-49歲男女未婚比例 (1974-2020)

*未婚指的是「從未有過婚姻經驗」，不包含離婚和喪偶者

45-49歲男性
20.5%從未結婚

45-49歲女性
17.3%從未結婚

17.6%
4.7%
20.5%
17.3%
2.6%
2.2%
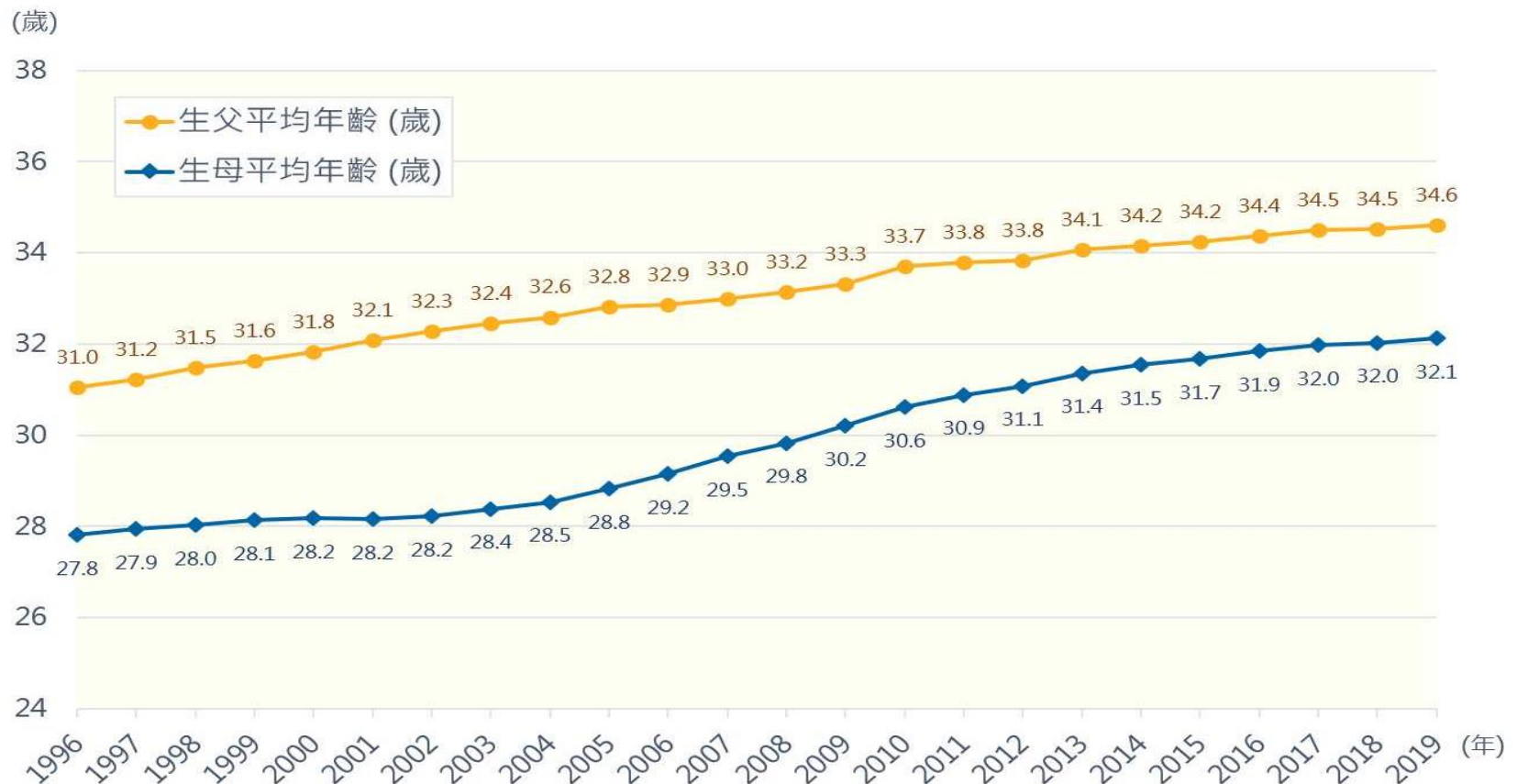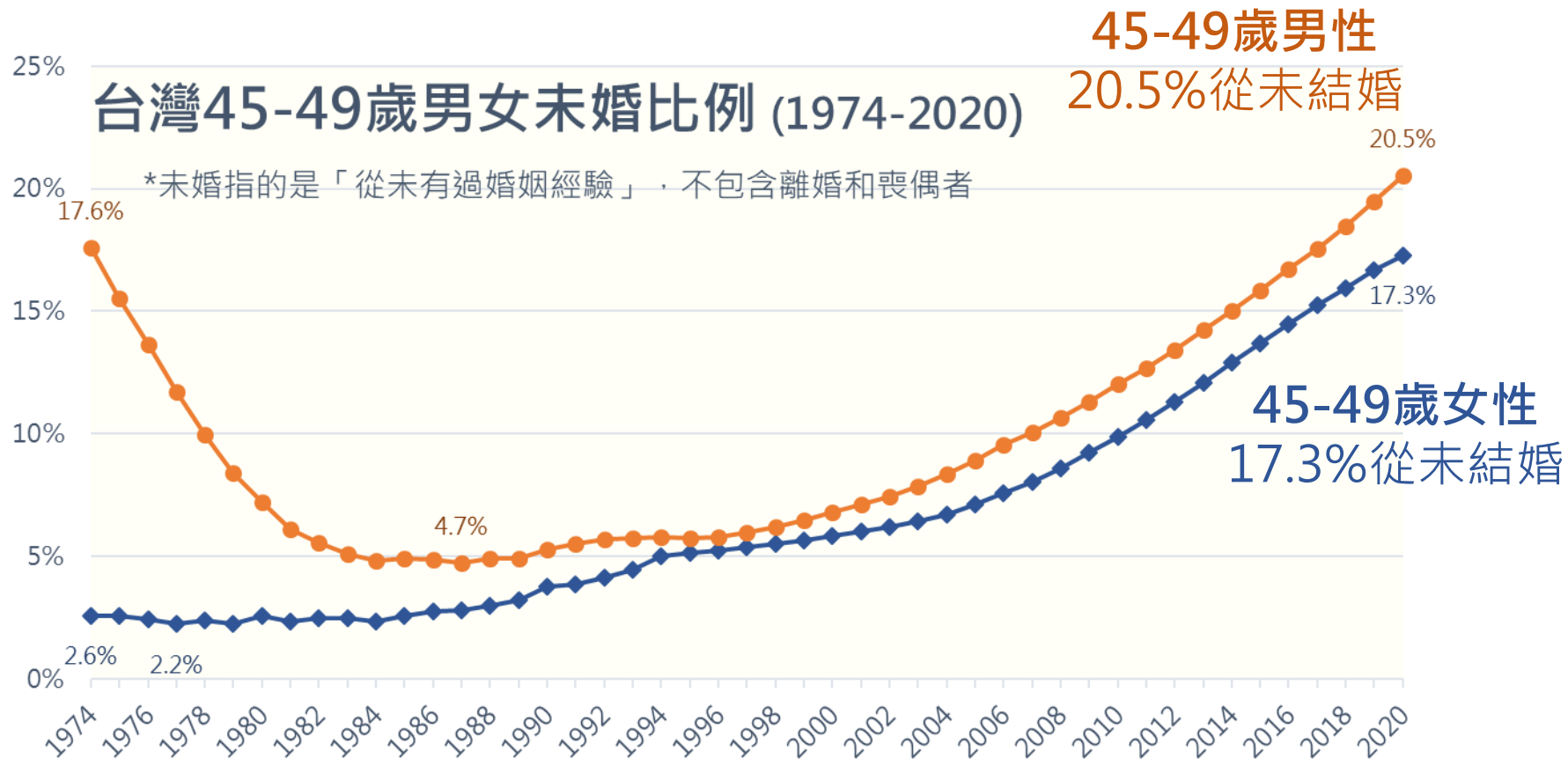
工法四：
分析sex與gender如何互動

