



# 資料視覺化

Data Visualization

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# 資料視覺化的基本要素

Data Visualization Fundamentals

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款	項	目	節	科目編號	科目名稱	本年度預算數	上年度預算數	前年度決算數	本年度與上年度比
4	16	3		3505421200	少年事件處理	7,859	5,723	5,417	2,
4	16	4		3505421400	公證及提存事件處理	882	882	816	
4	16	5		3505429000	一般建築及設備	4,717	4,120	11,562	
4	16	6		3505429800	第一預備金	390	390	-	
4	17			3505430000	臺灣板橋地方法院	1,195,306	1,162,094	1,076,538	33,
4	17	1		3505430100	一般行政	1,059,499	1,018,290	961,938	41,
4	17	2		3505431000	審判業務	115,673	120,508	94,973	-4,
4	17	3		3505431200	少年事件處理	8,325	8,325	7,647	
4	17	4		3505431400	公證及提存事件處理	819	819	763	
4	17	5		3505439000	一般建築及設備	10,429	13,591	11,216	-3,
4	17	6		3505439800	第一預備金	561	561	-	
4	18			3505470000	臺灣桃園地方法院	915,504	872,453	794,248	43,
4	18	1		3505470100	一般行政	781,760	740,094	683,433	41,
4	18	2		3505471000	審判業務	95,716	111,400	92,985	-15,
4	18	3		3505471200	少年事件處理	13,212	10,031	9,638	3,
4	18	4		3505471400	公證及提存事件處理	1,434	1,434	1,415	
4	18	5		3505478500	司法機關擴建計畫	17,242	-	-	17,
4	18	6		3505479000	一般建築及設備	5,800	9,154	6,777	-3,
4	18	7		3505479800	第一預備金	340	340	-	
4	19			3505480000	臺灣新竹地方法院	540,298	486,608	411,091	53,
4	19	1		3505480100	一般行政	401,778	384,363	362,598	17,
4	19	2		3505481000	審判業務	38,841	40,385	35,512	-1,
4	19	3		3505481200	少年事件處理	4,374	4,824	4,382	-
4	19	4		3505481400	公證及提存事件處理	441	441	392	
4	19	5		3505488500	司法機關擴建計畫	89,813	54,052	5,748	35,
4	19	6		3505489000	一般建築及設備	4,716	2,208	2,458	2,
4	19	7		3505489800	第一預備金	335	335	-	
4	20			3505490000	臺灣苗栗地方法院	304,773	291,690	272,946	13,
4	20	1		3505490100	一般行政	270,954	256,599	239,574	14,
4	20	2		3505491000	審判業務	25,462	27,882	27,440	-2,
4	20	3		3505491200	少年事件處理	4,193	3,286	3,286	
4	20	4		3505491400	公證及提存事件處理	300	300	297	
4	20	5		3505499000	一般建築及設備	3,337	3,096	2,350	
4	20	6		3505499800	第一預備金	527	527	-	
4	21			3505500000	臺灣臺中地方法院	1,279,652	1,230,455	1,186,429	49,
4	21	1		3505500100	一般行政	1,148,656	1,097,389	1,052,475	51,

Default

政事別

主管單位

新增

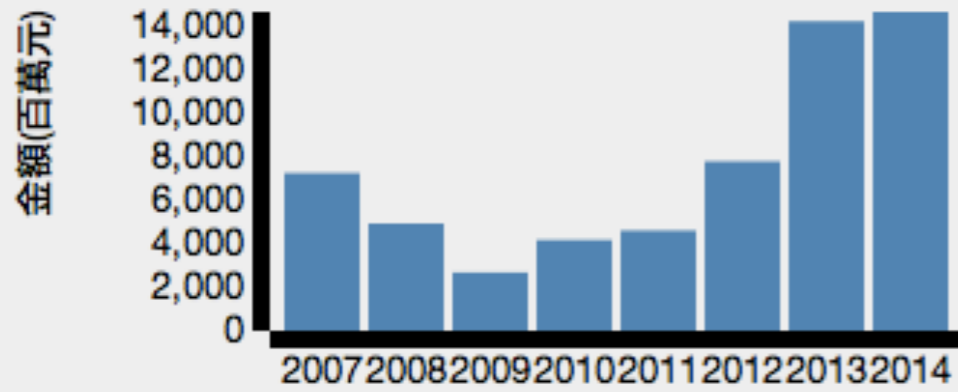
+25% +10% +2% +0% -2% -10% -25%

圖例

### i 臺灣鐵路管理局(交通部/營業基金)

147億元(+3.04%)  
(即為4億份營養午餐(回扣))

連結到此項 : <http://budget.g0v.tw/budget/6029018020>



例如: 林益世

標記相關人士

林益世

工研院

透過按一下表達你對於此預算的看法!

6人



希望追加

1人



表示不懂

8人

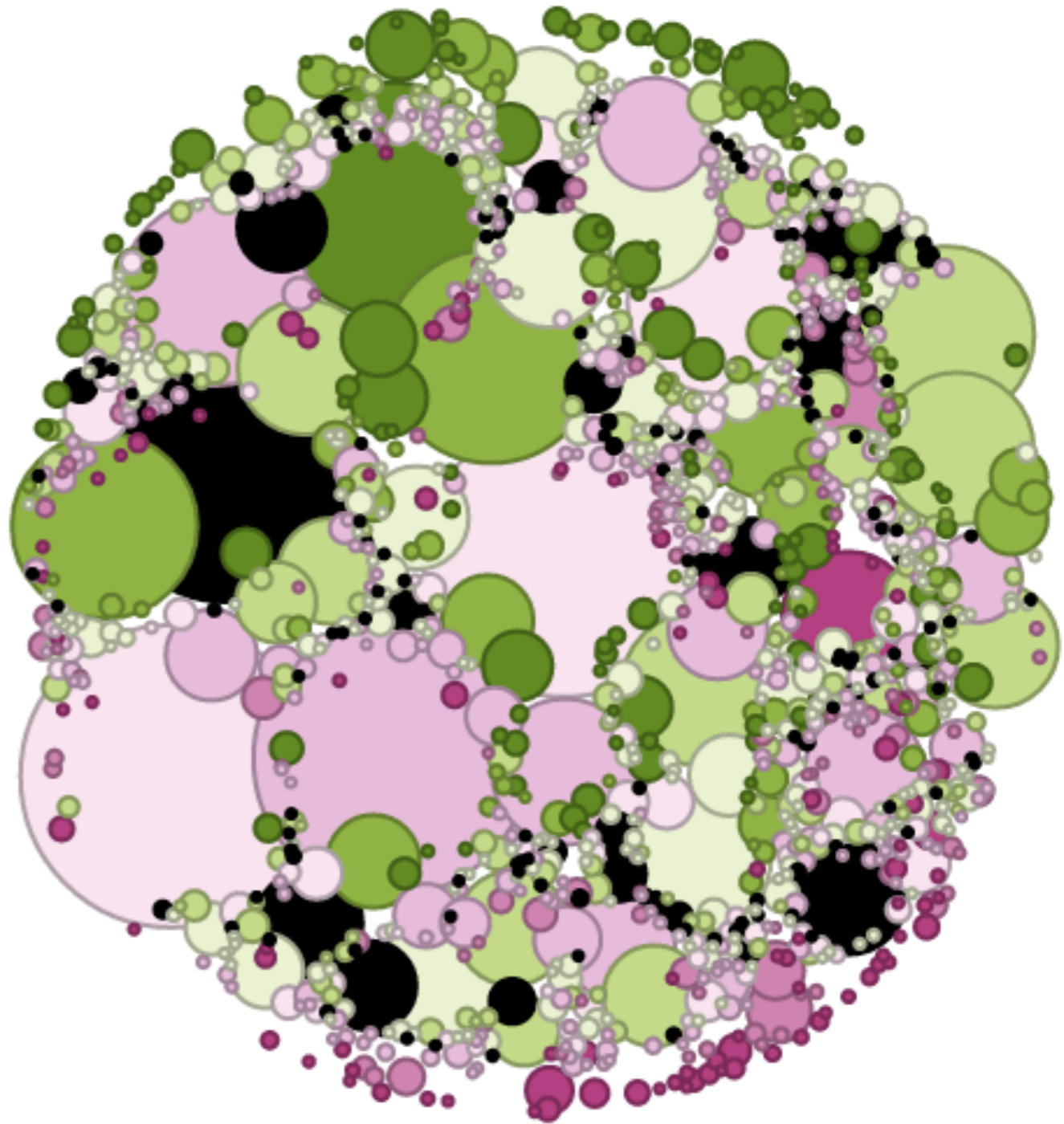


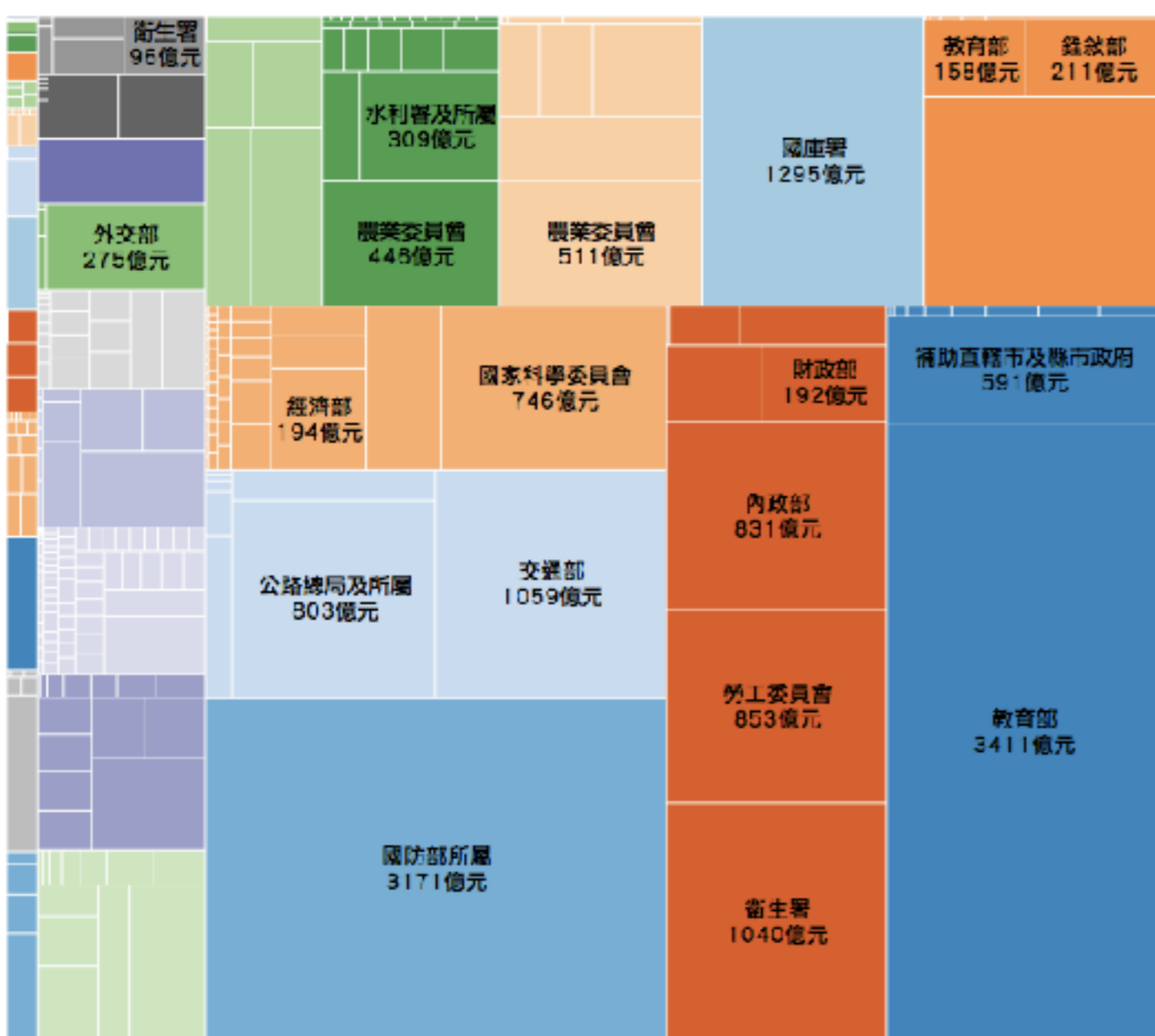
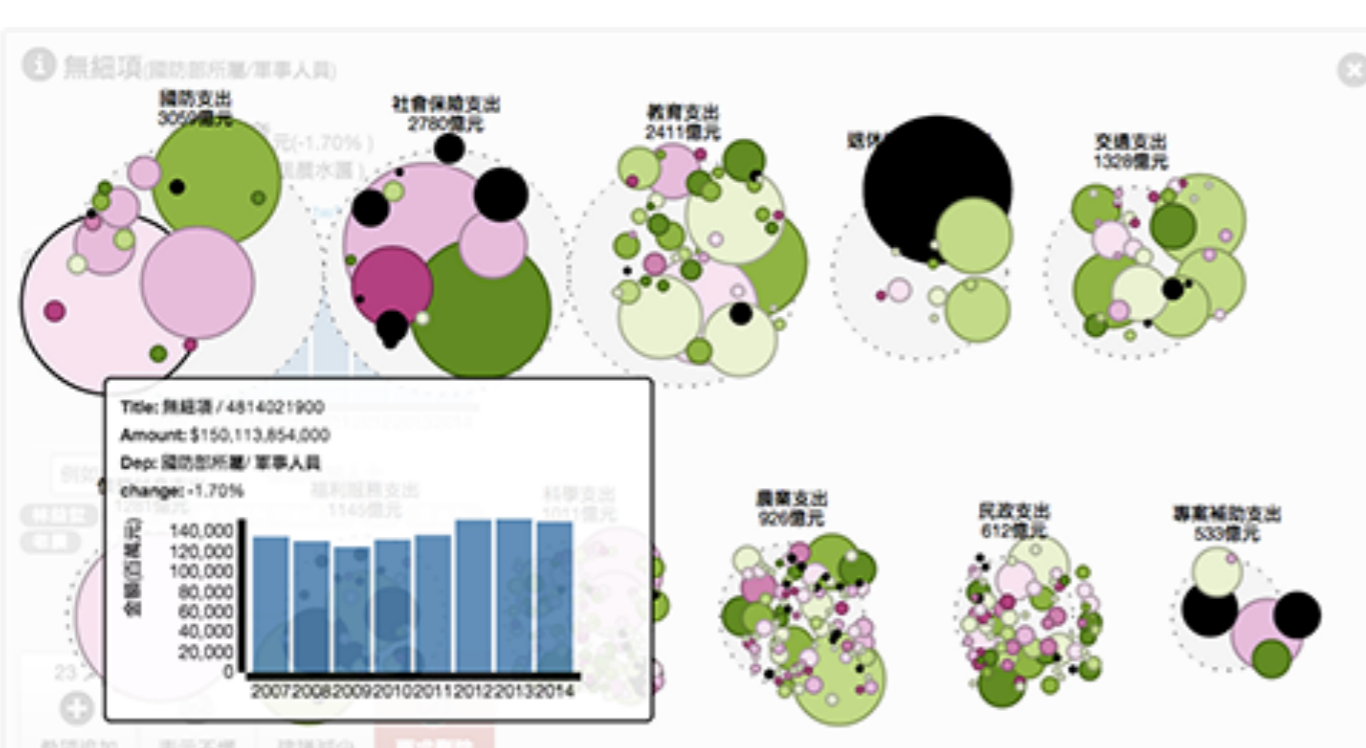
建議減少

3人



要求刪除





例如: 林益世 標記相關人士

林益世 馬英九 請先明列用途細項 紙 曹金生 老農

透過按一下表達你對於此預算的看法!

23 人 + 希望追加	23 人 ? 表示不懂	151 人 - 建議減少	251 人 ⊘ 要求刪除
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5 則回應

省市地方政府 2千座釣魚台 衛生福利部主管 1千座釣魚台

同時於 Facebook 上發表 以 Kirby Wu 身分發表 (更改) 留言

王歐郎 · 追蹤 · 留言最多的人 · 牽光中一小小小小目願打雜 王者兼特教  
會增加是因為已經確定好的款項現在才進 因為有一票裝備要進來...(拿掉這些可是負成長)  
回覆 · 讚 · 追蹤貼文 · 2013年12月25日 14:46

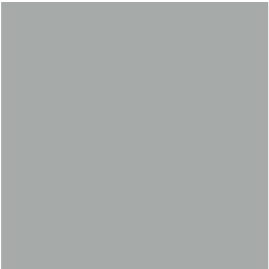
林敬倫 · Scream Lab 員工  
沒有細項的支出，該砍了吧  
回覆 · 讚 · 追蹤貼文 · 2013年9月17日 23:48

委員會主管 1千座釣魚台 交通部主管 1千座釣魚台 還有 3 個留言 內政部主管 1千座釣魚台 經濟部主管 760.1座釣魚台

Facebook 社群外掛元件

7	8	5	1	7	8	7	5	4	9	2	5	6	3	1	6	1	8	5
9	1	2	6	5	8	6	9	5	6	1	7	3	1	5	8	8	9	4
3	5	4	2	1	5	8	7	5	1	3	9	1	3	6	1	9	7	3
6	9	9	9	5	9	9	2	4	6	1	6	1	2	5	4	5	9	8
5	9	2	9	3	2	3	2	7	7	6	6	1	4	3	9	9	2	7
1	2	7	2	6	8	6	4	6	9	6	9	7	6	1	2	1	1	9
4	6	5	1	6	1	8	1	2	1	4	5	1	3	7	3	9	9	4
6	8	7	4	4	3	9	8	3	7	9	8	1	3	4	6	6	6	6
8	2	4	2	9	3	3	5	5	1	4	7	3	6	2	1	9	8	7
1	7	6	3	1	5	9	2	3	7	7	8	9	1	4	4	7	8	3
4	3	6	6	2	6	1	9	3	5	1	7	4	1	1	3	5	1	9
9	6	8	6	6	8	8	2	4	3	6	9	6	5	2	2	3	5	6
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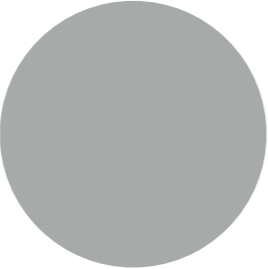
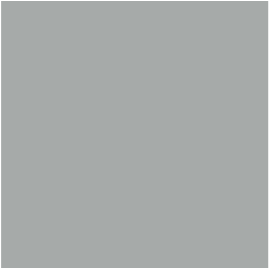
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5	9	2	9	3	2	3	2	7	7	6	6	1	4	3	9	9	2	7
1	2	7	2	6	8	6	4	6	9	6	9	7	6	1	2	1	1	9
4	6	5	1	6	1	8	1	2	1	4	5	1	3	7	3	9	9	4
6	8	7	4	4	3	9	8	3	7	9	8	1	3	4	6	6	6	6
8	2	4	2	9	3	3	5	5	1	4	7	3	6	2	1	9	8	7
1	7	6	3	1	5	9	2	3	7	7	8	9	1	4	4	7	8	3
4	3	6	6	2	6	1	9	3	5	1	7	4	1	1	3	5	1	9
9	6	8	6	6	8	8	2	4	3	6	9	6	5	2	2	3	5	6
3	8	4	4	6	5	2	9	2	4	3	4	7	7	2	3	1	8	7



color

shadow

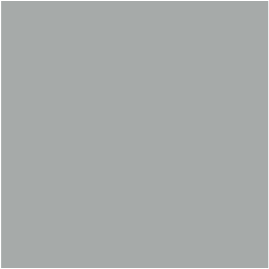
closure



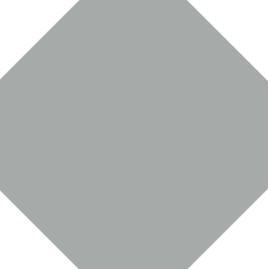
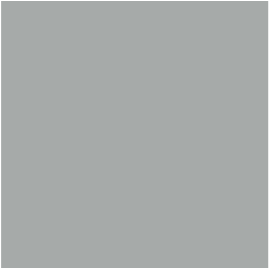
shape

proximity

enclosure

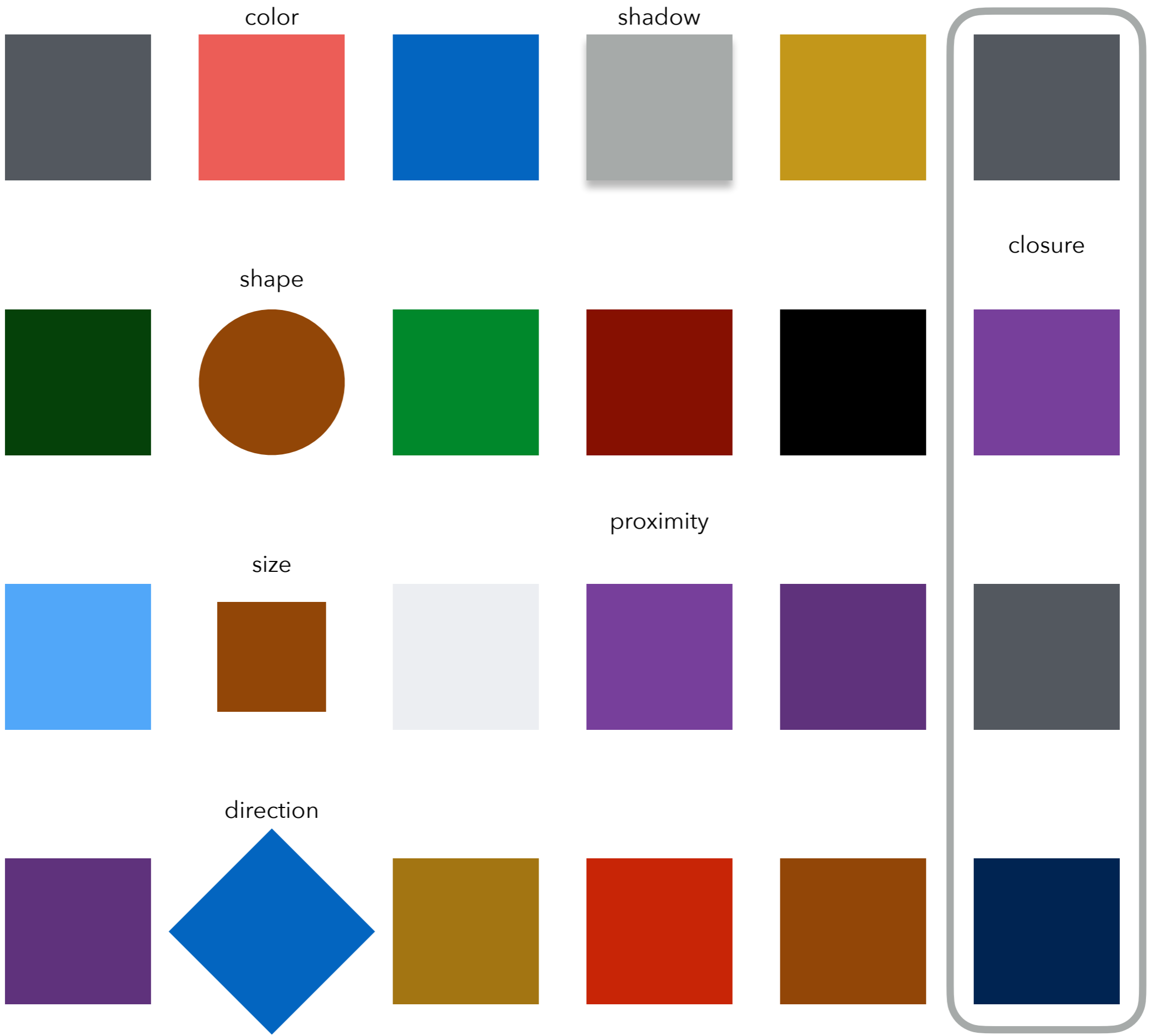


size



direction





# 零時政府官網

22 位主要開發者

  
yjlou

  
ronnywang

  
floydsoft

  
youchenlee

  
lanfon72

  
jeffhung

  
jessy1092

  
caasi

  
thebrecht

  
darbychang

  
dannvix

  
shelling

  
carlcarl

  
yhsiang

  
victorhsieh

  
zbryikt

  
audreyt

  
pofeng

  
walkingice






  
chilijung

  
clkao

  
ipaaa

# moedict

18 位主要開發者

 youchenlee    viirya    miau715    yhsiang    miaout17    miaoski    lwhsu    timdream    a-tsioh    kcwu    caasi

 wildjrt

 muan

 clkao

 c9s

 hlb

 ethantw



au

通自  
系檢方  
(115)

承做假  
偵辦

覆包  
(405)

邱彥  
王起來

出入都  
(3237)

間就出現，《蘋果》即時新聞統整這一年，不包括鄭捷案，加上今天這起，北捷驚魂事件就有以下16起：

### 1、北捷中山站持刀砍人 4人受傷送醫

今天台北捷運中山站4號出口附近，剛有男子持刀砍人，造成4人受傷，警消已趕赴現場，將傷者送醫，砍人男子已被捷運保全壓制落網。

### 2、北捷再現隨機殺人 1男學生胸口中刀

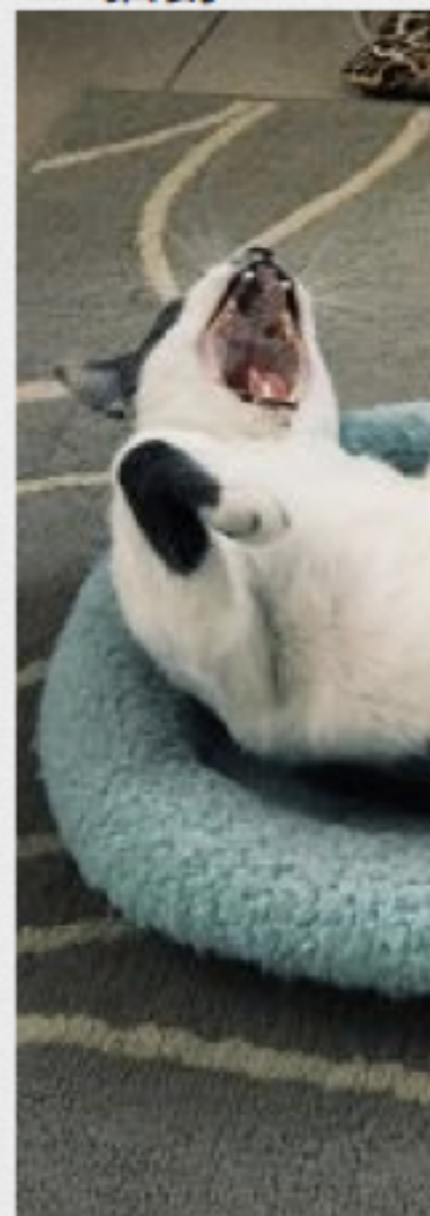
北捷台北捷運站發生隨機傷人案，1名男學生搭手扶梯下樓，突遭身旁1名男子以利器割向胸口，男學生受傷後痛苦的用雙手摀住傷口，旅客發現立即報案。

### 3、捷運台大醫院站 2男互毆乘客驚逃

日前捷運台大醫院站發生鬥毆案件，67歲男子與40多歲男子在捷運站口角後大打出手，一旁乘客發現嚇得趕緊逃離車站，警方趕抵將2人拉開，40多歲男子眼睛瘀青臉部撕裂傷，被緊急送往台大醫院，67歲男子則是拒送。

騎士新資減壓

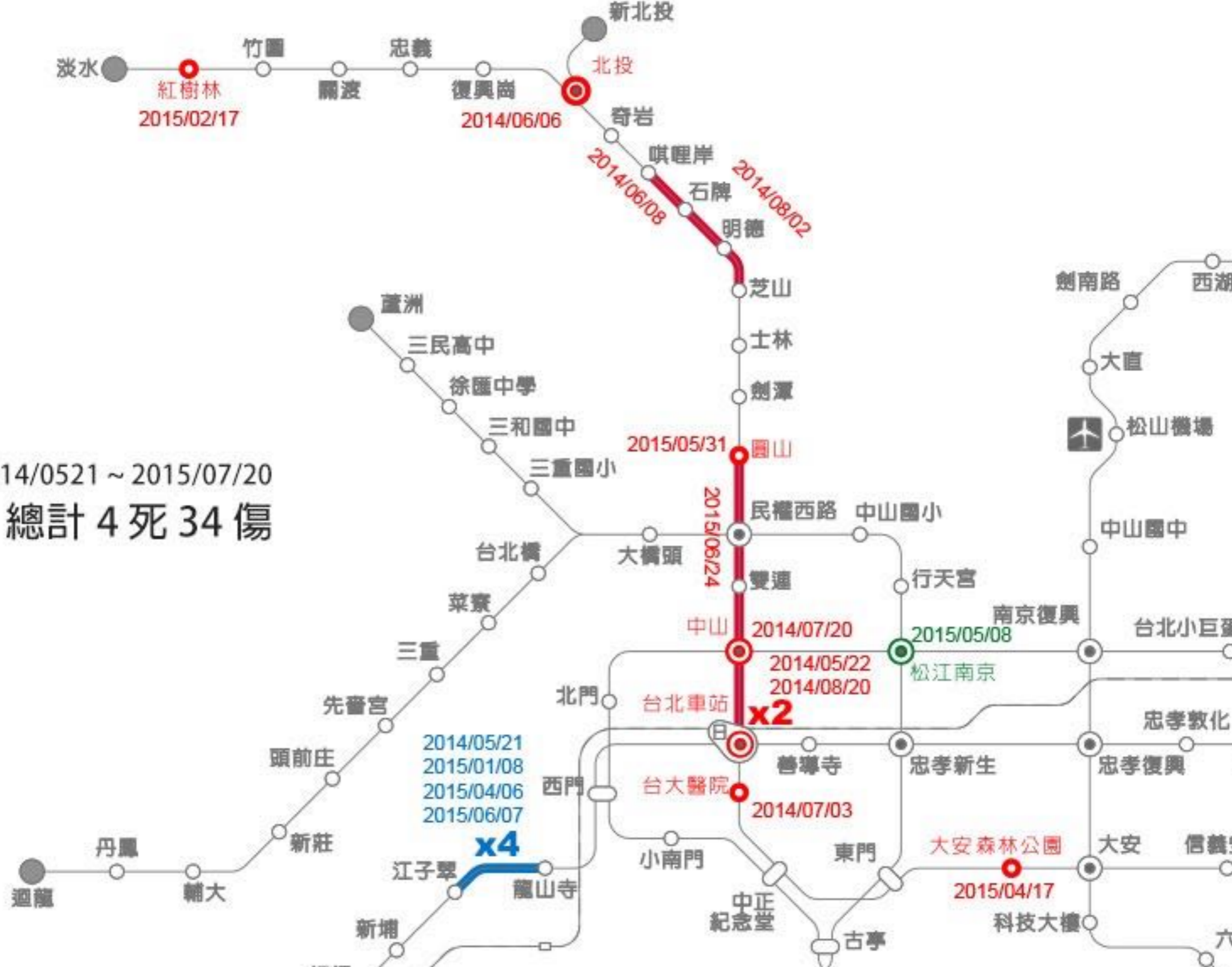
#毛小孩  
貓爵



啾醬：早～哈～  
7小時

Crowdy  
展開 我在痞客

2014/0521 ~ 2015/07/20  
 總計 4 死 34 傷





# 資料視覺化的基本要素

Data Visualization Fundamentals

I – 功能面

Functional Aspect

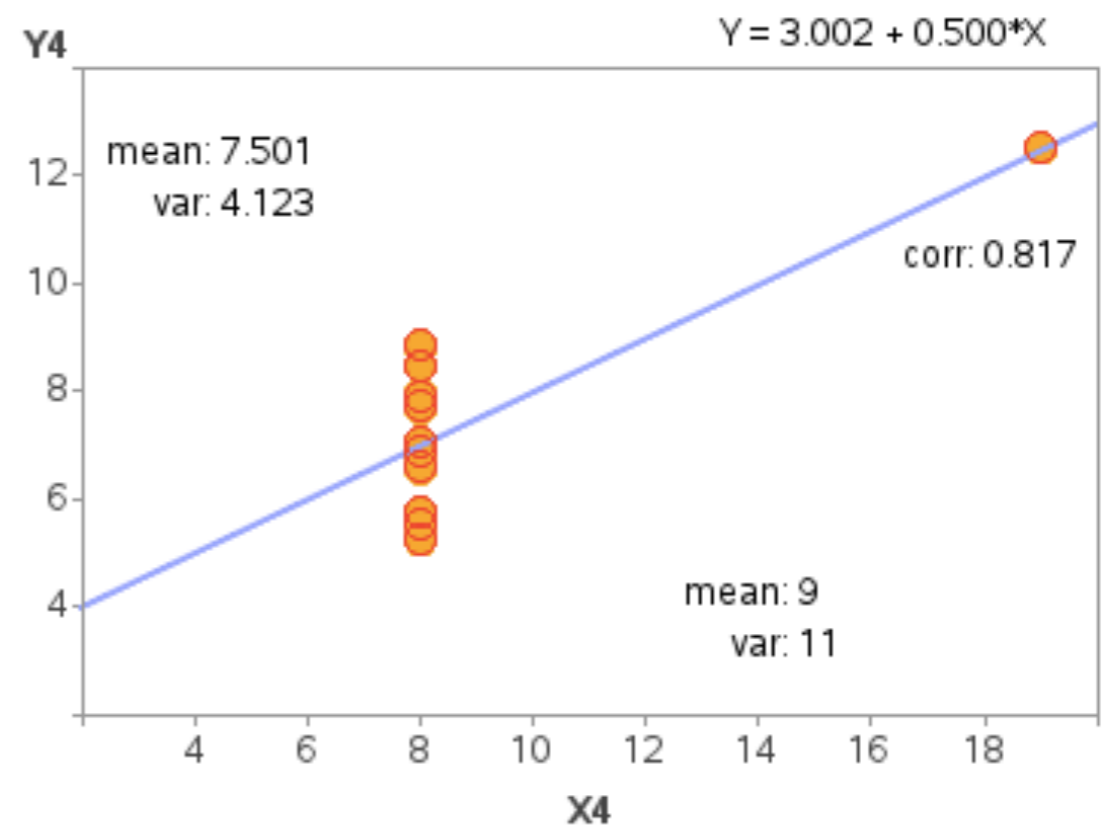
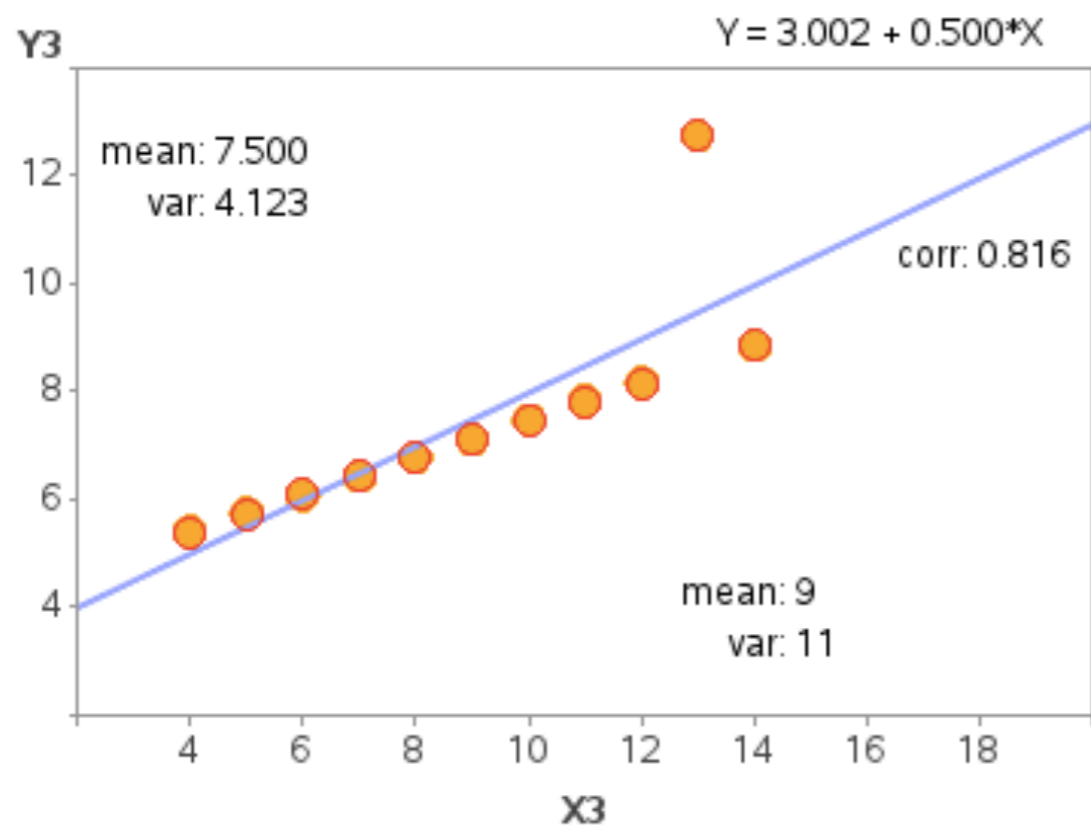
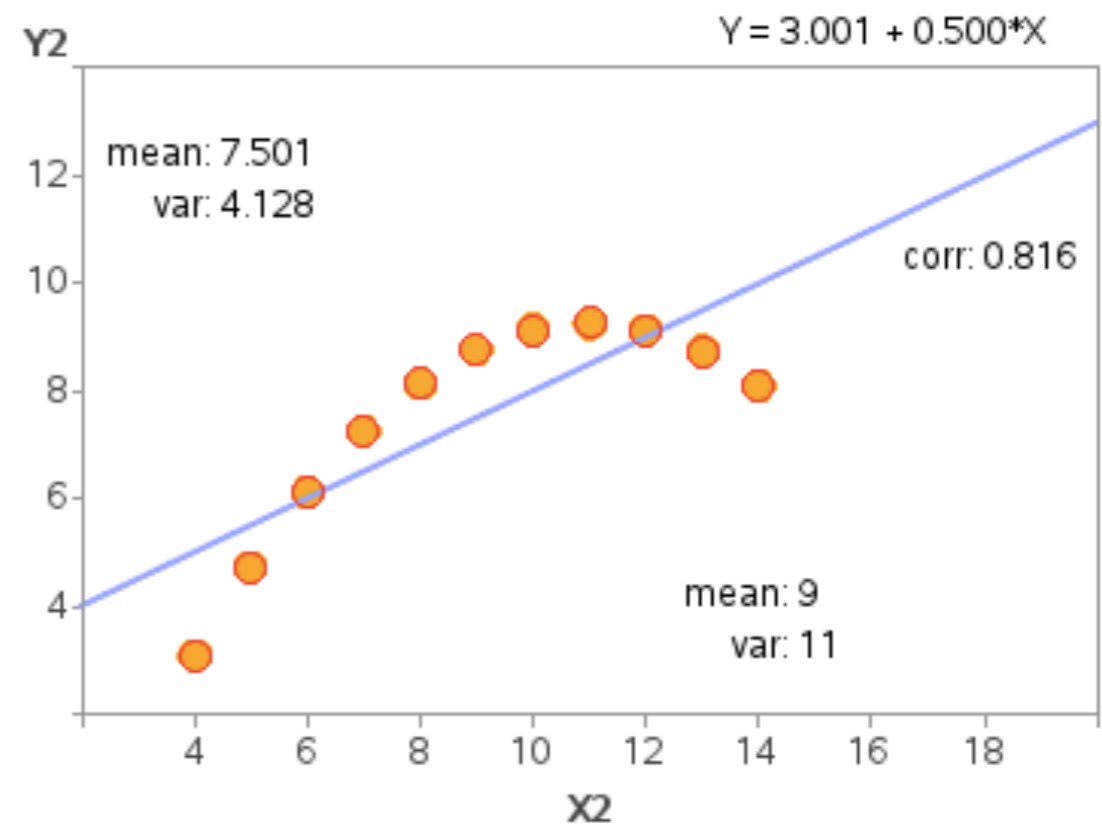
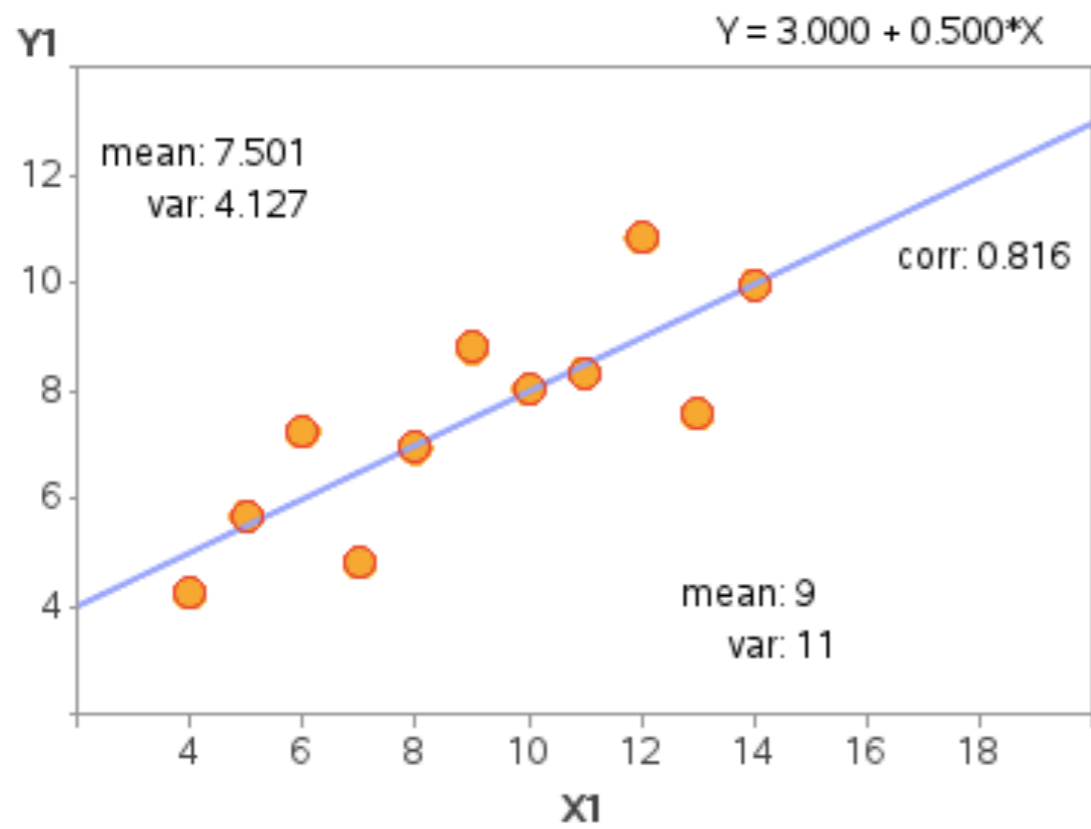
# Anscombe's quartet

I		II		III		IV	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

I		II		III		IV	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

Property	Value	Accuracy
Mean of $x$	9	exact
Sample variance of $x$	11	exact
Mean of $y$	7.50	to 2 decimal places
Sample variance of $y$	4.125	plus/minus 0.003
Correlation between $x$ and $y$	0.816	to 3 decimal places
Linear regression line	$y = 3.00 + 0.500x$	to 2 and 3 decimal places, respectively





[-] [NetflixisGr8](#) 383 指標 3小時前

Is this a joke or are the organizers of this event intentionally trying to call someone out

[永久連結](#) [儲存](#) [檢舉](#) [贈送金幣](#) [回覆](#)

[-] [TheMexicanRobot](#) [S] 319 指標 3小時前

I think it's a tongue in cheek kinda thing

[永久連結](#) [儲存](#) [上層留言](#) [檢舉](#) [贈送金幣](#) [回覆](#)

[-] [cake4chu](#) 87 指標 2小時前

Major Nelson is going to hunt your friend down.

[永久連結](#) [儲存](#) [上層留言](#) [檢舉](#) [贈送金幣](#) [回覆](#)

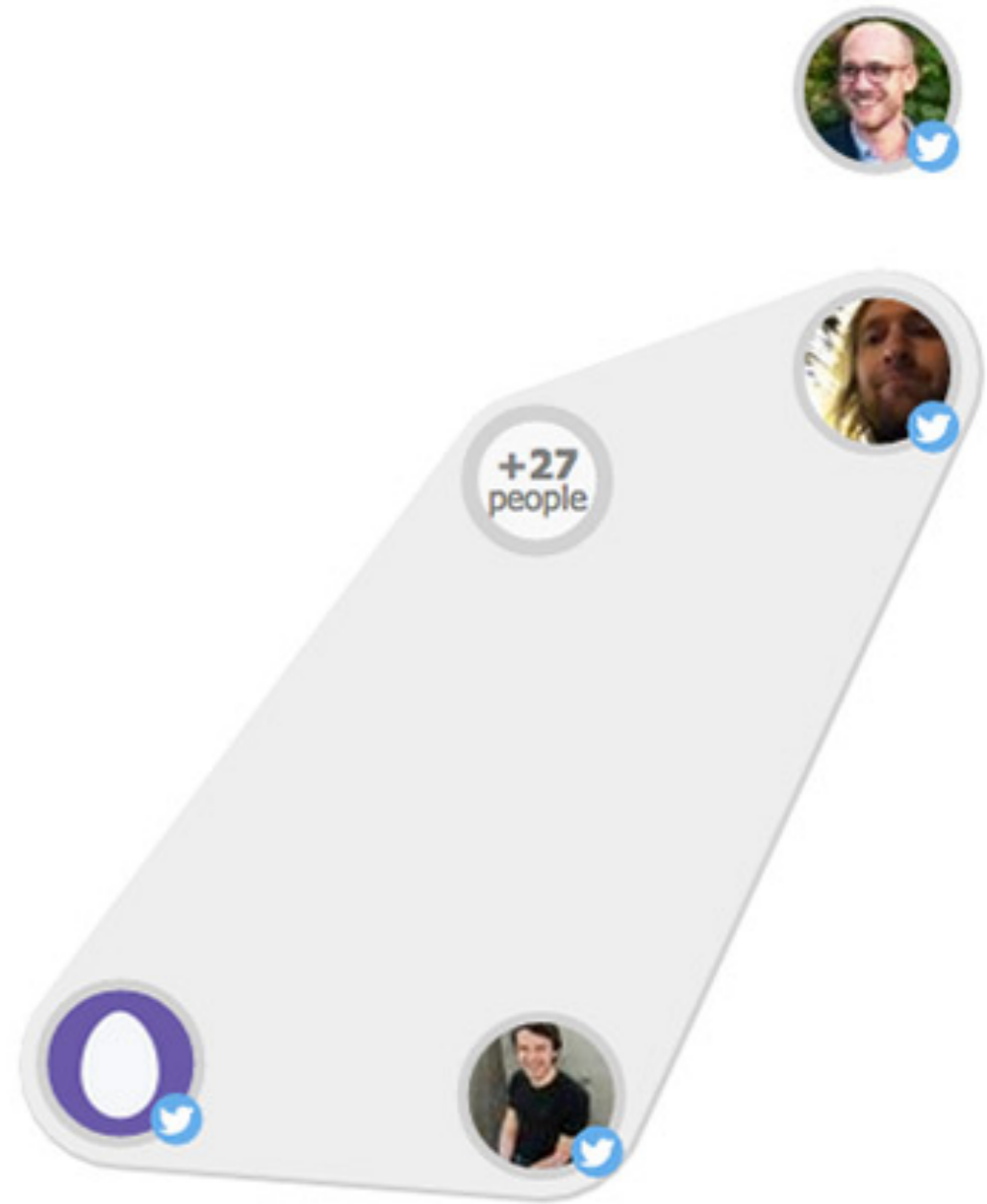
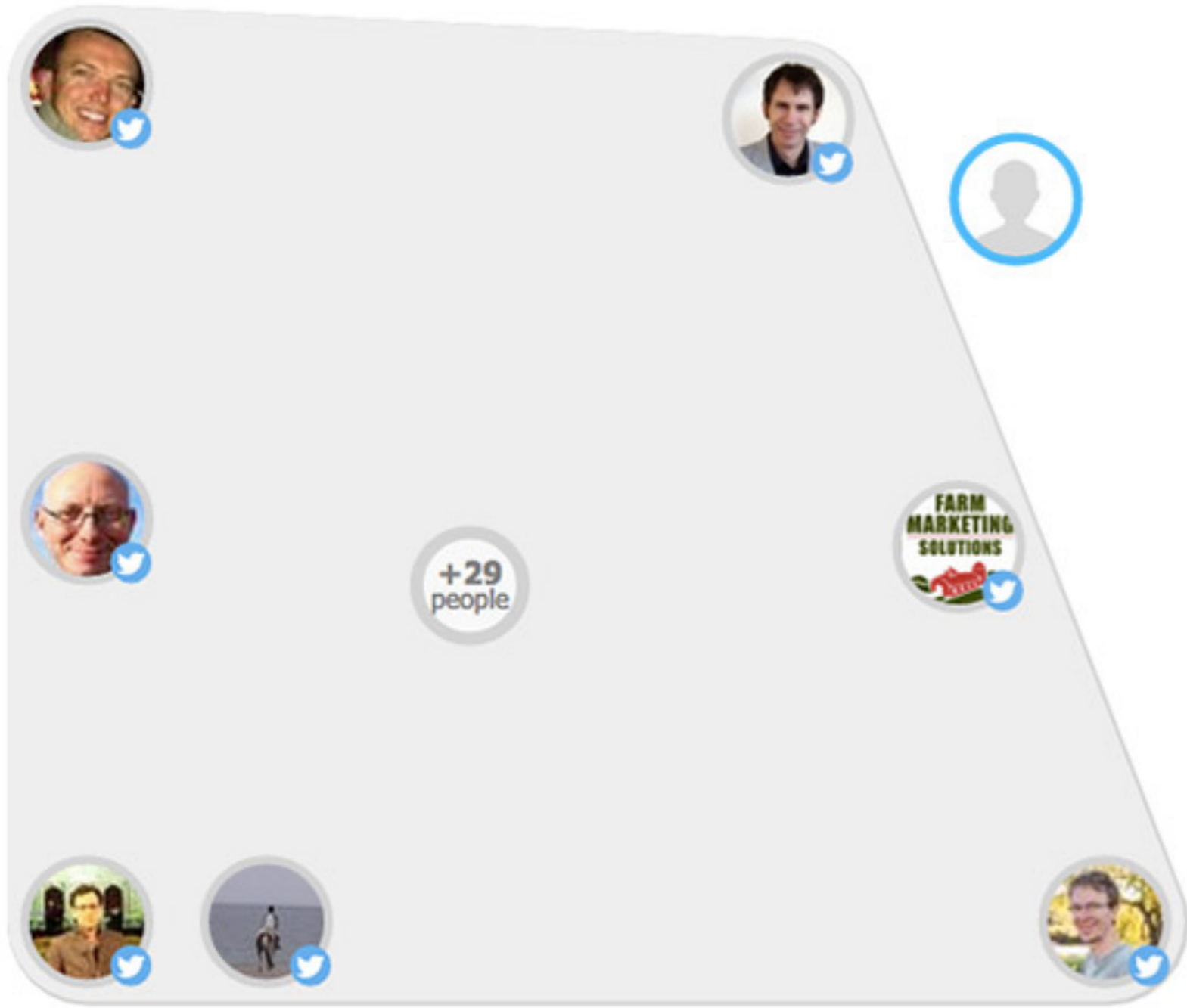
[-] [persona\\_dos](#) 28 指標 49 minutes ago

Let's summon him. [u/majornelson](#)

[永久連結](#) [儲存](#) [上層留言](#) [檢舉](#) [贈送金幣](#) [回覆](#)

[-] [Lark\\_vi\\_Britannia](#) 18 指標 42 minutes ago

... **212 more**



React Write Majority



## GROUP SUMMARY

39 people



### ▲ 86% AGREED

37 in the selected group saw this comment.  
32 of those participants agreed.

**Football is 'too big to fail'**

Comment submitted Sun Jan 11 2015

### ▲ 9

12 in the  
11 of the

As league  
game  
path  
appr  
them  
best.