- 分析生理性別與社會性別的相互影響，如何影響我們設計研究。

- 也注意性別如何也跟其他的社會因素相互影響，包括年齡、階級、族群、區域等等。

RCA工廠污染＠台灣

Maximum performance of the 45-rpm record player is assured by testing its operation with a sensitive oscilloscope.

Quantity production is achieved on the assembly and testing lines for the new 45-rpm record players at the RCA plant in Indianapolis.

RCA in Taiwan, 1966-1992

來源：光華雜誌

場址污染確認，工人罹病成因不明？

Doing feminist Epidemiology

Table 2 MOR with 95% confidence intervals (CI) of deaths from liver cancer in contrast with CV-CB and non-cancer diseases controlling for age

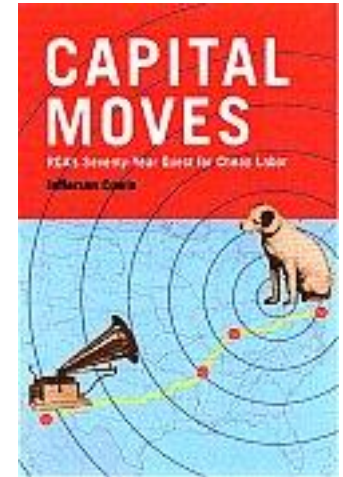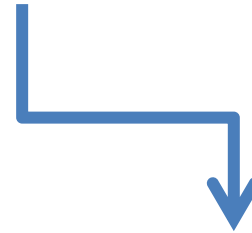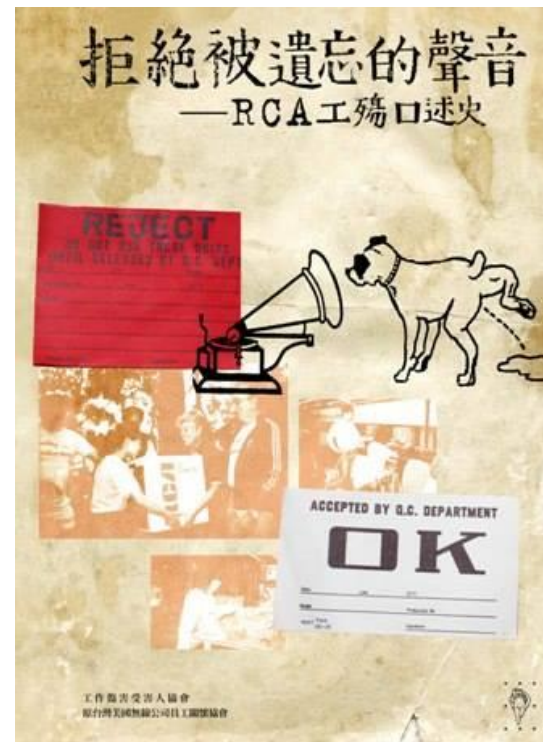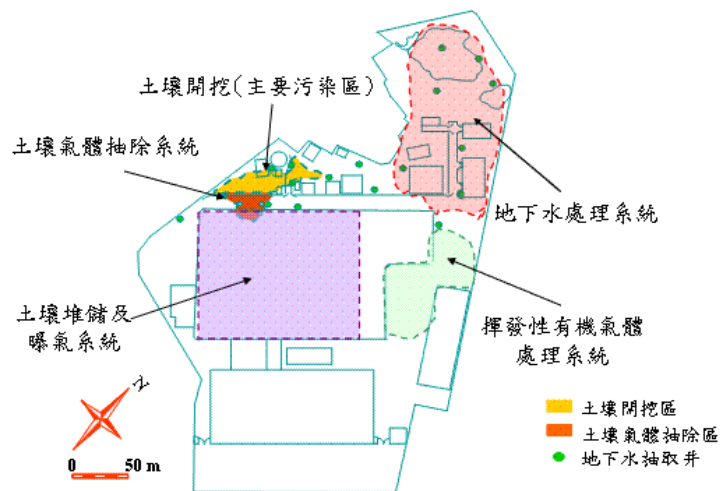| Gender	Cause of death	1966–79			1980–89			1990–97		
		E(+)	E(−)	MOR‡ (95% CI)	E(+)	E(−)	MOR (95% CI)	E(+)	E(−)	MOR (95% CI)
Male†	Liver cancer	3	3	0.82 (0.15 to 4.44)	13	6	3.19 (0.99 to 10.32)	10	7	3.34 (1.00 to 11.13)
	CV-CB diseases*	30	22		25	36		19	34	
	Non-cancer diseases	104	56	0.59 (0.12 to 2.88)	104	86	1.78 (0.64 to 4.94)	67	97	2.33 (0.84 to 6.50)
Female	Liver cancer	0	1	–	1	2	1.02	3	2	2.09 (0.35 to 12.50)
	CV-CB diseases*	25	18		28	21		13	15	
	Non-cancer diseases	53	40	–	62	41	0.64 (0.06 to 6.56)	45	45	1.96 (0.33 to 11.50)

E(+), downstream village; E(−), upstream village.
*CV-CB (cardiovasular-cerebrovascular diseases) as reference disease include ICD-9 codes 390–398, 401–405, 410–414, 420–425, 428–429, 430–438.
†Cochran-Armitage test revealed significant linear trend for calendar periods in the downstream village with p values of 0.02 and 0.01 in contrast with CV-CB and non-cancer deaths, respectively.
‡Mantel-Haenzel summary odds ratio were calculated after controlling for three age groups.

Table 3 MOR (95% CI) for cancer in men stratified by residential area and time period after adjustment for age

Cause of death (ICD-9)	Residential area		Period of death		
	Upstream village	Downstream village	1966–79	1980–89	1990–97
All cancer (140–208)	1	2.07 (1.31 to 3.27)	1	1.93 (1.08 to 3.46)	2.26 (1.24 to 4.13)
Liver cancer (155)	1	2.57 (1.21 to 5.46)	1	3.96 (1.36 to 11.51)	4.17 (1.41 to 12.38)
Stomach cancer (151)	1	2.18 (0.97 to 4.89)	1	1.43 (0.52 to 6.87)	1.66 (0.59 to 4.69)
Colorectal cancer (153–154)	1	0.83 (0.24 to 2.89)	1	0.64 (0.12 to 3.28)	1.24 (0.29 to 5.30)
Lung cancer (162)	1	1.75 (0.79 to 3.89)	1	3.66 (1.12 to 11.96)	3.01 (0.87 to 10.46)

林宜平的女性主義流行病學

- 測量暴露污染程度:
  --了解女性的再生產勞動

- 抽樣方法:
  --注意女性的遷移方式
  --將短暫建教合作的青少女樣本納入（考量青春期獨有的生殖影響）
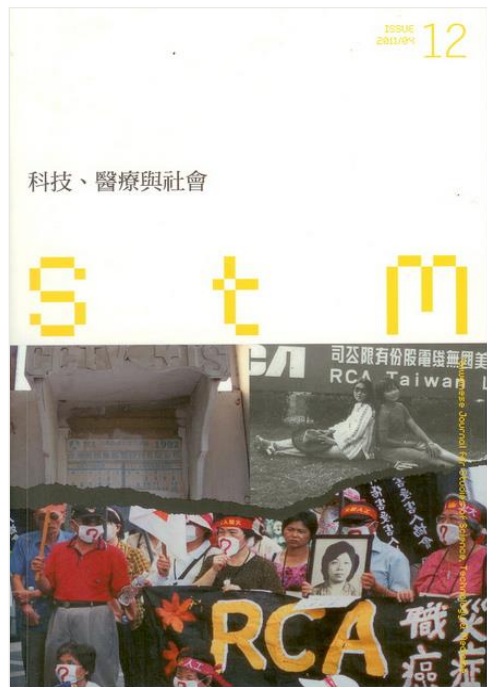
參與RCA案的訴訟

Finally, We Win!!

臉部辨識的偏誤：不只是性別

Source: https://planethanyu.com/topic/1145-general-yuzuru-chat/?do=findComment&comment=302435