Comm



Sol Villarreal •



Christopher Small •



John Suscovich •

	 Insertion	 Selection	 Bubble	 Shell	 Merge
 Random					
 Nearly Sorted					
 Reversed					
 Few Unique					

# Sorting Algorithms Comparison



# 資料視覺化的基本要素

Data Visualization Fundamentals

**II – 美感面**

Aesthetic Aspect



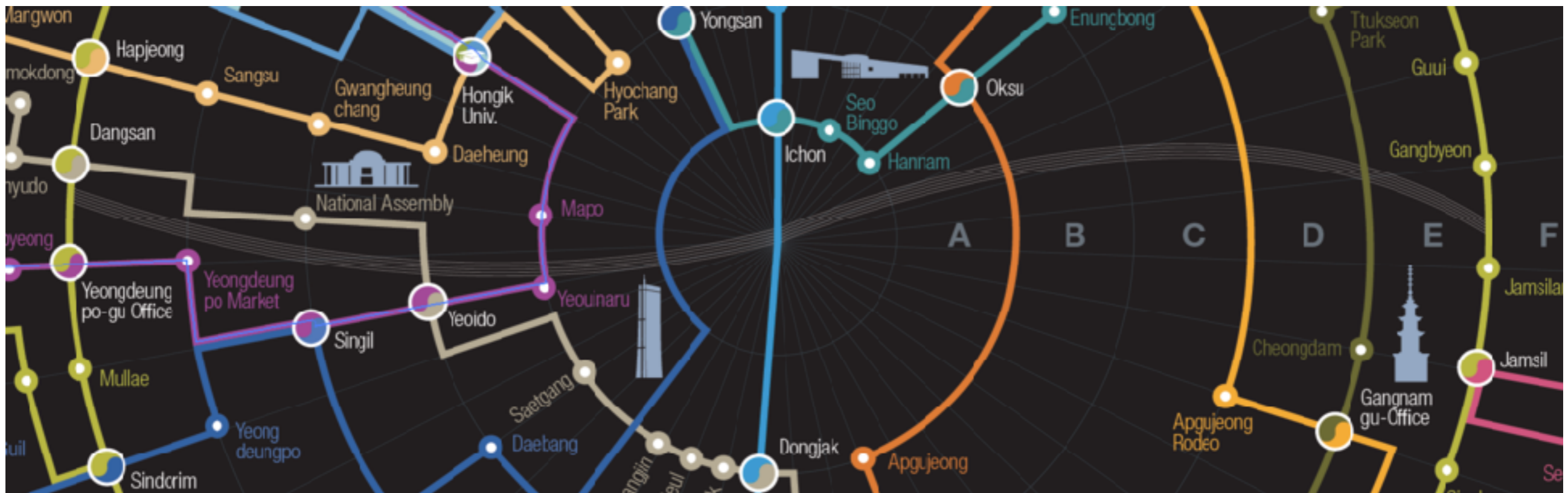
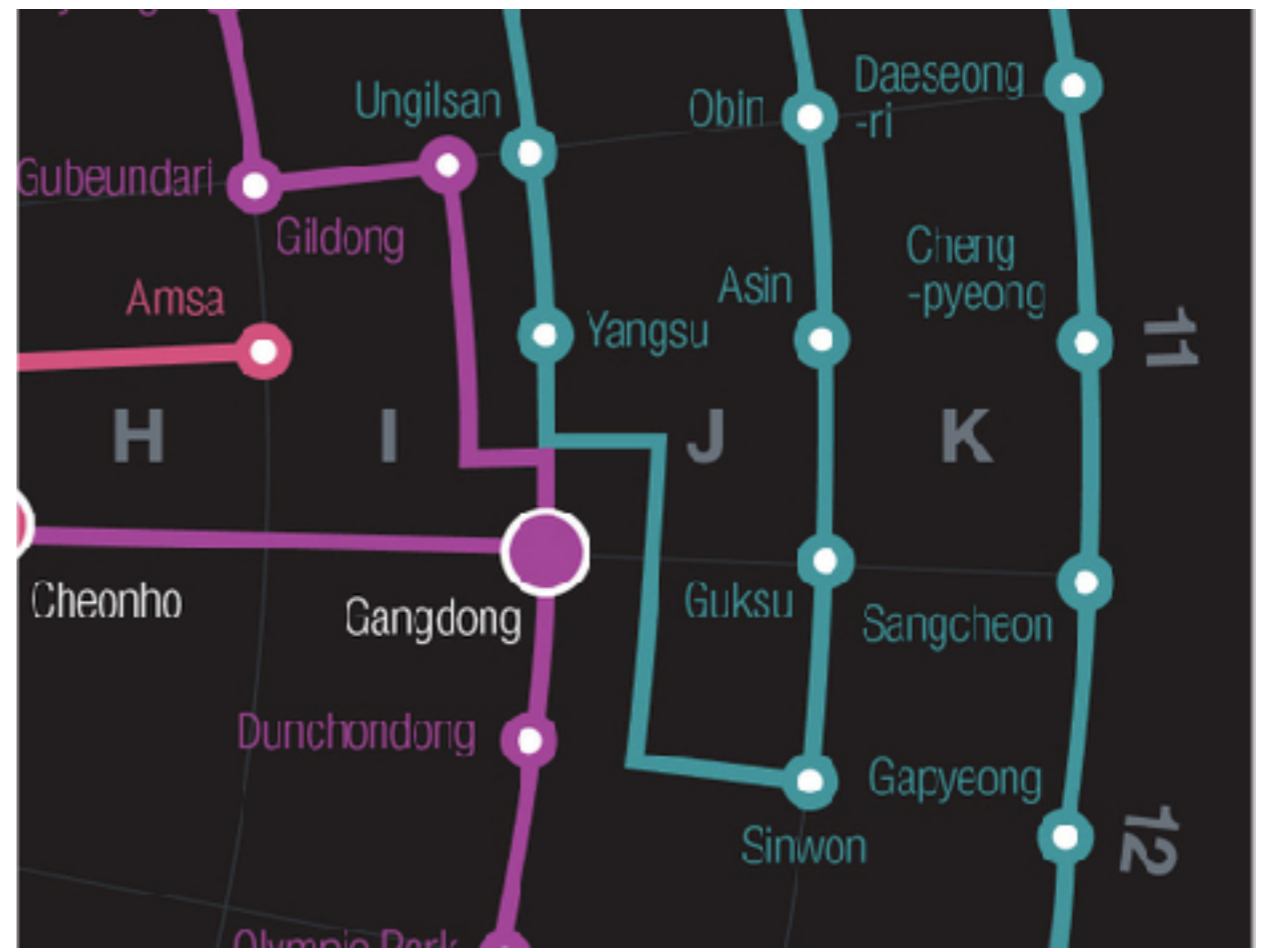


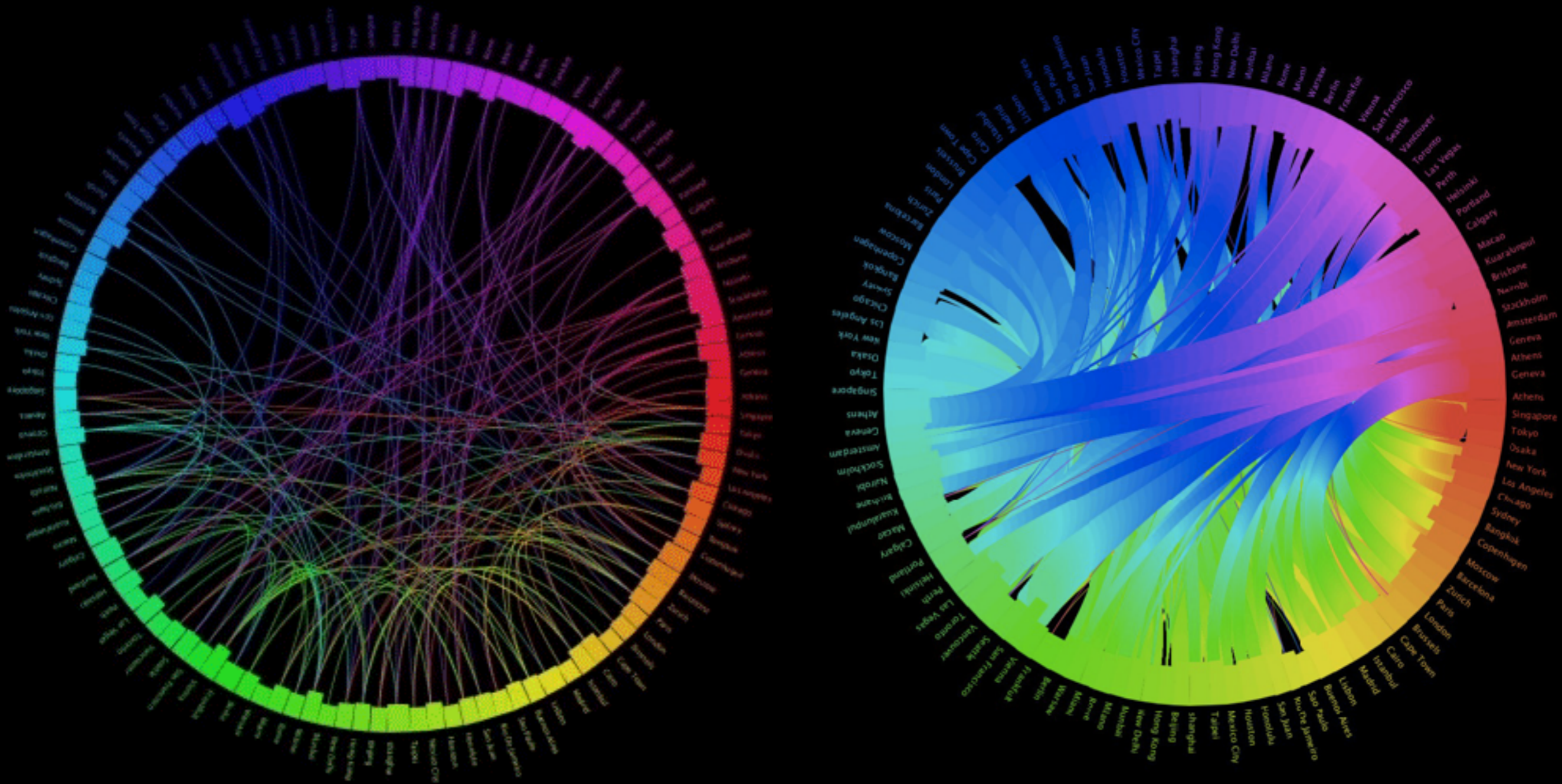
# balance and symmetry

Seoul Metro Map, Visual Design Explorations (2015 revisited), Sung Hyun Cho

<http://www.sunghcho.com/seoul-metro/>



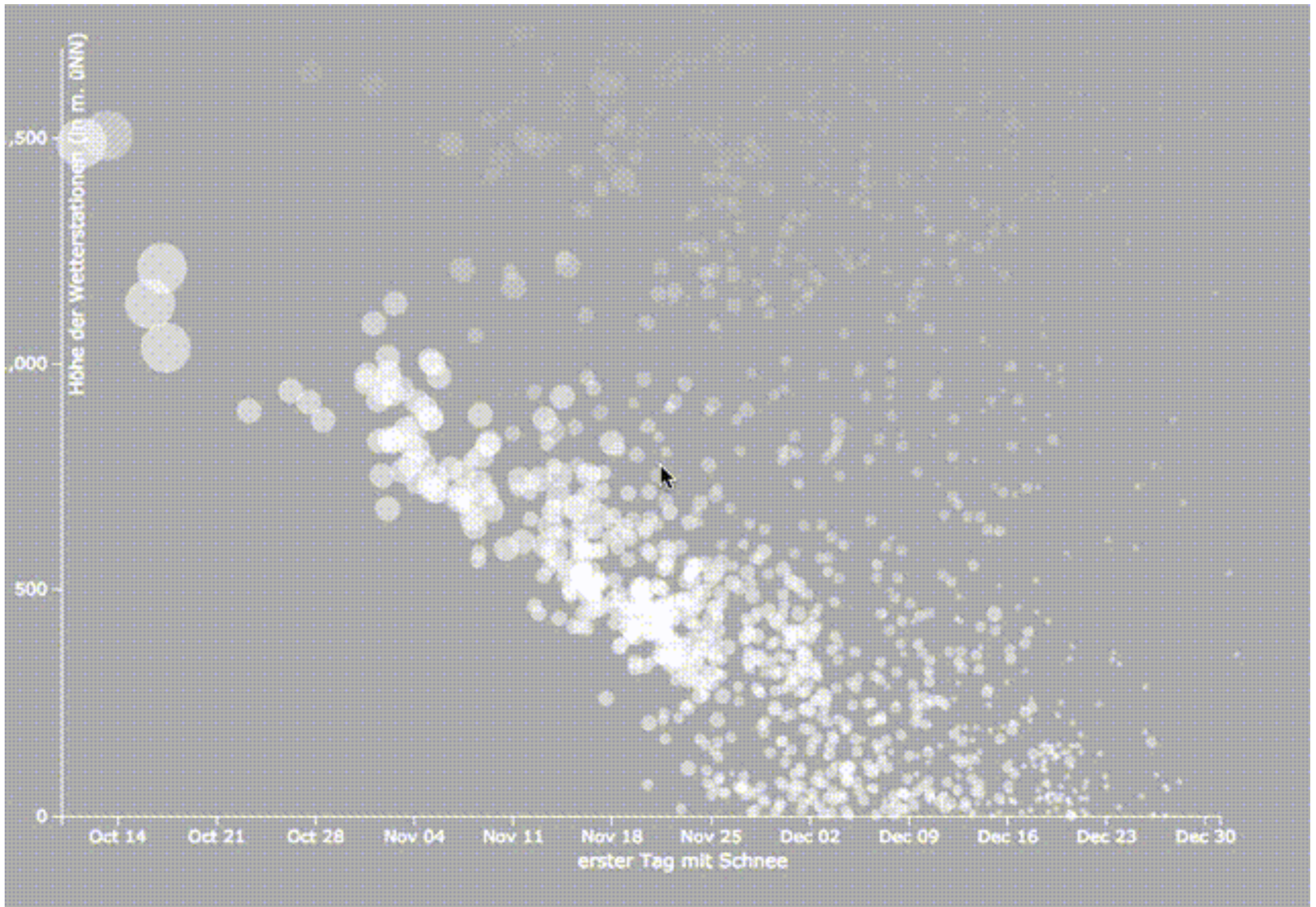


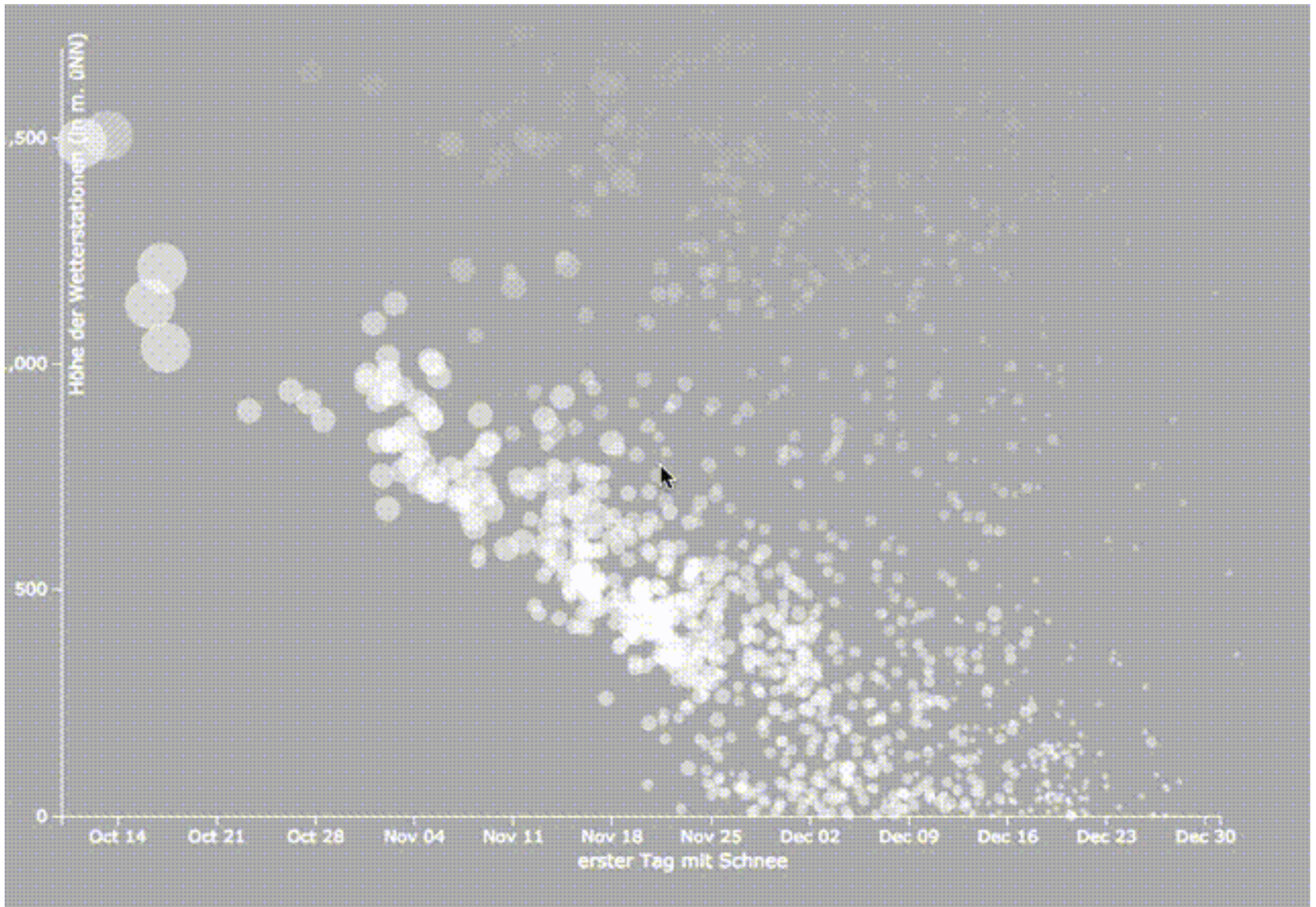


# World Flight Visualization

Takuma k, 2015/09/17

<https://www.behance.net/gallery/29597595/World-Flight-Visualization>



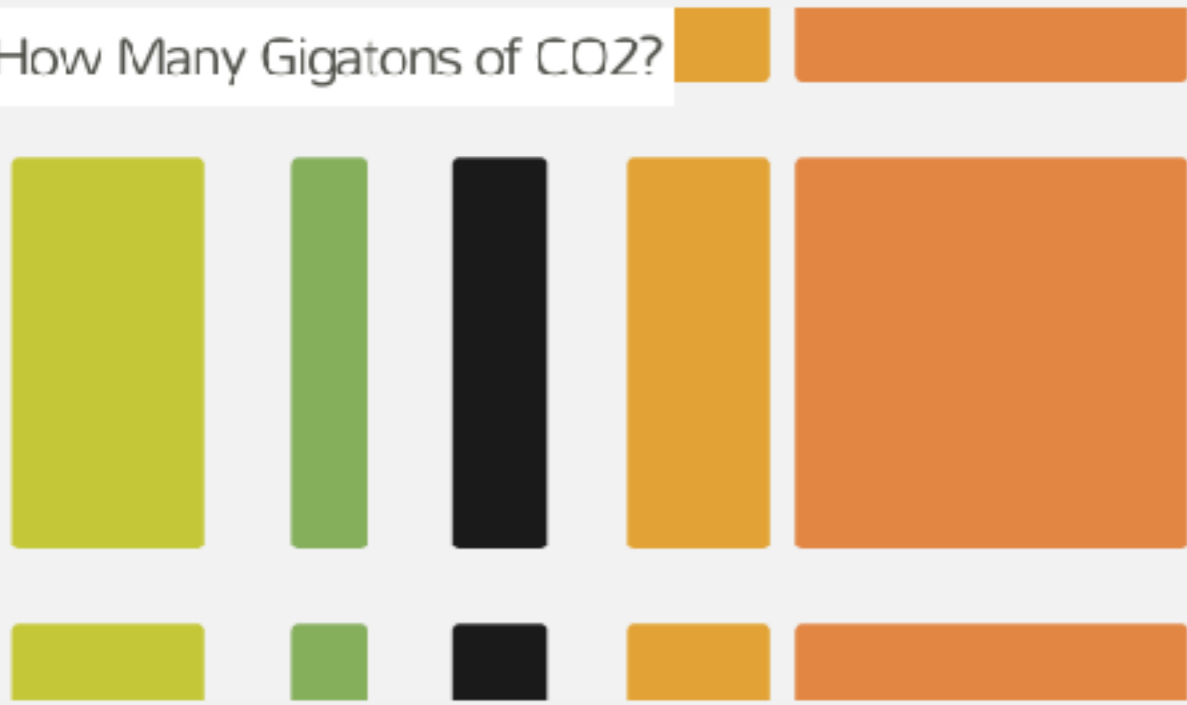


## 初雪時間、海拔與積雪深度

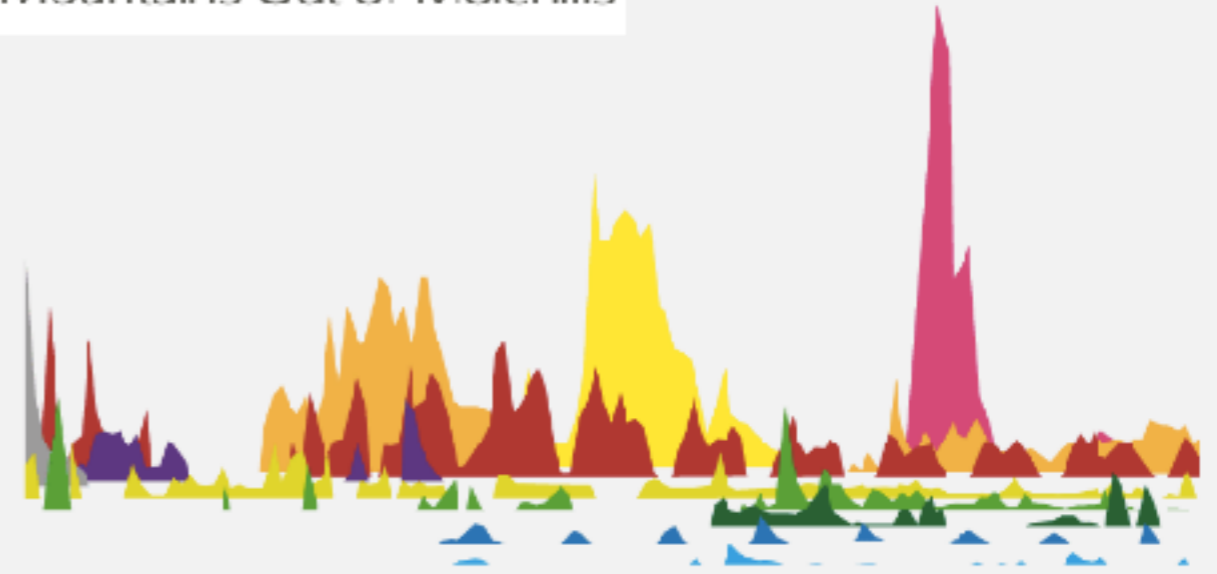
Spiegel Online, 2015

<http://www.spiegel.de/panorama/wetter-wann-faellt-in-deutschland-der-erste-schnee-a-1064475.html>

How Many Gigatons of CO2?



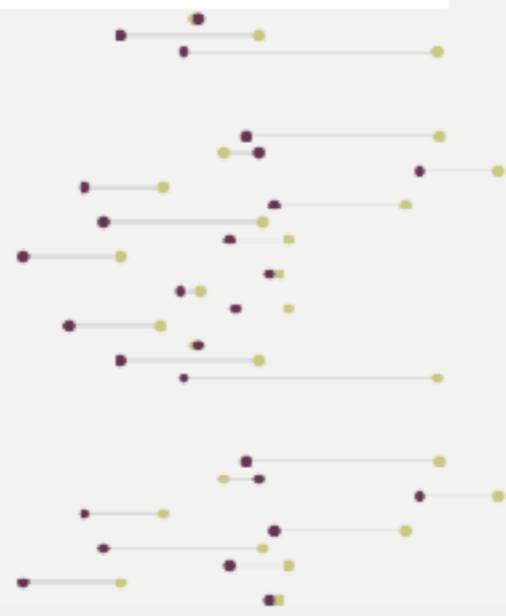
Mountains Out of Molehills



Who Old Are You?



Gender Pay Gap UK



Common MythConceptions



# Information is Beautiful

David Mccandleuss

<http://www.informationisbeautiful.net/>



# 痛斥槍械零管制

# 20分鐘



就有1名美國人死於槍下

但美國議會偏偏不敢跟國家步槍協會  
「打對台」提出嚴格規管槍械

涉及槍械的自殺及謀殺案的死亡人數

過去 **25**年

美軍在阿富汗和伊拉克陣亡  
加埋恐襲美國中死亡的人數



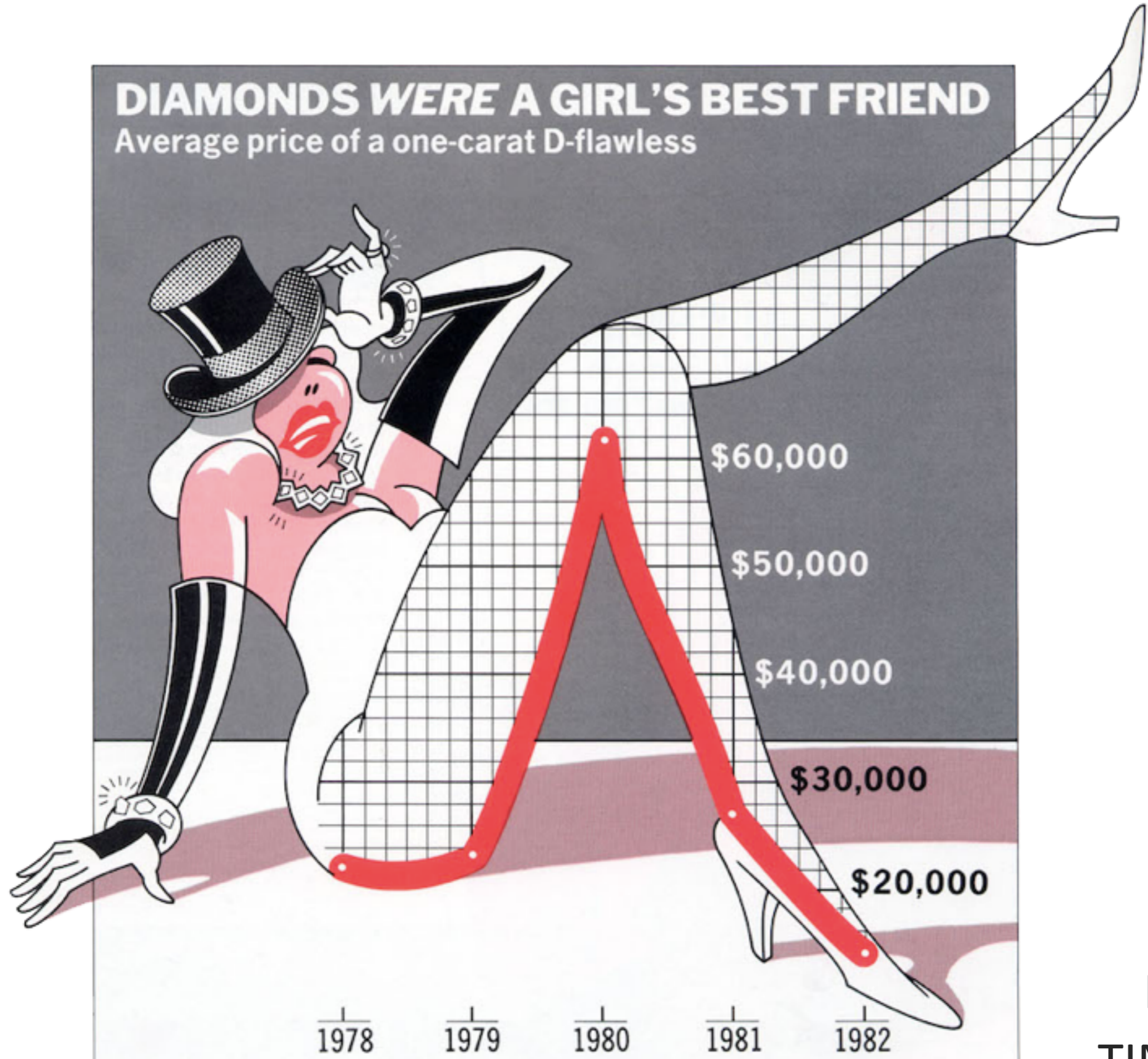
過去 **6**個月

美國在半年內發生 涉及槍械的  
自殺及謀殺案的死亡人數



# DIAMONDS WERE A GIRL'S BEST FRIEND

Average price of a one-carat D-flawless



TIME Chart by Nigel Holmes

Source: The Diamond Registry

Nigel Holmes  
TIME Magazine



# Chart Junk Debate

「凡對讀者的智力抱著懷疑態度來對待的人，  
也無法寫出像樣的作品。」

- *E.B. White*

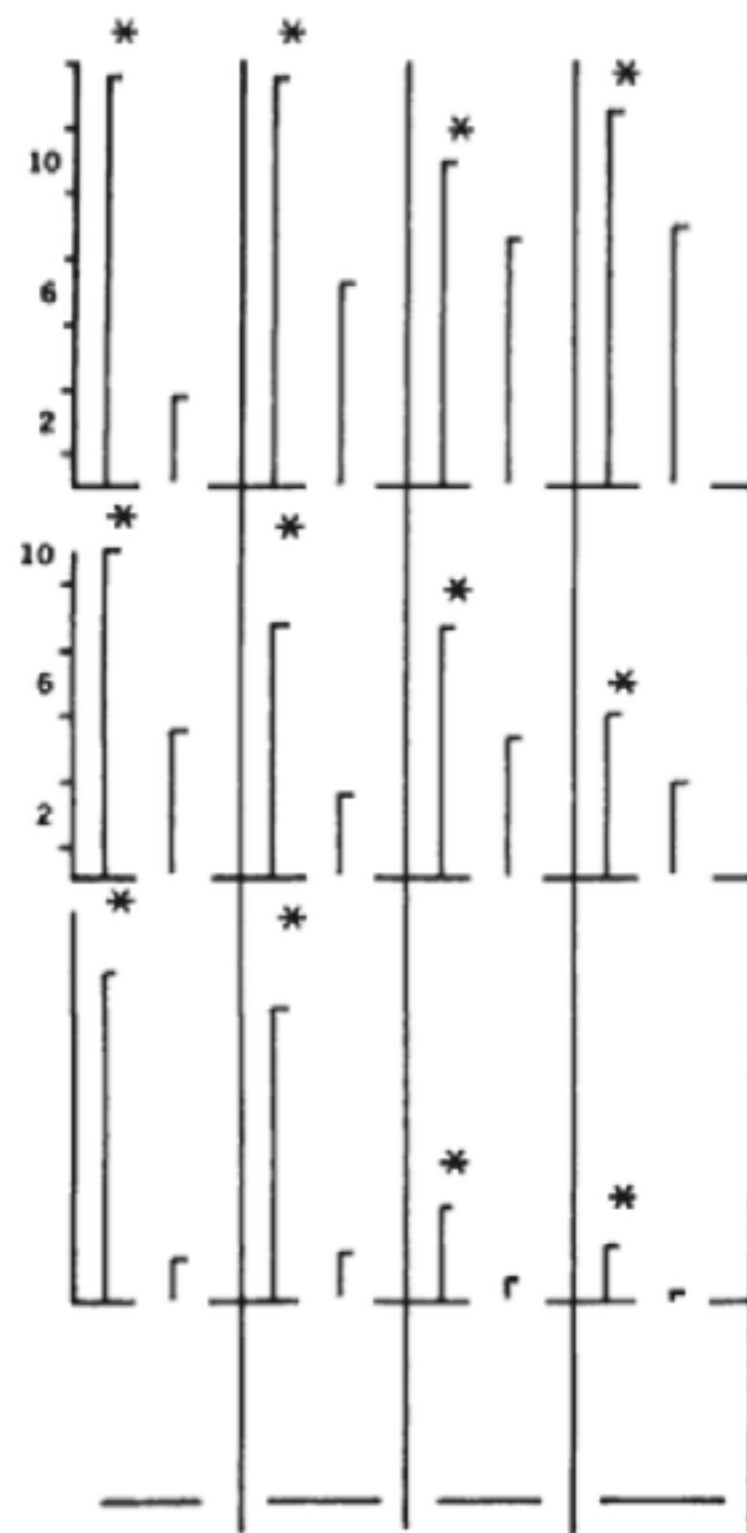
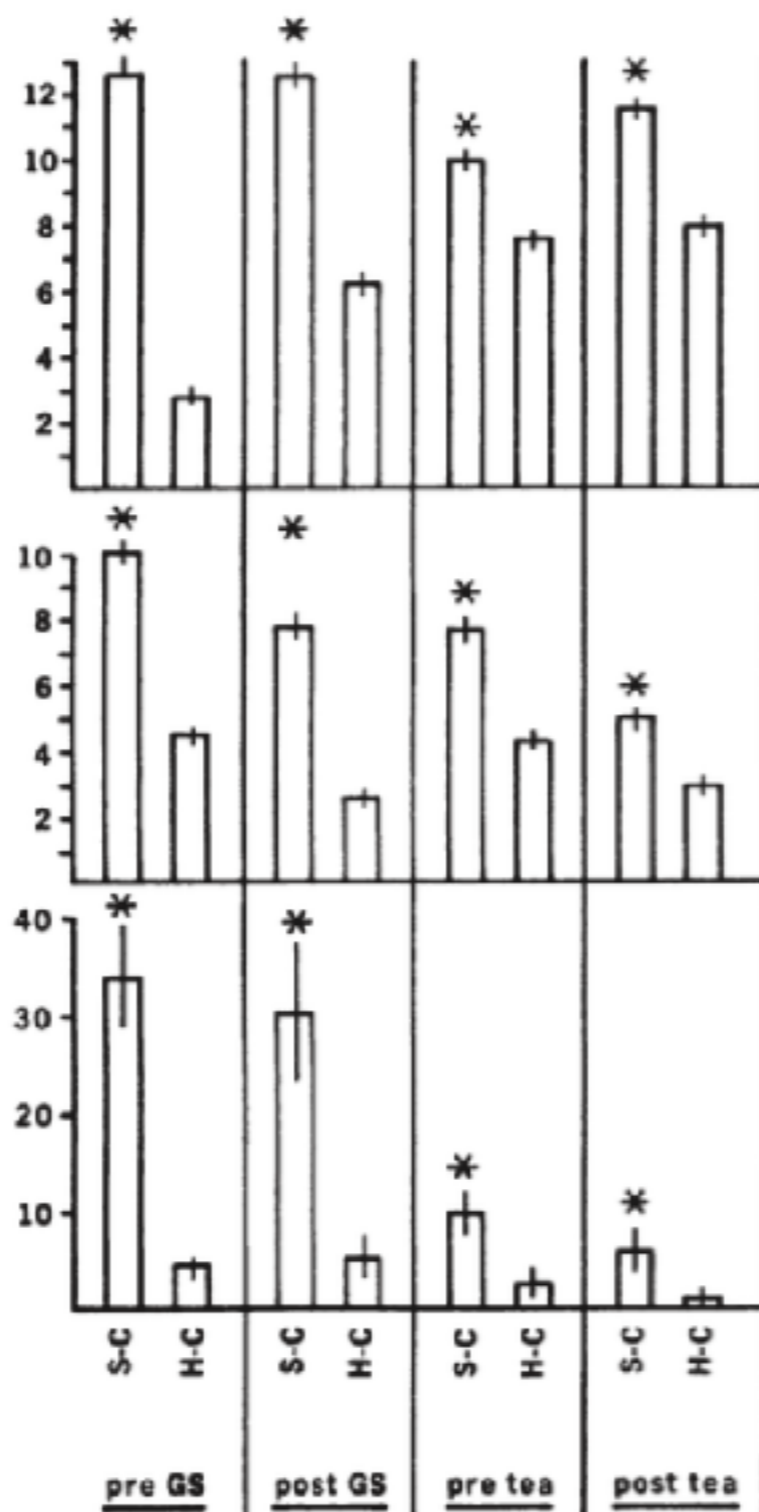
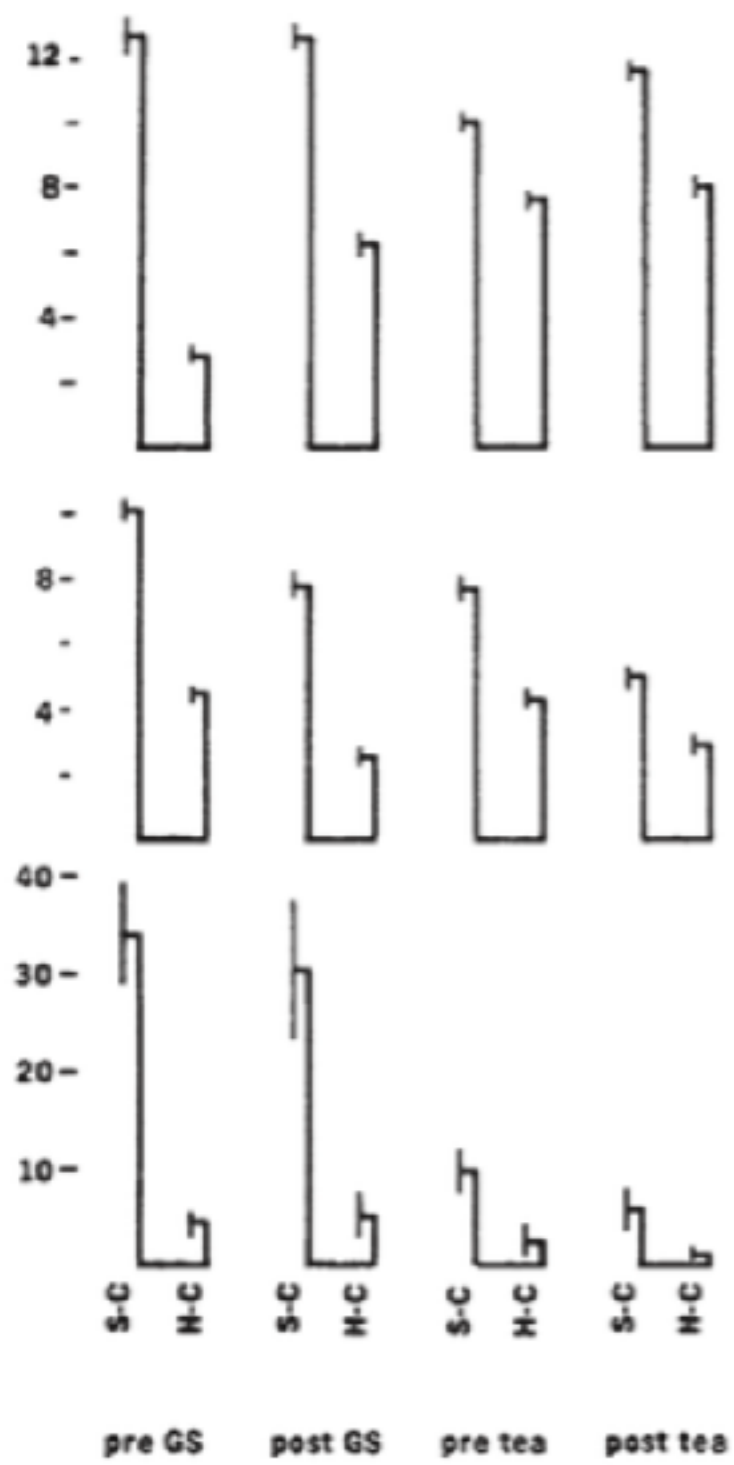
「如果統計數字枯燥乏味的話，  
那你肯定弄錯了數字」

- *Edward Tufte, in VDQI*

# Chart Junk Debate

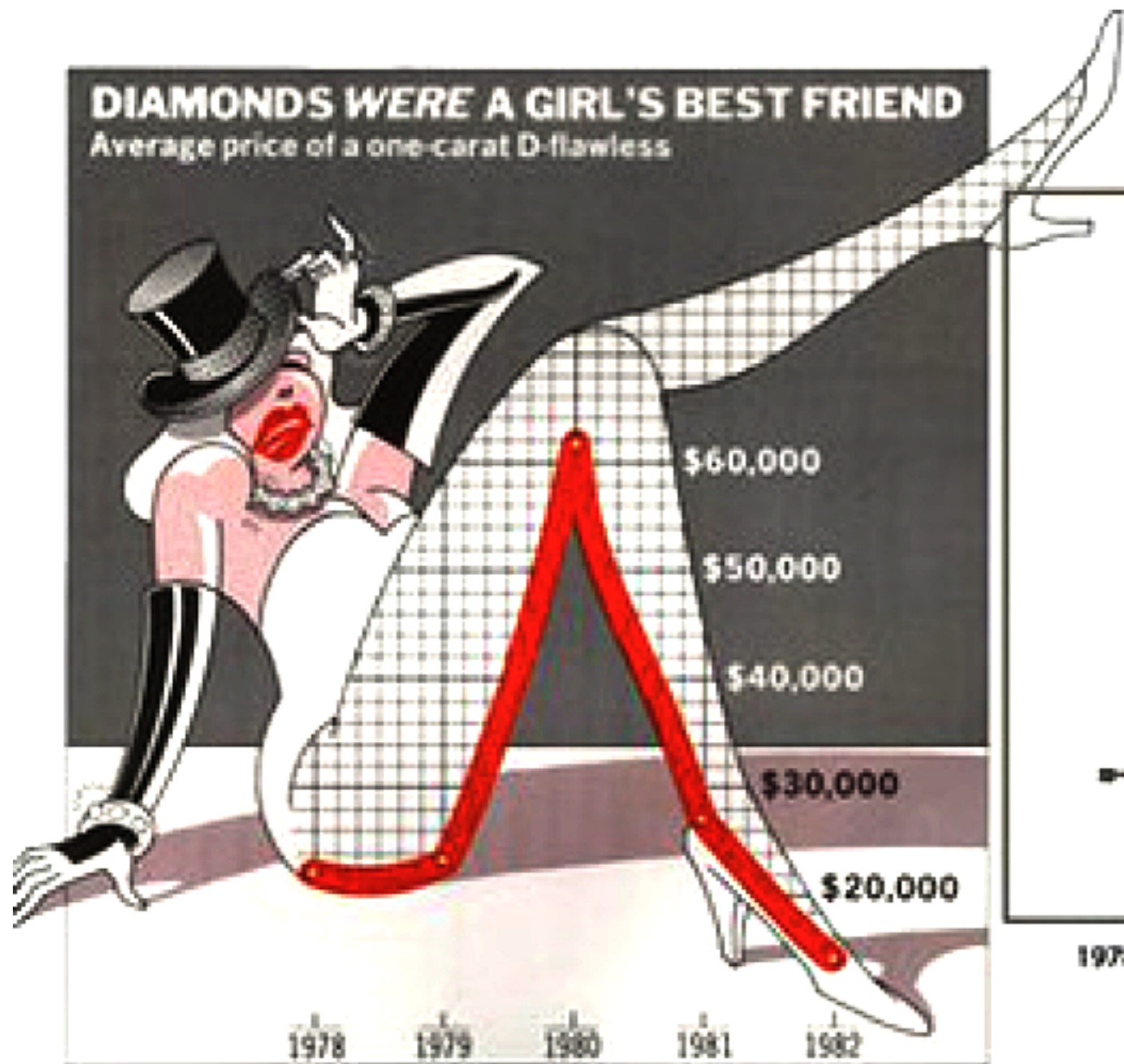
$$\text{Data-Ink-Ratio} = \frac{\text{Ink-of-Data}}{\text{Total-Ink-Used}}$$