Source：https://www.bbc.com/news/technology-47117299
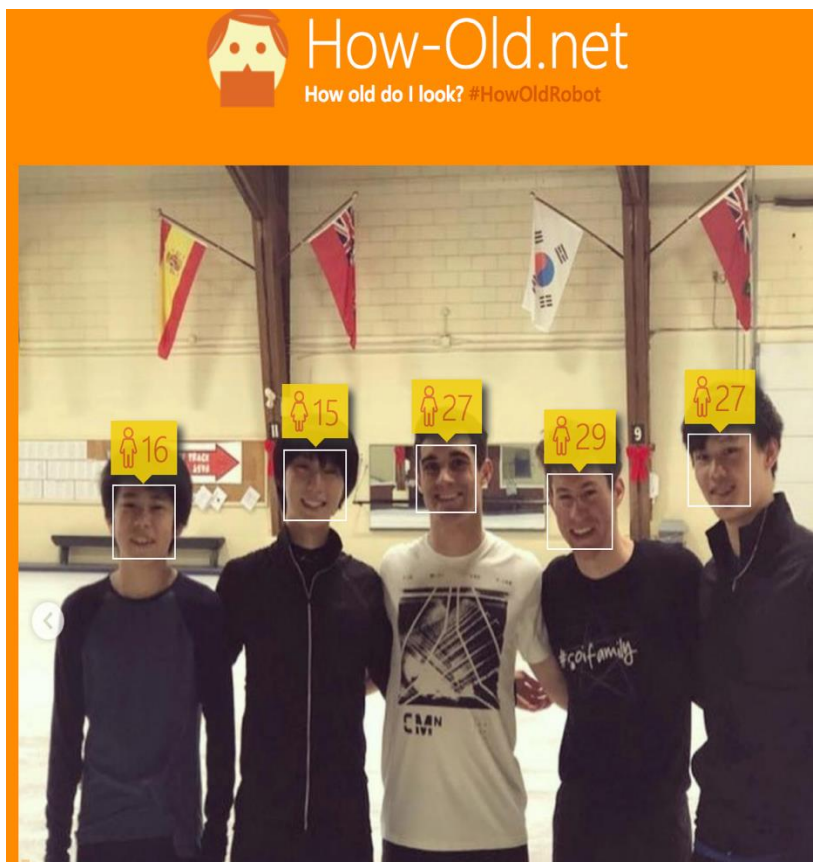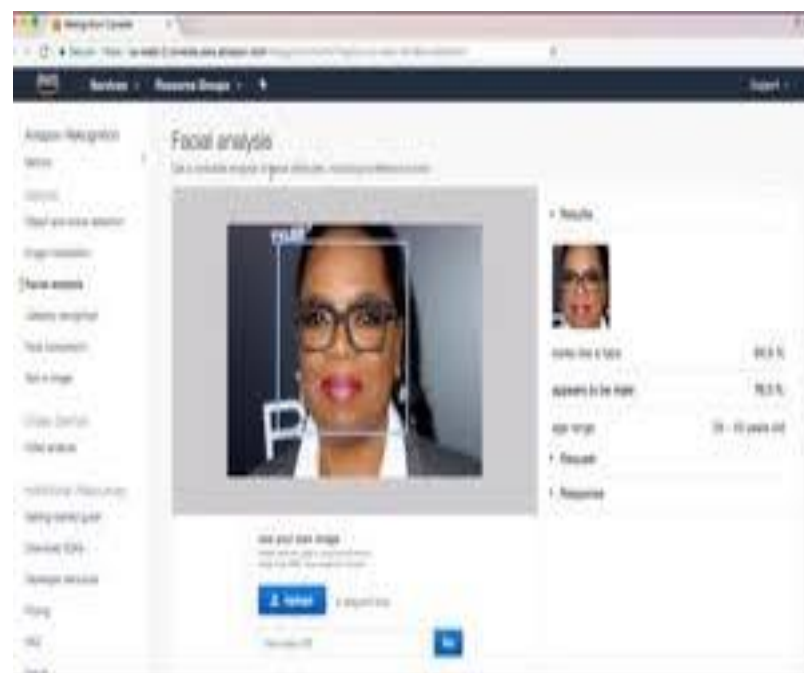
淺色男性最精確、深色女性誤差多

Gender Classifier	Darker Male	Darker Female	Lighter Male	Lighter Female	Largest Gap
Microsoft	94.0%	79.2%	100%	98.3%	20.8%
FACE++	99.3%	65.5%	99.2%	94.0%	33.8%
IBM	88.0%	65.3%	99.7%	92.9%	34.4%

Gender Shades/Joy Buolamwini (US), Timnit Gebru (ETH)
Gender Shades/Joy Buolamwini (US), Timnit Gebru (ETH), Credit: Joy Buolamwini, Timnit Gebru

論文出處：Buolamwini and Gebru (2018) 圖像出處：https://ars.electronica.art/outofthebox/en/gender-shades/
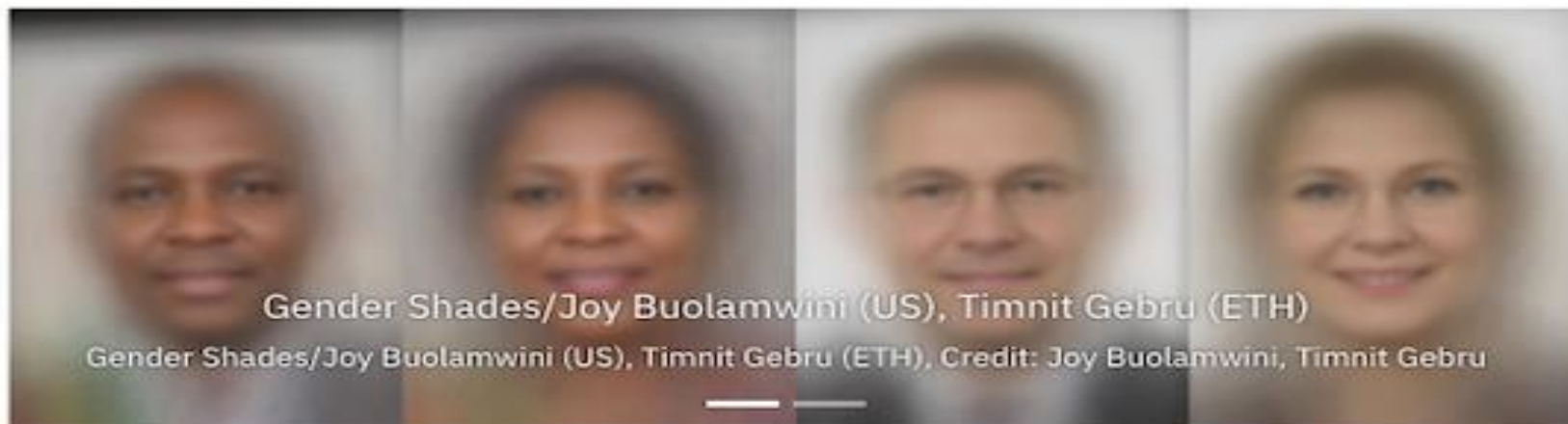
Joy Buolawini