- Edward Tufte, in VDQI



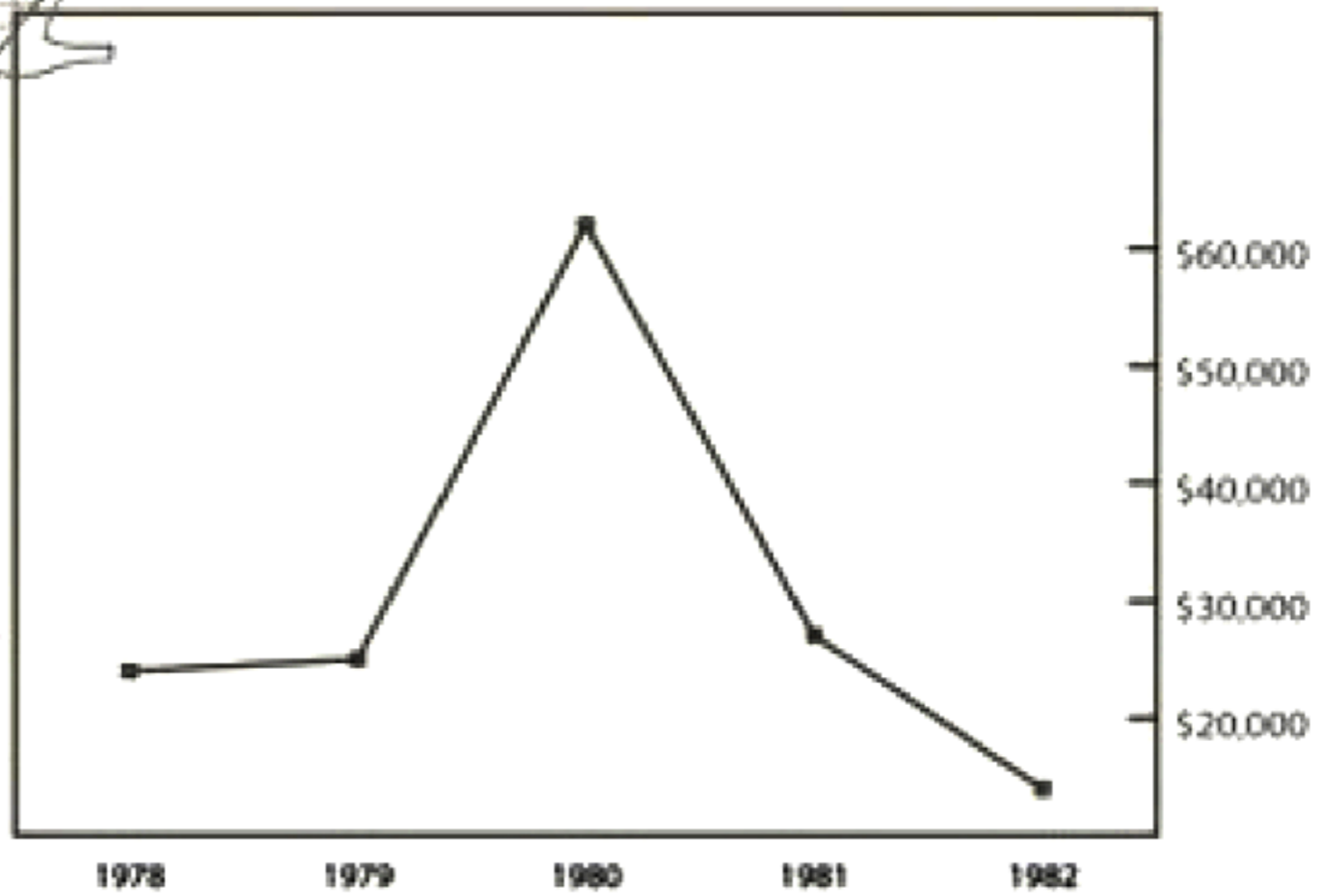
# DIAMONDS WERE A GIRL'S BEST FRIEND

Average price of a one-carat D-flawless



# DIAMONDS WERE A GIRL'S BEST FRIEND

Average price of a one-carat D-flawless





# Useful Junk?

## The Effects of Visual Embellishment on Comprehension and Memorability of Charts

Scott Bateman

Regan L. Mandryk, Carl Gutwin,  
Aaron Genest, David McDine, Christopher Brooks

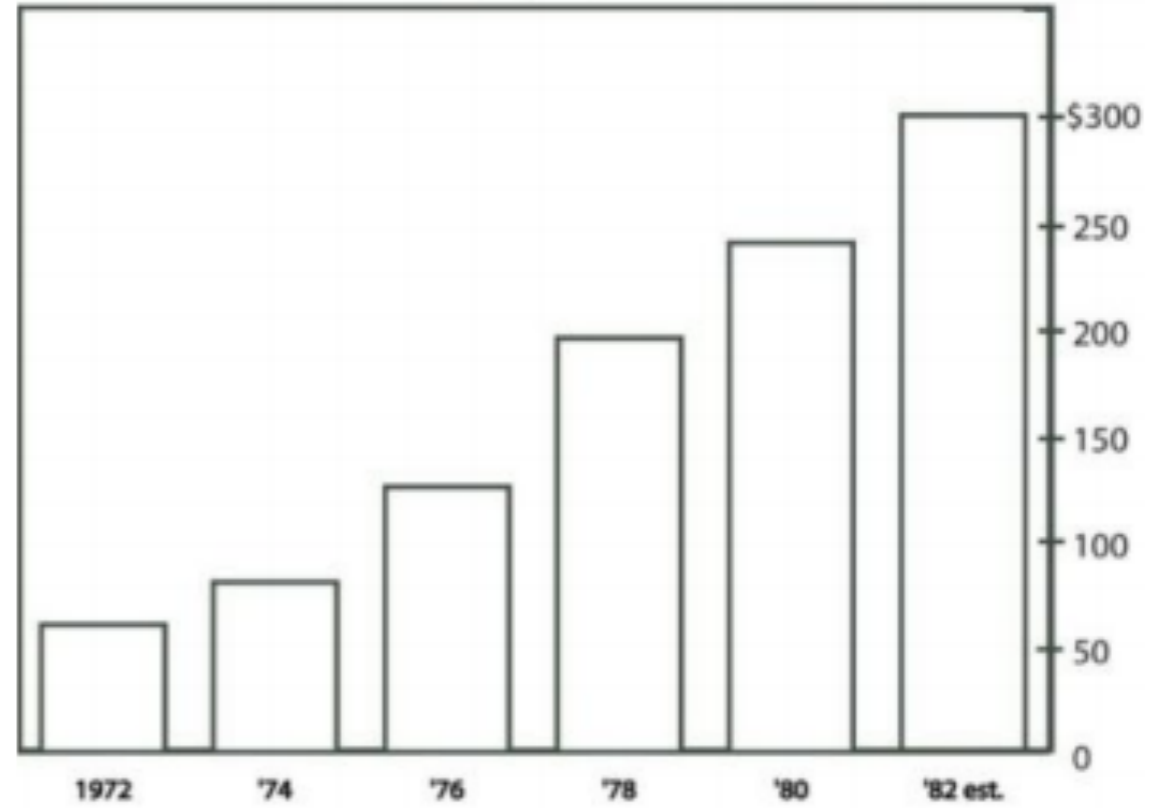
# MONSTROUS COSTS

Total House and Senate campaign expenditures, in millions



# MONSTROUS COSTS

Total House and Senate campaign expenditures, in millions



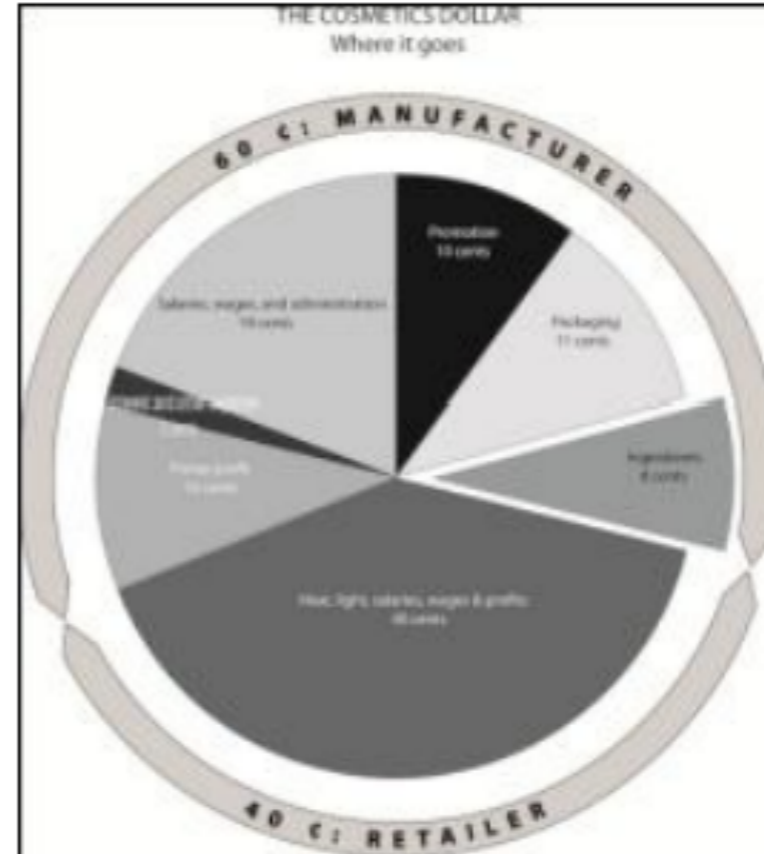
# THE COSMETICS DOLLAR

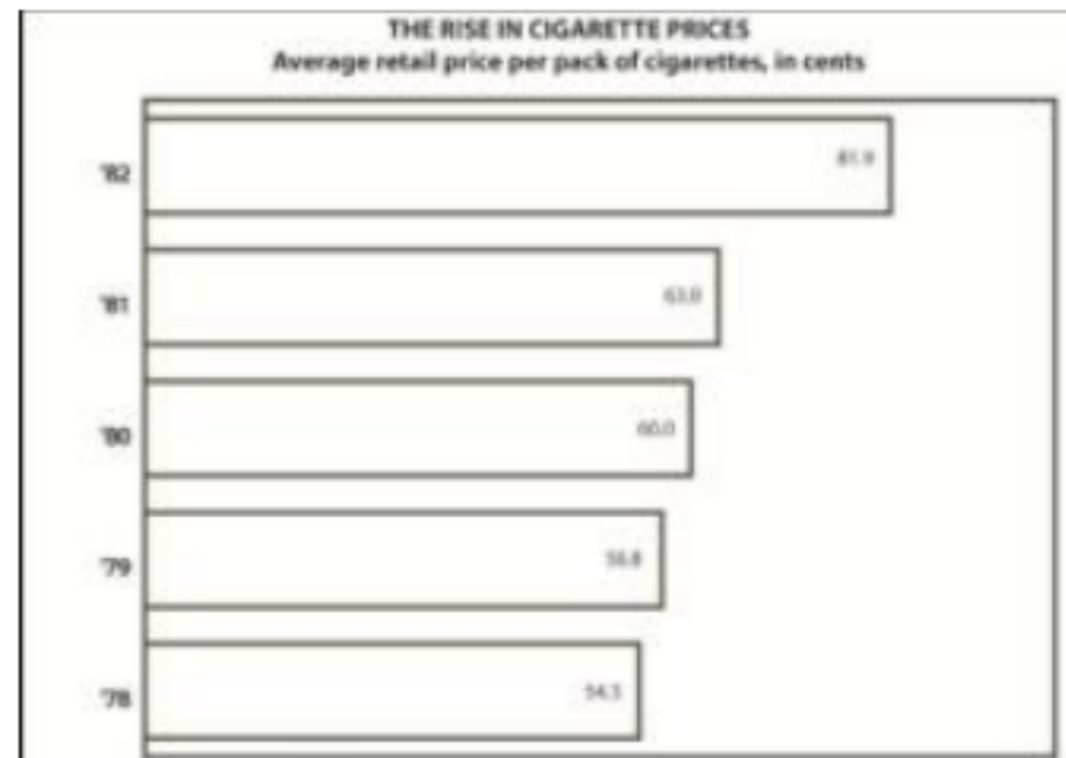
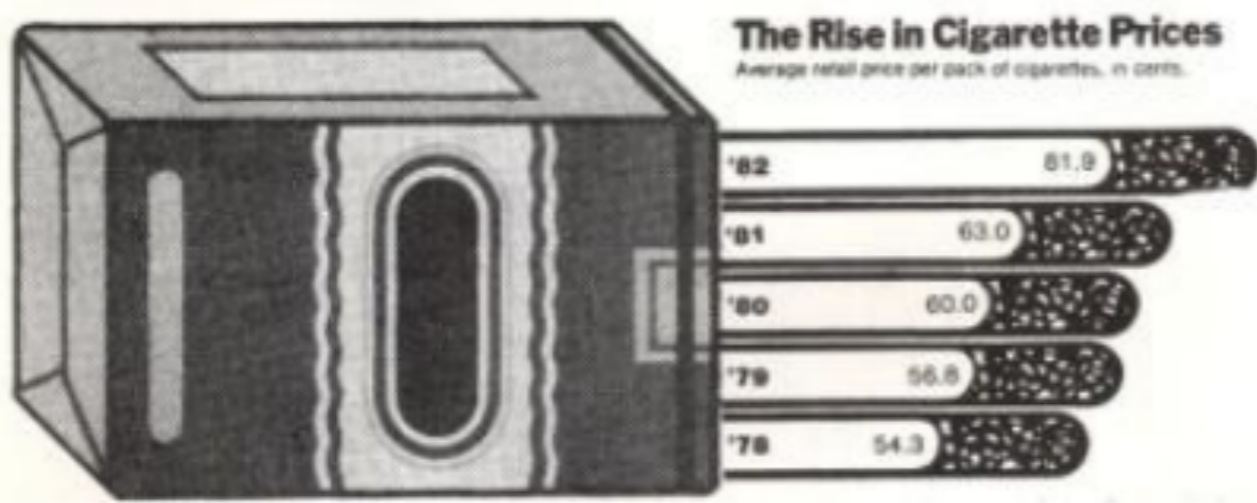
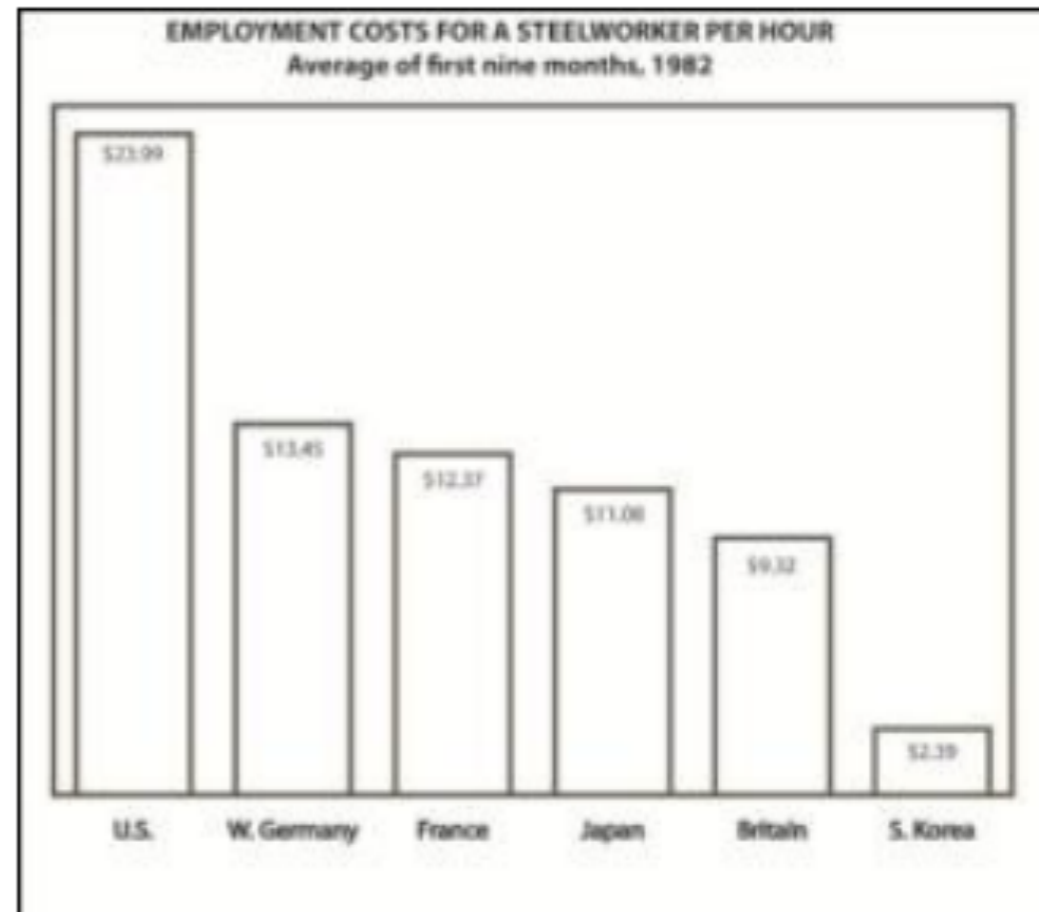
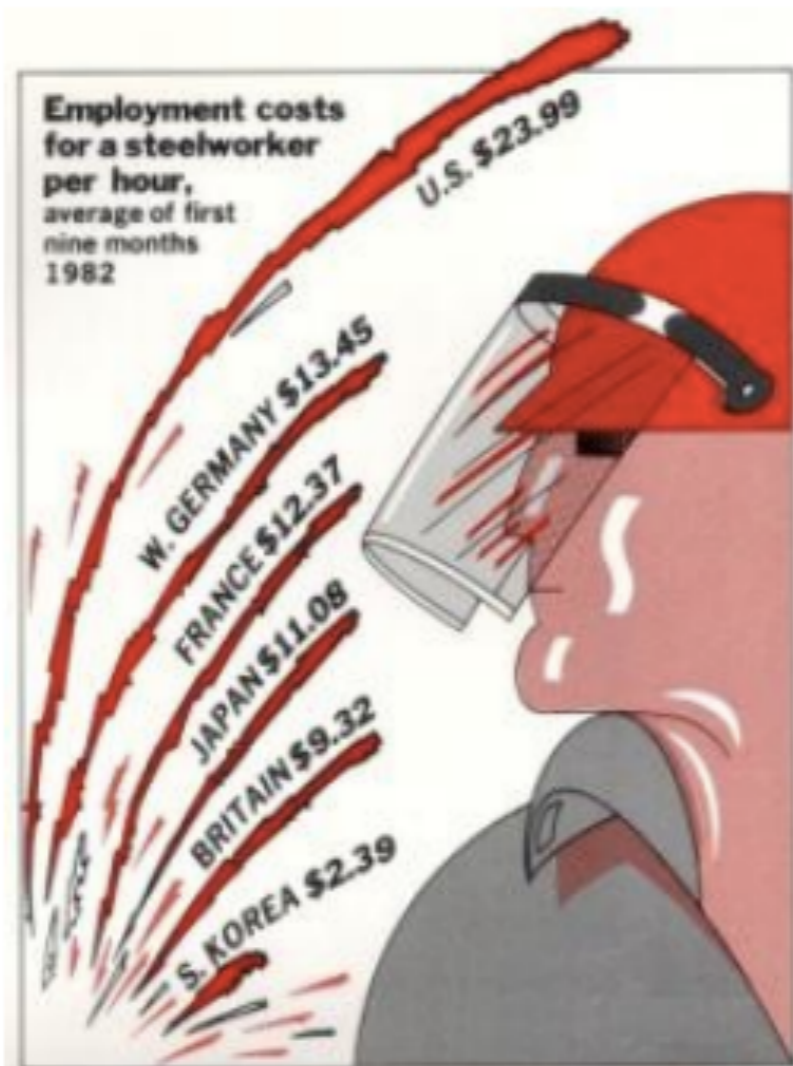
Where it goes



# THE COSMETICS DOLLAR

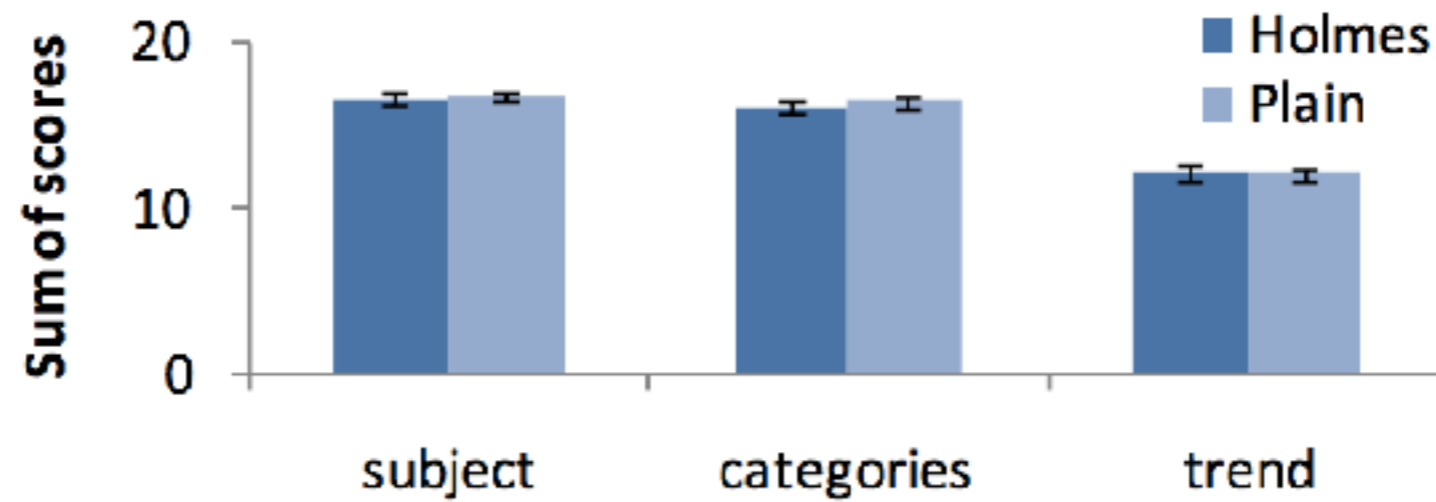
Where it goes



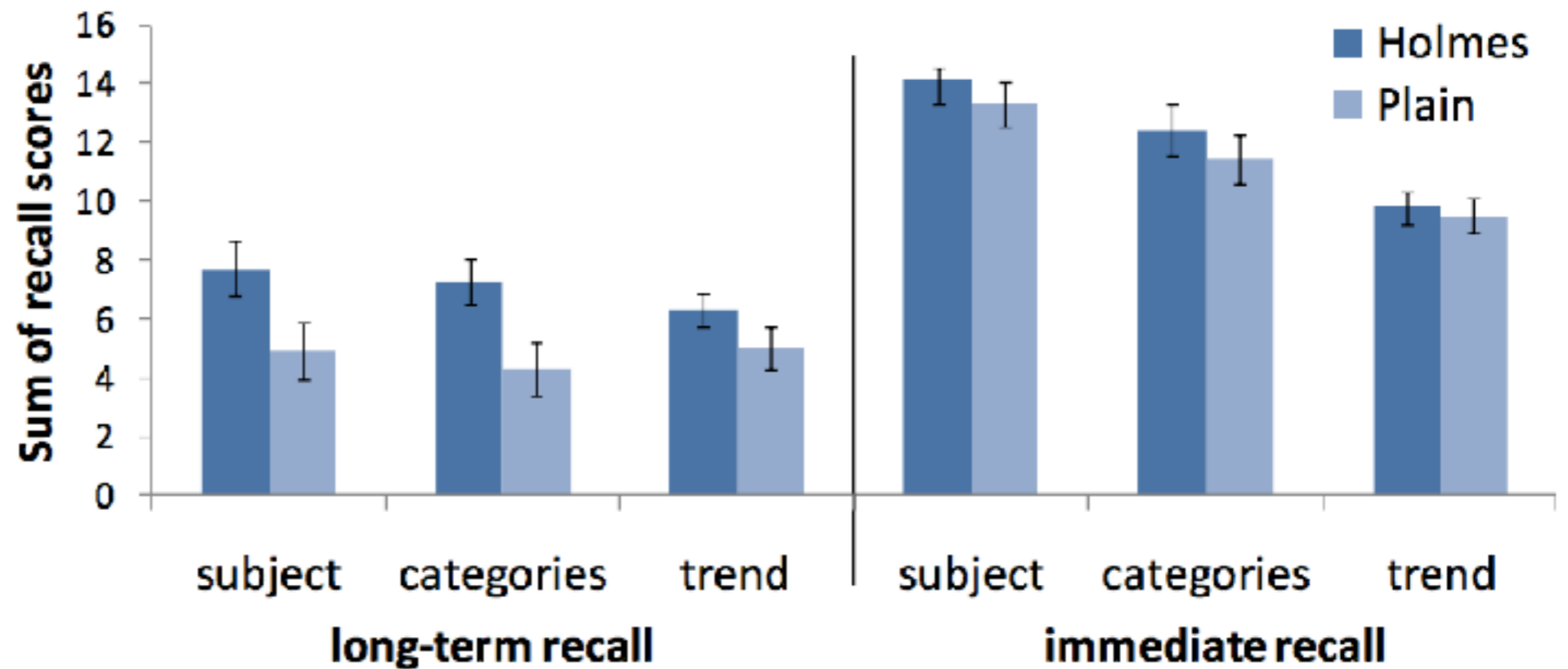


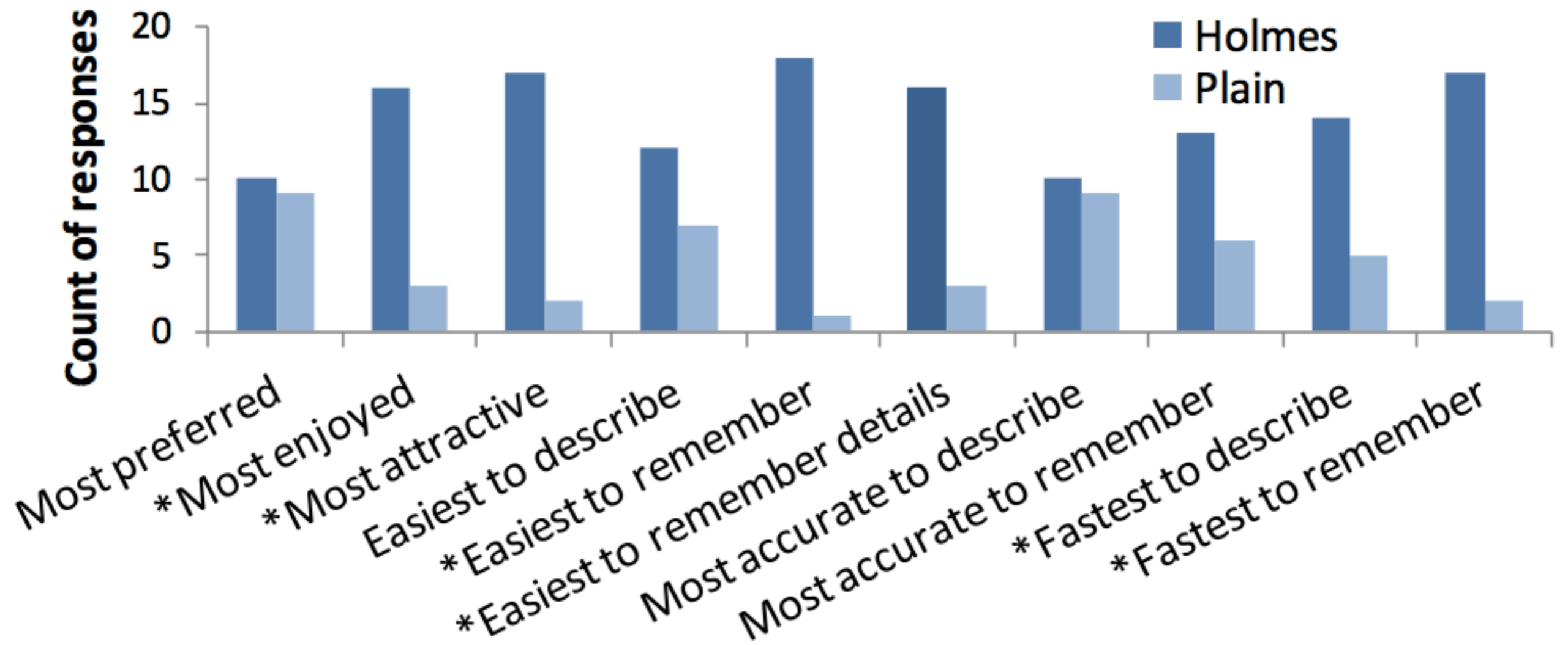


description  
score



long / short  
term score





# Chart Junk Debate

「凡對讀者的智力抱著懷疑態度來對待的人，  
也無法寫出像樣的作品。」

- *E.B. White*

「如果統計數字枯燥乏味的話，  
那你肯定弄錯了數字」

- *Edward Tufte, in VDQI*



# 資料視覺化的基本要素

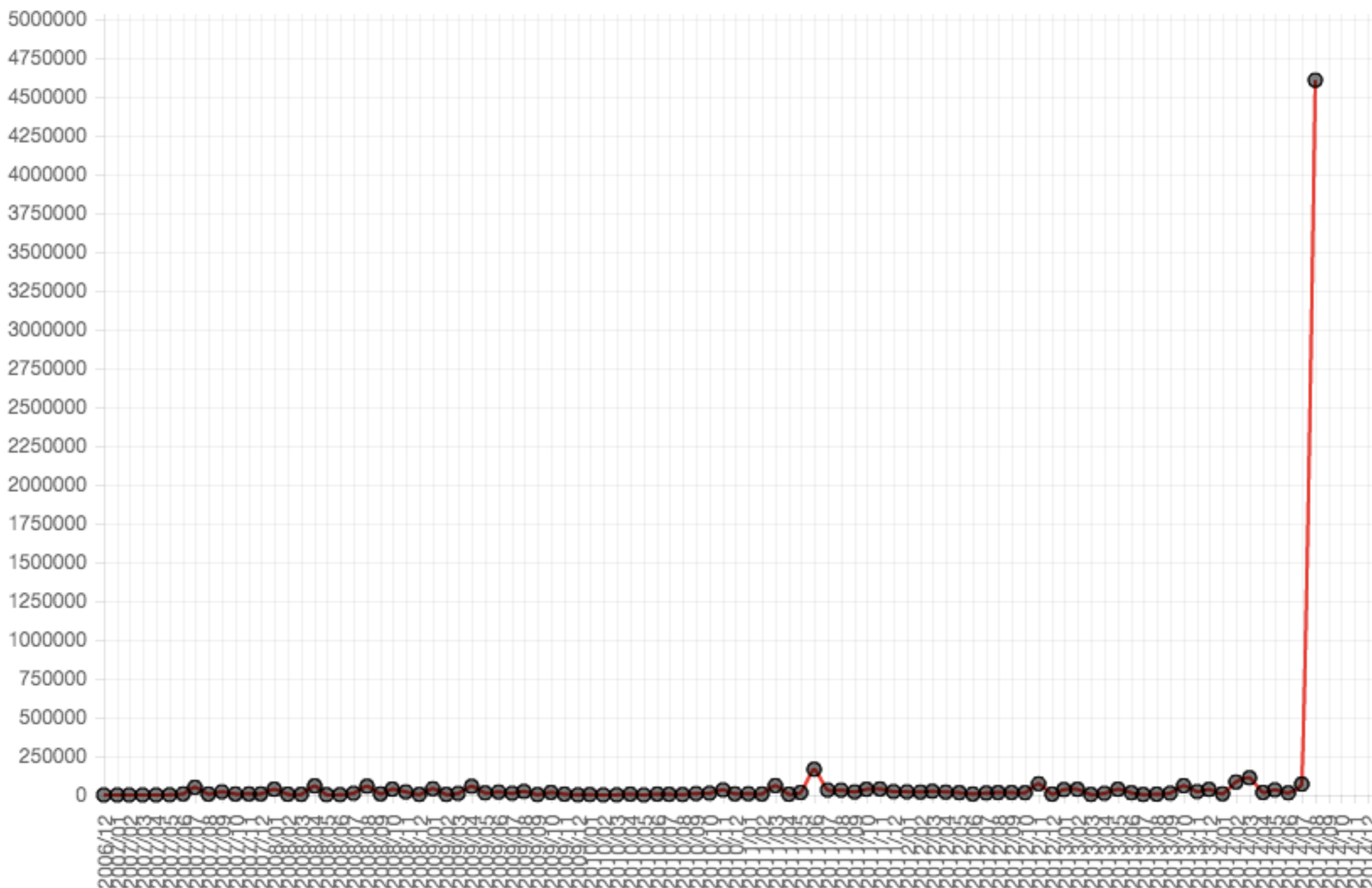
Data Visualization Fundamentals

III – 故事性  
Storytelling Aspect

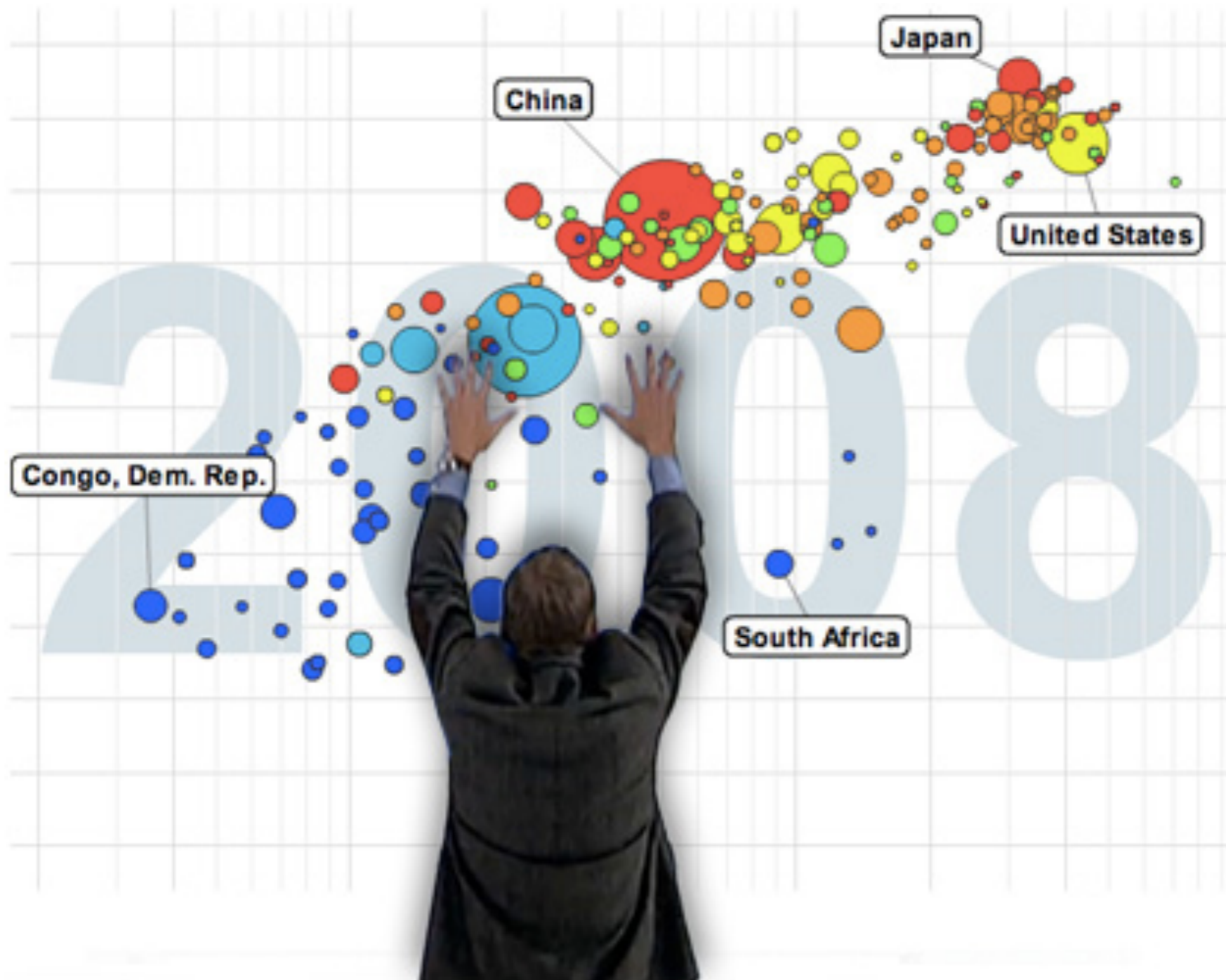
# 中華民國運動神經元疾病病友協會捐款金額統計

資料來源：智邦公益館 (線上信用卡捐款頁面)

從 2007 年起，捐款總金額 652 萬 1362 元，2014 年 8 月單月截至今日為止金額 460 萬 6828 元，佔總金額 **70.6%**。下圖 X 軸為時間，Y 軸為金額 (新台幣)







# Hans Rosling用前所未有的方法詮釋數字統計

Hans Rosling@TED, 2006

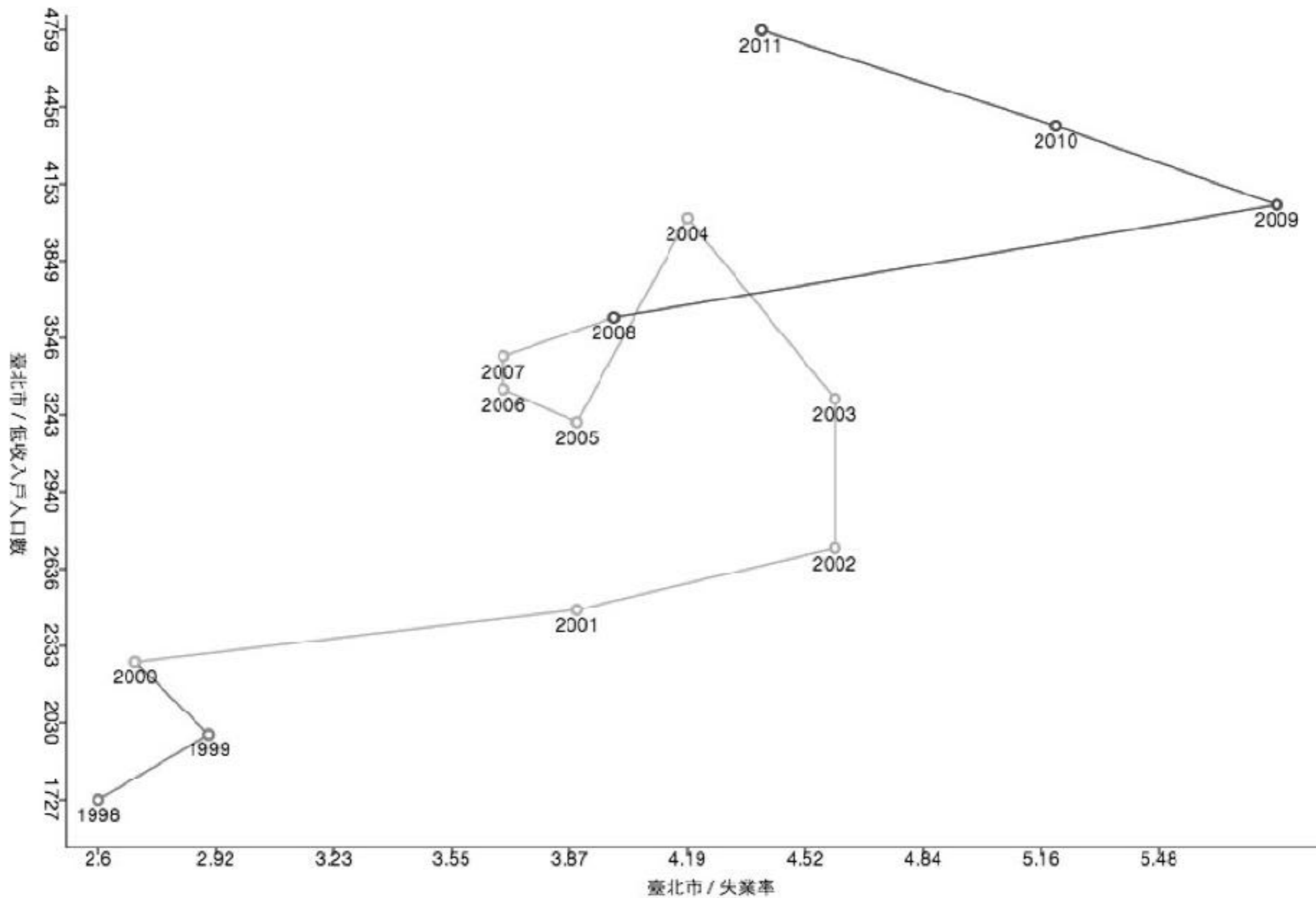
[https://www.ted.com/talks/hans\\_rosling\\_shows\\_the\\_best\\_stats\\_you\\_ve\\_ever\\_seen?language=zh-tw#t-228413](https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen?language=zh-tw#t-228413)

# 台北市失業率與低收入戶人口數之比較

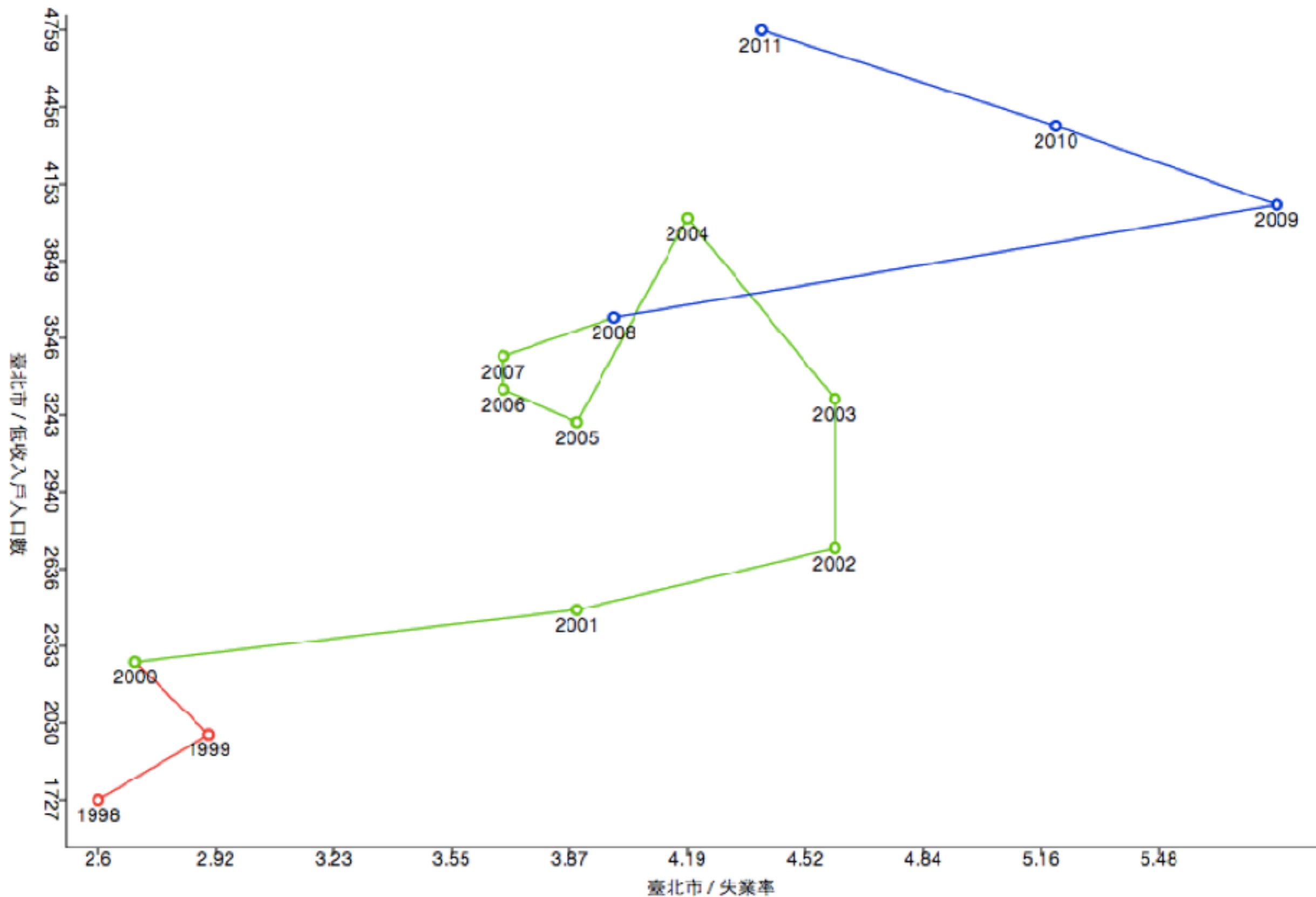
【改制後】縣市人力資源重要統計指標 依 指標, 期間 與 縣市	
	臺北市
失業率	
1998	2.6
1999	2.9
2000	2.7
2001	3.9
2002	4.6
2003	4.6
2004	4.2
2005	3.9
2006	3.7
2007	3.7
2008	4.0
2009	5.8
2010	5.2
2011	4.4
2012	4.3
2013	4.2

【改制後】縣市社會救助重要統計指標 依 指標, 期間 與 縣市	
	臺北市
低收入戶人口數	
1998	17,270
1999	19,843
2000	22,706
2001	24,760
2002	27,184
2003	33,071
2004	40,184
2005	32,146
2006	33,437
2007	34,752
2008	36,274
2009	40,708
2010	43,823
2011	47,597
2012	51,282
2013	50,649



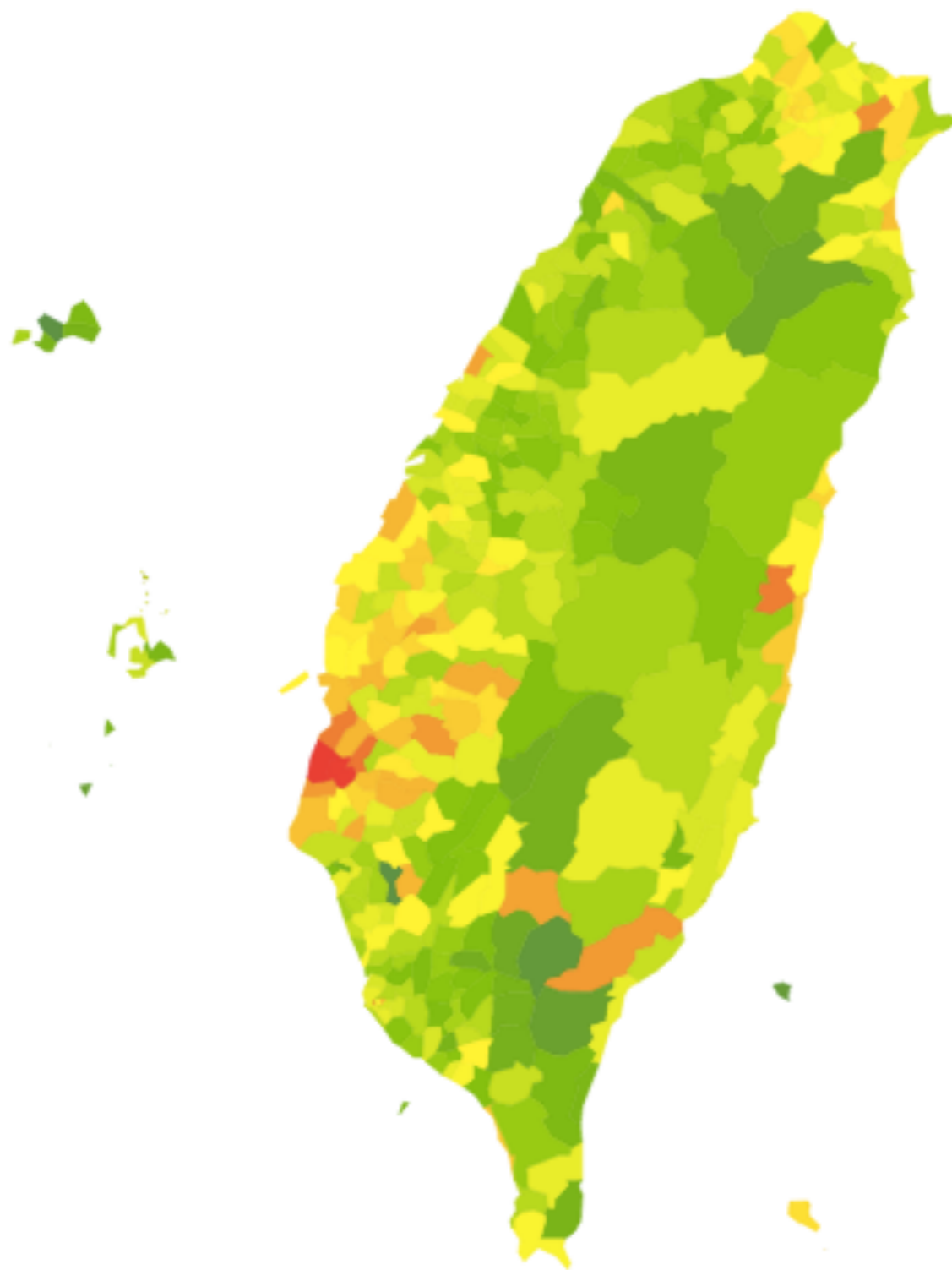
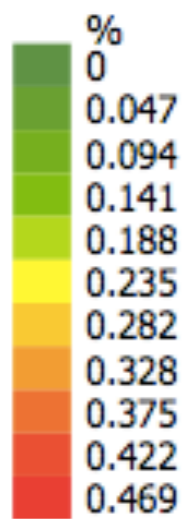


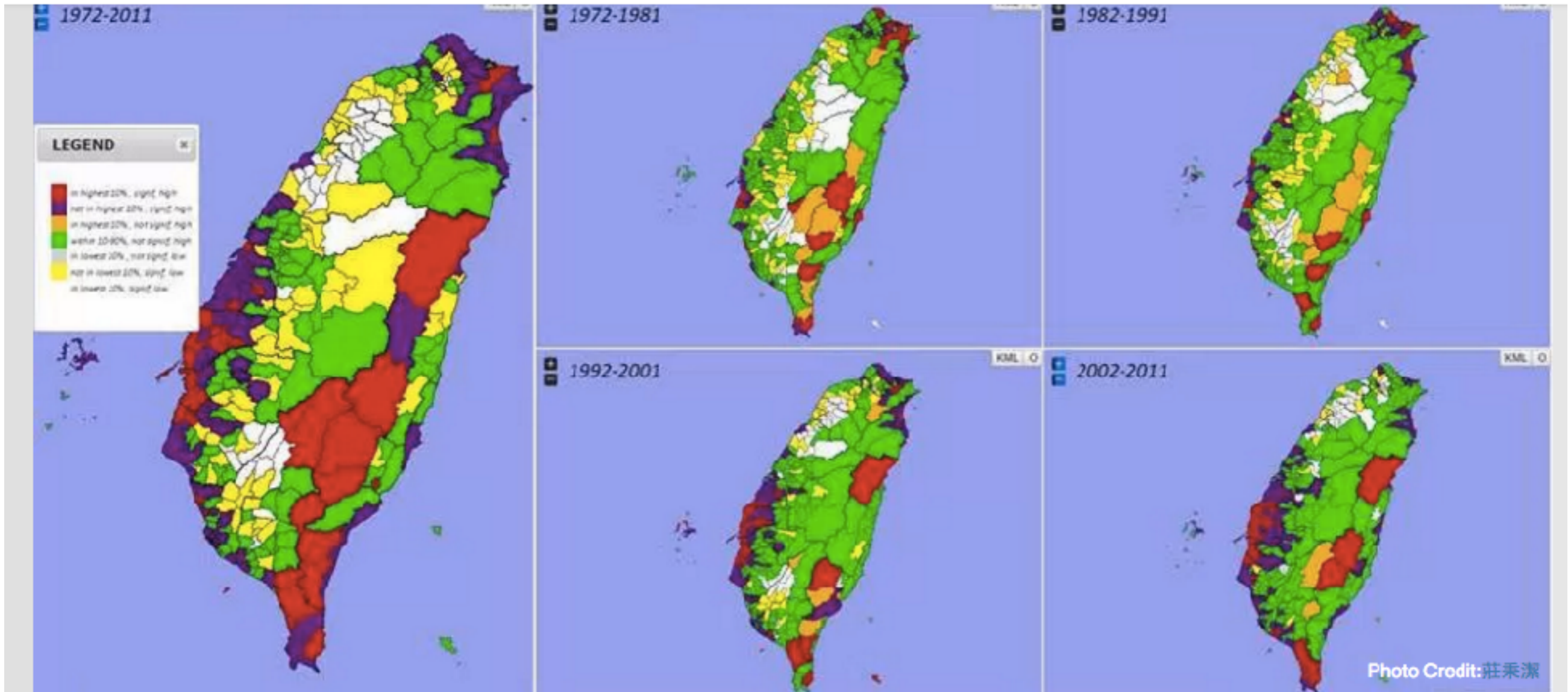
# 失業率 ft. 低收入人口數 台北市 (1998 ~ 2011)



## 失業率 ft. 低收入人口數 台北市 (1998 ~ 2011)

# 鄉鎮級台灣癌症地圖





## 台灣40年癌症地圖：台北是健康了，但中彰雲嘉卻變成「重癌鄉症」

2016/04/17 20:33:00 發表於 | 社會 · 健康



Yang

現任 關鍵評論網The News Lens 編輯；有些人喜歡，有些人不喜歡。

[看更多Yang的文章](#)

追蹤這位作者



# 台灣 40 年癌症地圖 ( 關鍵評論網 )

中興大學環境工程教授莊秉潔17日在臉書貼文公布，最新的全癌症死亡率分佈地圖（1972-2011）。並表示大家可以看到中雲嘉持續惡化中（封面照片圖為年齡標準化後之死亡率。）

**莊秉潔**教授指出，台北在1981年許多鄉鎮不是紅色就是紫色，分別代表全台最高的10%或顯著高的鄉鎮。但自從1980後工廠遷出台北及1997後台北捷運陸續通車後，其癌症相對於全台就開始減少了。**已經有不少行政區成了代表最低10%的鄉鎮區的白色或顯著低的黃色。但是中雲嘉就正好相反。**

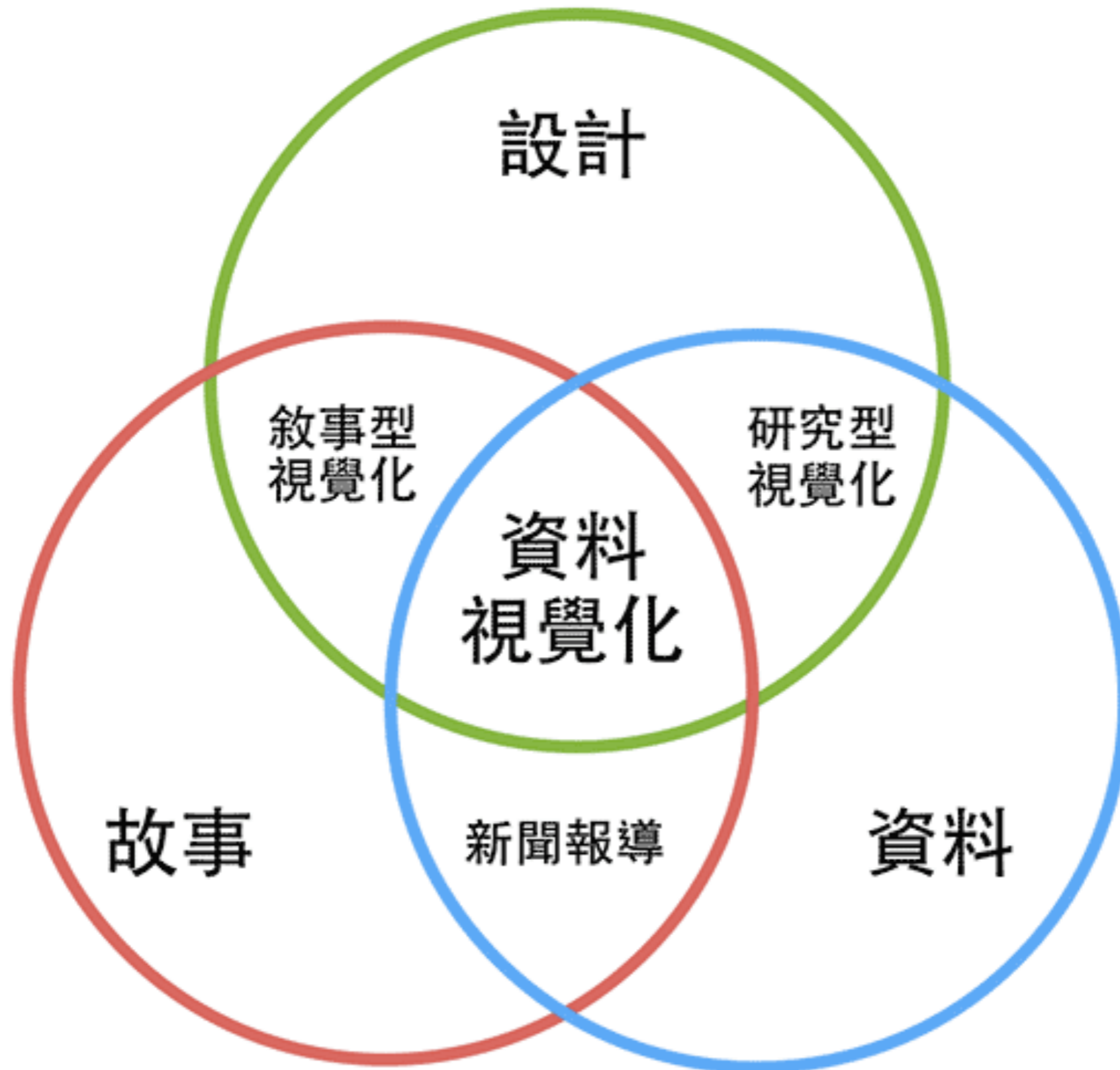
（... 中略 ...）

三立報導，中山醫學大學教授廖勇柏最近剛完成台灣四十年癌症地圖，畫面上紅色區塊就是癌症死亡率最高的區域，在西南沿海、宜蘭部分鄉鎮以及花東山區癌症死亡率都偏高，全國最高的是台南的北門區。

**廖勇柏**說：「**地下水有砷的污染，後來全面改用自來水，它（數據）已經在下降了。**」不喝地下水之後終於有改善，但早年的砷殘留依然對人體有很大的殘害，因為研究顯示砷會致癌，兩者有極大的相關，因此，近年來在蘭陽平原也發現地下水含砷，可解釋為什麼宜蘭的部分鄉鎮呈現紅色，排進全國罹癌致死率前10%名單。

**北門等過去烏腳病地區的罹癌率雖然高，但已經逐年下降，反倒是雲林麥寮，過去二**

# 資料視覺化的三要素





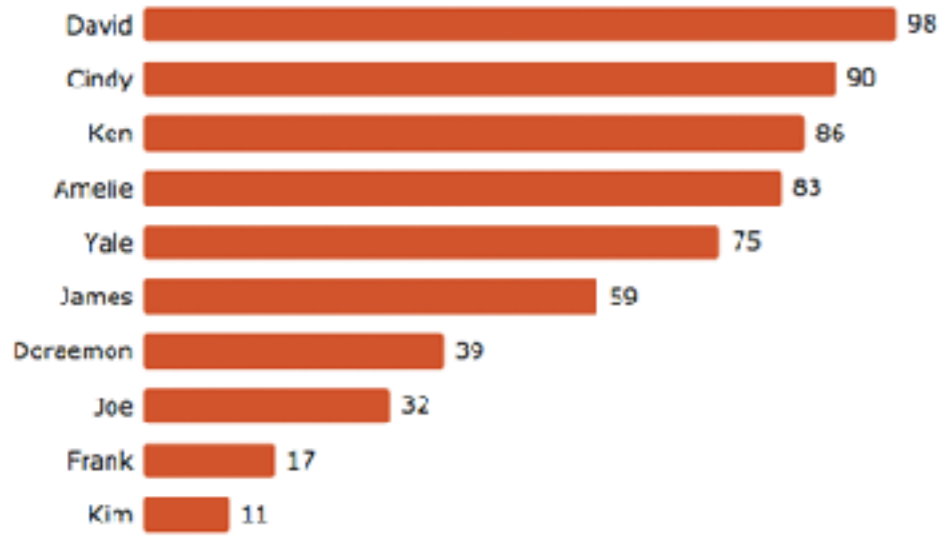
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# 基本圖表的設計原則

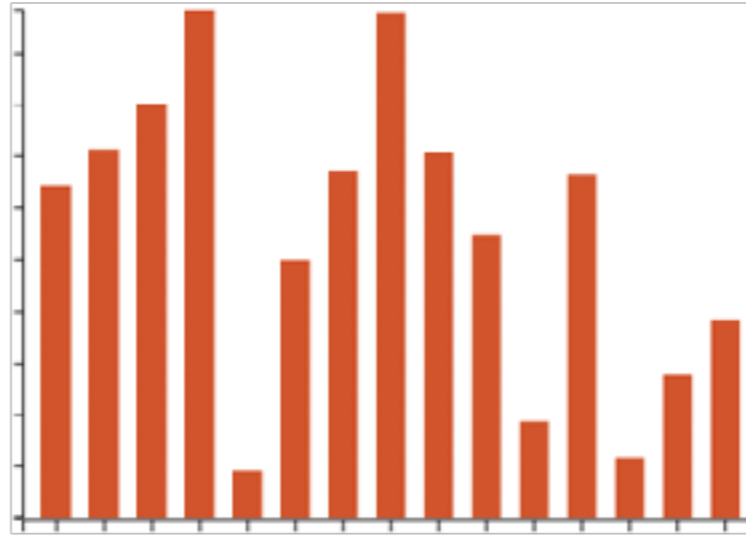
Thumb Rules for Basic Charts

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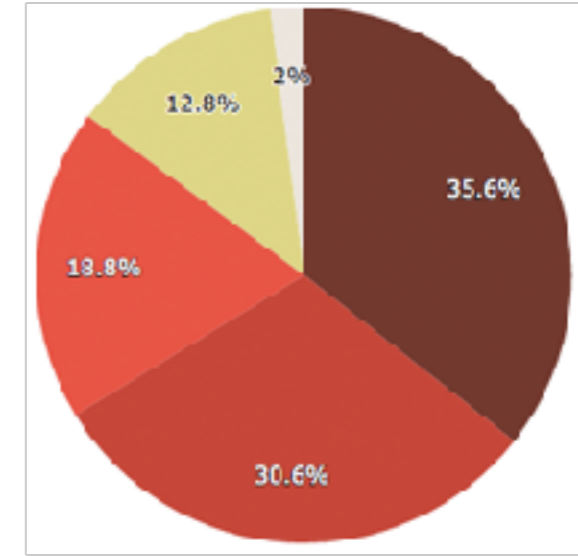
### Bar Chart



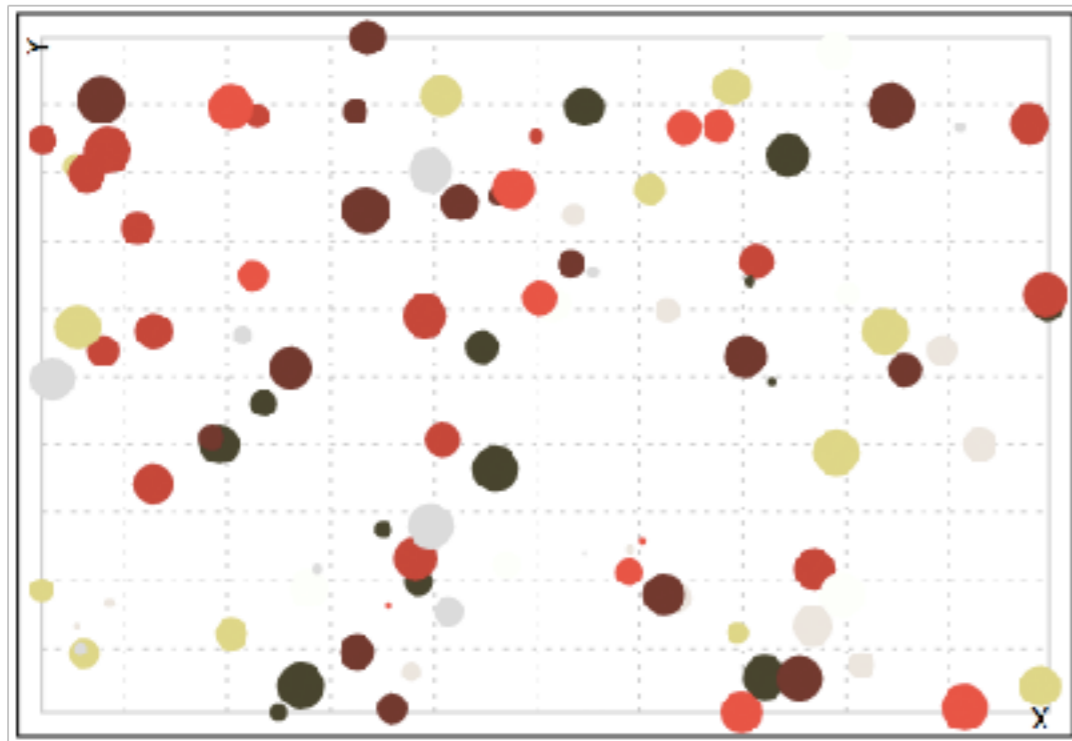
### Column Chart



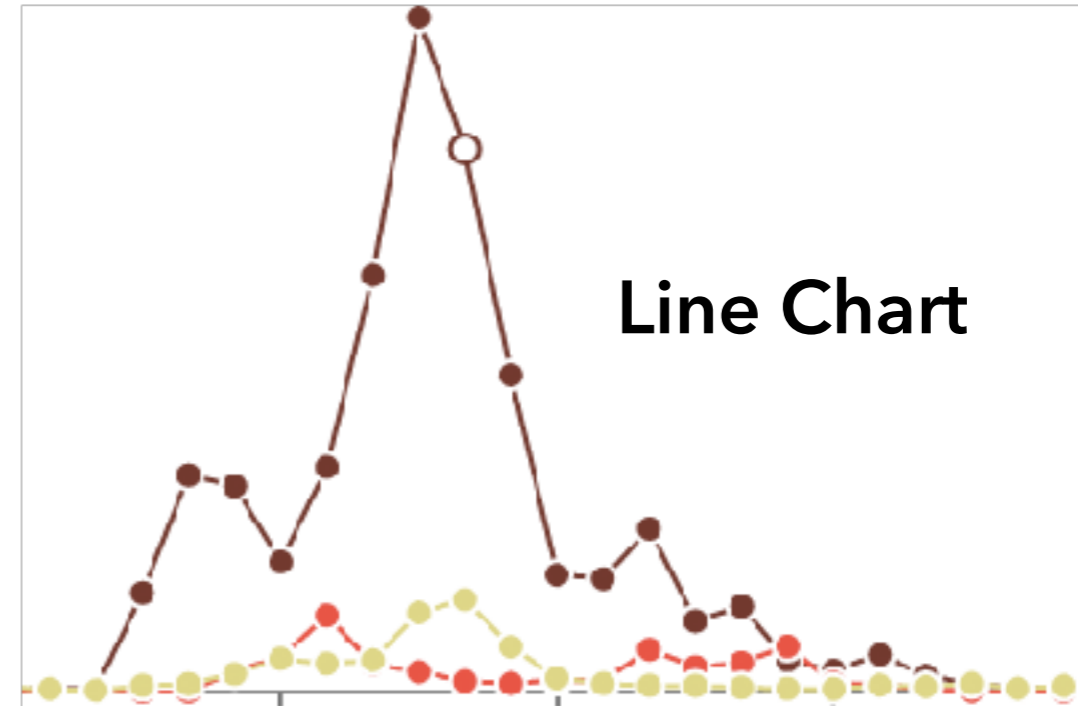
### Pie Chart



### Scatter Chart



### Line Chart



McKinsey : 5 Basic Chart Types



## Time series

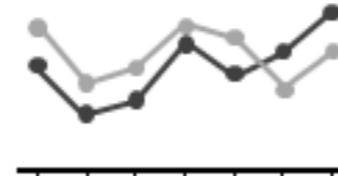
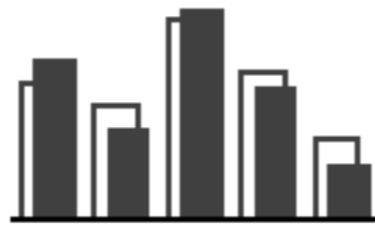
## Structures

Columns  
(cont.)

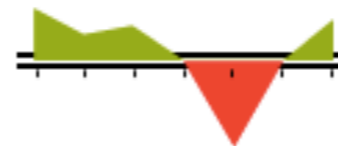
Lines and areas  
(cont.)

Bars  
(cont.)

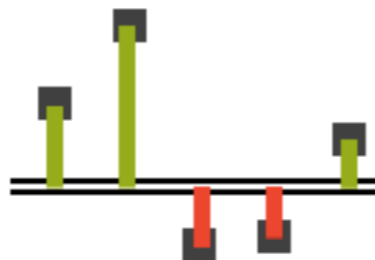
Grouped  
Comparisons



Red and green  
Absolute variances



Red and green pins  
Relative variances



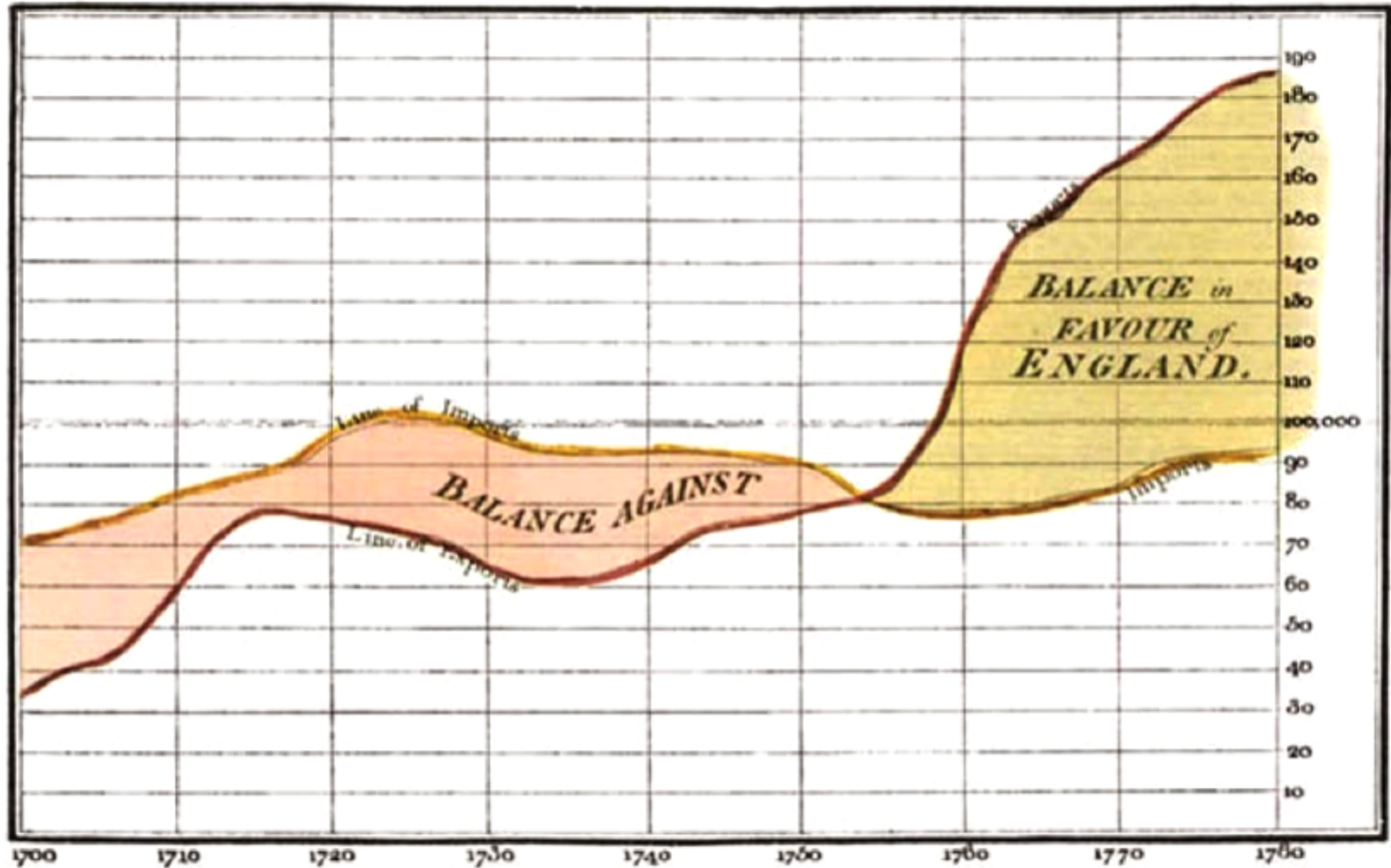
Red and green waterfall  
Contributions  
to variance



# IBCS – Use Correct Chart Type

from IBCS, <http://www.ibcs-a.org/standards/136>

# exports and imports to and from Denmark & Norway from 1700 to 1780



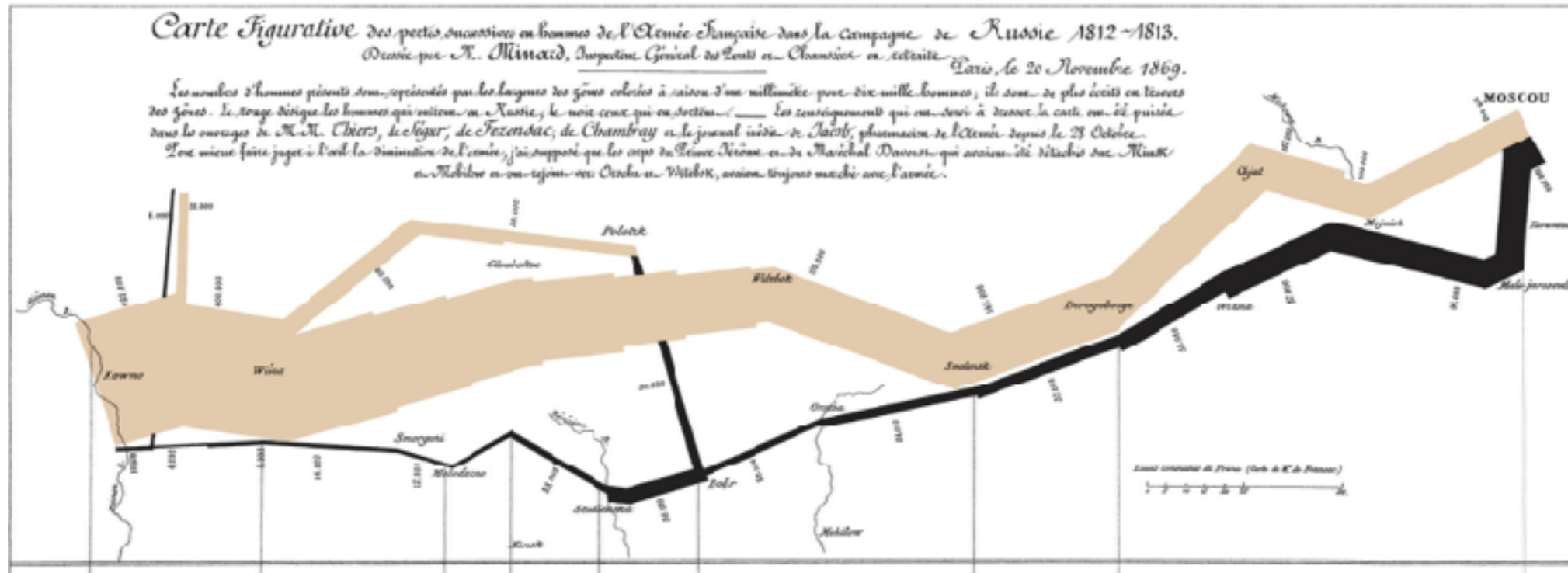
*The Bottom line is divided into Years, the Right hand line into 1.10,000 each.*

*Published at the Art Library, 10' May 1786. by W. Playfair*

*North and St. Paul, Strand, London.*

# William Playfair, 1786

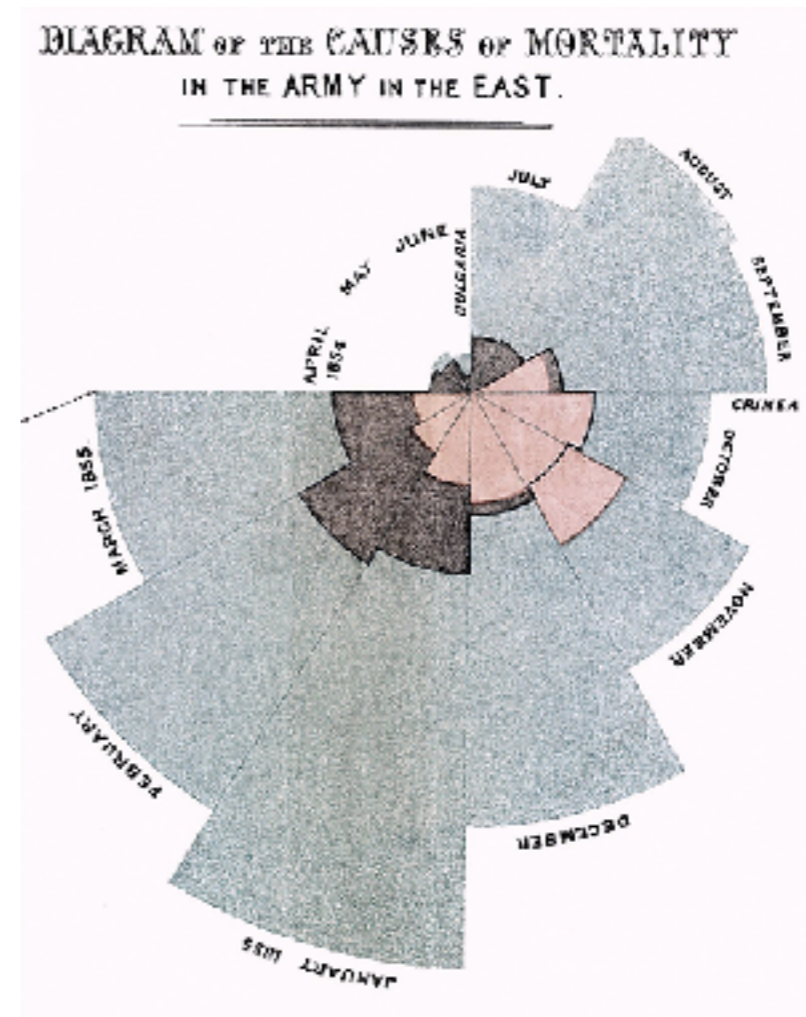
scottish engineer and economist



1869

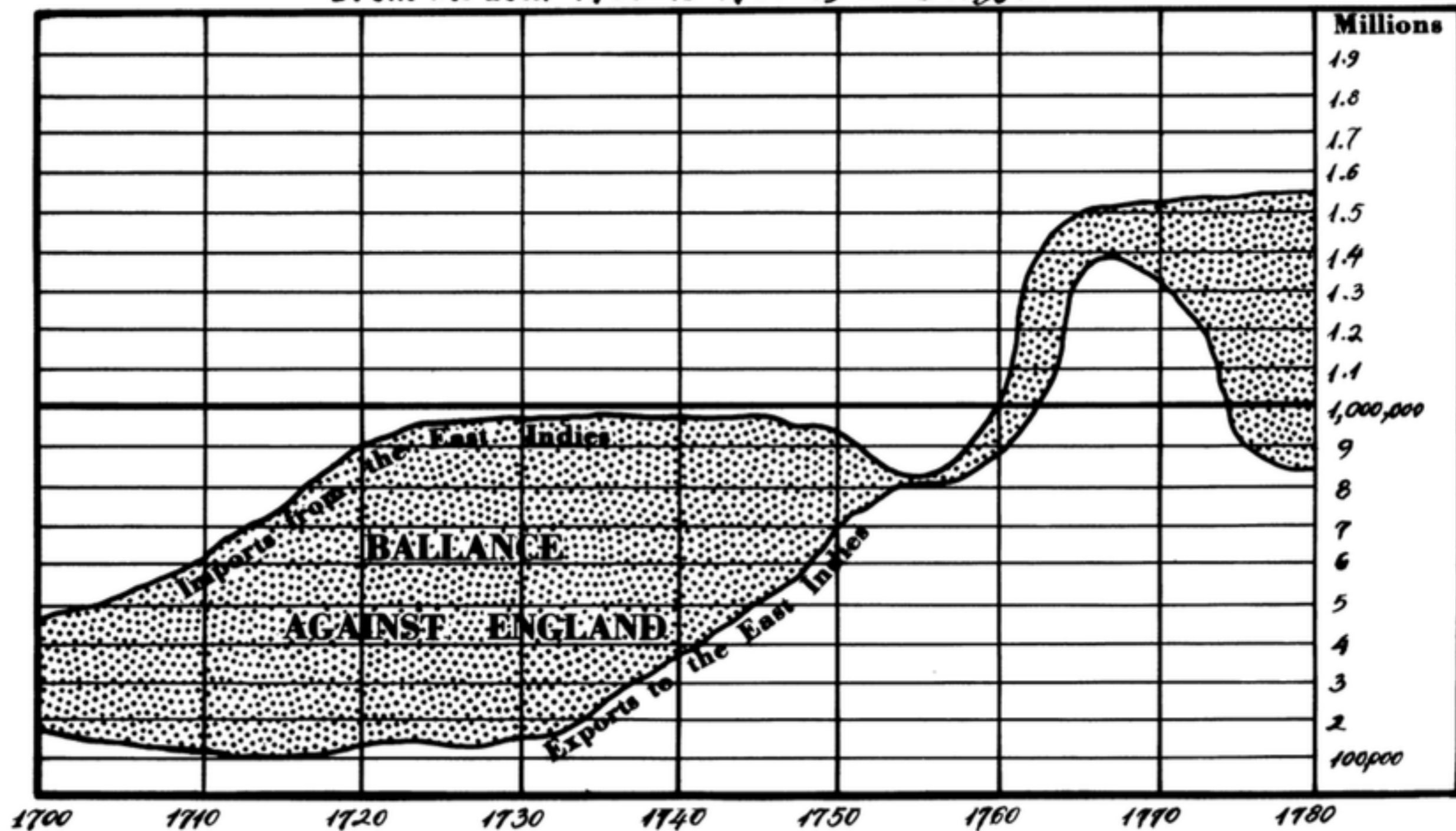


1854



1858

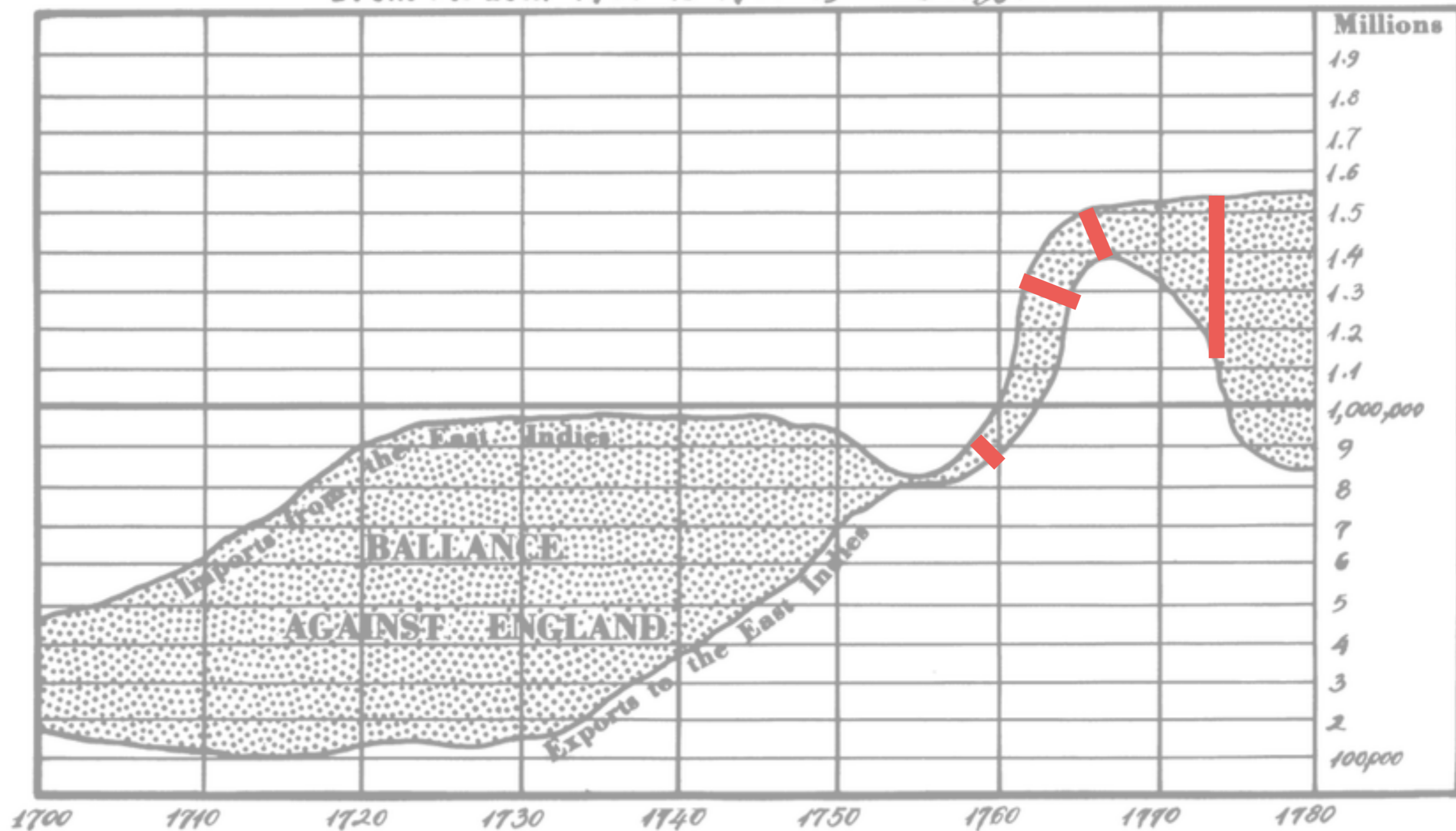
**CHART of EXPORTS and IMPORTS to and from the EAST INDIES**  
*From the Year 1700 to 1780 by W. Playfair*



*The Bottom Line is Divided into Years the Right hand Line into HUNDRED THOUSAND POUNDS*  
*is force Page 31<sup>st</sup>* *Published in the Act Divine 16<sup>th</sup> Aug. 1785*

Figure 6. Curve-difference chart after Playfair.

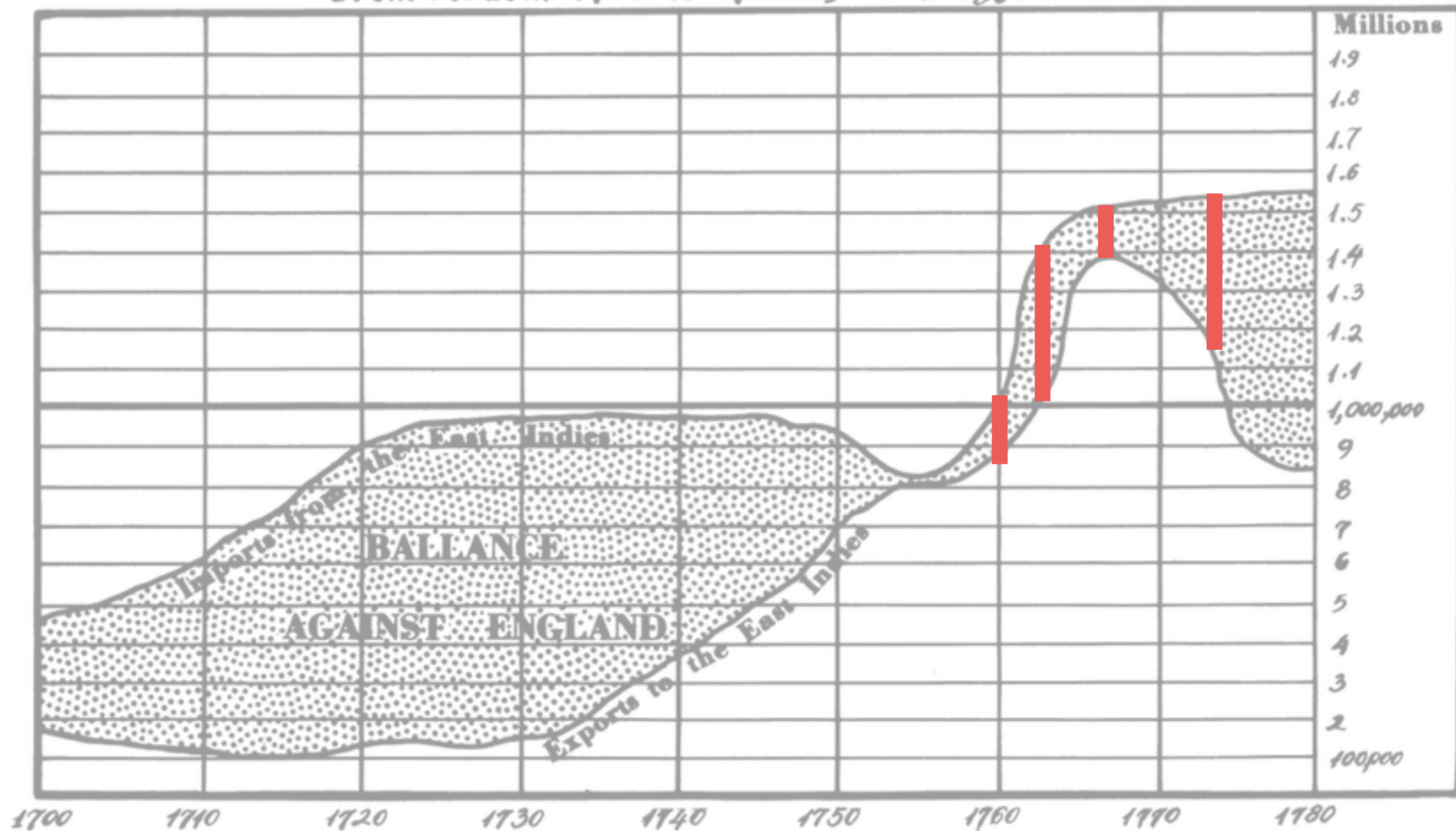
**CHART of EXPORTS and IMPORTS to and from the EAST INDIES**  
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*shingathe Thight is force Page 31<sup>st</sup> Published in the Act Diocine 16<sup>th</sup> Aug. 1785*

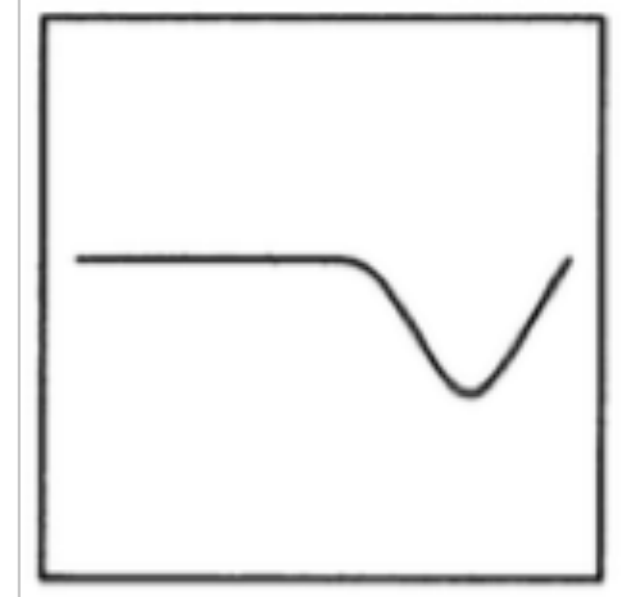
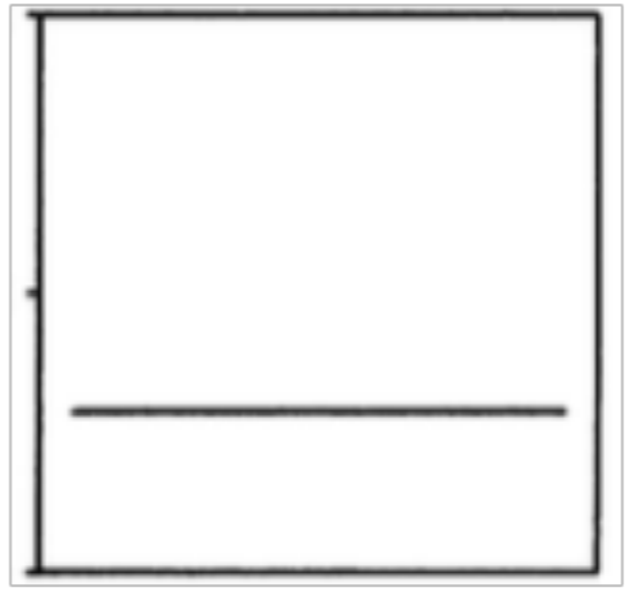
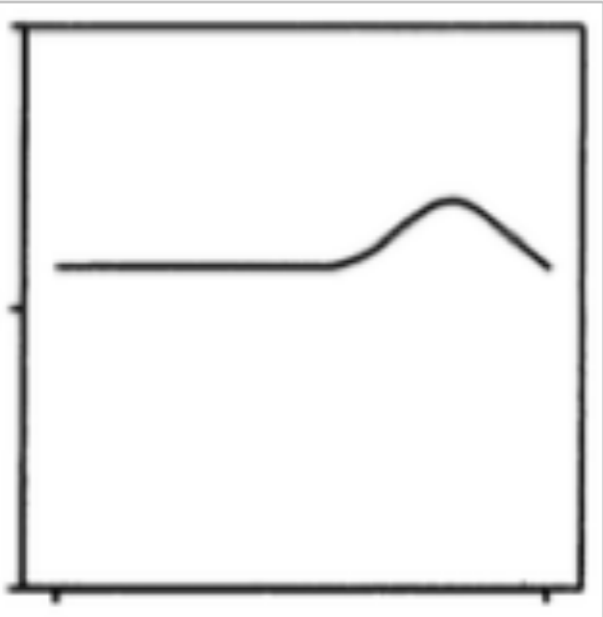
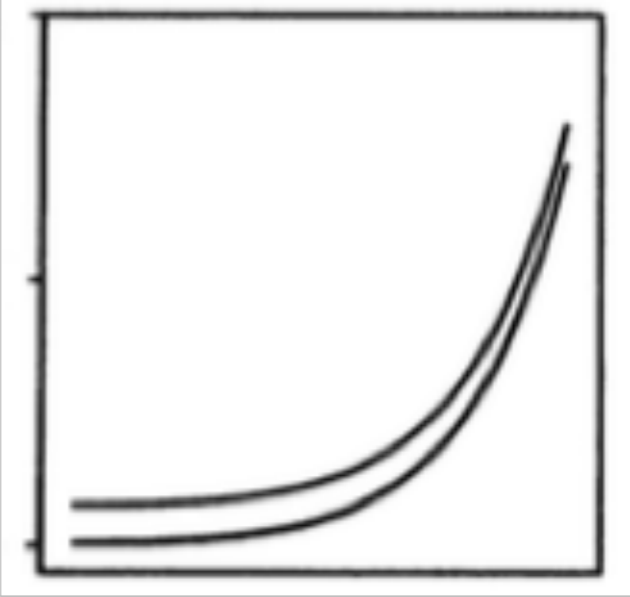
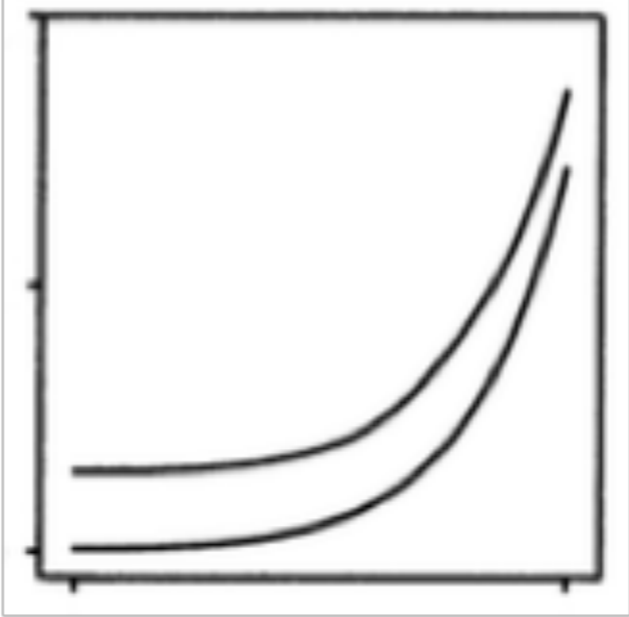
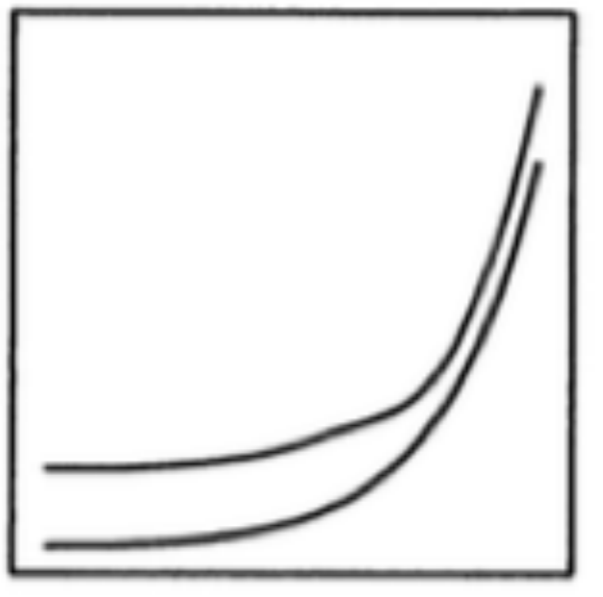
Figure 6. Curve-difference chart after Playfair.

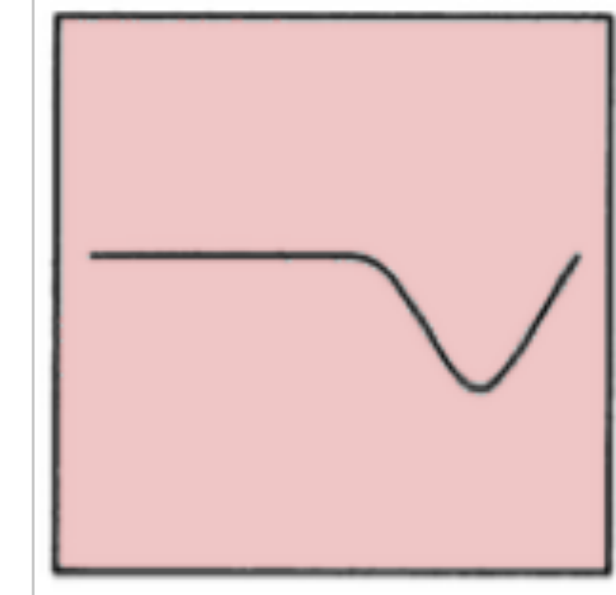
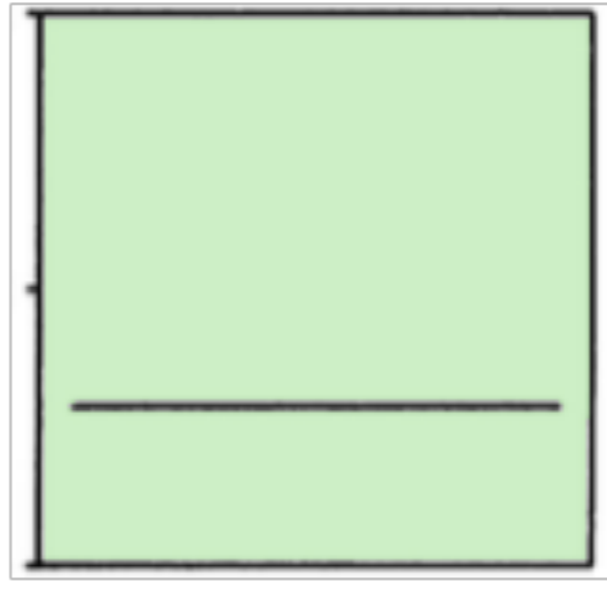
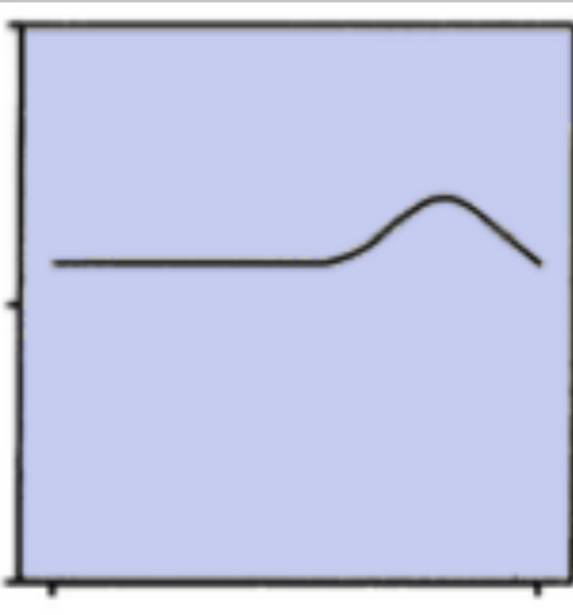
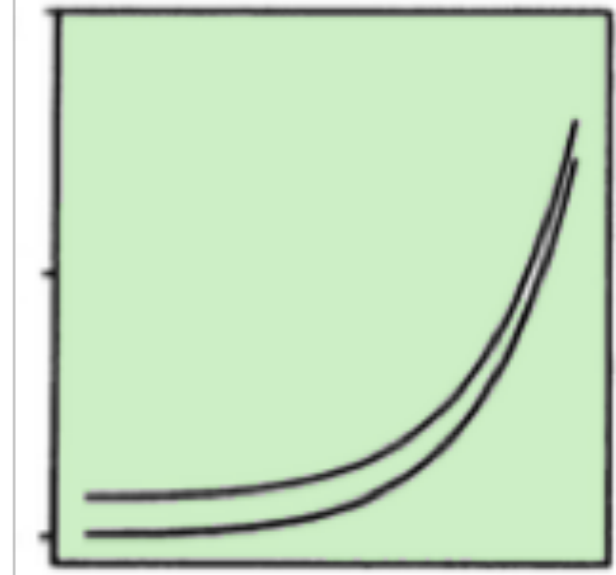
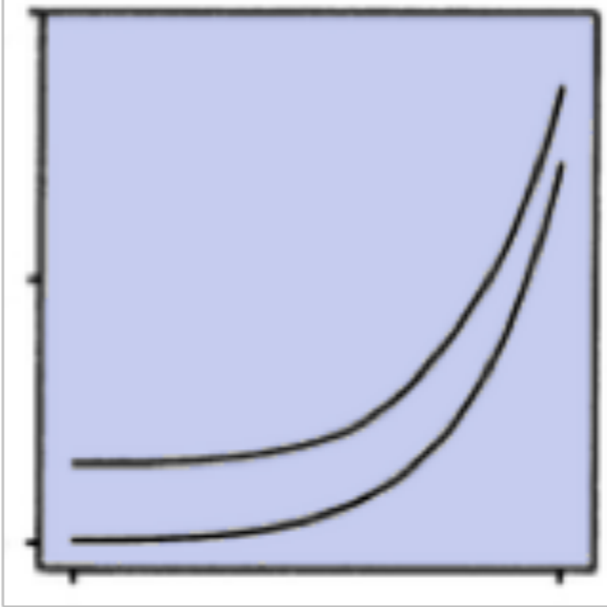
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*From the Year 1700 to 1780 by W. Playfair*



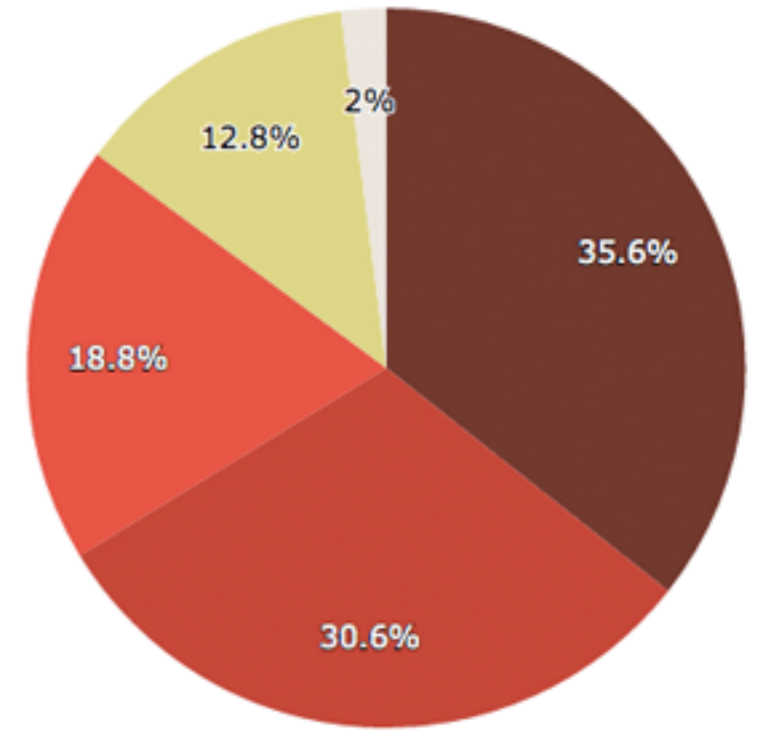
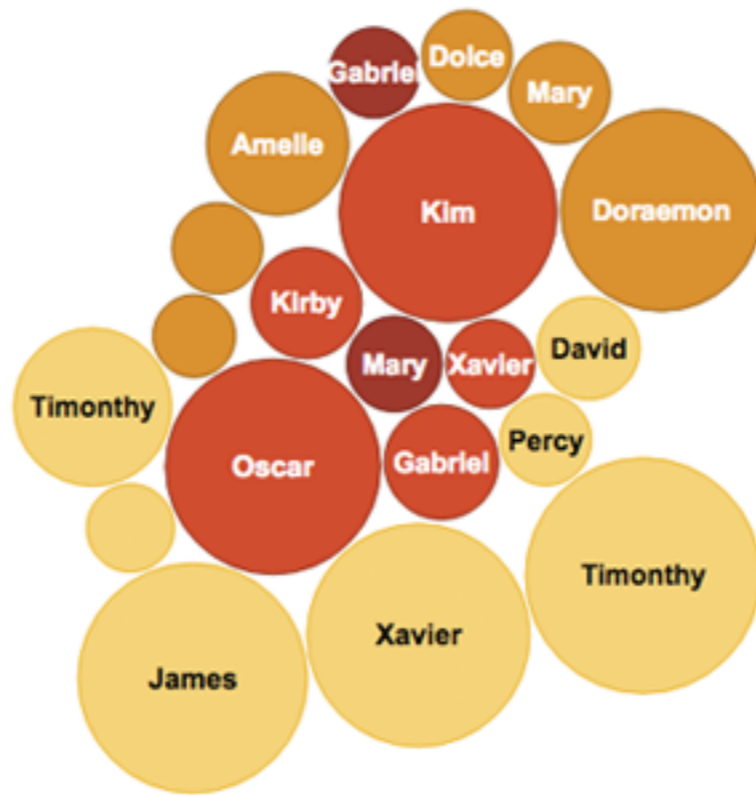
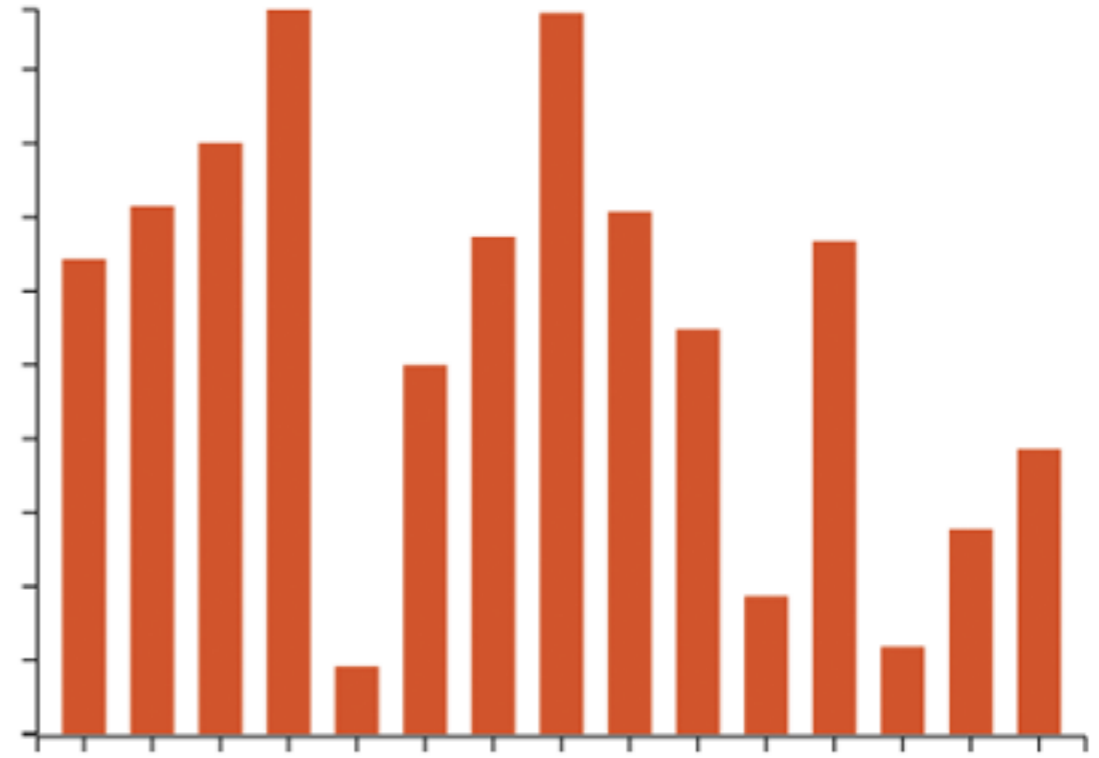
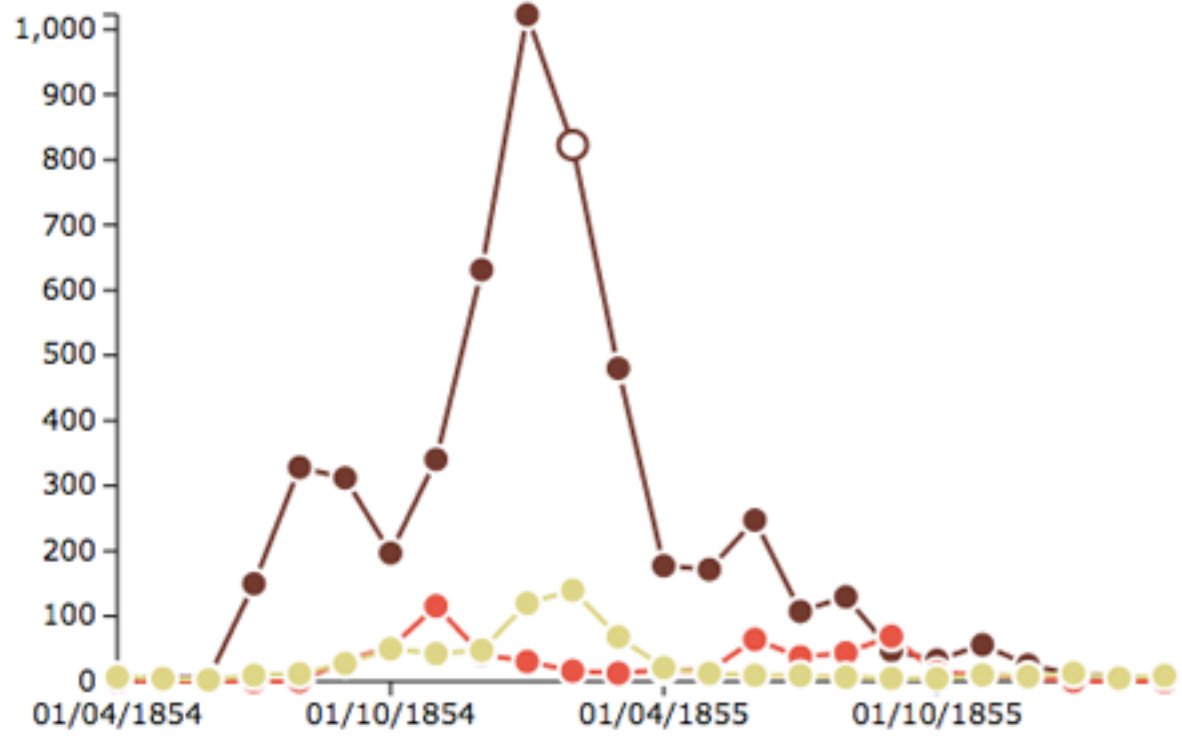
*The Bottom Line is Divided into Years the Right hand Line into HUNDRED THOUSAND POUNDS*  
*is force Page 31<sup>st</sup>* *Published in the Act Divine 16<sup>th</sup> Aug. 1785*

Figure 6. Curve-difference chart after Playfair.