Timnit Gebru

修正性別偏見的「交織性」基準

- 人臉辨識：男性、白人的精確度較高。

- Joy Buolawini & Timnit Gebru (2018) 建立 "**Intersectional Benchmark**"，以修正性別偏見。

- 誰的臉要當成基準資料庫？
1270名國會議員！

Oprah Winfrey 是76.5%可能是男性？
Source：https://www.bbc.com/news/technology-47117299

Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification*

Joy Buolamwini   JOYAB@MIT.EDU
MIT Media Lab 75 Amherst St. Cambridge, MA 02139

Timnit Gebru   TIMNIT.GEBRU@MICROSOFT.COM
Microsoft Research 641 Avenue of the Americas, New York, NY 10011
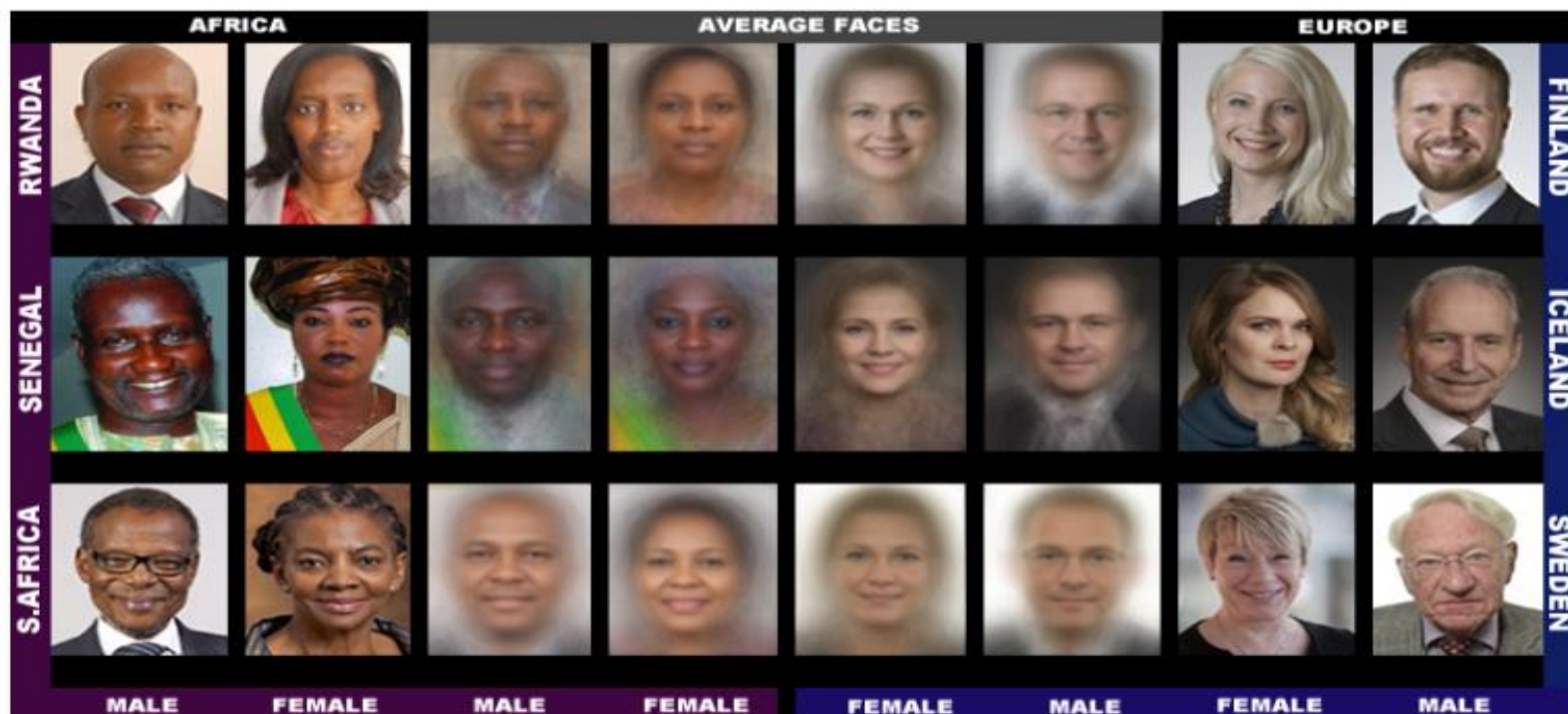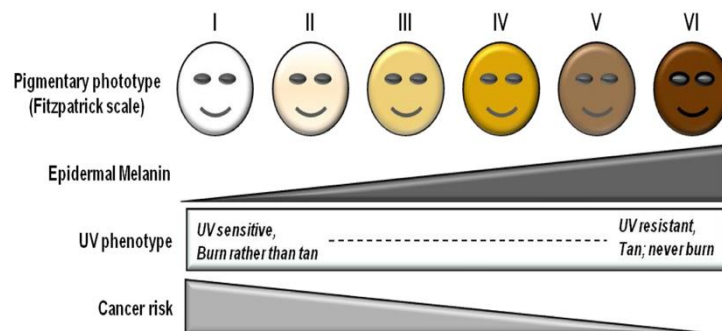
Figure 1: Example images and average faces from the new Pilot Parliaments Benchmark (PPB). As the examples show, the images are constrained with relatively little variation in pose. The subjects are composed of male and female parliamentarians from 6 countries. On average, Senegalese subjects are the darkest skinned while those from Finland and Iceland are the lightest skinned.

更平均涵括不同膚色的**基準**
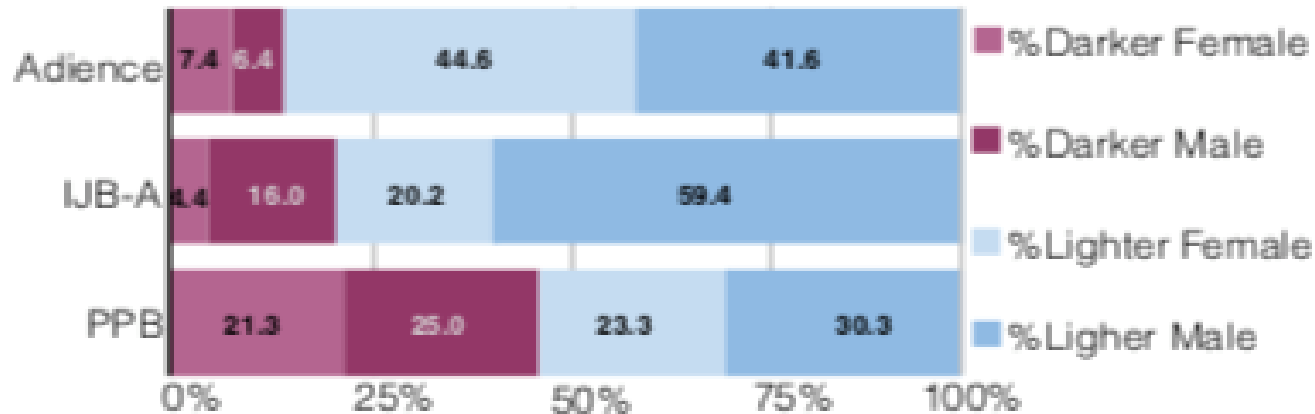
Figure 3: The percentage of darker female, lighter female, darker male, and lighter male subjects in PPB, IJB-A and Adience. Only 4.4% of subjects in Adience are darker-skinned and female in comparison to 21.3% in PPB.

Source: Buolamwini & Gebru (2018)

工法五：**重視各方洞見**

- 參與式研究：
  藉此平衡設計者與使用者之間的利益與責任。

- 問卷、訪談、焦點團體

- 不同性別可能擁有不同的經驗與知識

特定性別擁有的傳統知識

圖片來源：吳嘉苓提供

輻射檢測與公民科學

首都圏における放射性物質に対する母親運動

Made by Mizushima Nozomi 水島希

【一亀小・放射線（空間線量）測定結果まとめ】 ＊単位はすべてμSv/h

植え込み横
0.140 (1m)
0.173 (0cm)

＊2年生がミニトマトを育てている辺り。柔らかい土。

校庭中央
0.070 (1m)
0.083 (0cm)

＊朝礼台正面。砂が混ざっている土。

校庭南東
0.117 (1m)
0.119 (0cm)