FUNDAMENTAL CHARTS  
PART 1

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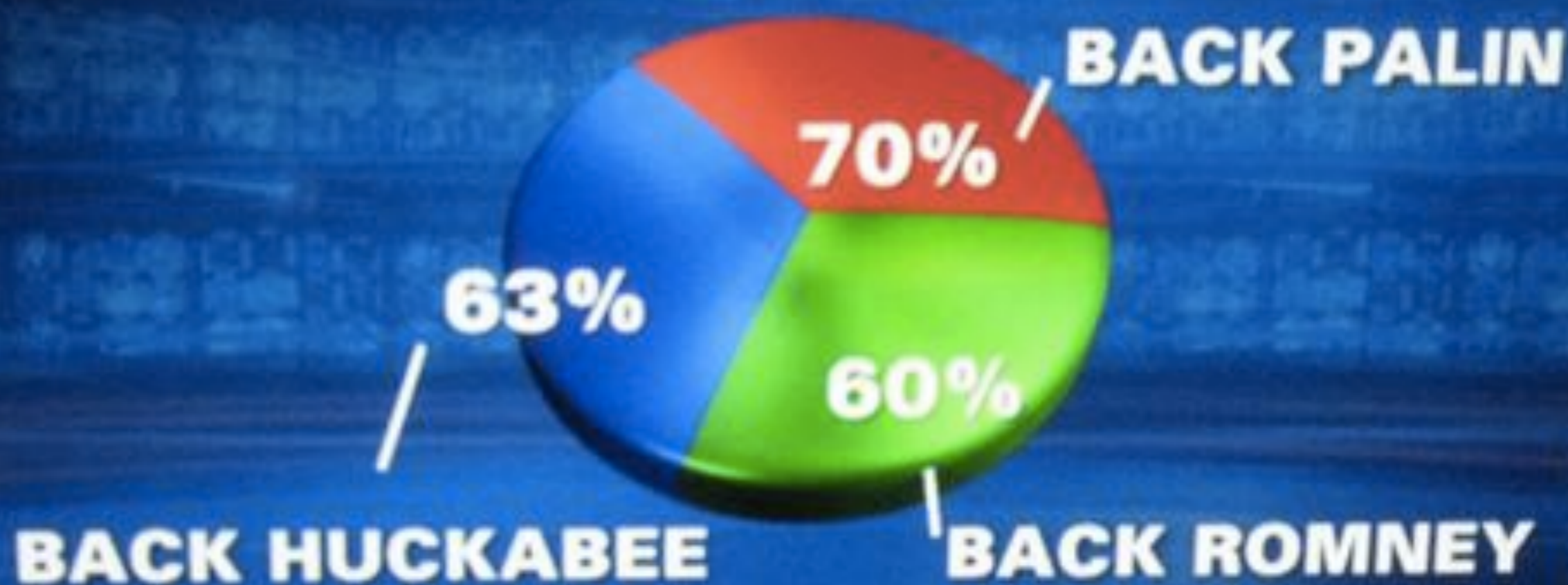
# 圓餅圖

Pie Charts

---

# 2012 PRESIDENTIAL RUN

GOP CANDIDATES

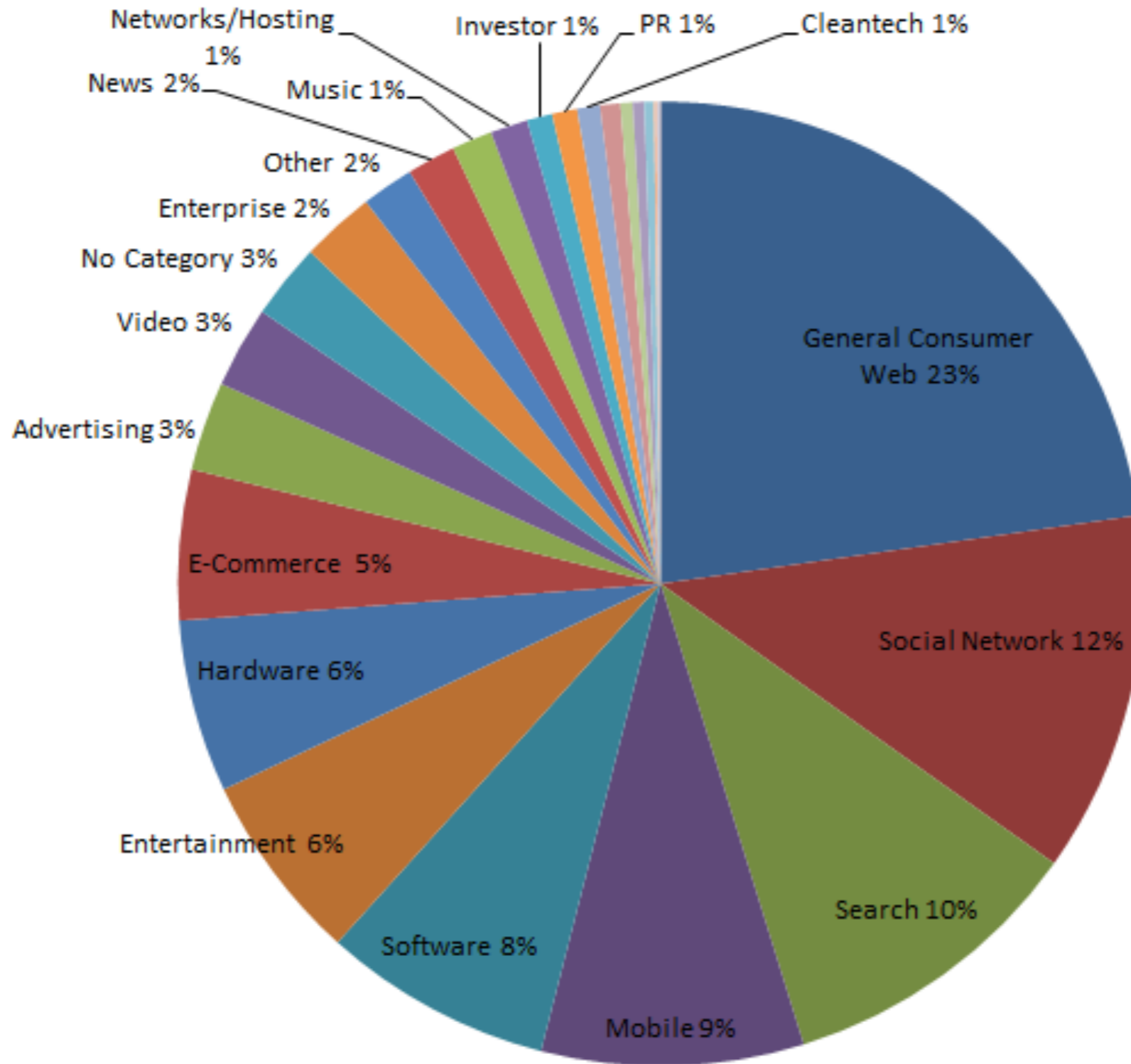


**FOX**

47'

**SOURCE: OPINIONS**

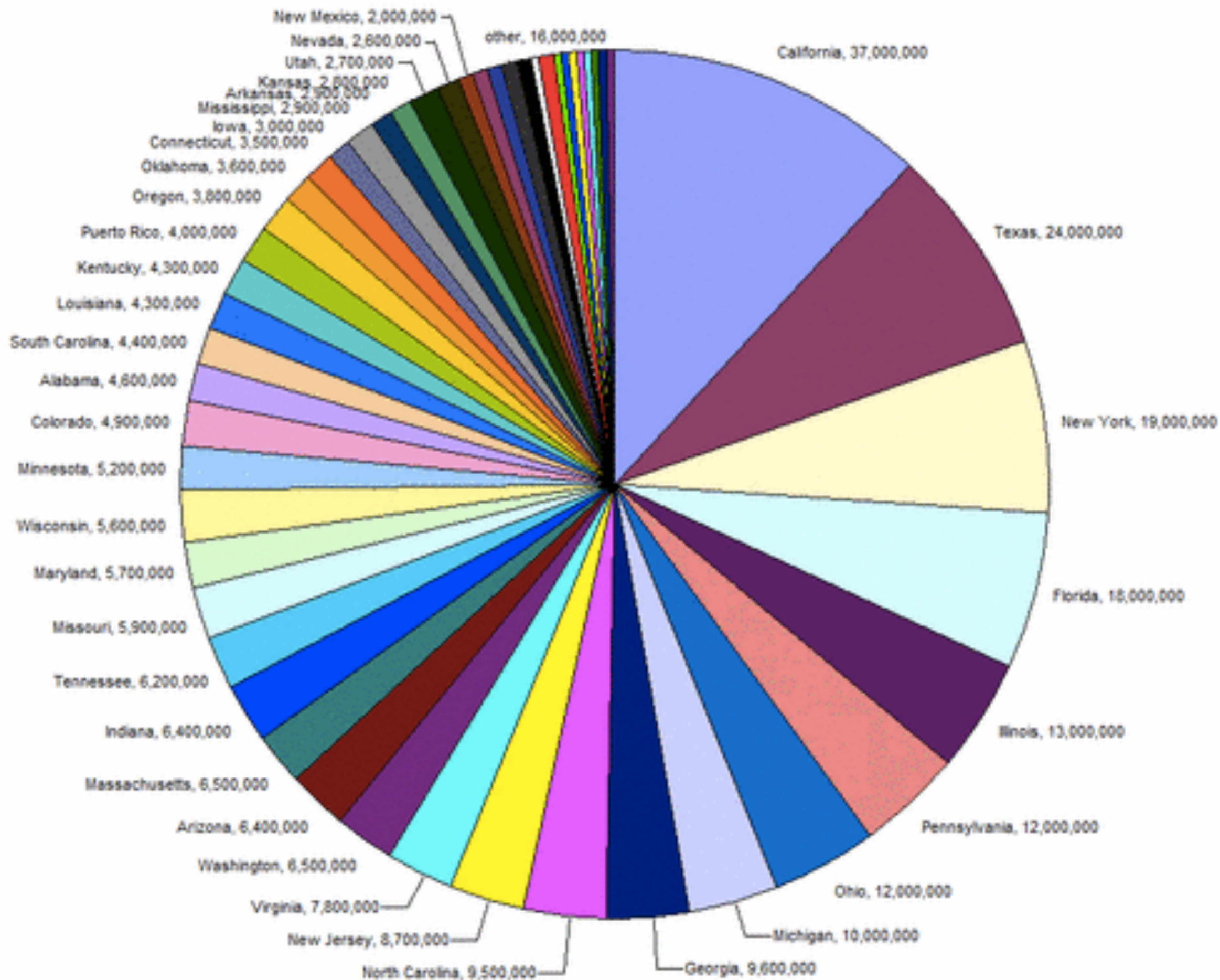
**DYNAMIC**

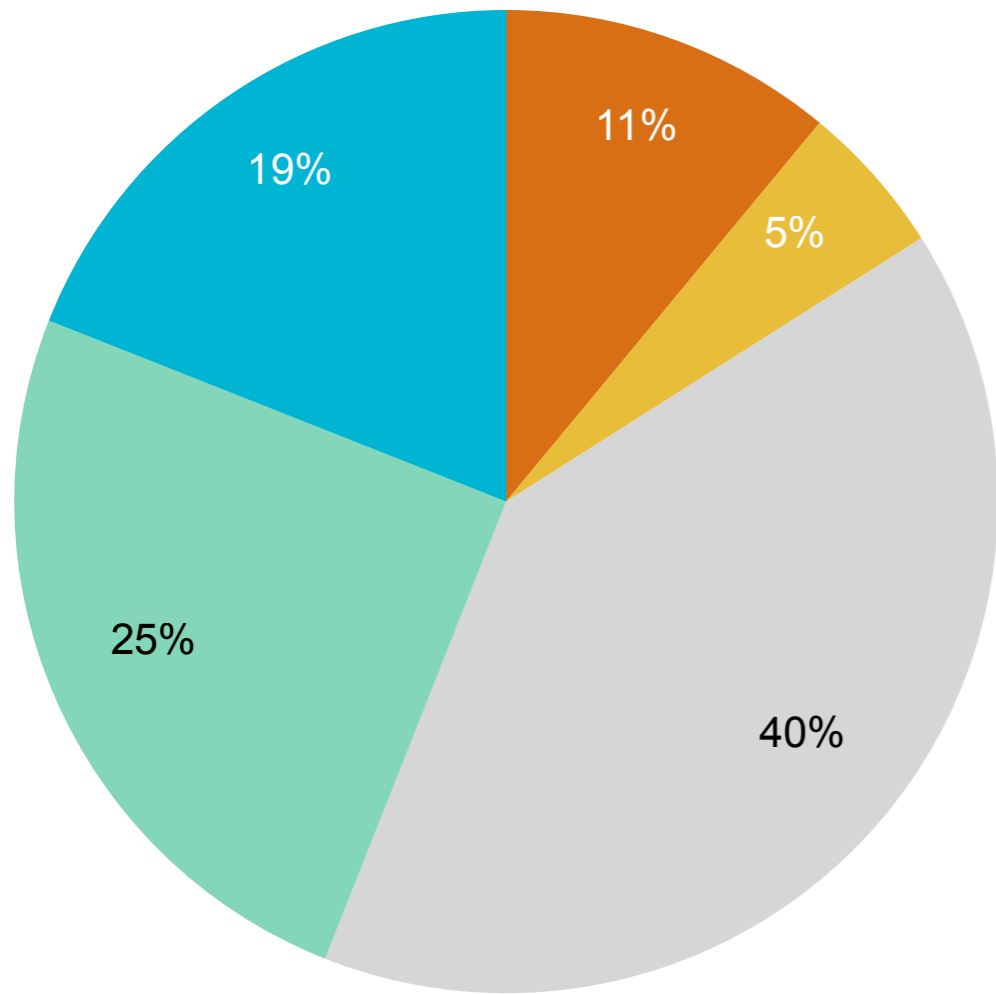


# The Math of TechCrunch

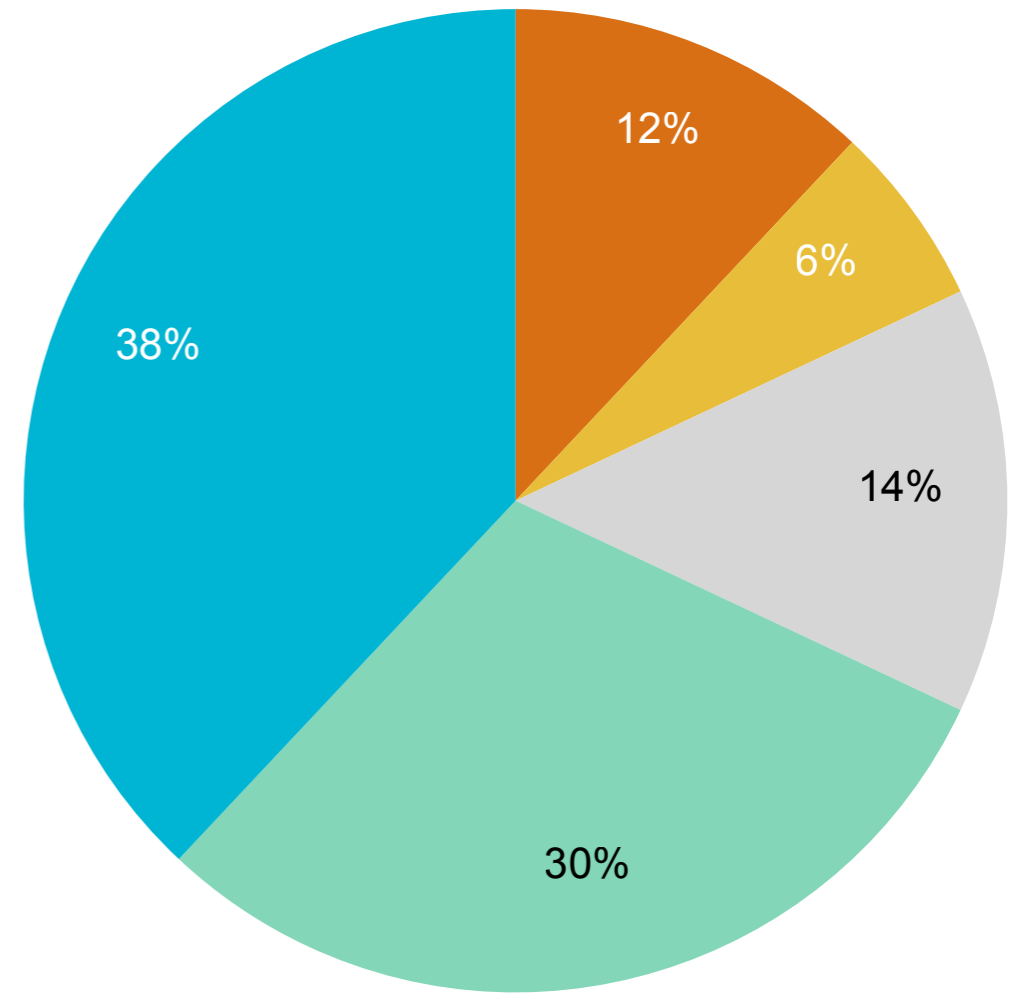
Mark Goldenson, TechCrunch

<https://techcrunch.com/2011/06/26/math-techcrunch-part-2-favorites/>





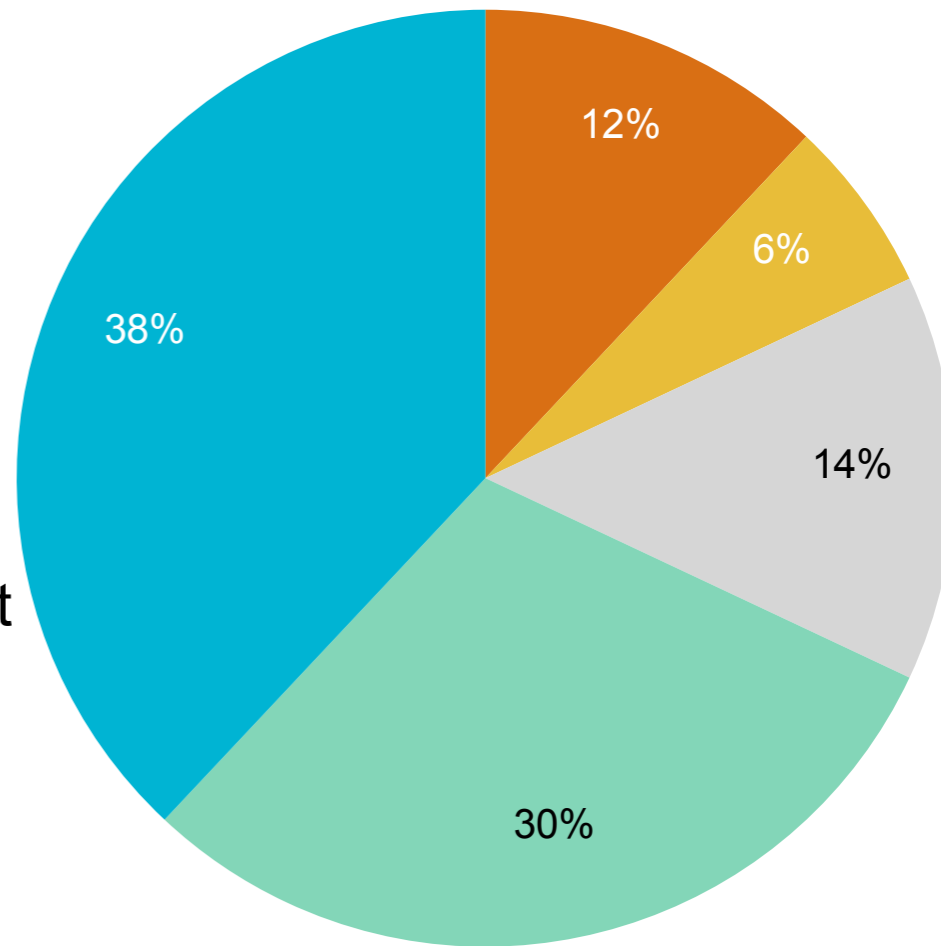
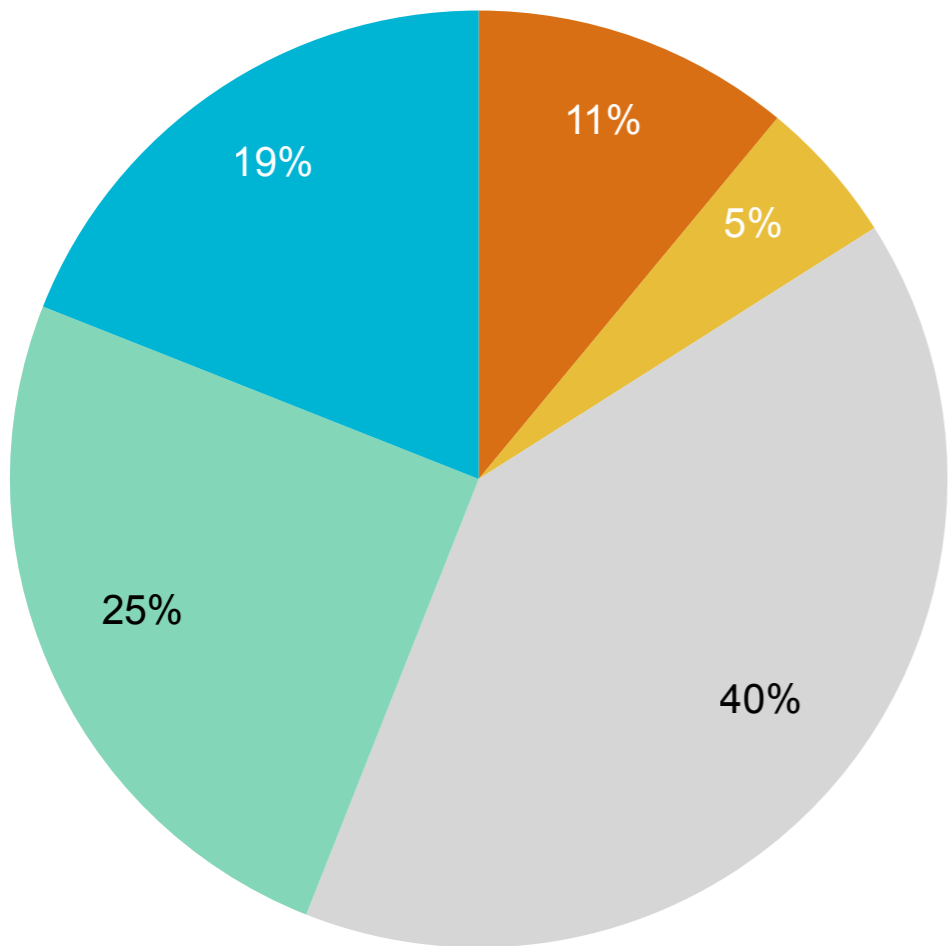
**Before Class**



**After Class**

# How do you feel about doing science?

adopted from "Storytelling with data" by Cole Nussbaumer Knaflic



**Before**



**Bored**

**OK**

**Interested**

**After**



0

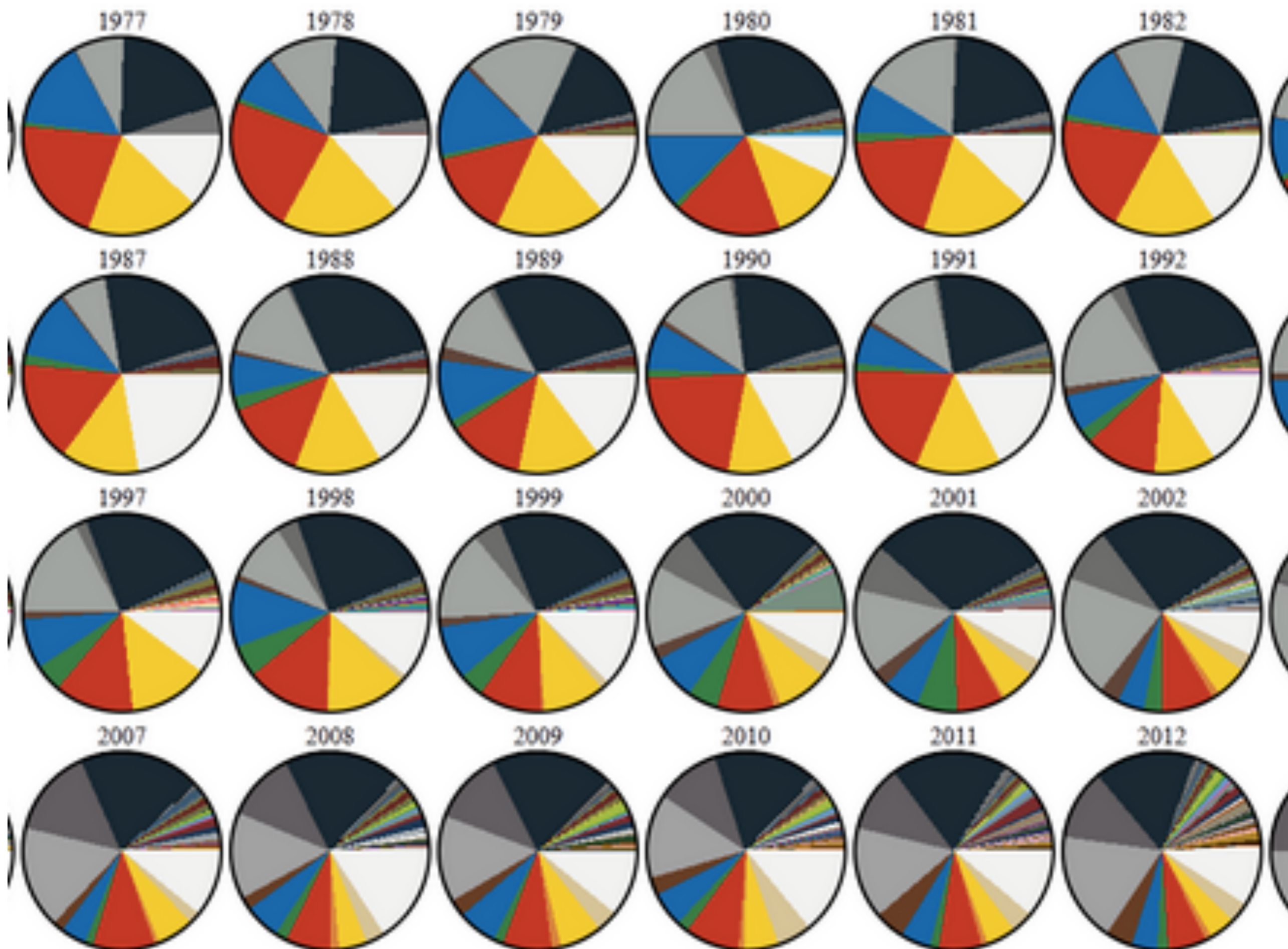
0.2

0.4

0.6

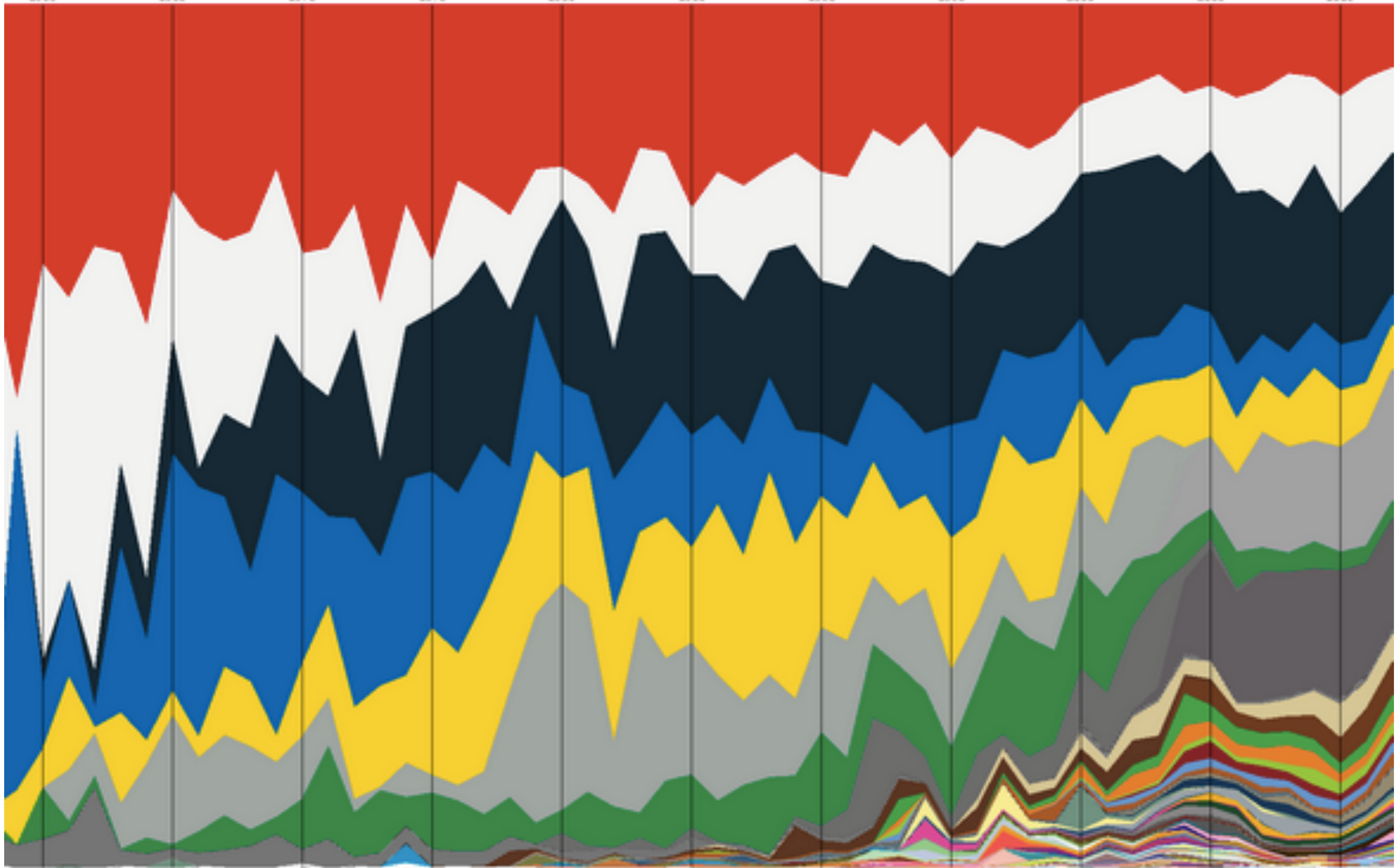
0.8

1





1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010



Marxist Chip

Homemaker Sets with Brown

Brown Plastic Chip Hubs

Paradise

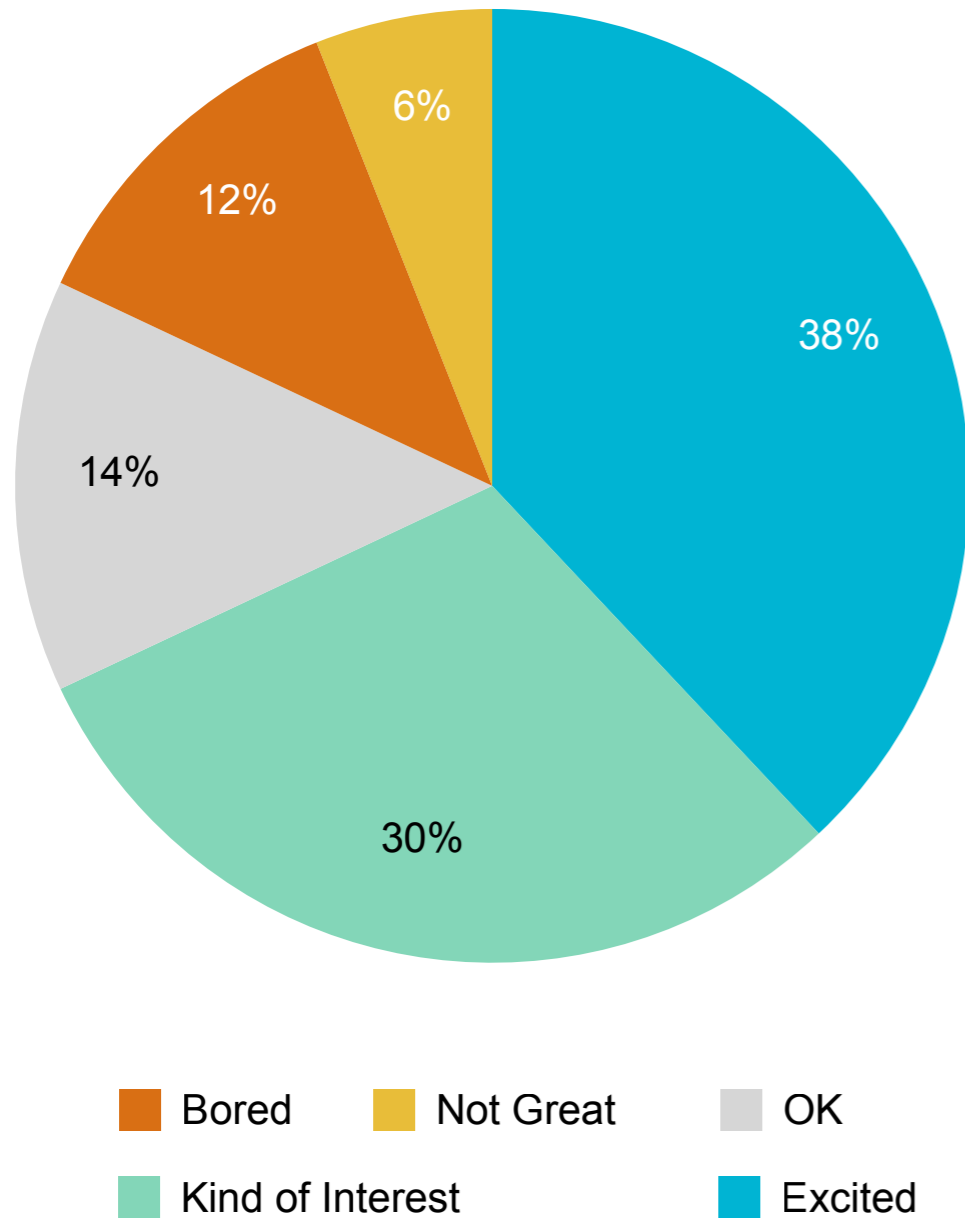
Delude

Soak

Statue of Liberty

Blonde Pearl Lt. Grey

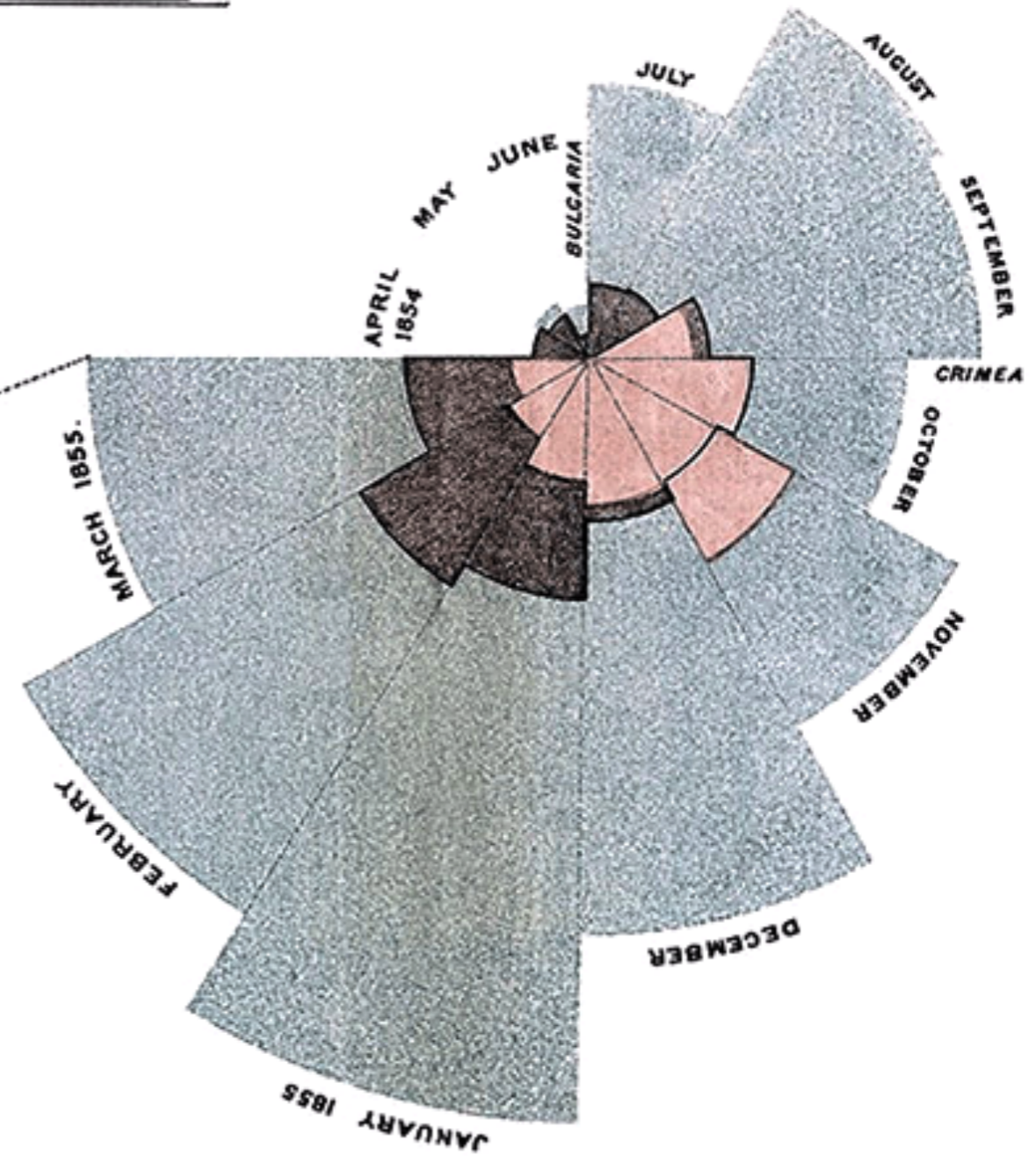
# 圓餅圖要點



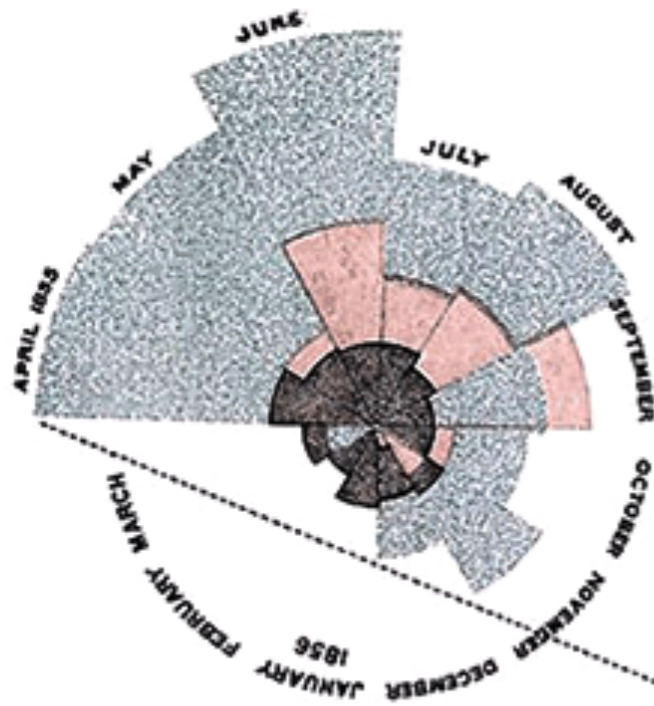
1. 表現整體與部份之比例
2. 總和為 100%
3. 從 12 點鐘方向開始
4. 順時針繞圓排序
5. 數量不宜多，2 ~ 7 為佳
6. 不適合跨圖表比較

# DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.

1.  
APRIL 1854 TO MARCH 1855.



2.  
APRIL 1855 TO MARCH 1856.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.  
 The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.  
 The black line across the red triangle in Nov. 1854 marks the boundary of the deaths from all other causes during the month.  
 In October 1854, & April 1855, the black area coincides with the red, in January & February 1856, the blue coincides with the black.  
 The entire areas may be compared by following the blue, the red & the black lines enclosing them.

## Cause of Mortality

in Hospital of Crimean War, 1854 ~ 1856, by Nightingale Florence



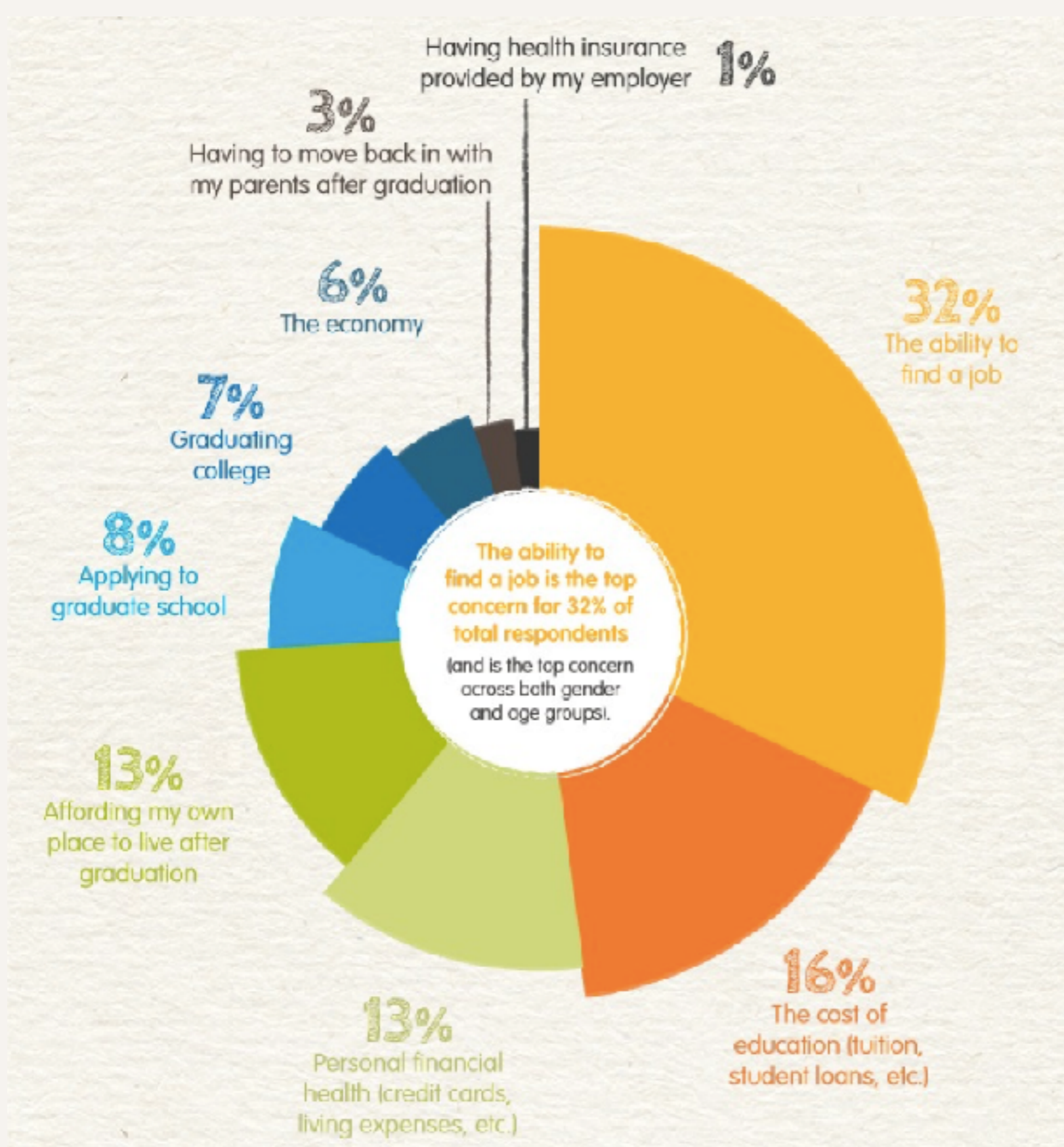


FUNDAMENTAL CHARTS  
PART ●●

---

面積圖  
Area Charts

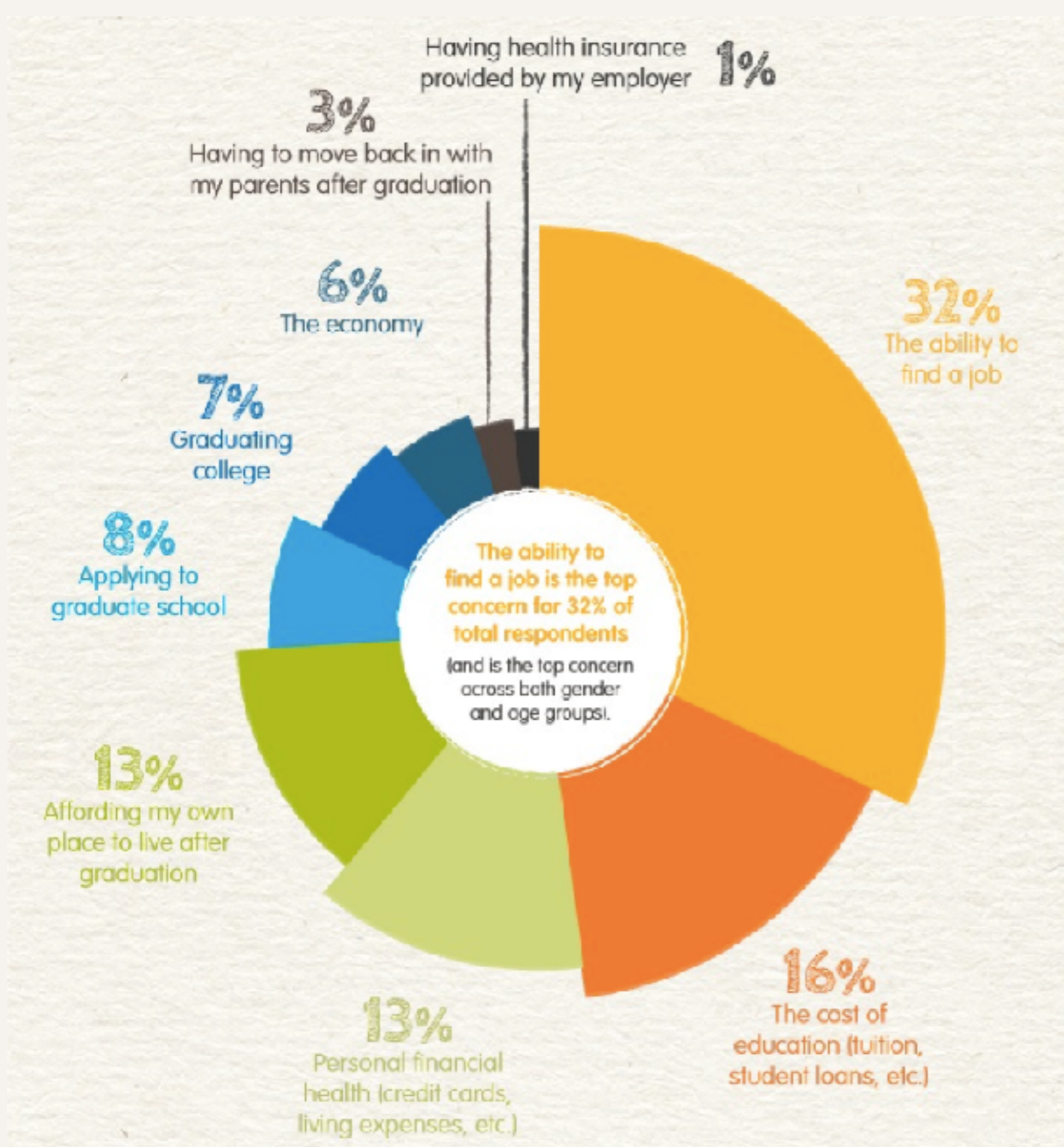
---



# What are their concerns for the future?

for Gen Z and millennials

<http://www.americaninfographic.com/post/121773506453/infographic-gen-z-millennials>



$$\frac{\text{rad}}{2\pi} \times \pi r^2$$

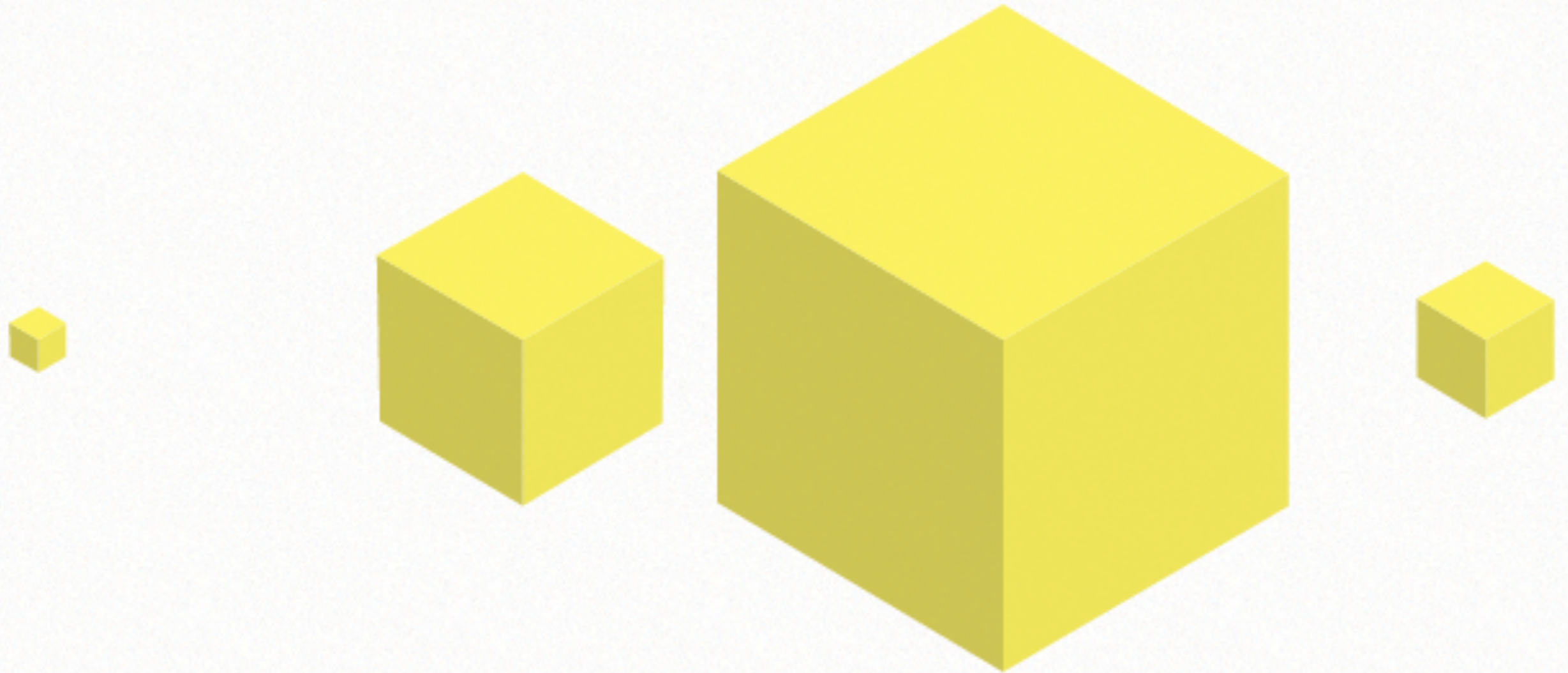
Ratio of Area:

$$\frac{\text{rad}_a \times r_a^2}{\text{rad}_b \times r_b^2}$$

## What are their concerns for the future?

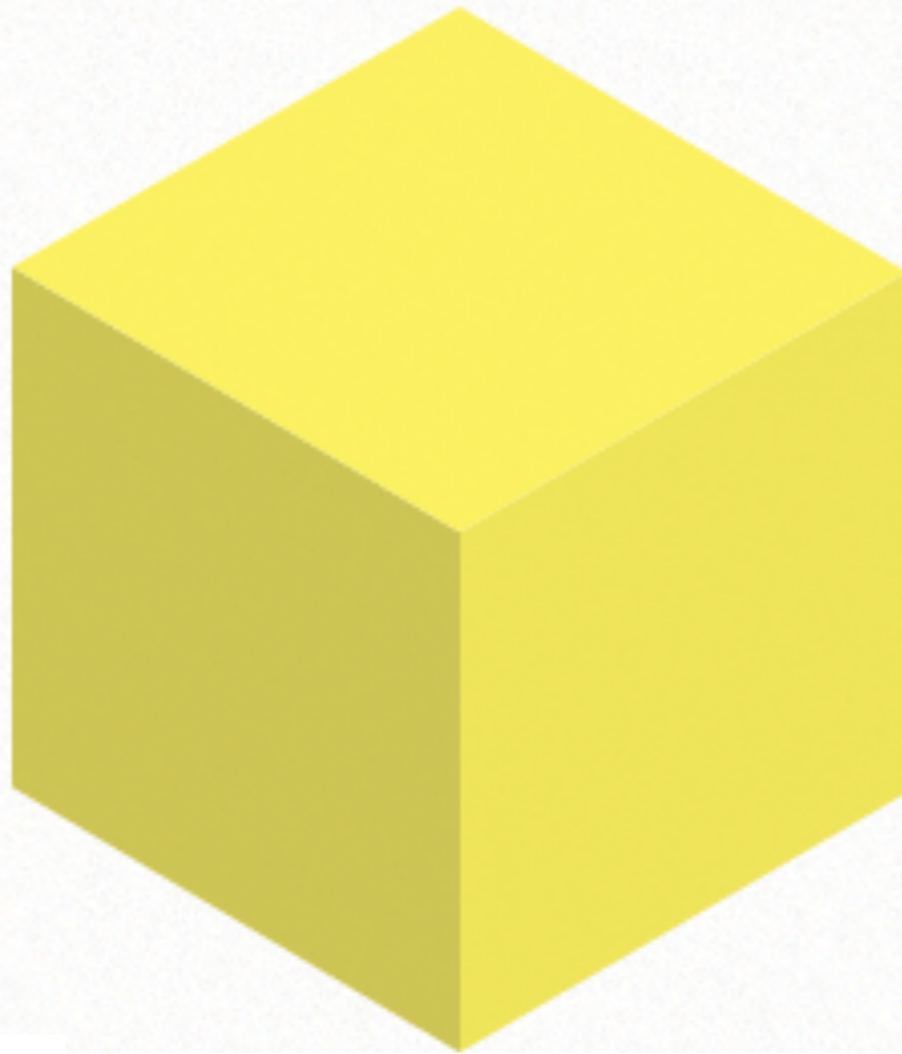
for Gen Z and millennials

<http://www.americaninfographic.com/post/121773506453/infographic-gen-z-millennials>



# Responsive Report 2014

<http://2014.report.gridsetapp.com>



**使用者體驗 ??%**

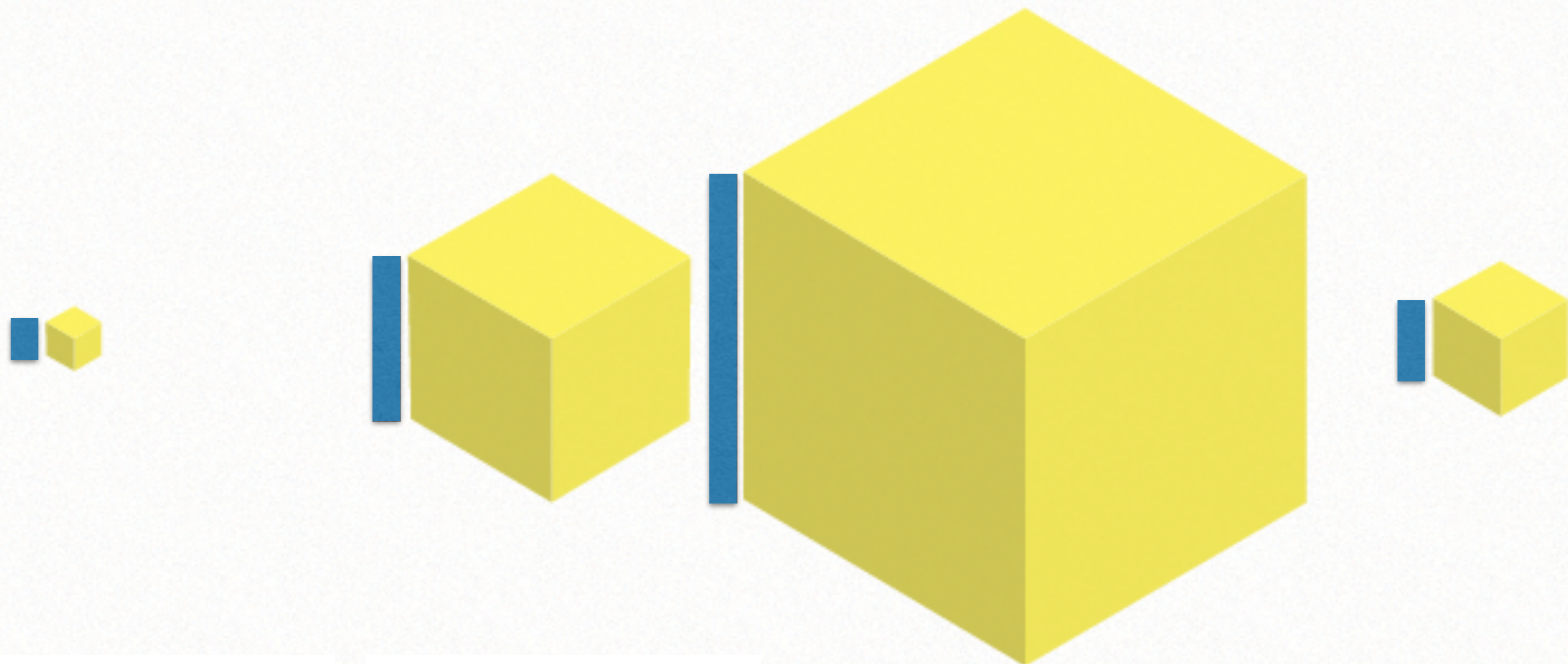
**前端工程 ??%**

**設計 + 工程 ??%**

**設計師 ??%**



# 單邊邊長



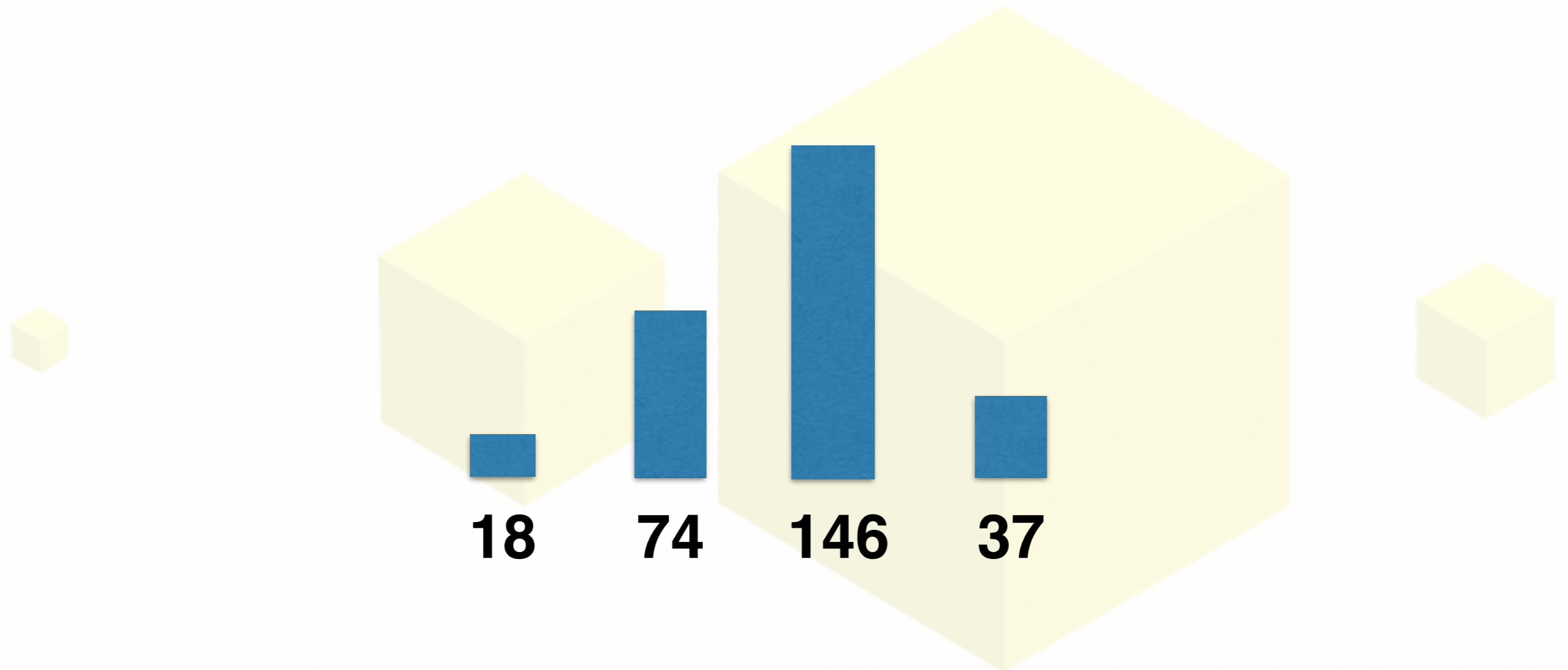
使用者體驗 ??%

前端工程 ??%

設計 + 工程 ??%

設計師 ??%

# 單邊邊長 - 實際像素量



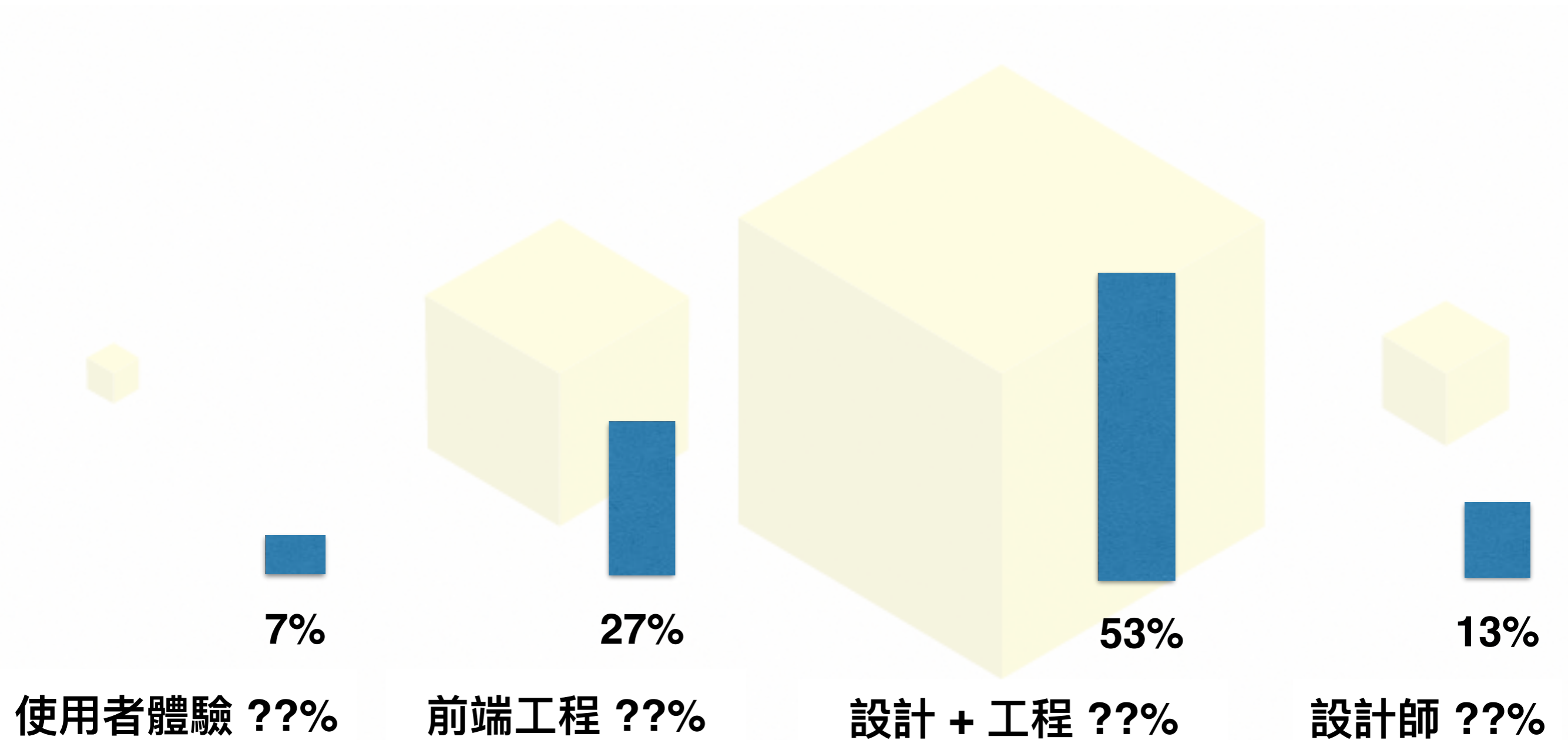
使用者體驗 ??%

前端工程 ??%

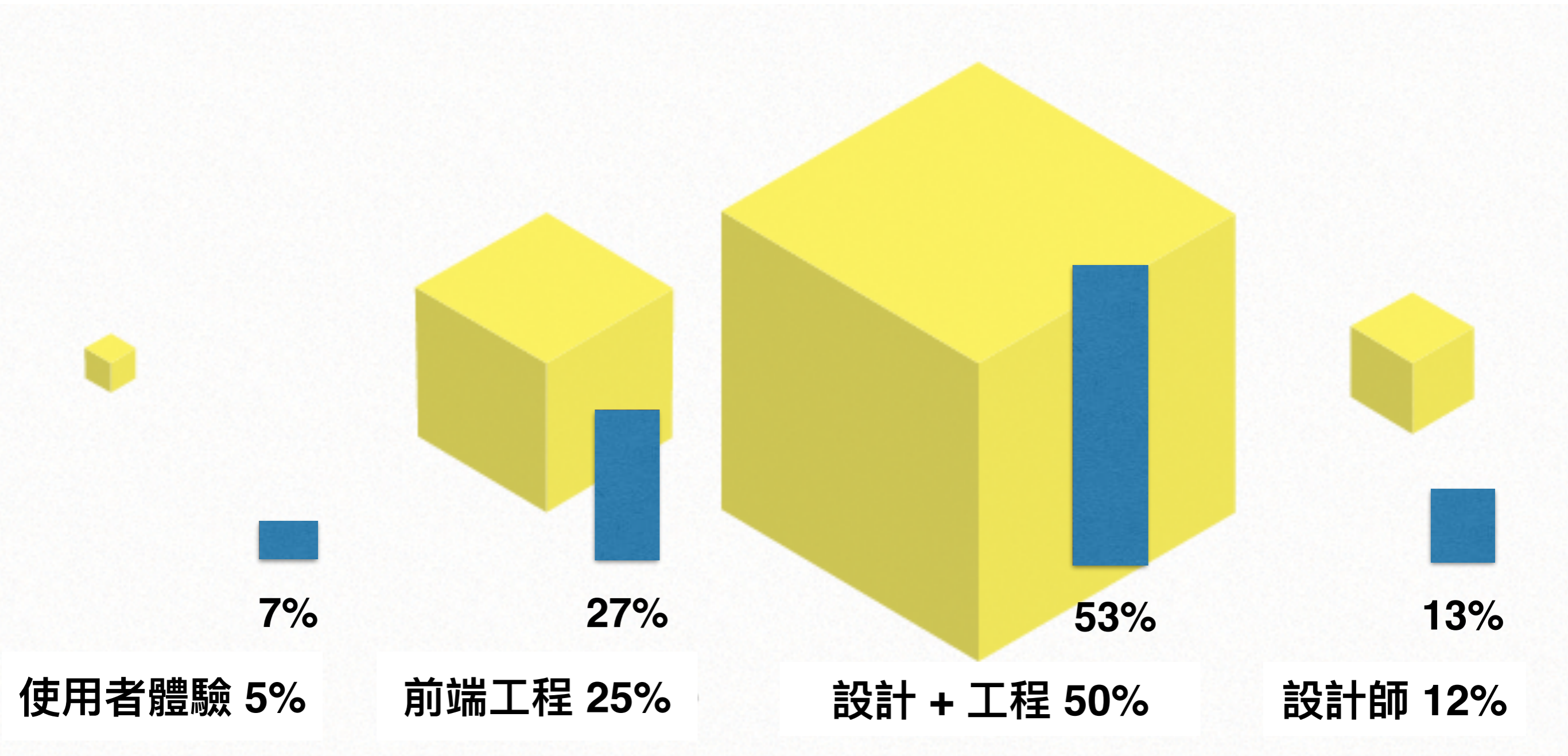
設計 + 工程 ??%

設計師 ??%

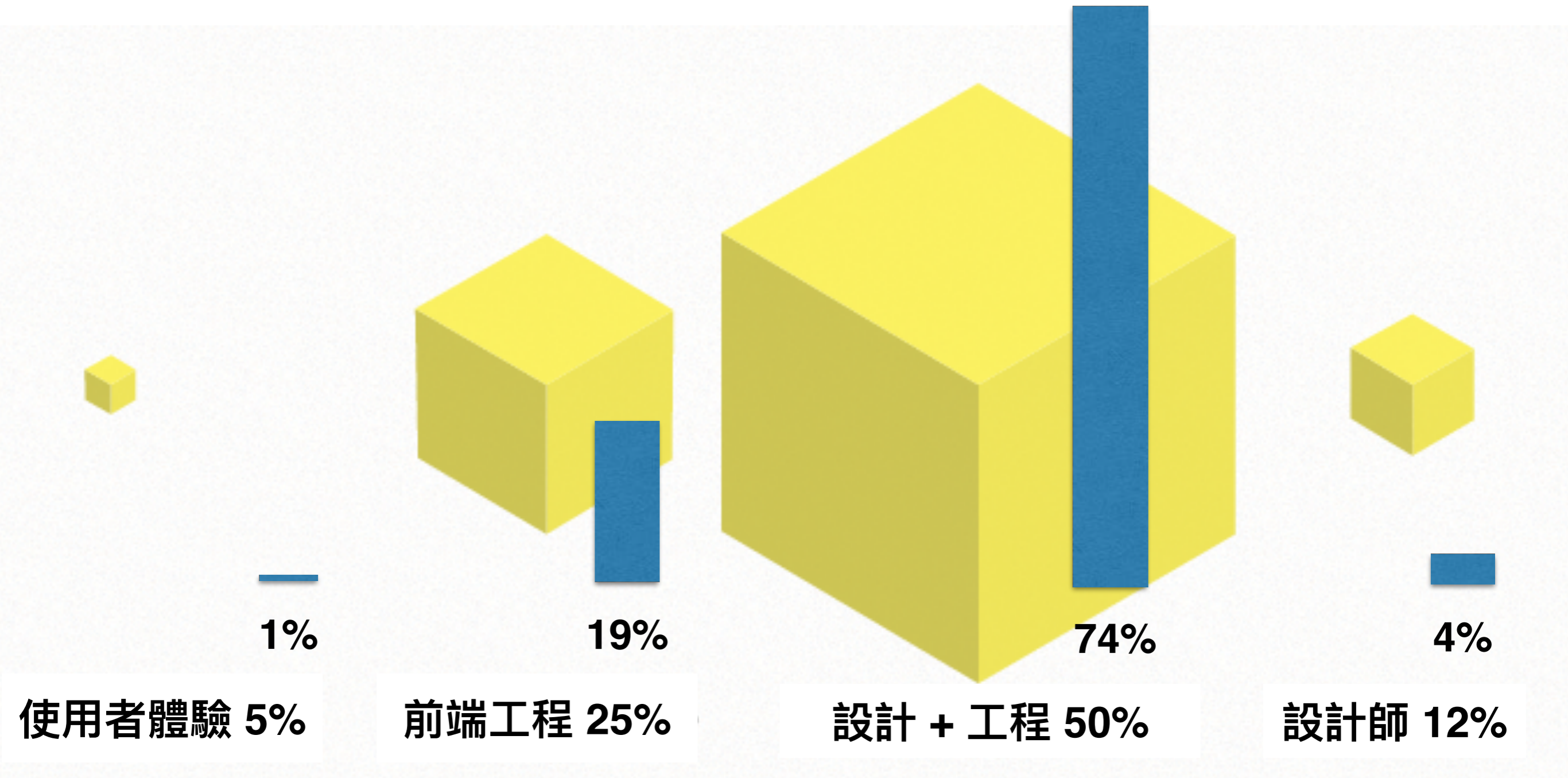
# 單邊邊長 - 長度比例 vs 答案



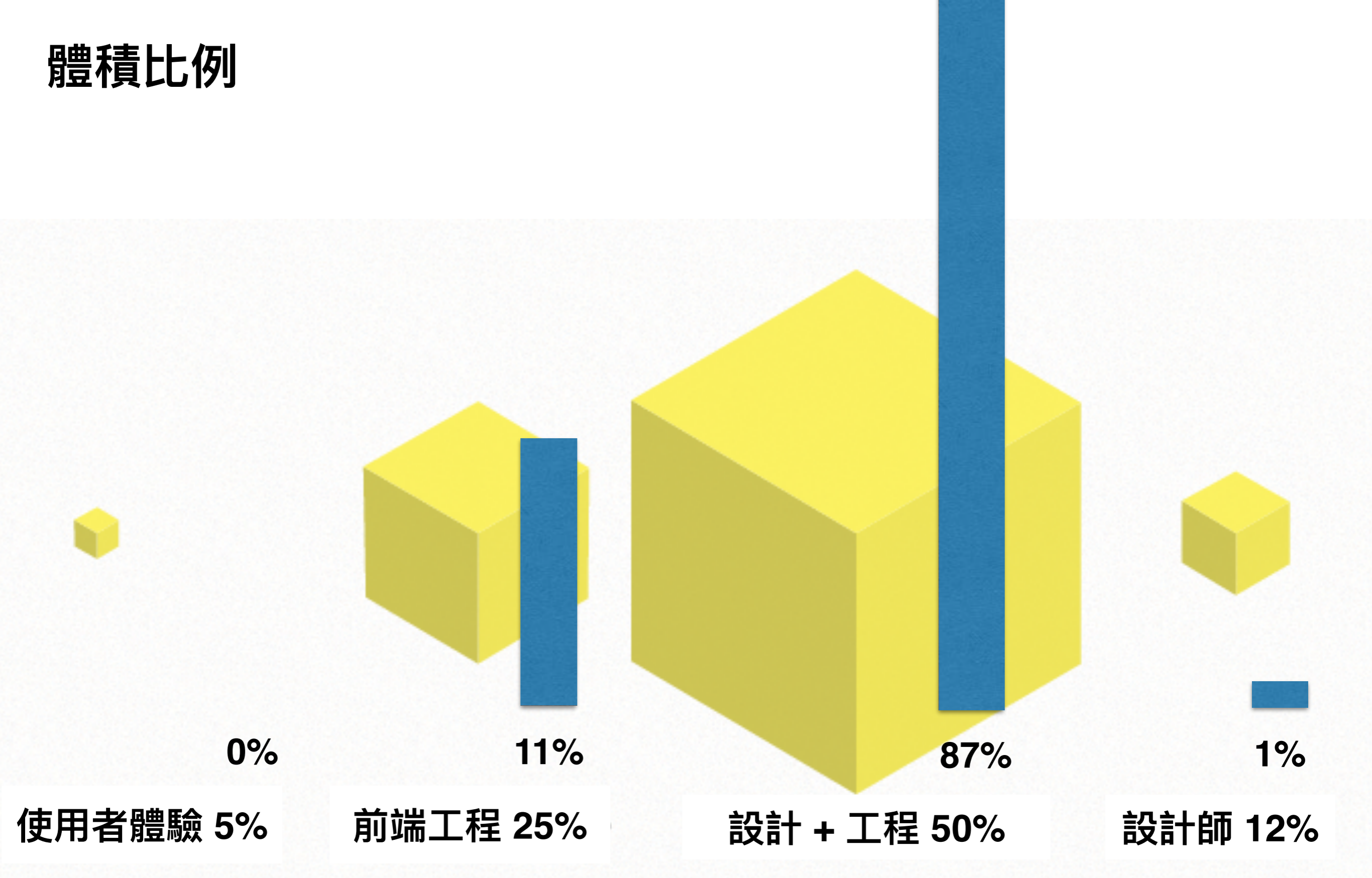
# 單邊邊長 - 長度比例 vs 答案



# 面積比例



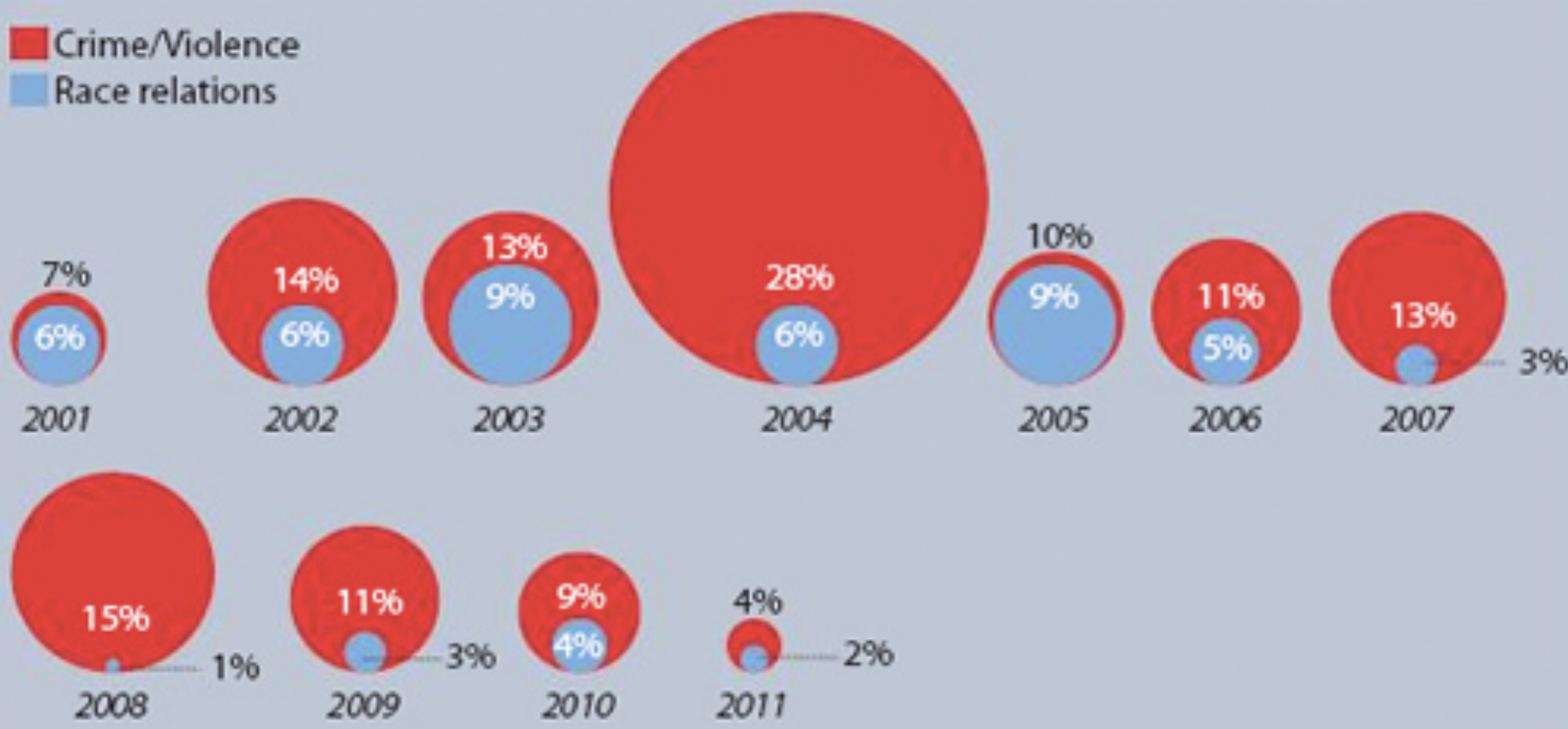
# 體積比例

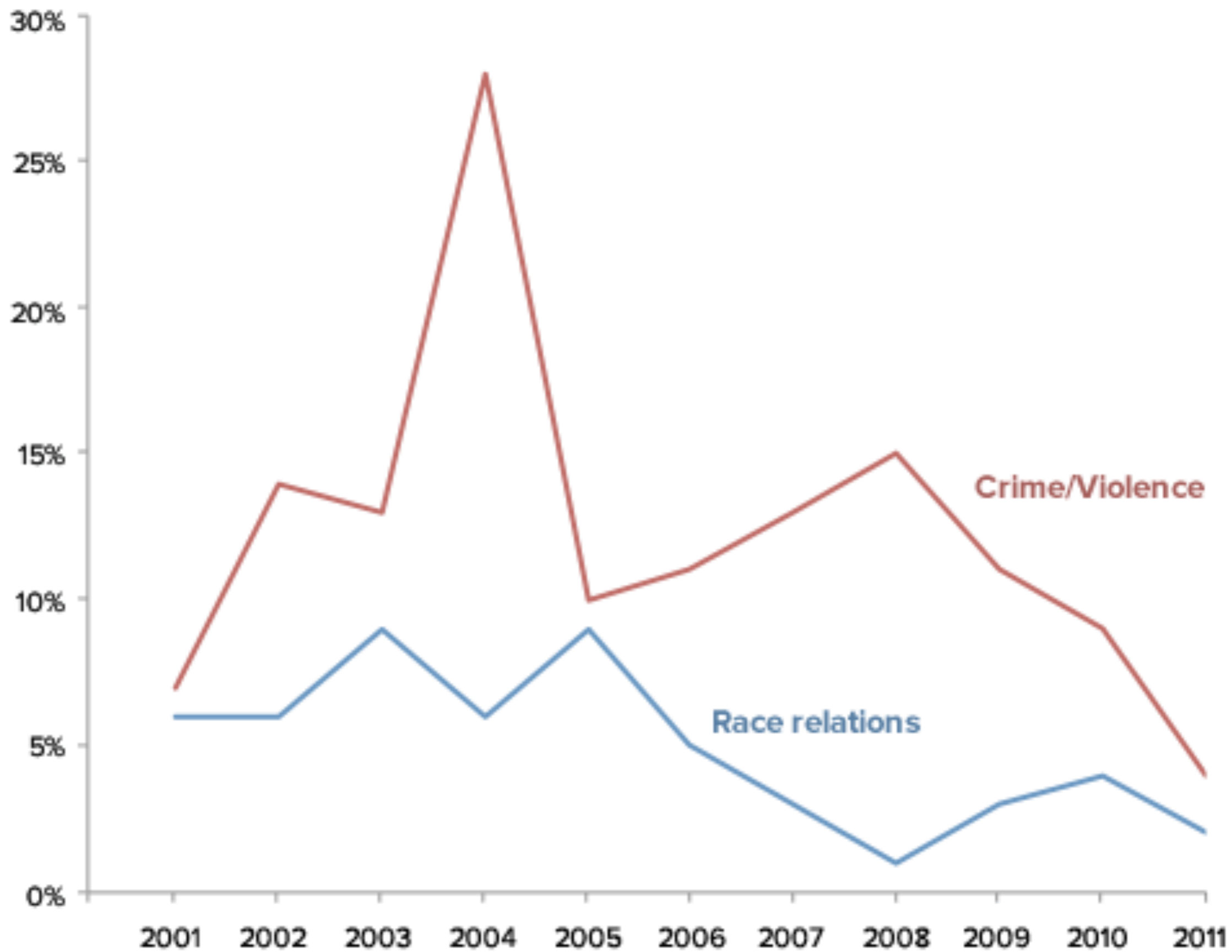


# Most important issues

What do you think is the most important problem facing New Zealand today?

- Crime/Violence
- Race relations







Default

政事別

主管單位

新增

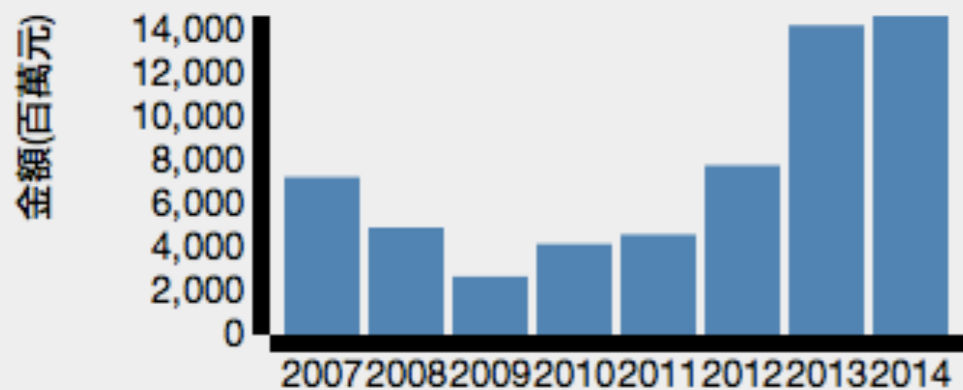
+25% +10% +2% +0% -2% -10% -25%

圖例

### 臺灣鐵路管理局(交通部/營業基金)

147億元(+3.04%)  
(即為4億份營養午餐(回扣))

連結到此項: <http://budget.g0v.tw/budget/6029018020>



例如: 林益世

標記相關人士

林益世 工研院

透過按一下表達你對於此預算的看法!

6人



希望追加

1人



表示不懂

8人

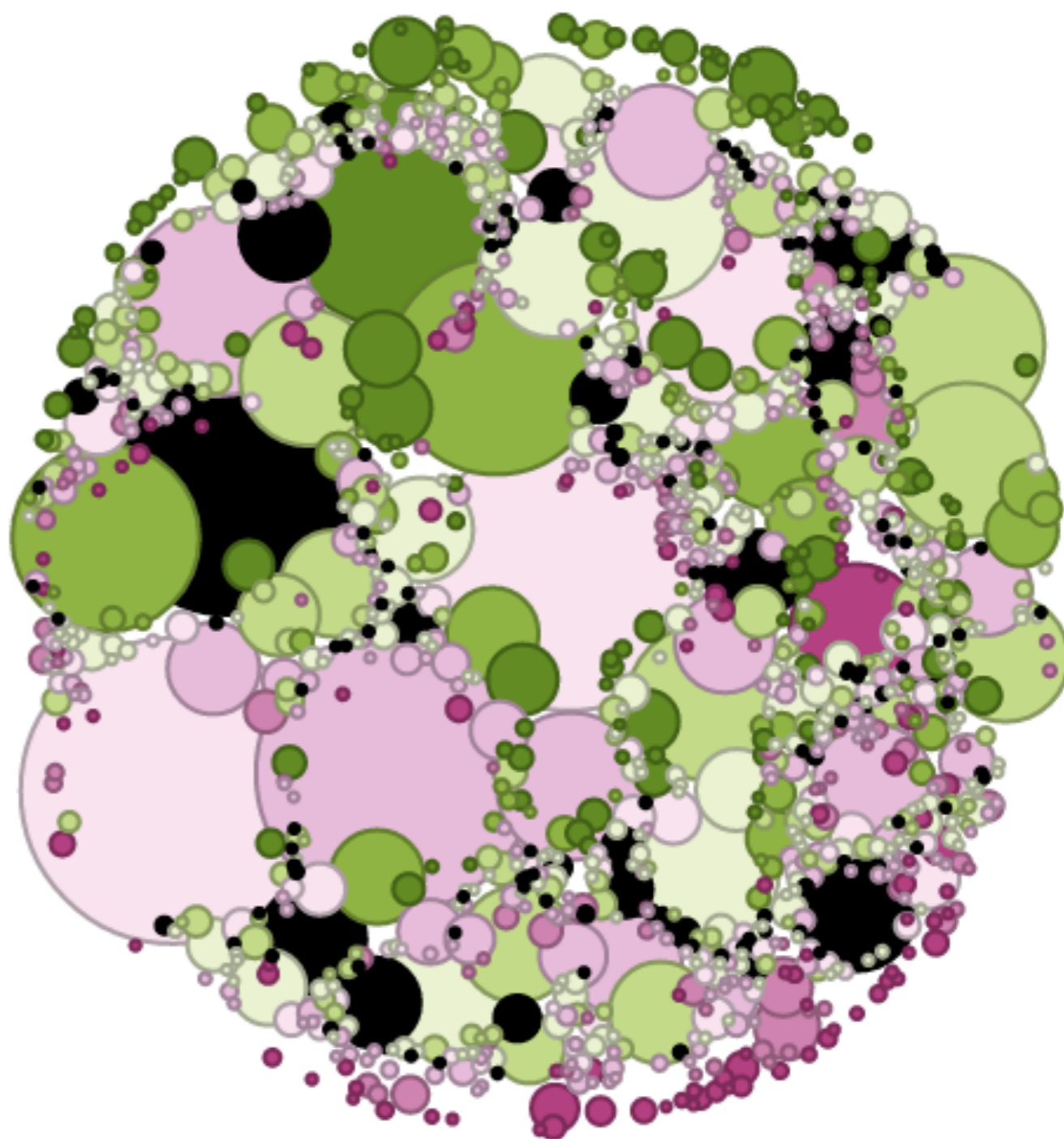


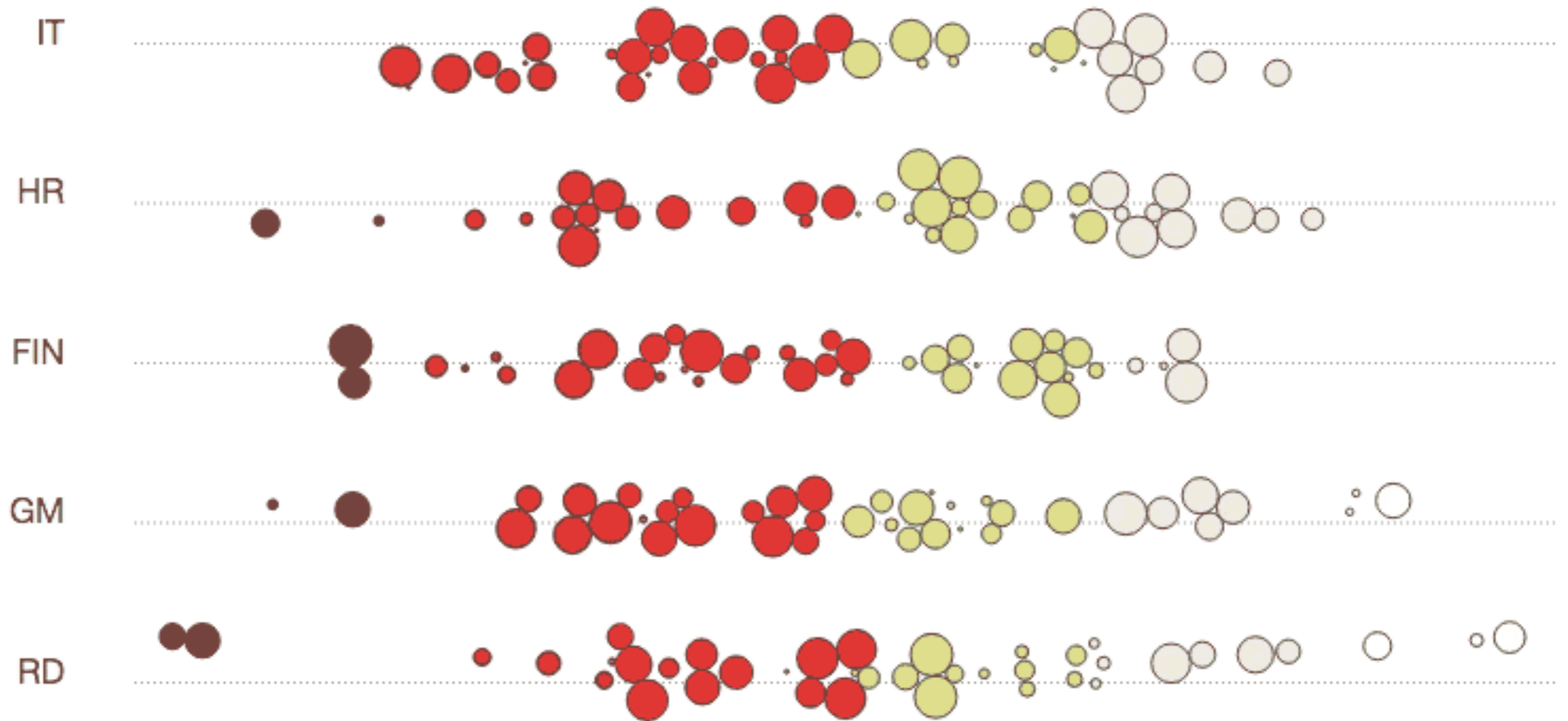
建議減少

3人



要求刪除





X 軸 - 得分

顏色 - 分組

Y 軸 - 部門

半徑 - 薪資

# 5:53am

SLOW

MEDIUM

FAST

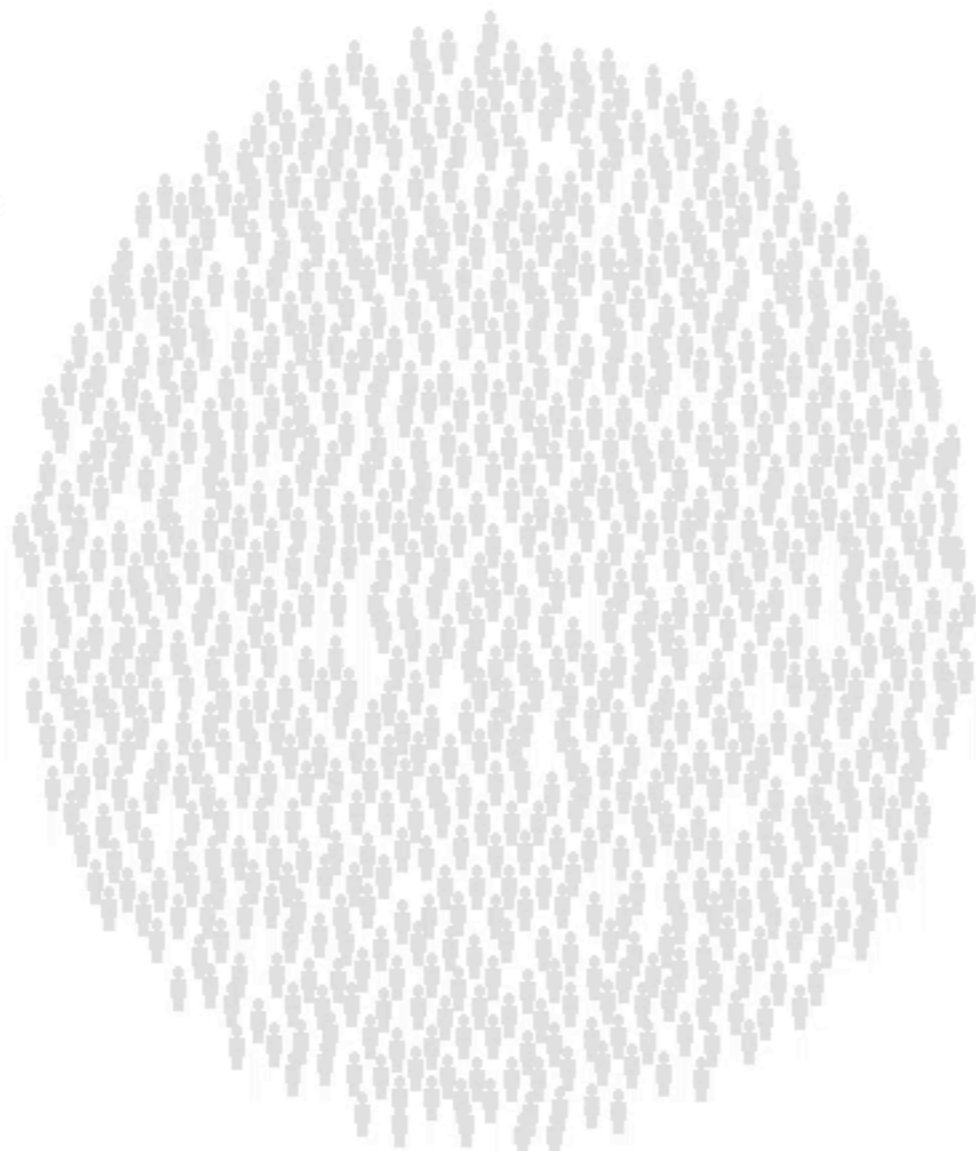
*Most people are still sleeping this early in the morning, but some are already at work or preparing for the day.*



This is a simulation of 1,000 people's average day. It's based on 2014 data from the [American Time Use Survey](#), made way more accessible by the [ATUS Extract Builder](#).

Heart disease, another common condition in residents, can have treatment conflicts with the other two diseases: treating it with statins may cause cognitive difficulties, and some blood pressure drugs should be avoided.

66%  
no heart disease

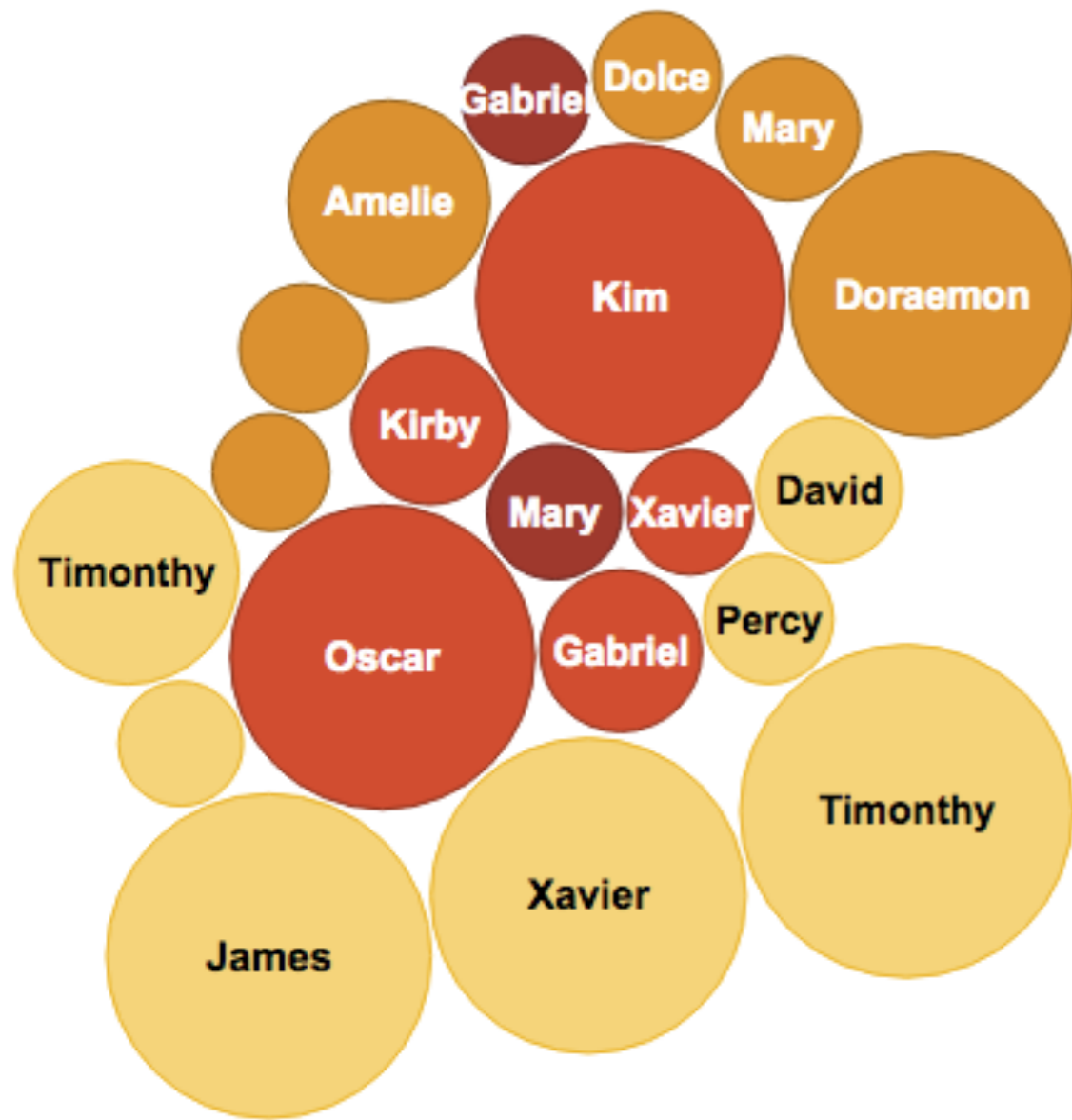


34%  
have heart disease

## For the Elderly, Diseases That Overlap

<http://www.nytimes.com/interactive/2013/04/16/science/disease-overlap-in-elderly.html>

# 面積圖要點



1. 概略表現資料
2. 適合相對性的比較
3. 數值與面積成正比
4. 避免圓以外的形狀
5. 避免用體積表現數值

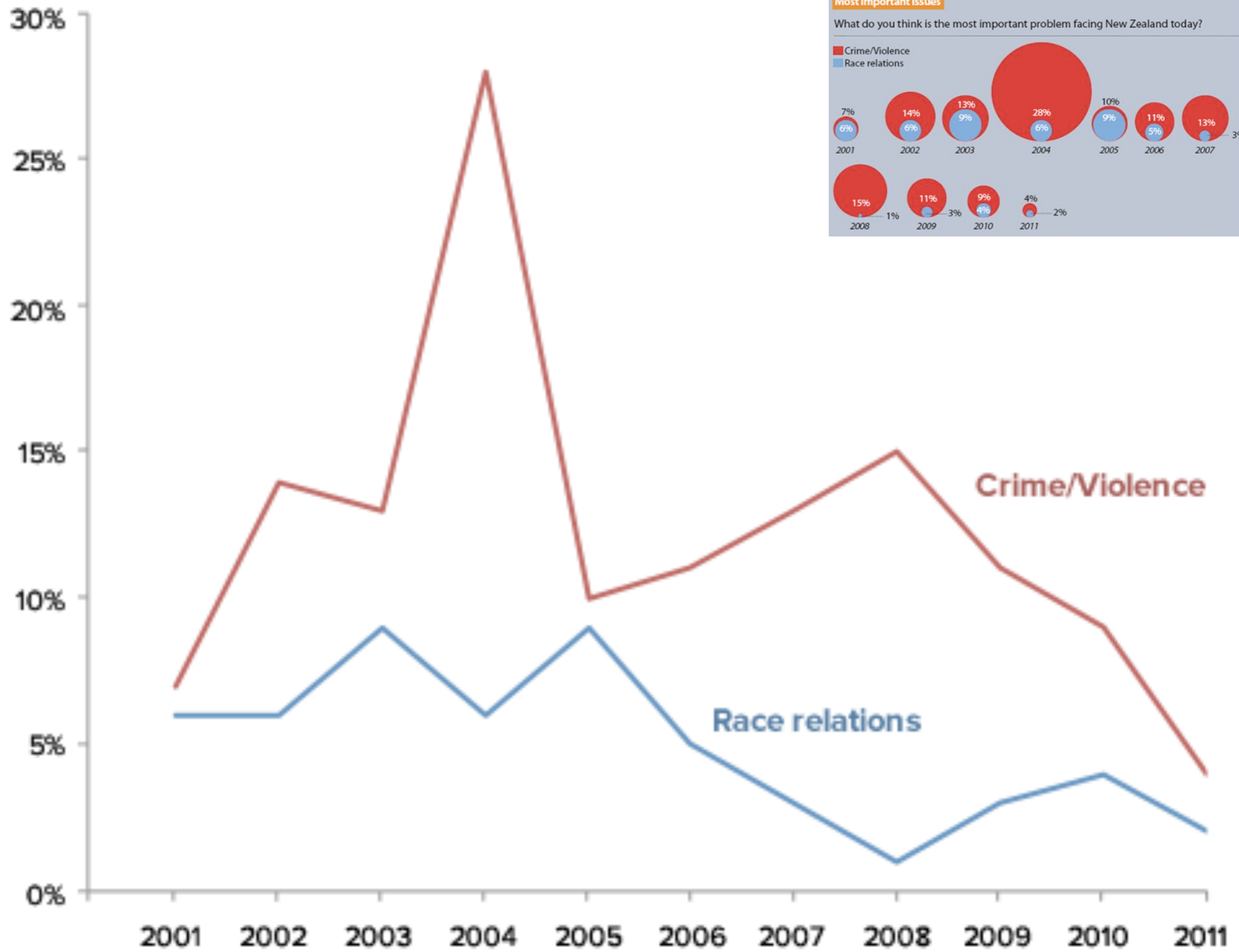


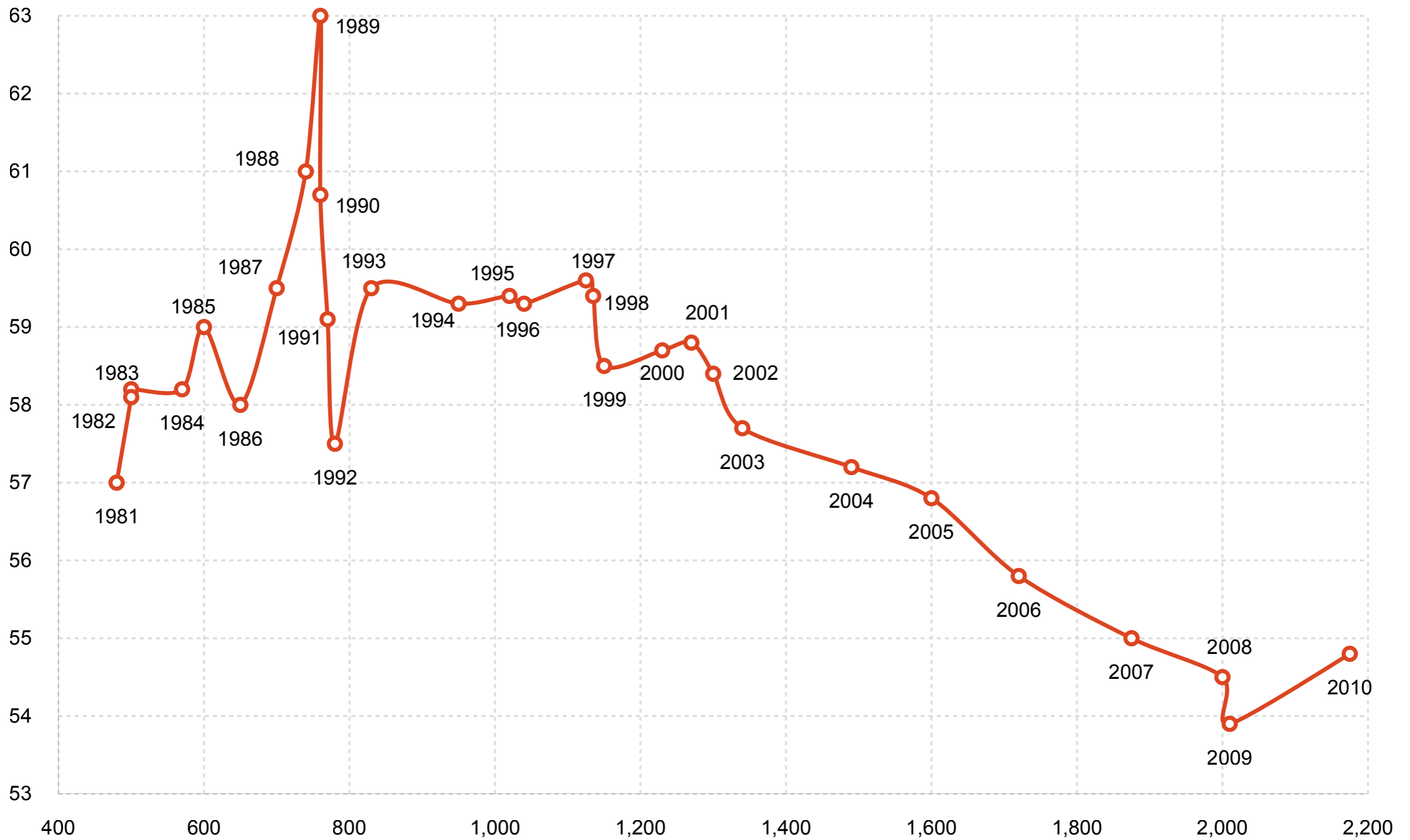
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# 折線圖與長條圖

Line Charts, Bar Charts and Column Charts

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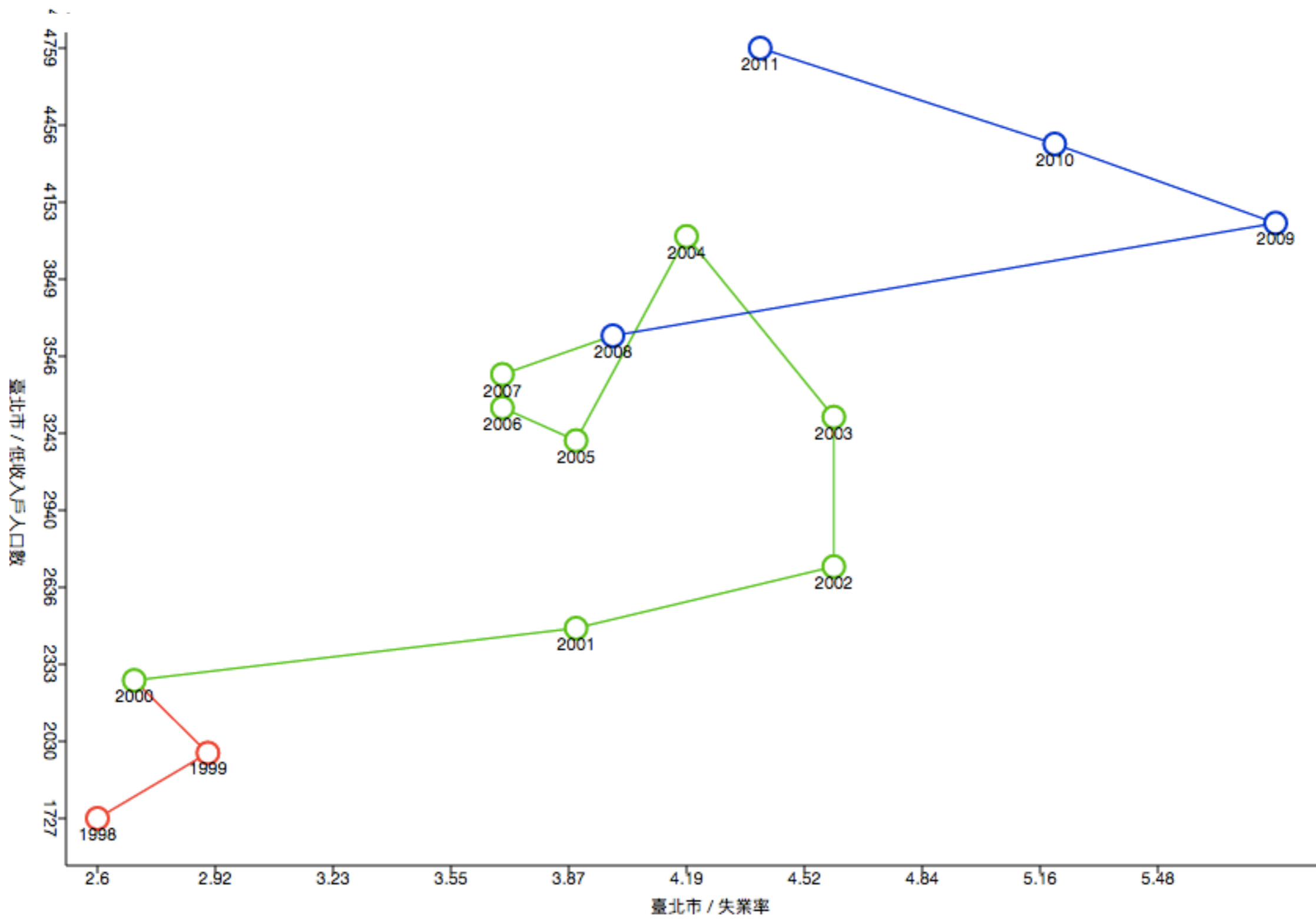