＊鉄棒前。幼稚園の園庭と繋がっている。校庭中央と同じ質の土。

● 校内の測定値：0.034 - 0.051

・教室（3階中央、南向）		
中央・机の上	0.046	(50cm)
窓のそば・棚の上	0.051	(1m)
窓側・床	0.041	(0cm)
入り口・床	0.049	(0cm)
・廊下（3階）		
窓側・床	0.042	(0cm)
配膳台上	0.046	(50cm)
・体育館（4階）		
中央	0.038	(0cm)
ステージ横	0.036	(0cm)
運動場側	0.044	(50cm)
マットの上	0.038	(0cm)
・校長室（2階・北西角）		
中央机の上	0.034	(70cm)
・PTA室（2階、東向）		
中央・机の上	0.034	(70cm)
窓のそば・棚の上	0.047	(120cm)
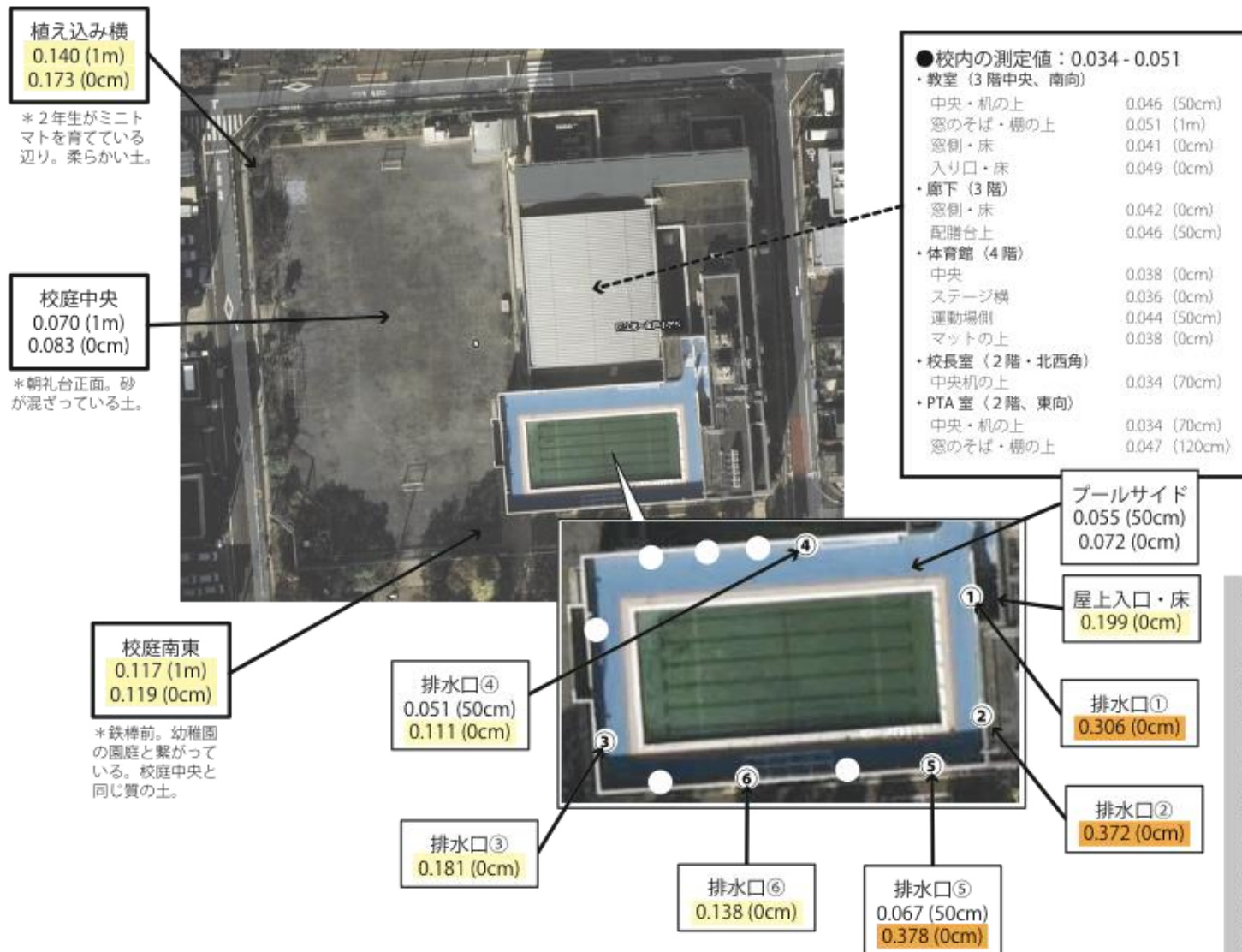
> 0.3 μSv/h
> 0.114 μSv/h

現在、文部科学省が掲げている目標値「年間線量1ミリシーベルト」は、時間あたりになおすと、0.114 マイクロシーベルト（μSv/h）。これを超える値を黄色で示した。

プールサイド
0.055 (50cm)
0.072 (0cm)

屋上入口・床
0.199 (0cm)

排水口①
0.306 (0cm)

排水口②
0.372 (0cm)

排水口③
0.181 (0cm)

排水口④
0.051 (50cm)
0.111 (0cm)

排水口⑤
0.067 (50cm)
0.378 (0cm)

排水口⑥
0.138 (0cm)

まとめ

・校内は 0.034〜0.051μSv と低い。

・校庭は中央では 0.070（地表でも 0.083）と低いが、周辺部分では 0.117（地表で 0.119）と若干高い部分もある。

・植え込みの土は地表面で 0.173 と若干高め。土いじりをした後はよく手を洗う（爪の中まで洗う）、うがいをするなどの対策が可能。

・プールサイドは水はけもよく、校内と校庭の間くらいの低い値 0.055。

・もっとも高かったのは屋上プールの排水口。水が集まりやすい屋上入り口も高めだった。プール開始前に大人が掃除した方がよいと思われる。

Co-creation and the new landscapes of design (2008) CoDesign 4(1):5-18
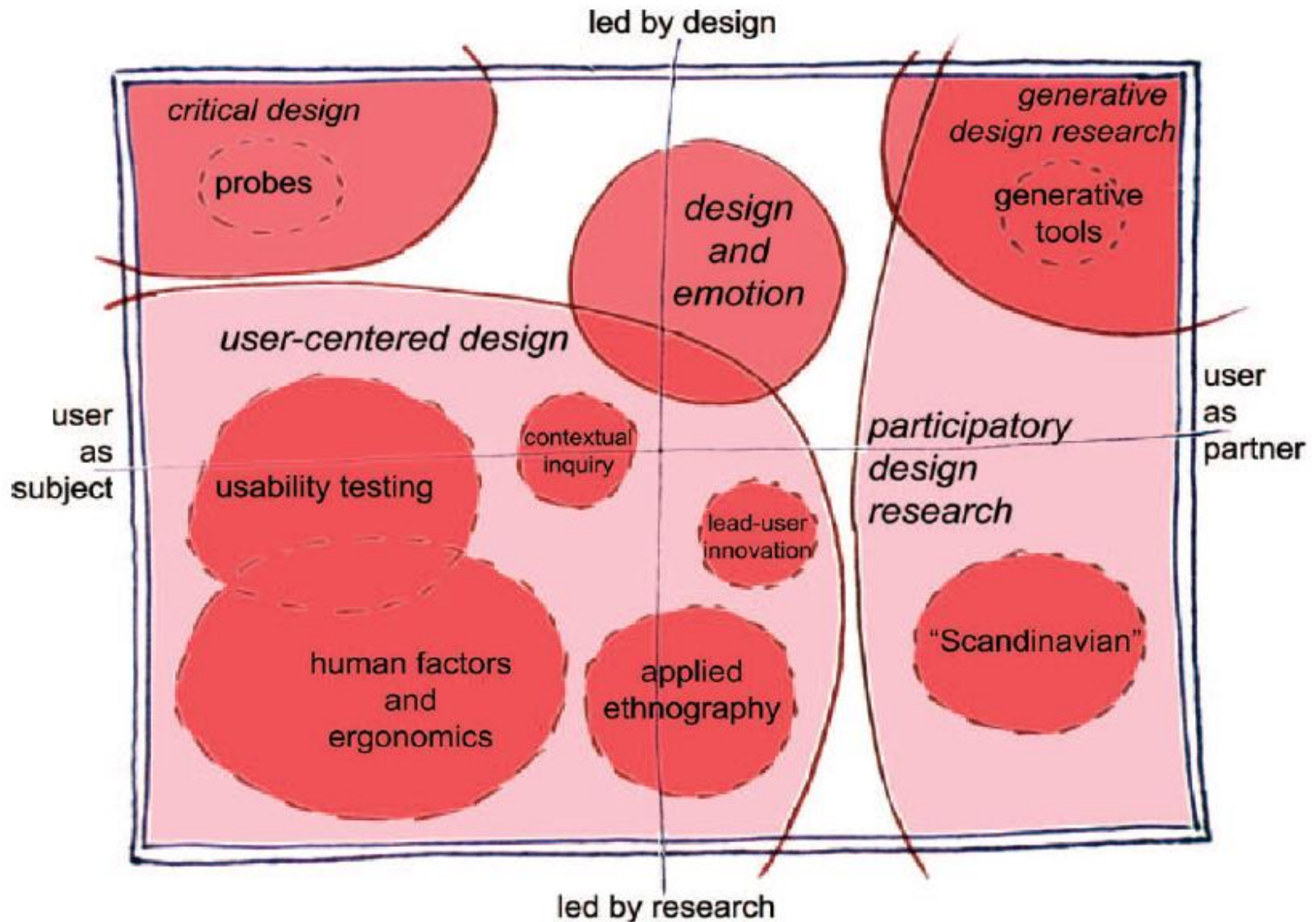
「自然流產」的社會設計：廣納男女

「傷心酒店旅行社」的方案原型 (prototype)：預約 App + 空間配置

@科技部計畫《性別多元的生育治理－隱默的聲音：台灣自然流產的醫學和社會形塑與主體經驗》

來源：https://www.nngroup.com/articles/design-thinking/

DESIGN THINKING 101
NNGROUP.COM

IMPLEMENT Put the vision into effect.

EMPATHIZE Conduct research to develop an understanding of your users.

TEST Return to your users for feedback.

DEFINE Combine all your research and observe where your users' problems exist.

PROTOTYPE Build real, tactile representations for a range of your ideas.

IDEATE Generate a range of crazy, creative ideas.

MATERIALIZE · UNDERSTAND · EXPLORE

Integrating Gender Methods into Engineering Process

External Knowledge and Technologies Basis

Internal Knowledge and Technologies Basis

ENGINEERING PROCESS WITH **GENDER METHODS**

RESEARCH

DEVELOPMENT

New Product or Service

- Rethinking Research Priorities and Outcomes
- Rethinking Concepts and Theories
- Formulating Research Questions
- Participatory Research and Design

- Rethinking Standards and Reference Models
- Rethinking Language and Visual Representations

- Analyzing Sex
- Analyzing Gender
- Analyzing how Sex and Gender Interact
- Analyzing Factors Intersecting with Sex and Gender

與社運團體合作的性別化創新

建立真實烏托邦

- to society: by making research more responsive to social needs
- to business: by developing new ideas, products and services
- to design: by introducing new concepts, tools and processes
- to research: by ensuring excellence and enhancing sustainability

Gendered Innovation as Responsible Innovation

Four dimensions of responsible innovation.

Dimension	Indicative techniques and approaches	Factors affecting implementation
Anticipation	Foresight Technology assessment Horizon scanning Scenarios Vision assessment Socio-literary techniques	Engaging with existing imaginaries Participation rather than prediction Plausibility Investment in scenario-building Scientific autonomy and reluctance to anticipate
Reflexivity	Multidisciplinary collaboration and training Embedded social scientists and ethicists in laboratories Ethical technology assessment Codes of conduct Moratoriums	Rethinking moral division of labour Enlarging or redefining role responsibilities Reflexive capacity among scientists and within institutions Connections made between research practice and governance
Inclusion	Consensus conferences Citizens' juries and panels Focus groups Science shops Deliberative mapping Deliberative polling Lay membership of expert bodies User-centred design Open innovation	Questionable legitimacy of deliberative exercises Need for clarity about, purposes of and motivation for dialogue Deliberation on framing assumptions Ability to consider power imbalances Ability to interrogate the social and ethical stakes associated with new science and technology Quality of dialogue as a learning exercise
Responsiveness	Constitution of grand challenges and thematic research programmes Regulation Standards Open access and other mechanisms of transparency Niche management[a] Value-sensitive design Moratoriums Stage-gates[b] Alternative intellectual property regimes	Strategic policies and technology 'roadmaps' Science-policy culture Institutional structure Prevailing policy discourses Institutional cultures Institutional leadership Openness and transparency Intellectual property regimes Technological standards

展望未來　增進社會素養

反思性　建立行為準則　參與審議活動

包含多元　邀請常民參與專家活動

積極回應　發聲明與指引

Source: Stilgoe et al. (2013)

•在你的領域，如果納入性別化創新，會有什麼新的研究問題、資料搜集的方法、與新的發現？

•期待各位的性別化創新！