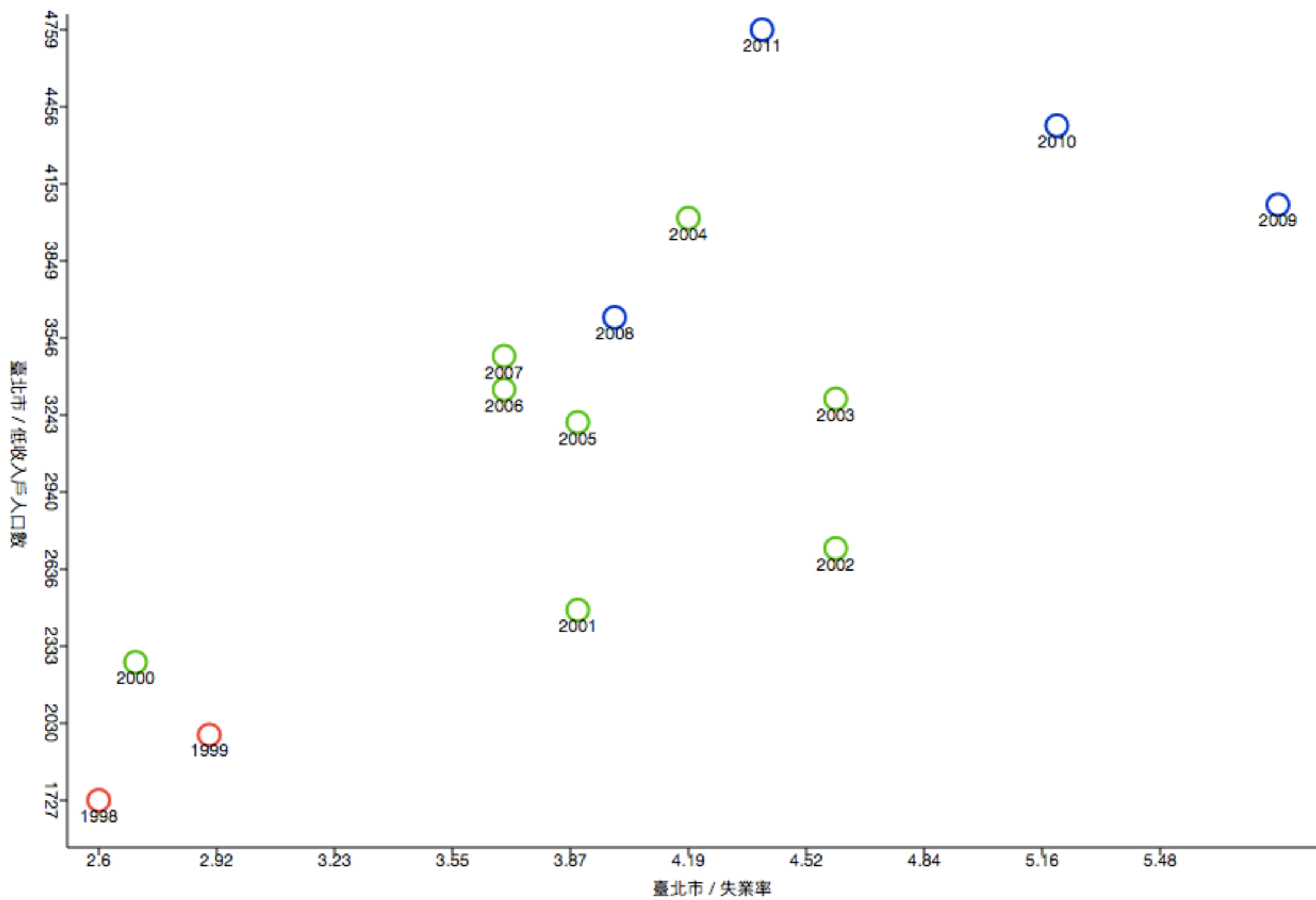


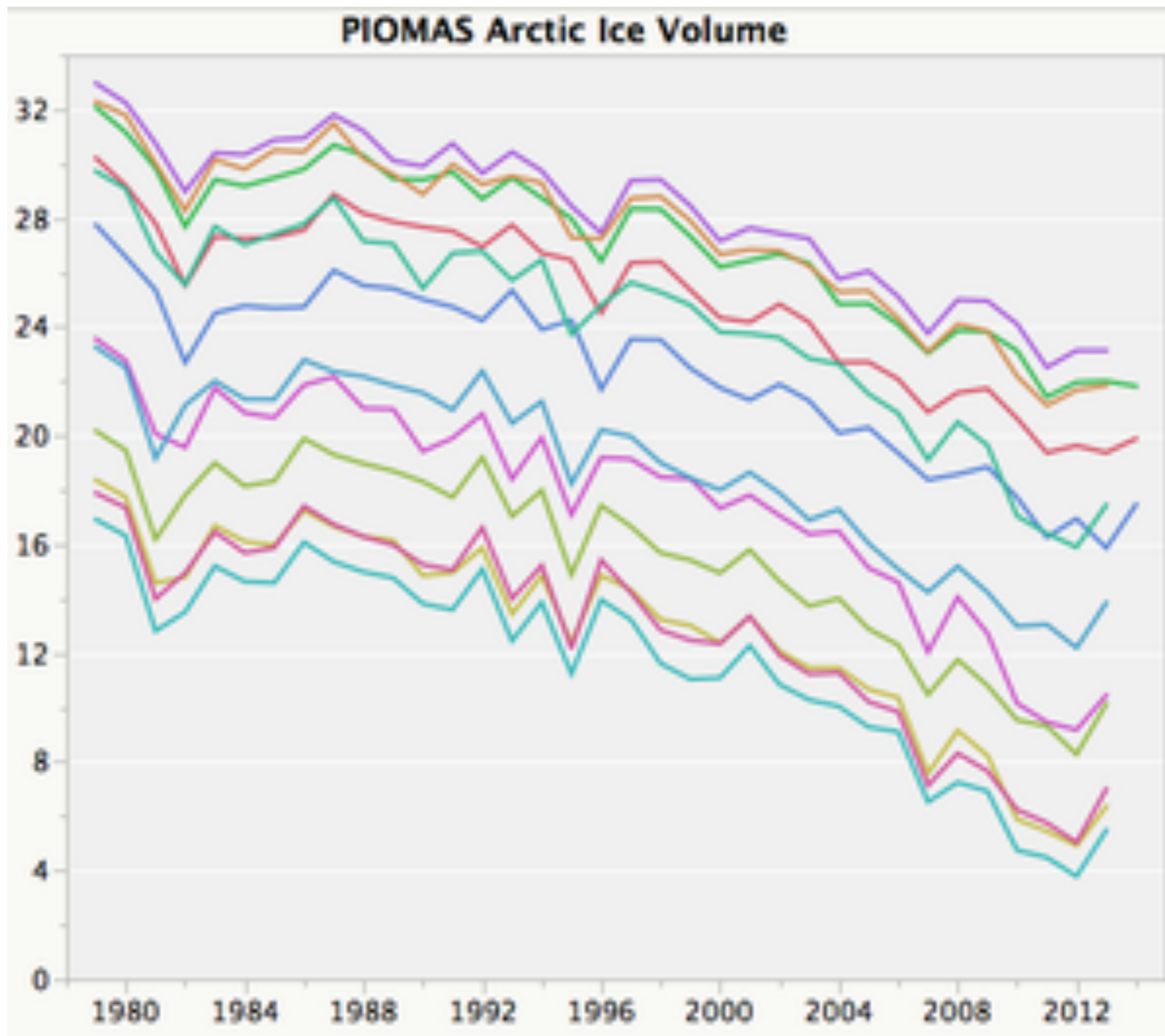
# Covariation of inequality and economic growth

Epoca Magazine (remade); data adopted from Functional Art







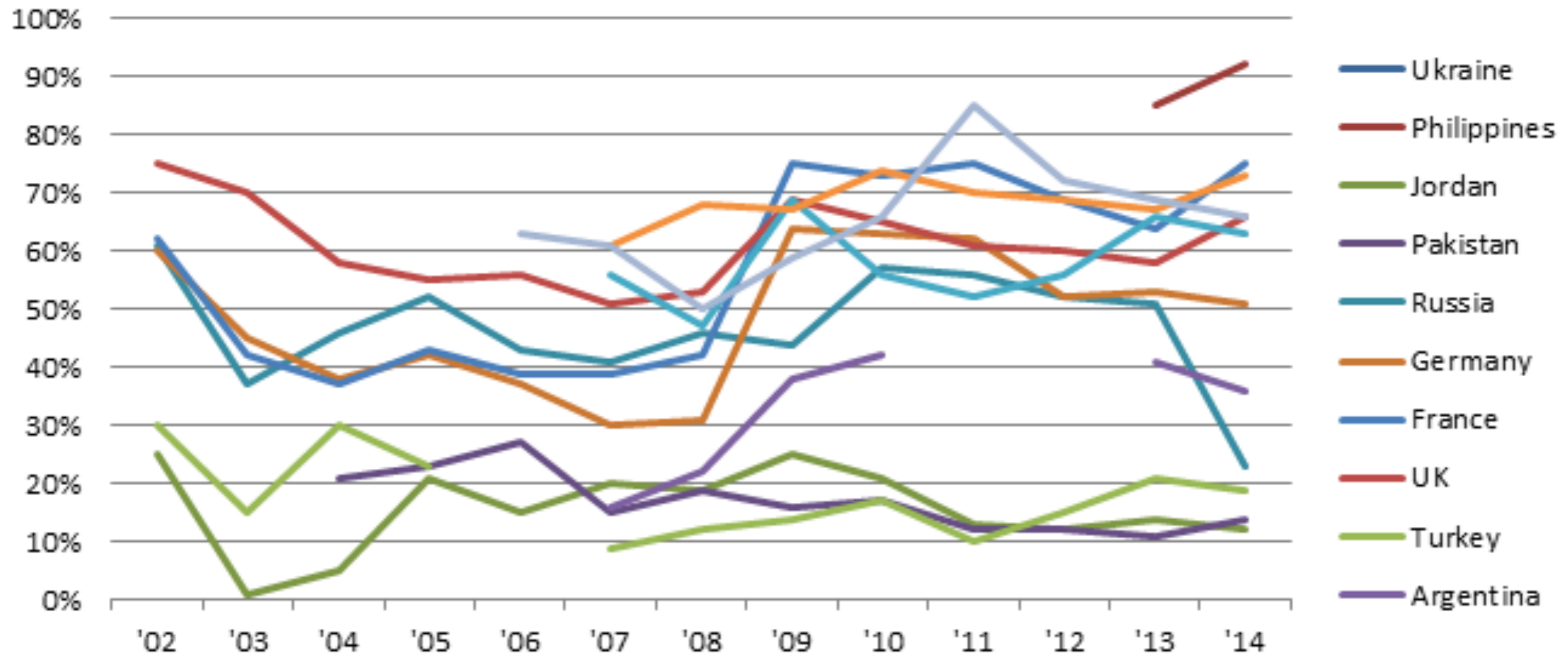


## PIOMAS Arctic Ice Volume

each line represents a single month

[http://junkcharts.typepad.com/junk\\_charts/2014/04/an-overused-chart-why-it-fails-and-how-to-fix-it.html](http://junkcharts.typepad.com/junk_charts/2014/04/an-overused-chart-why-it-fails-and-how-to-fix-it.html)

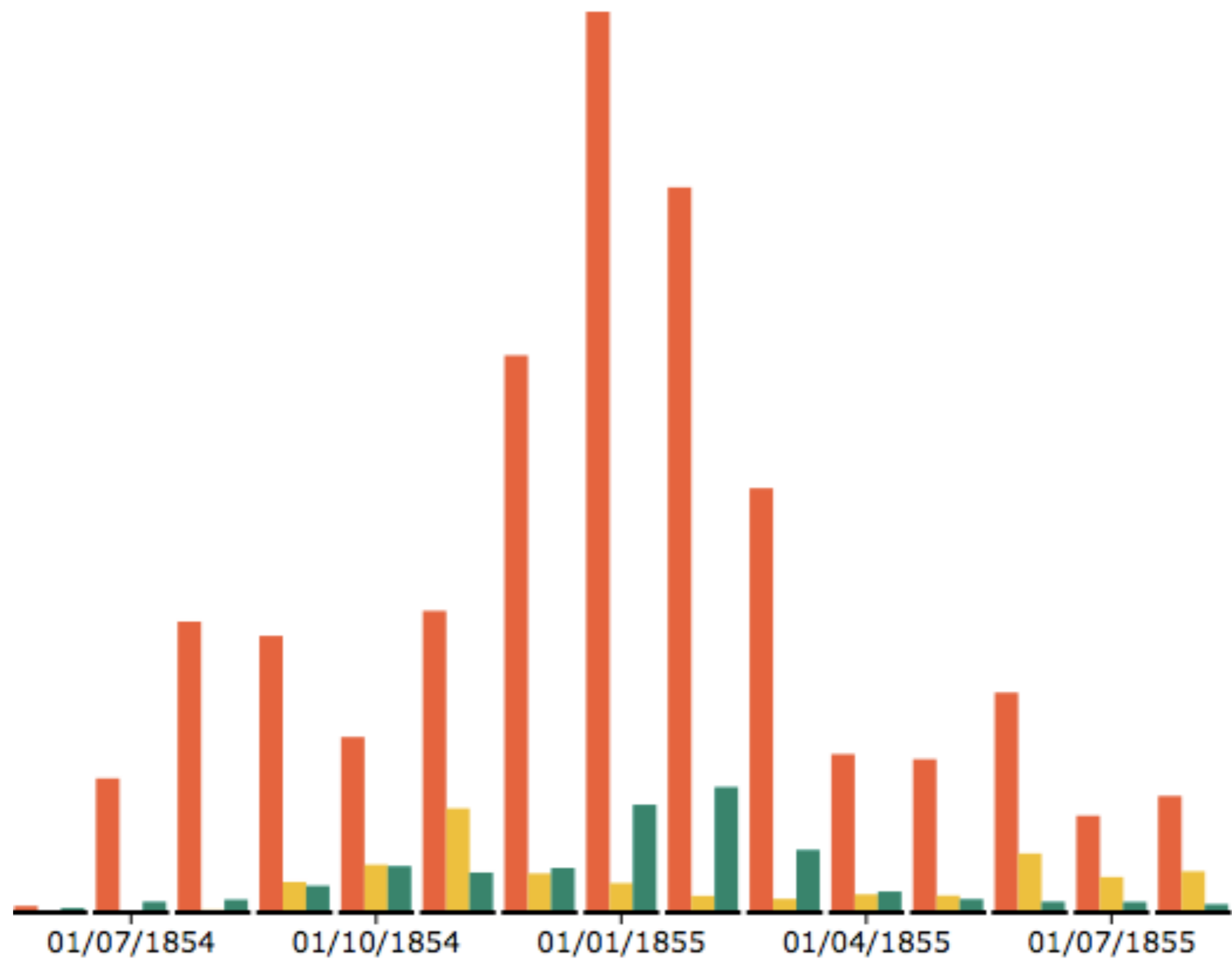
## Favorable view of the U.S. 2002-2014

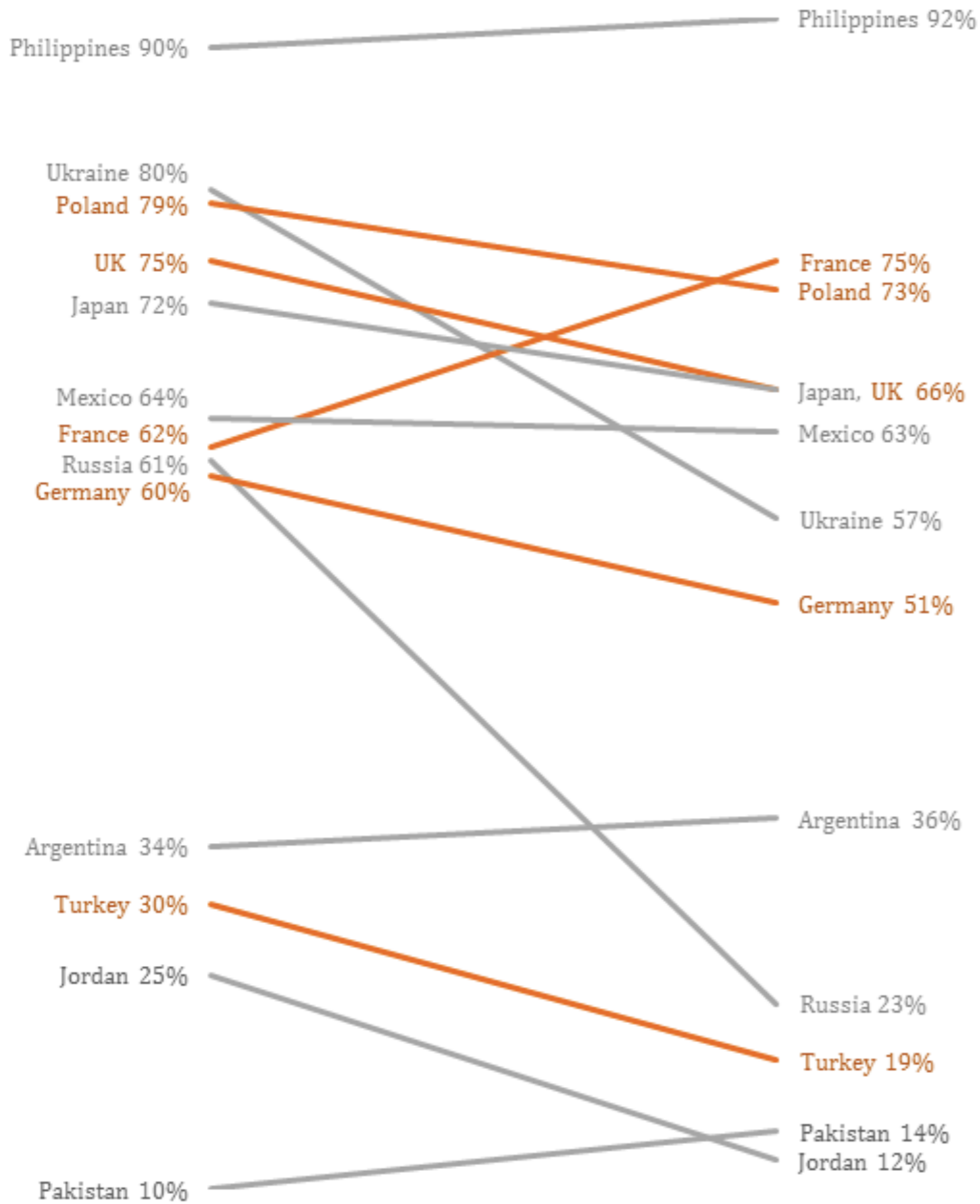


## Favorable View of US 2002 - 2014

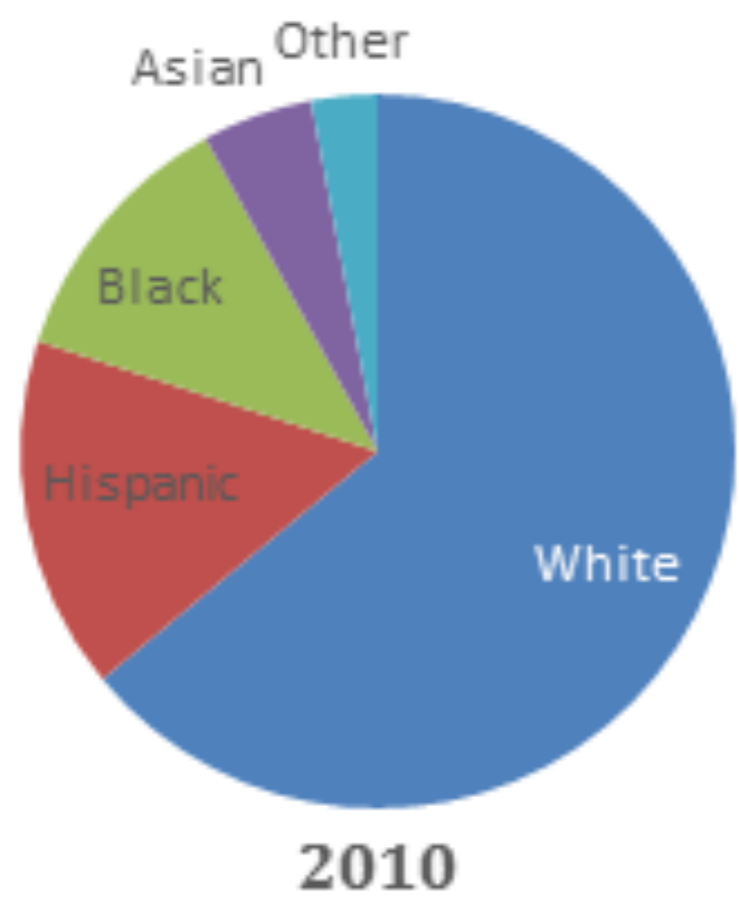
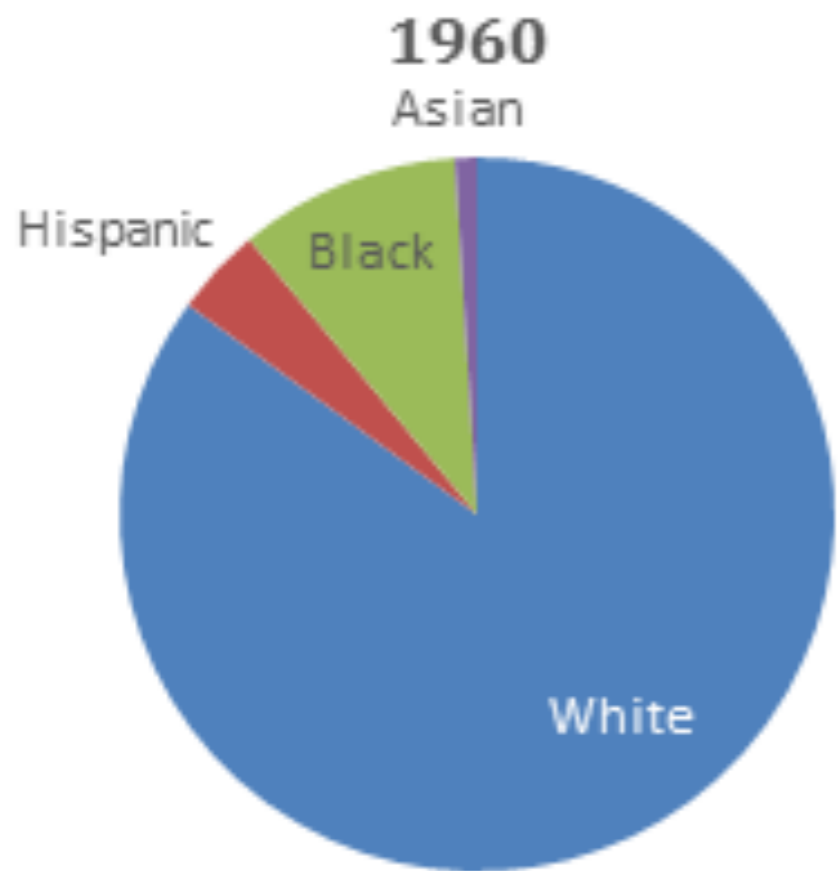
from "Slopegraph", [ceeside.com](http://ceeside.com)

<http://ceeside.com/slopegraphs/>

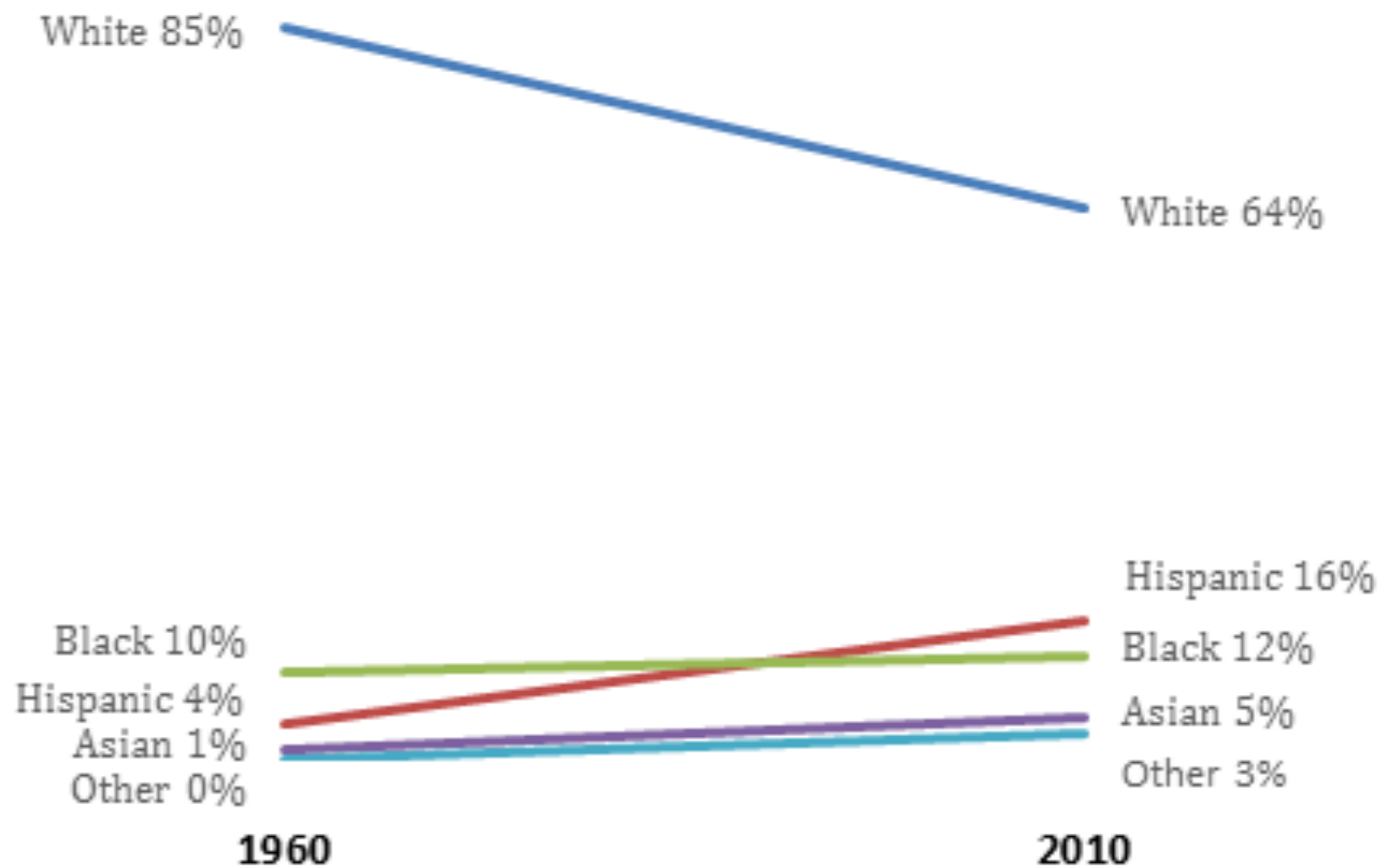
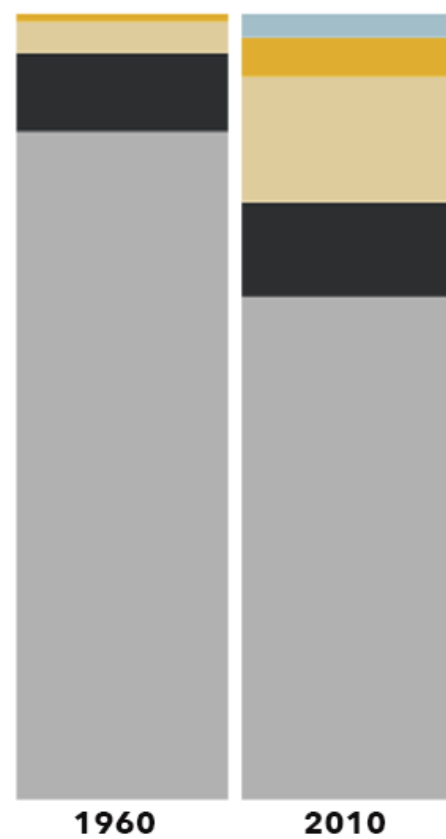




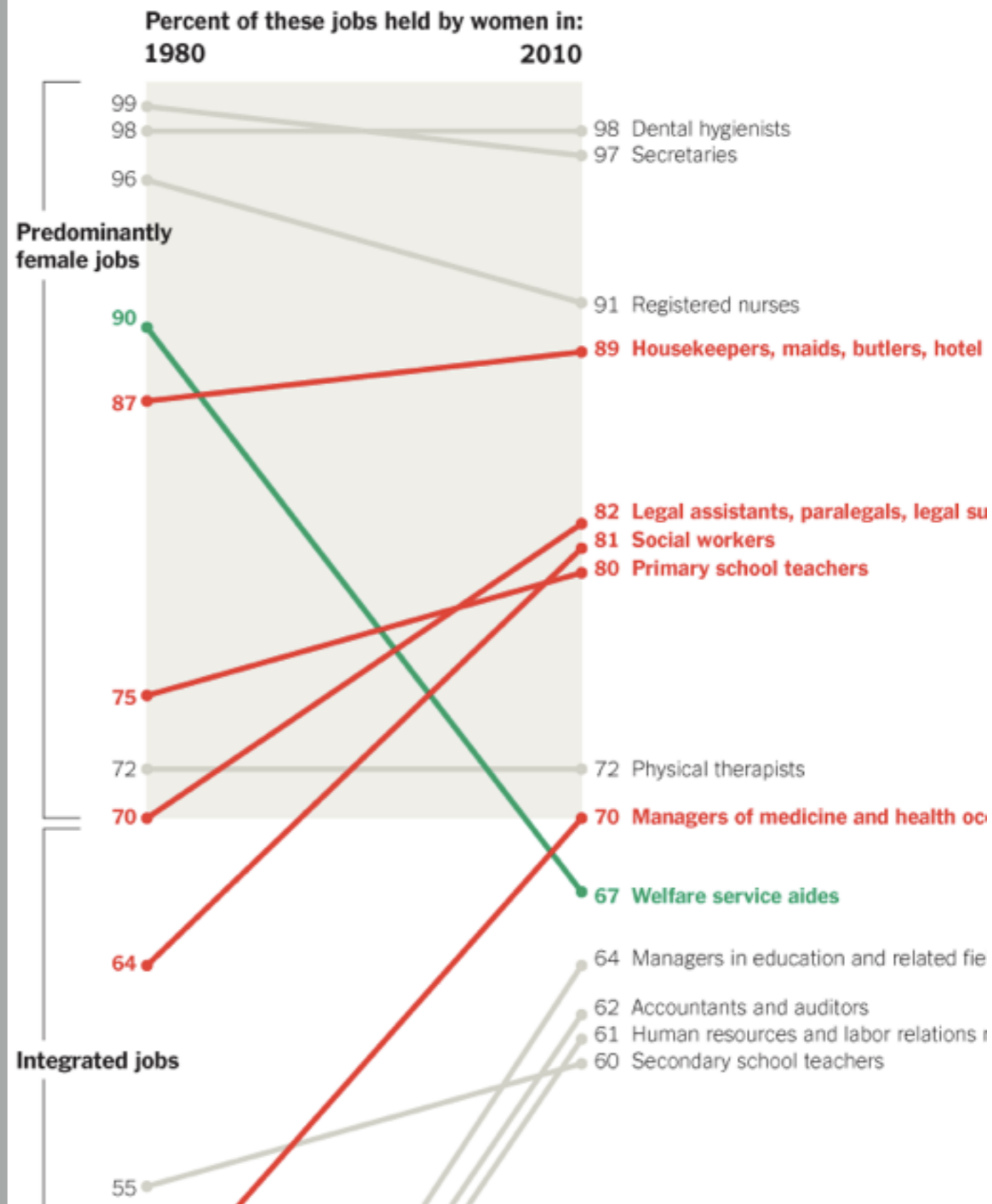
# Slopegraph



## U.S Demographics by Race, 1960-2010



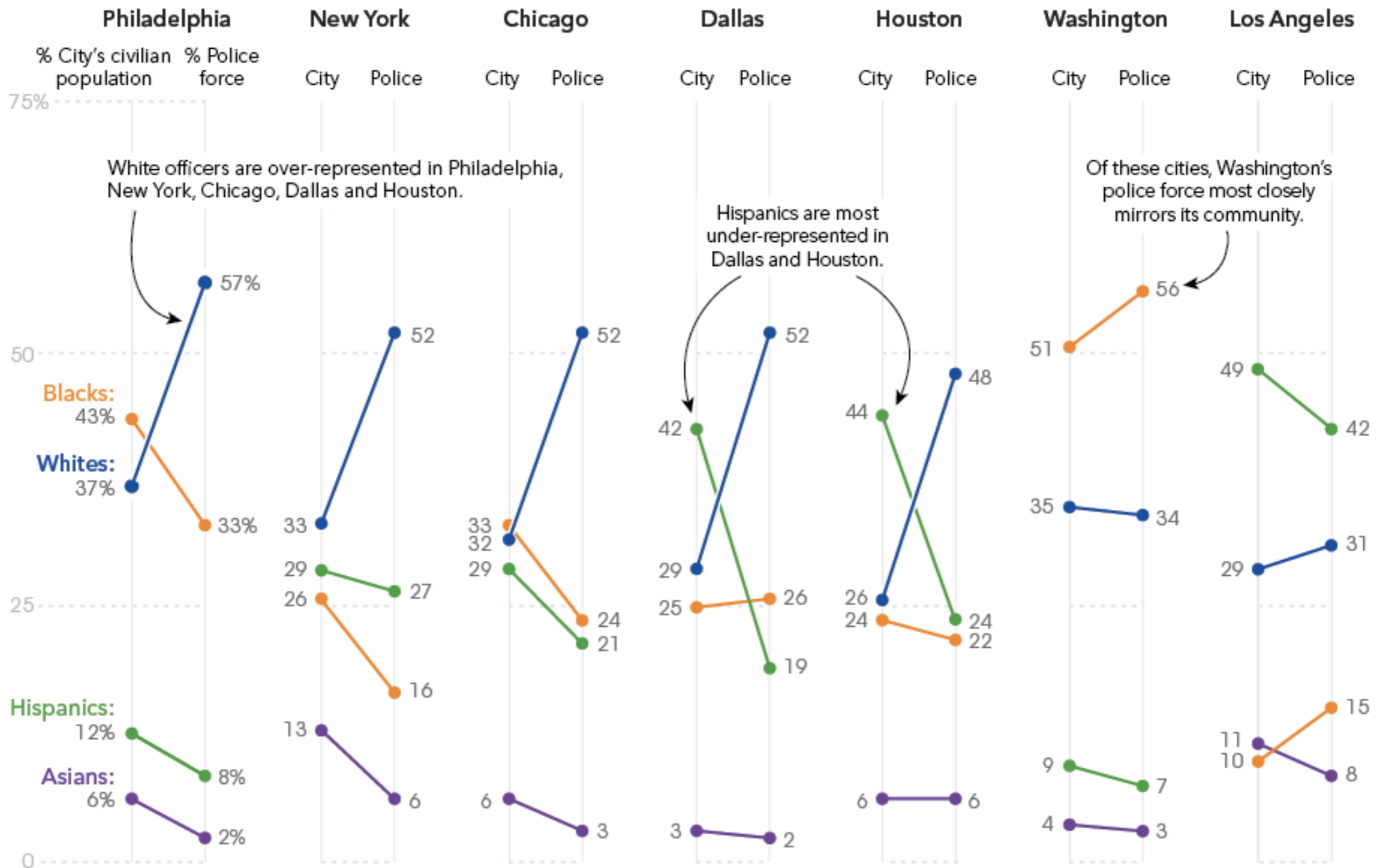




# NYTimes, Infant Death Rate Rank and Job % by Gender

[http://www.nytimes.com/imagepages/2009/04/06/health/infant\\_stats.html](http://www.nytimes.com/imagepages/2009/04/06/health/infant_stats.html)

<http://www.nytimes.com/imagepages/2012/09/30/opinion/30coontz-gr1.html>

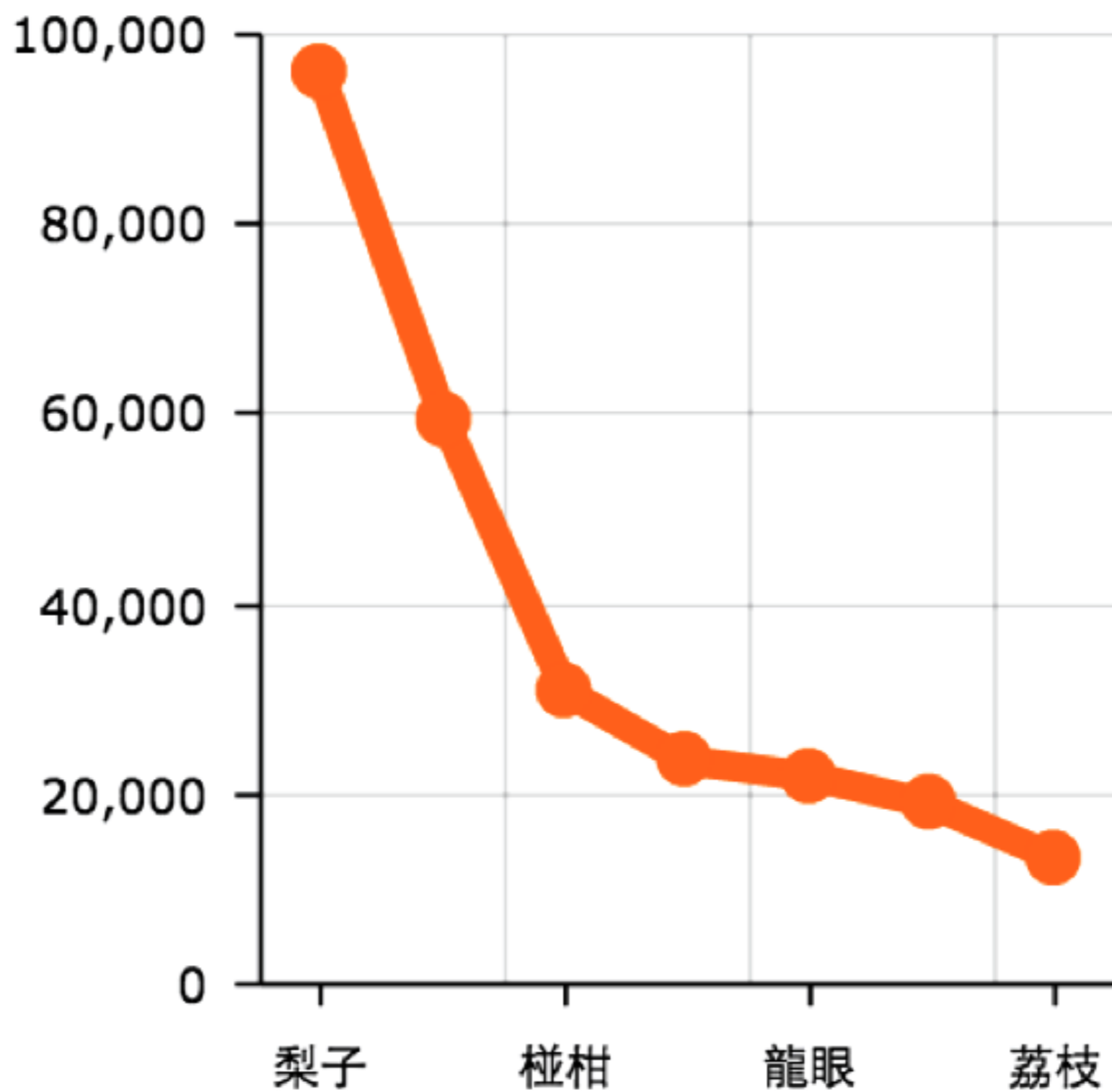


# Police Forces Skew White in Largest U.S. Cities

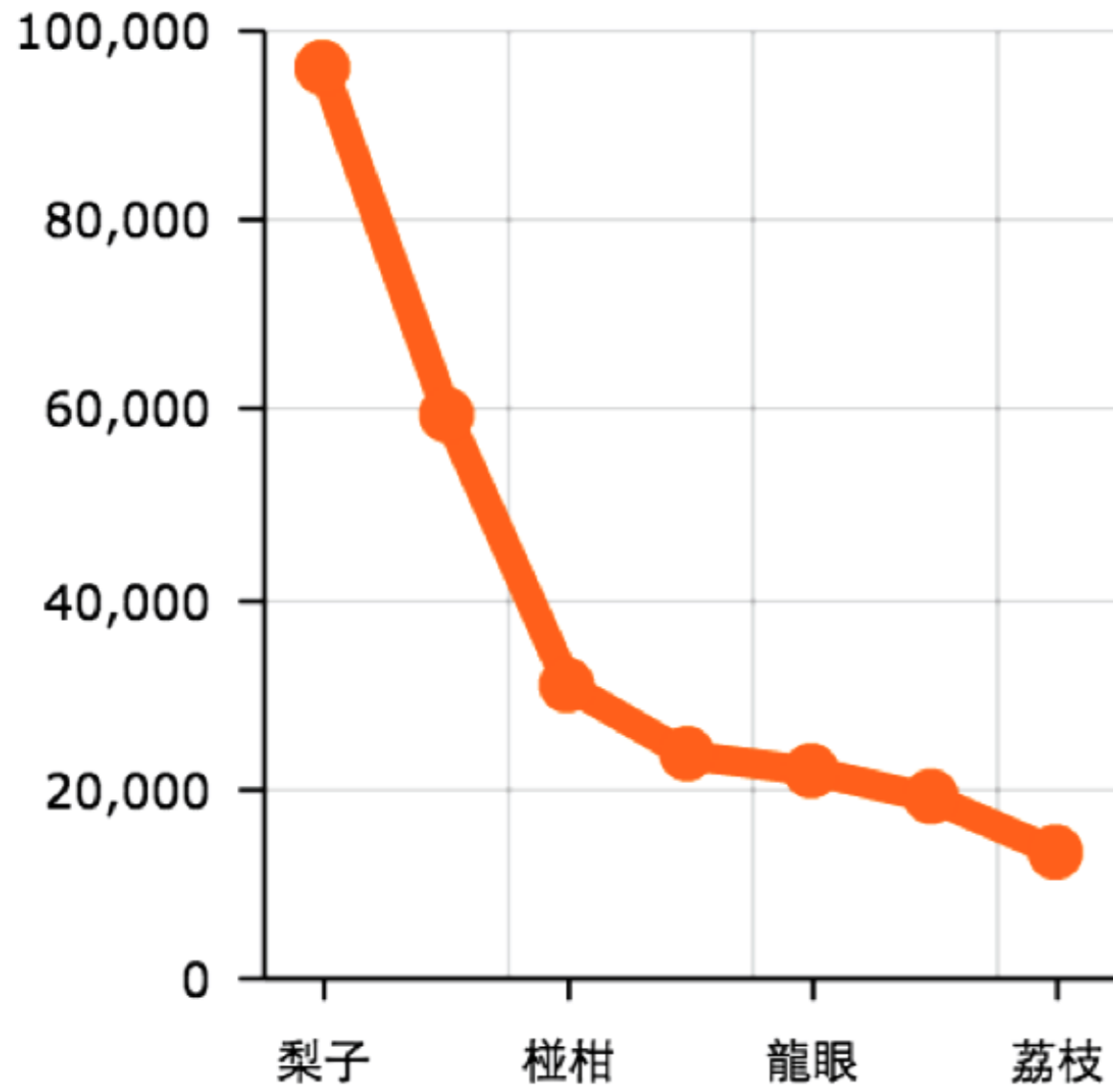
Bloomberg Visual Data, 2014/8/20

<http://www.bloomberg.com/infographics/2014-08-20/police-forces-skew-white-in-largest-u-s-cities.html>

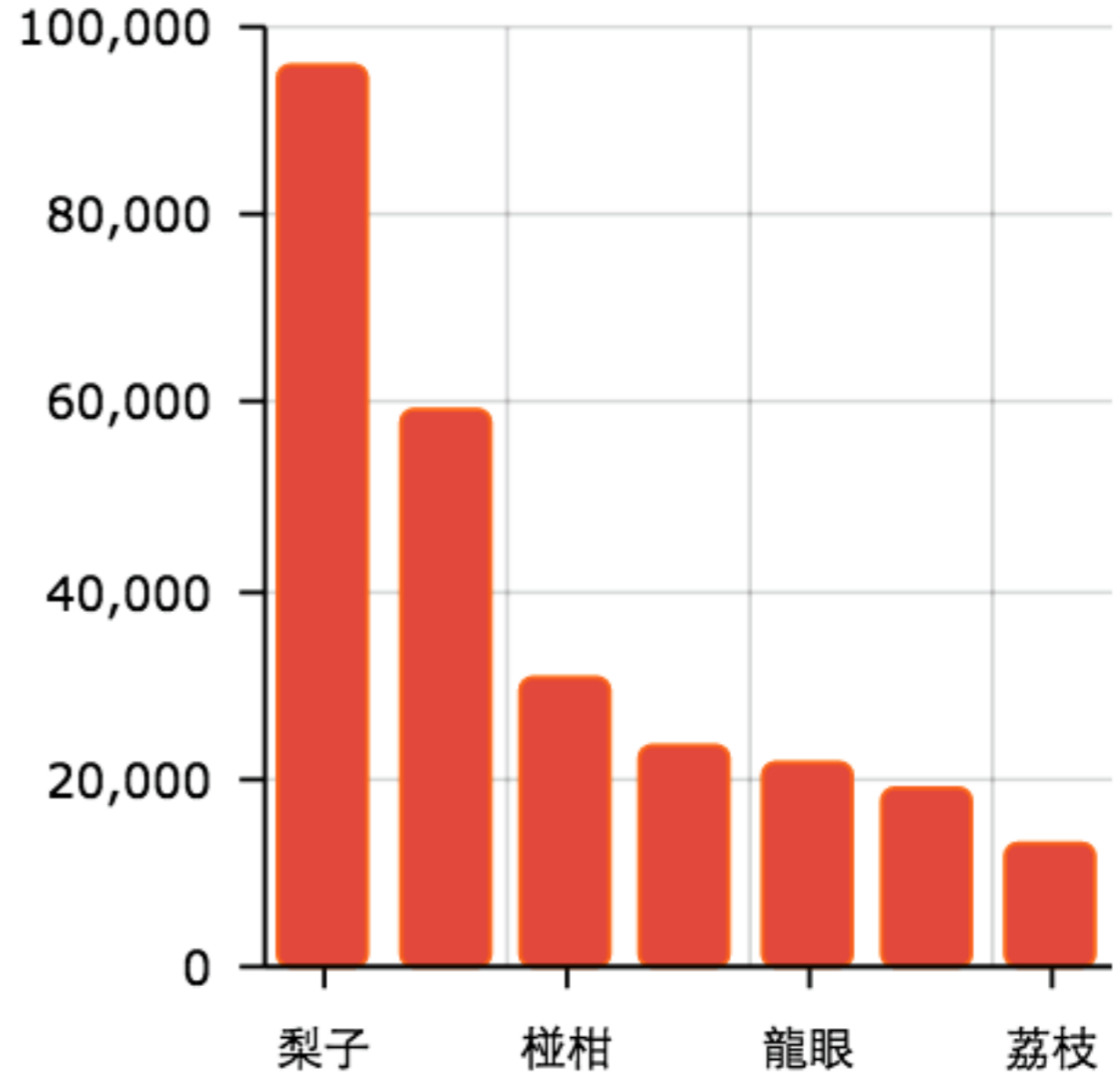
# 台中市101年度水果產量

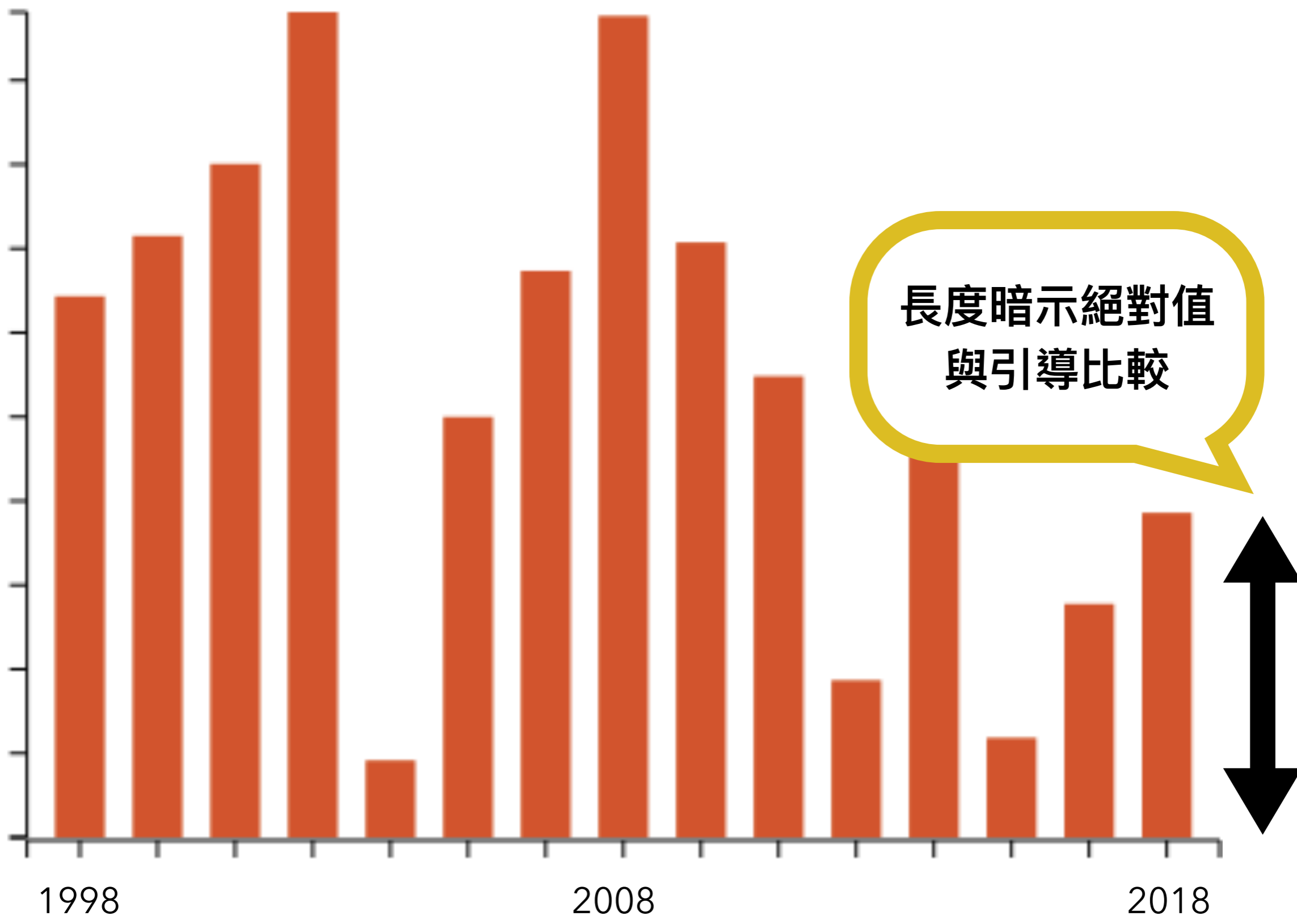


台中市101年度水果產量

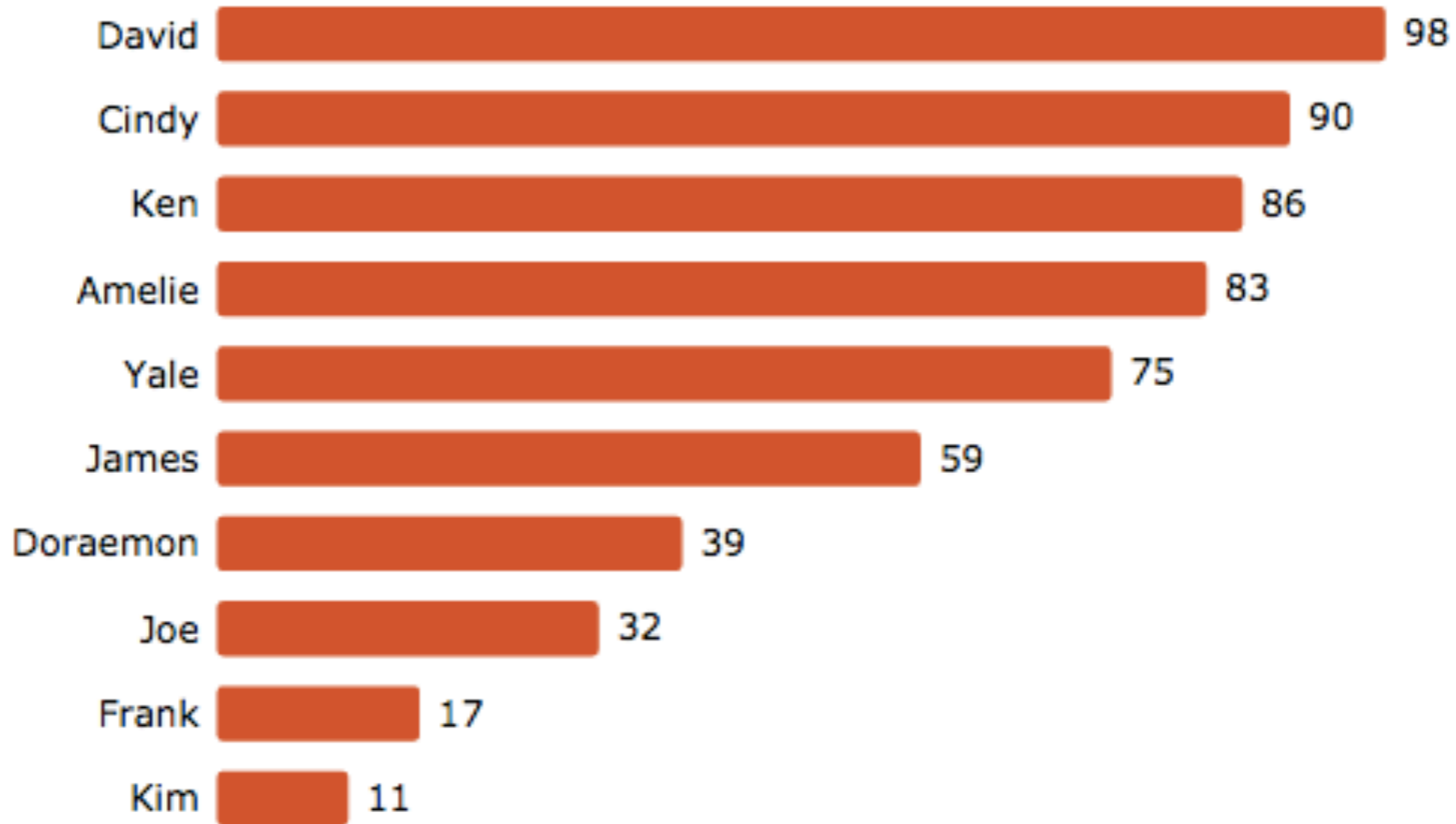
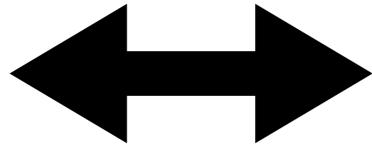


台中市101年度水果產量

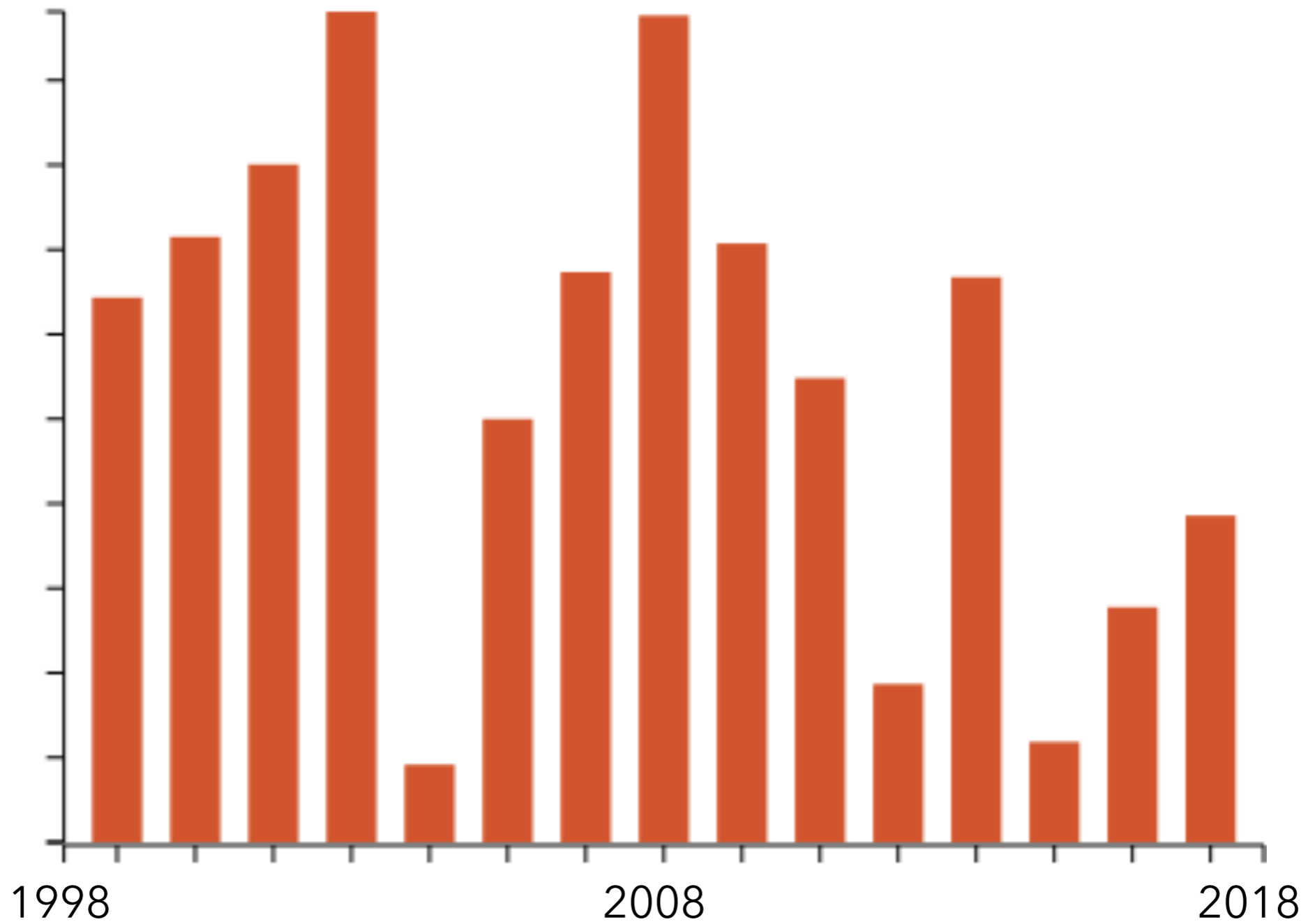




更寬

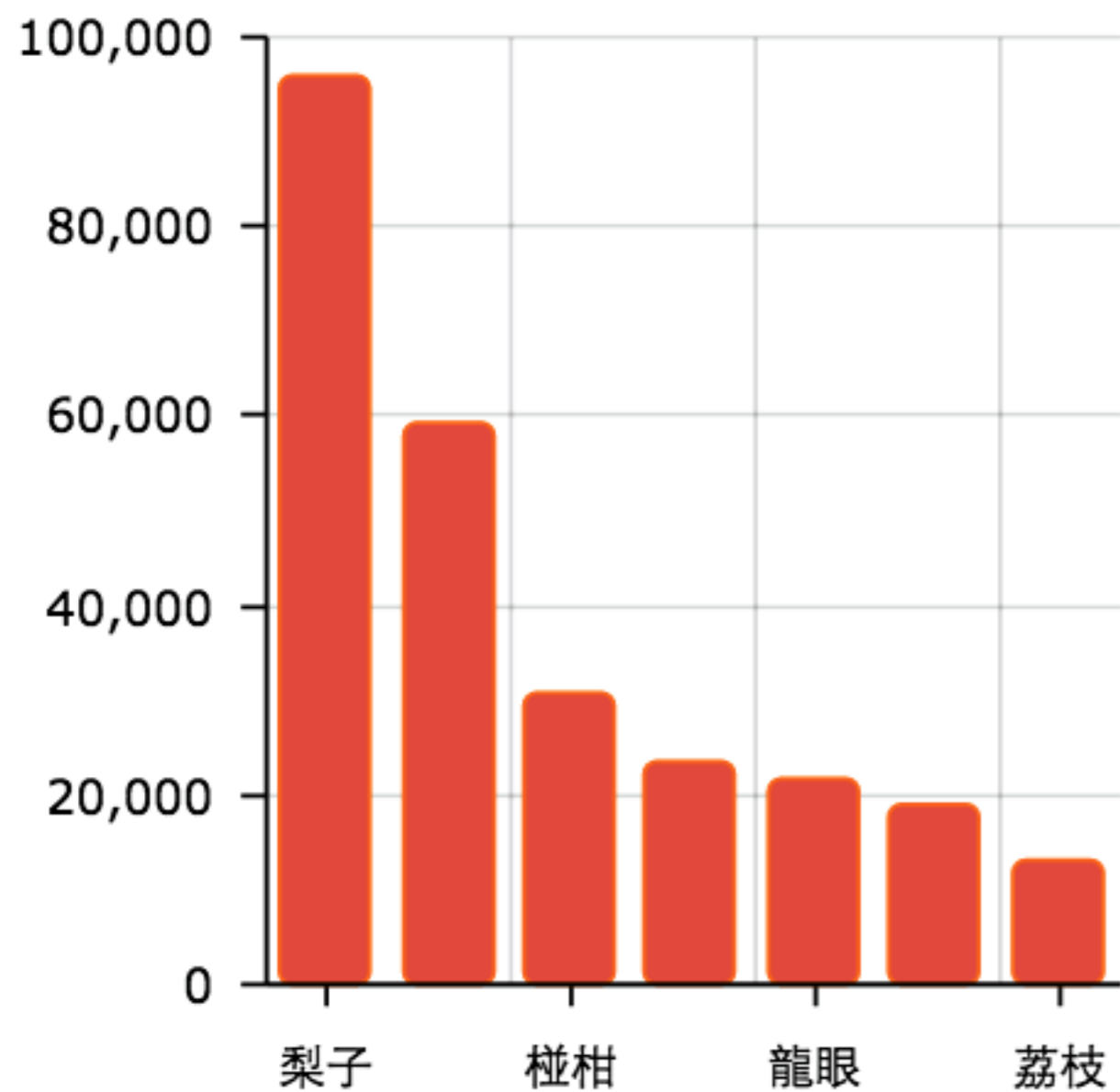


**Visualise for Nominal ( Category ) Data  
along Y Axis**

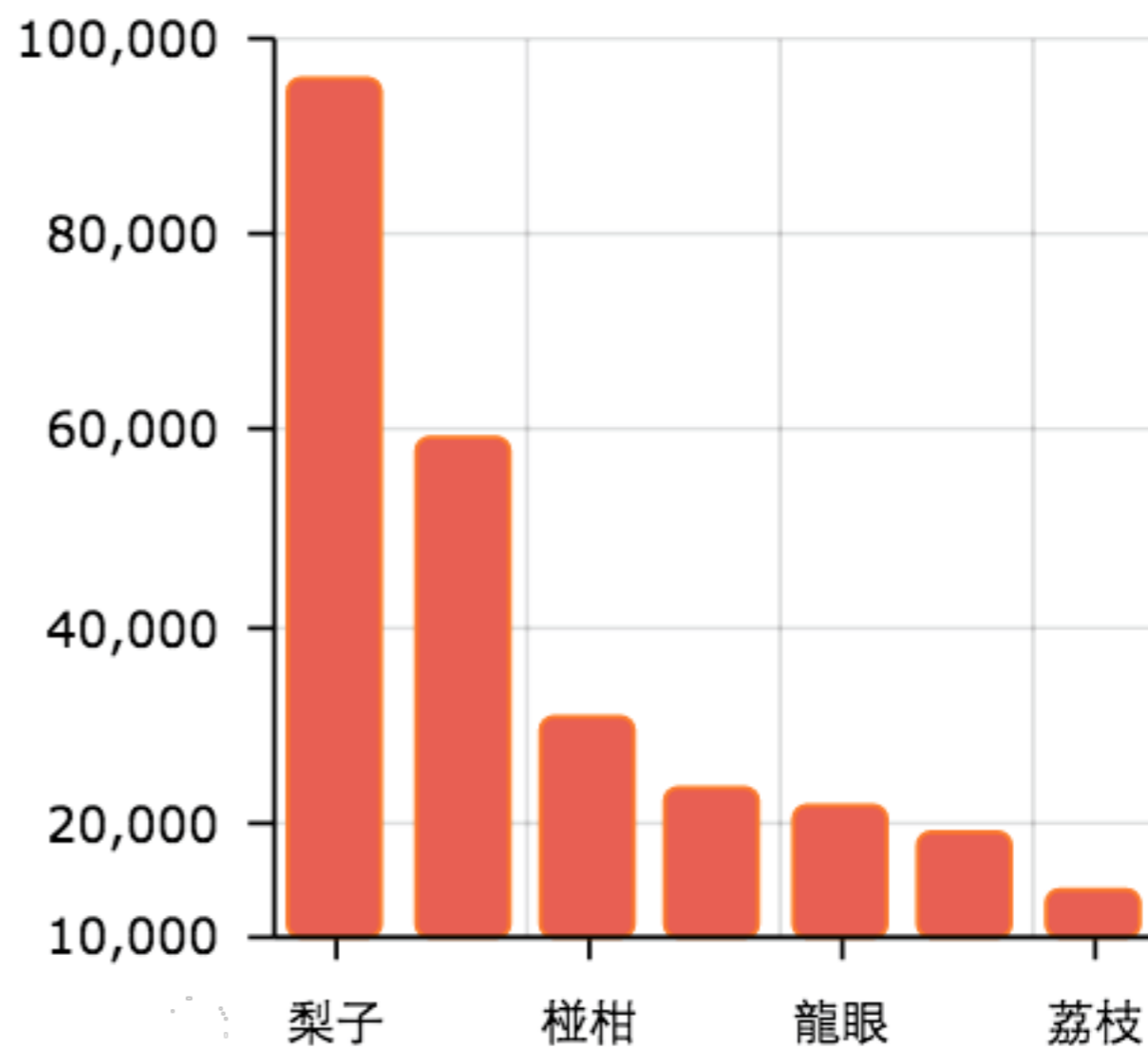


**Visualise for Order / Temporal Data  
along X Axis**

### 台中市101年度水果產量

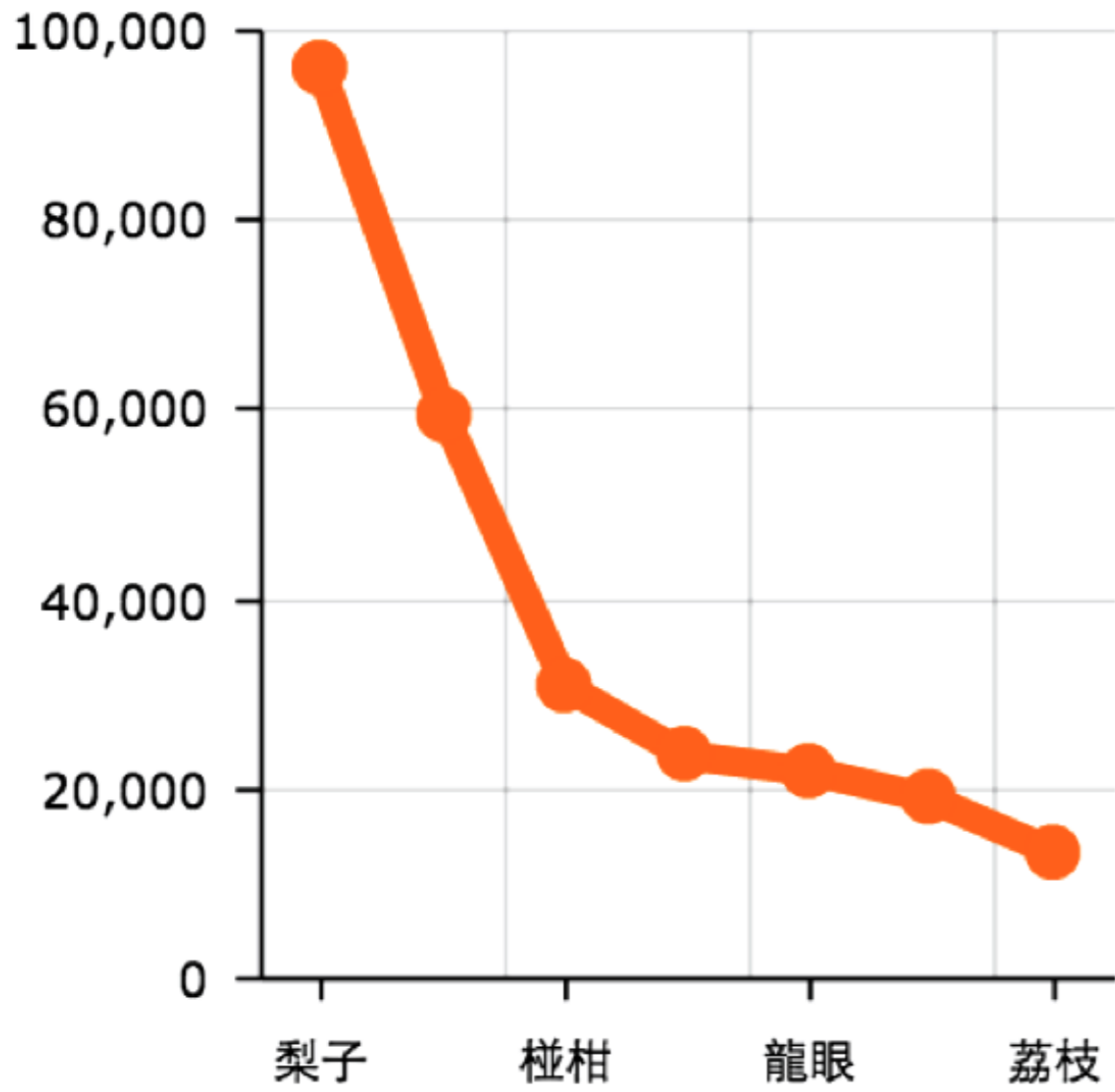


### 台中市101年度水果產量

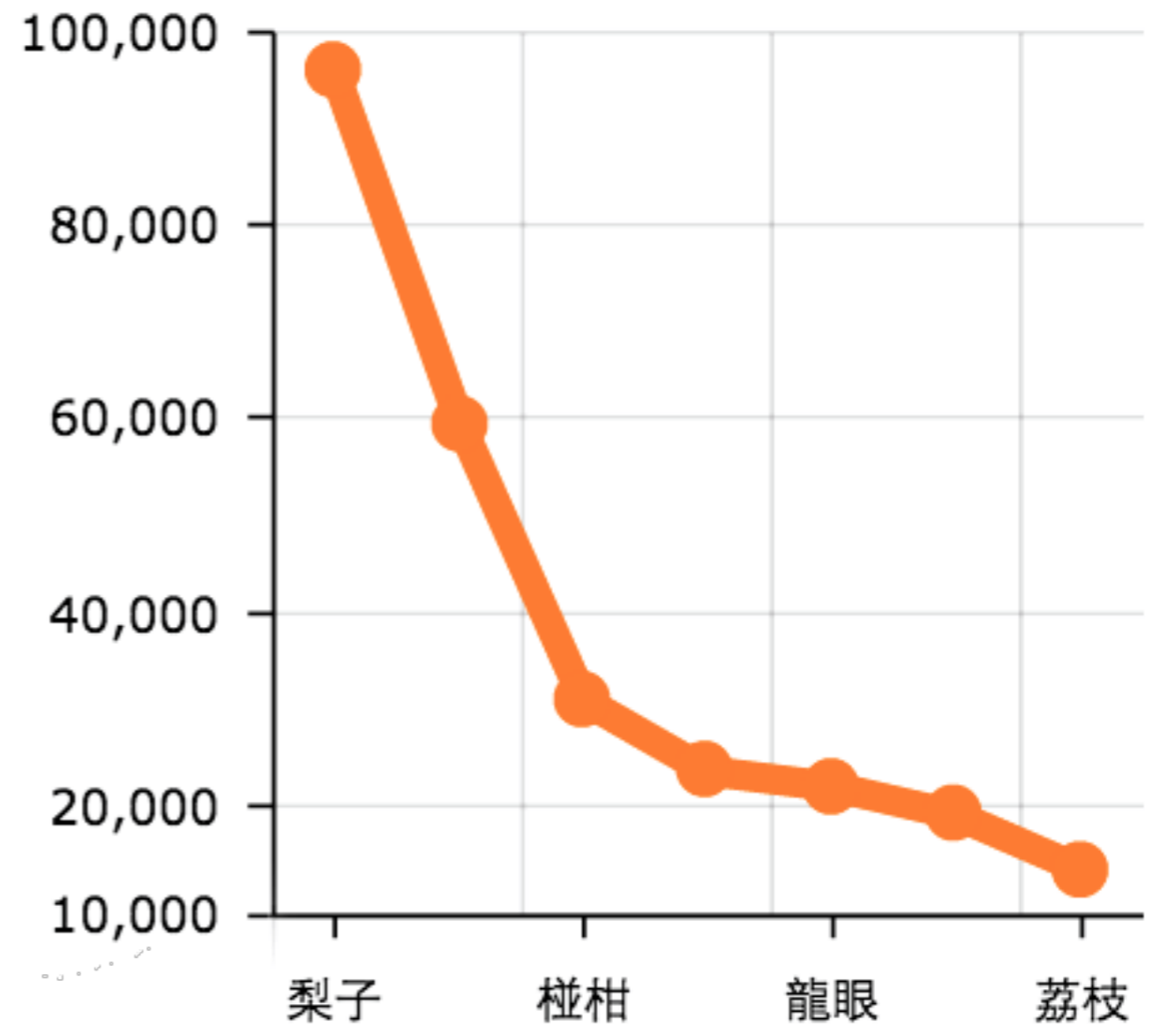




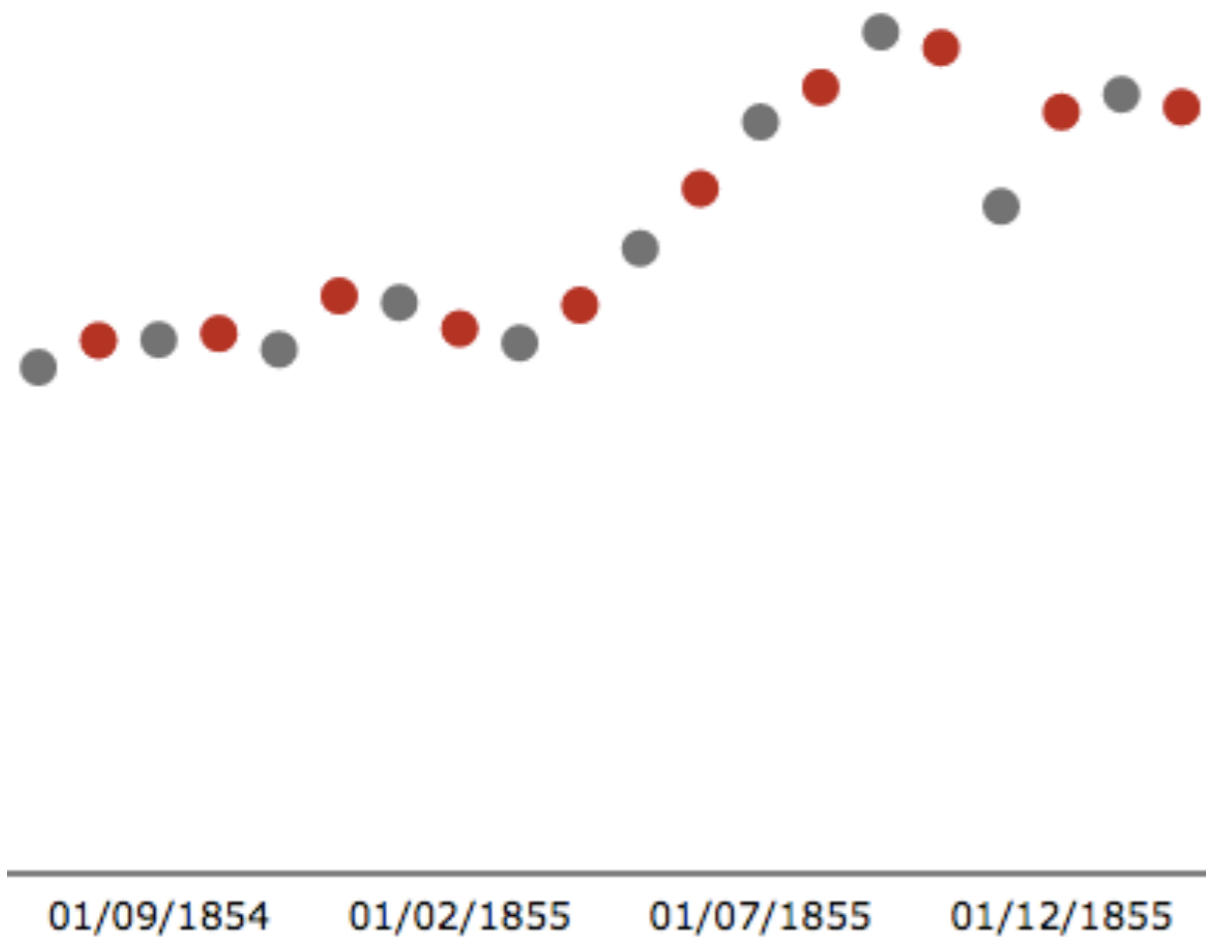
台中市101年度水果產量



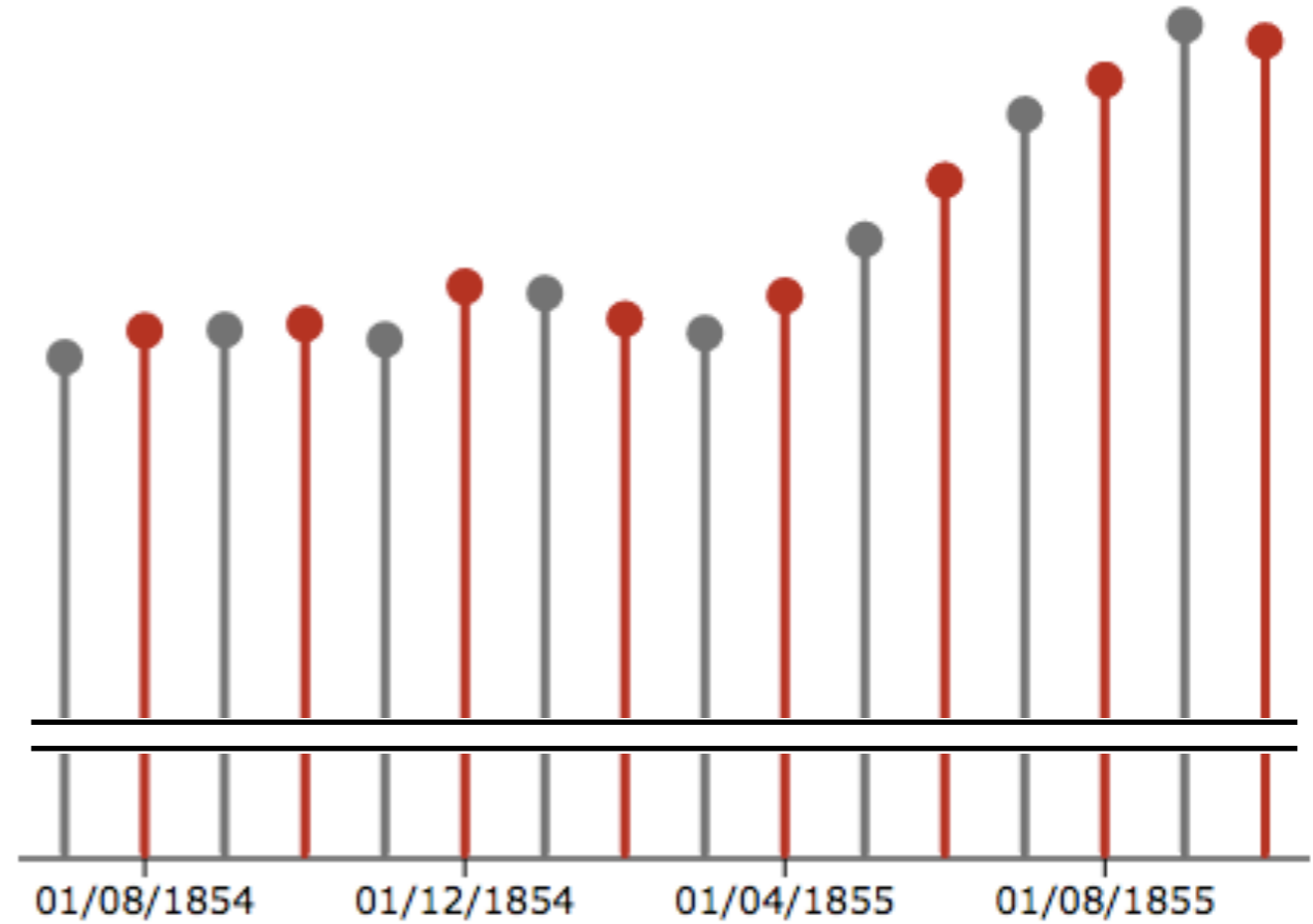
台中市101年度水果產量



# Categorical Extreme Data?

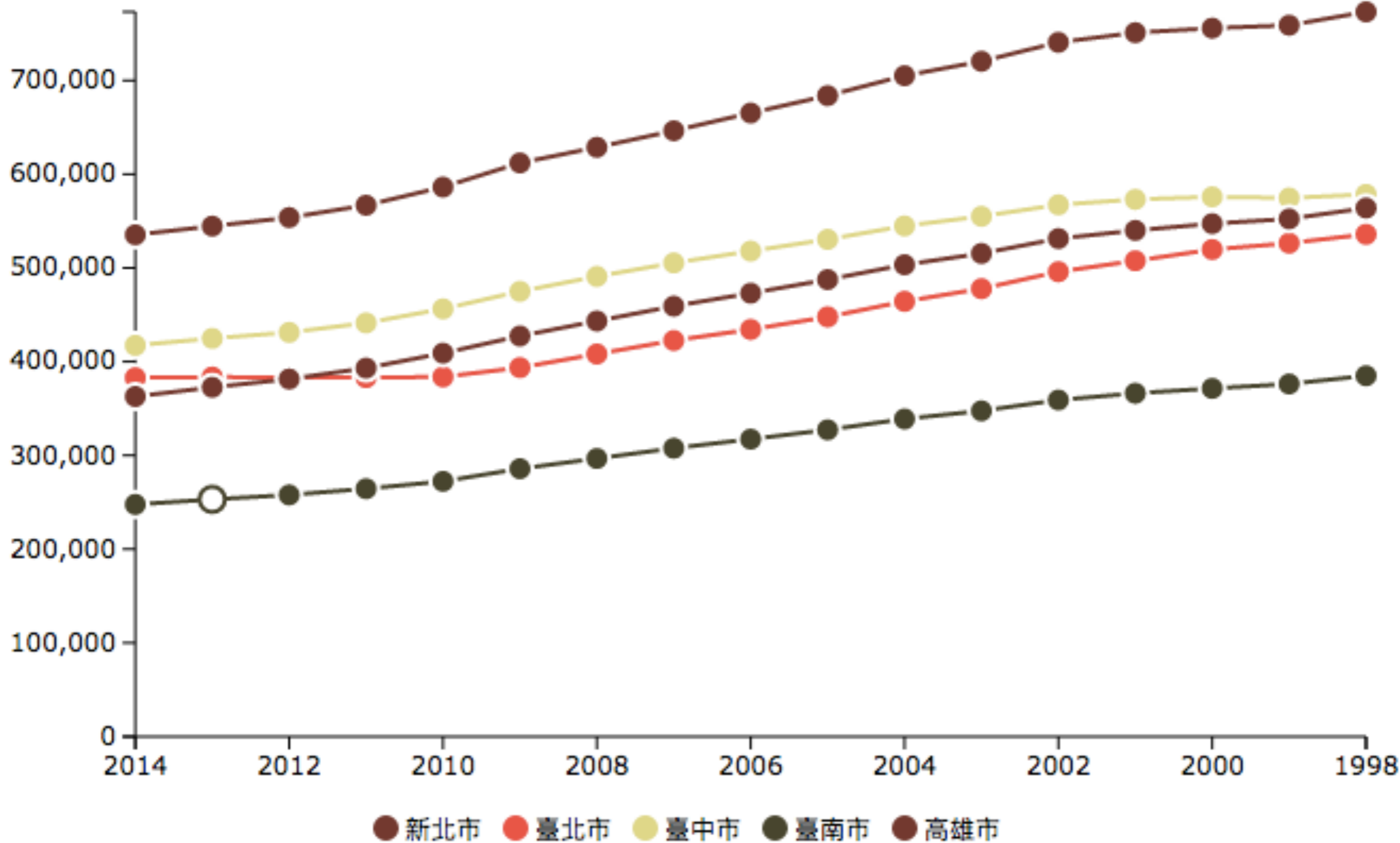


省略連線改用點圖



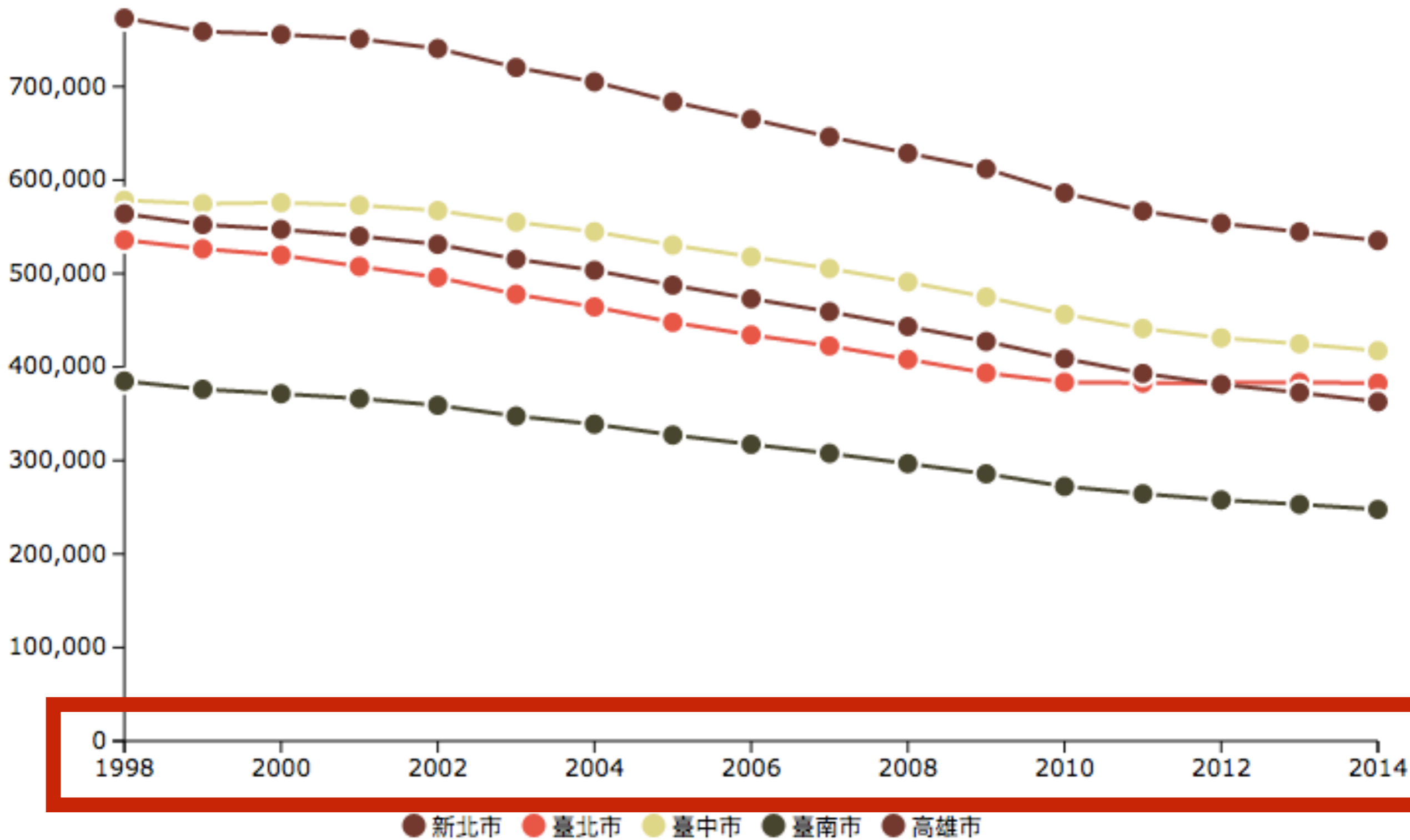
利用符號提示省略部份

or 移除極端數據另外表現



## 五都 0 ~ 14 歲人口走勢

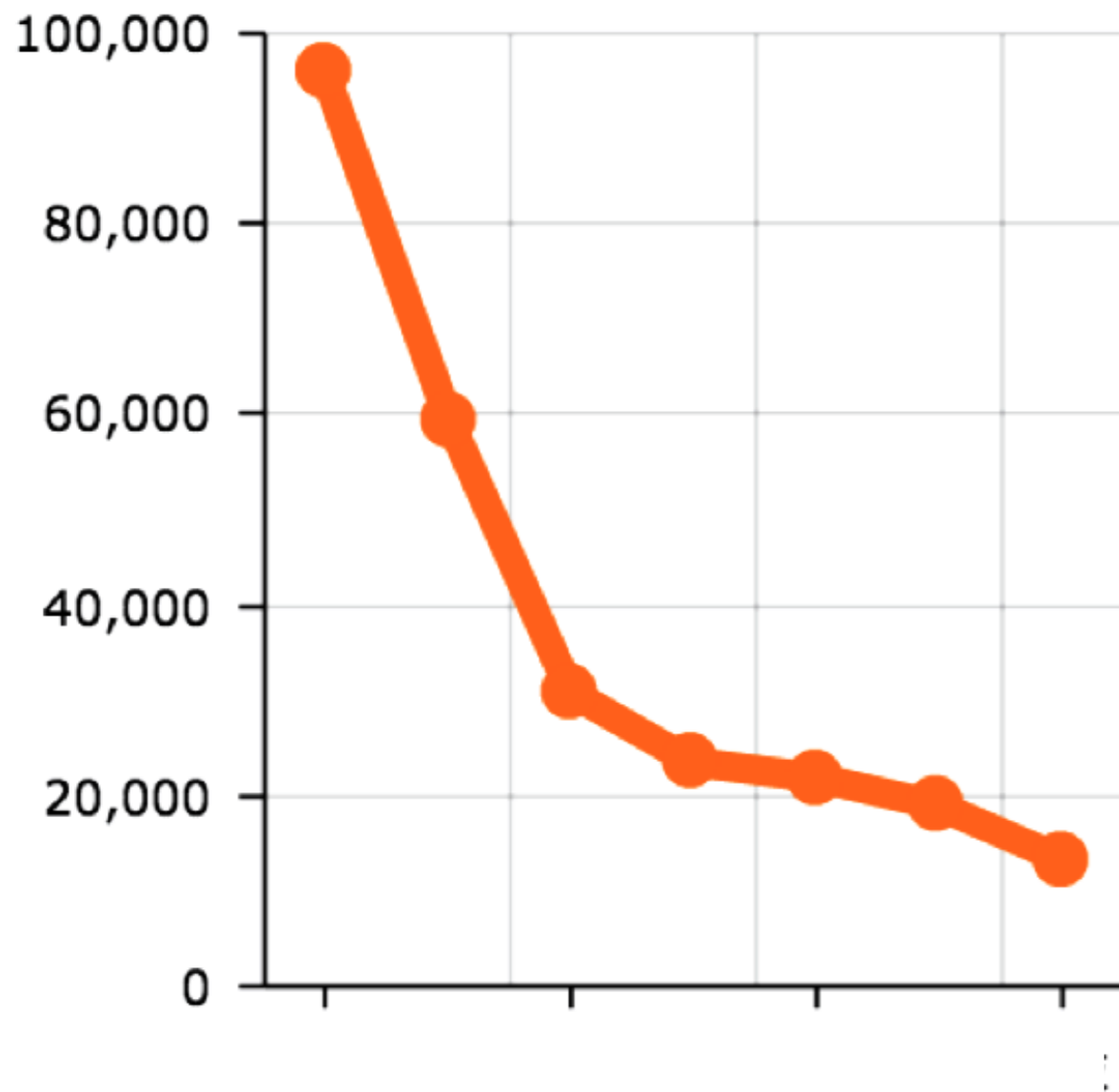
1998 ~ 2014, 中華民國統計資訊網 / 縣市重要指標查詢系統



## 五都 0 ~ 14 歲人口走勢

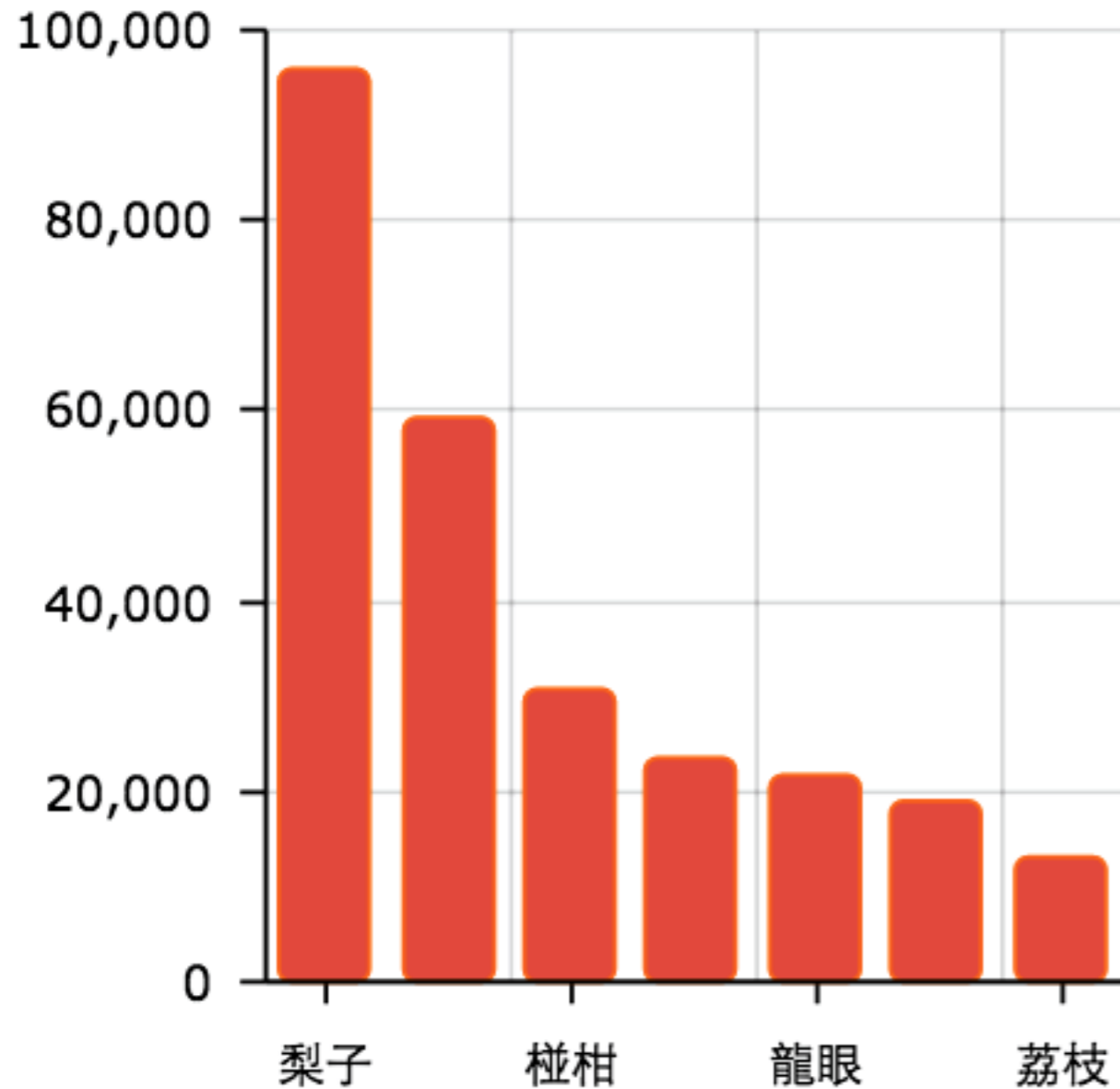
1998 ~ 2014, 中華民國統計資訊網 / 縣市重要指標查詢系統

# 折線圖要點



1. 用以表現趨勢
2. 橫軸左到右為趨勢方向
3. 避免座標裁切
4. 避免用在無序資料
5. 連接散布圖需標明方向
6. 刻度保持一致間距

# 長條圖要點



1. 用於無序資料
2. 橫軸左到右為趨勢方向
3. 避免座標裁切
4. 數據不宜過多
5. 資料宜排序後再呈現
6. 刻度保持一致間距



FUNDAMENTAL CHARTS

PART ●●●●

# 地圖與投影

Map and Projections

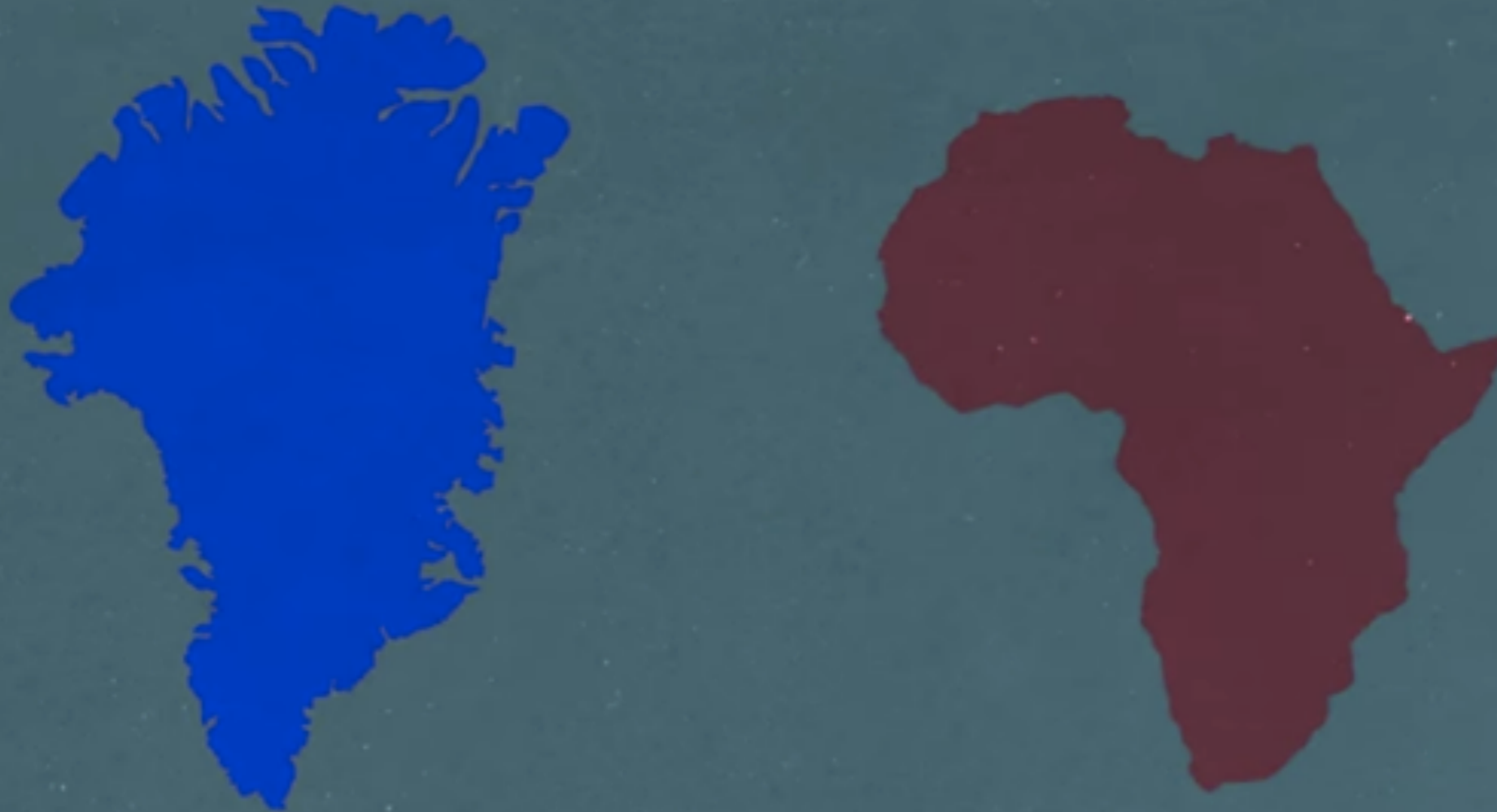


# Mercator Projection

Gerardus Mercator, 1569



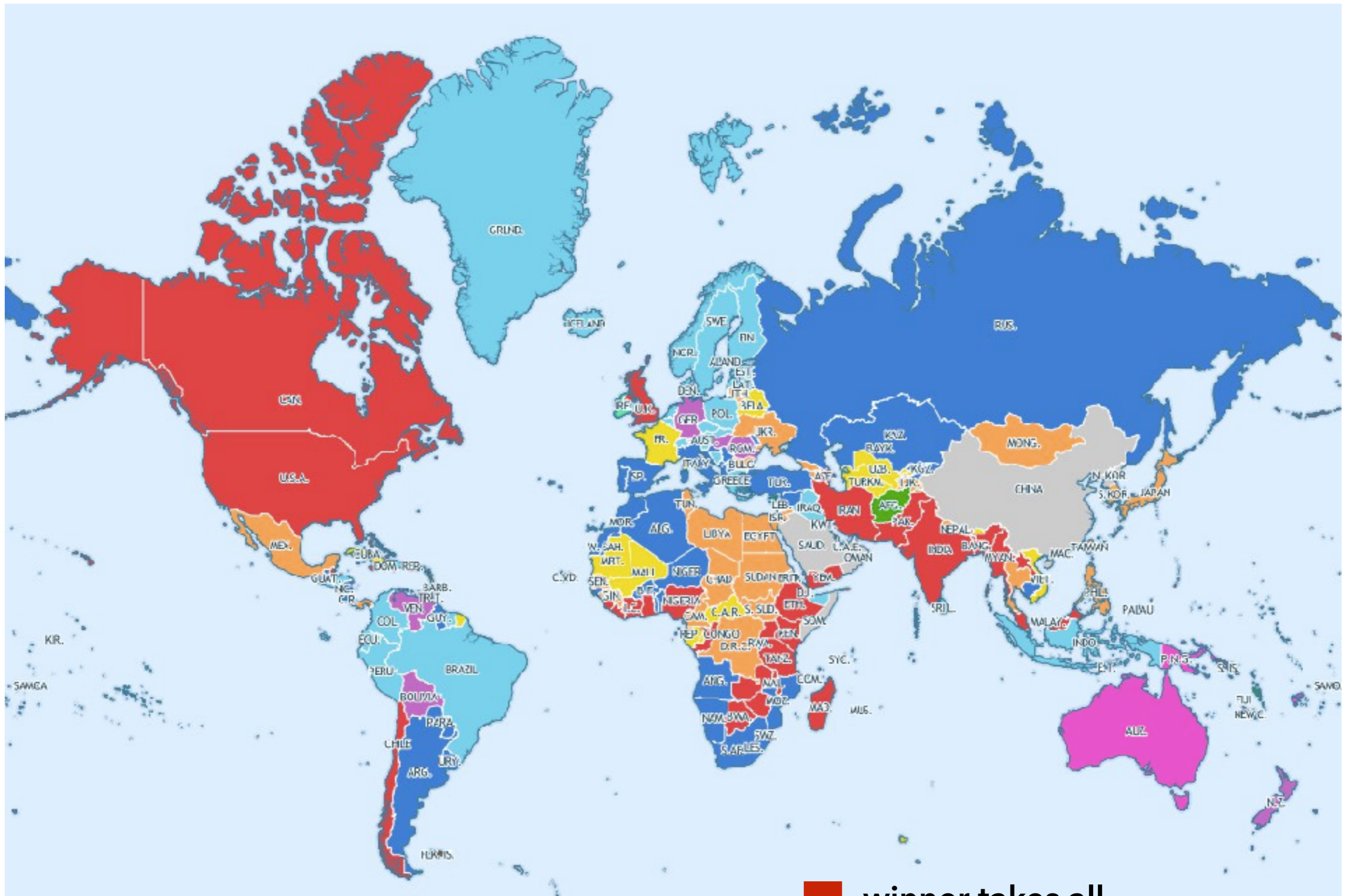
# GREENLAND AND AFRICA LOOK ROUGHLY THE SAME SIZE



## Maps That Prove You Don't Really Know Earth

BuzzFeed Blue, 2015/02

[https://www.youtube.com/watch?v=KUF\\_Ckv8HbE](https://www.youtube.com/watch?v=KUF_Ckv8HbE)

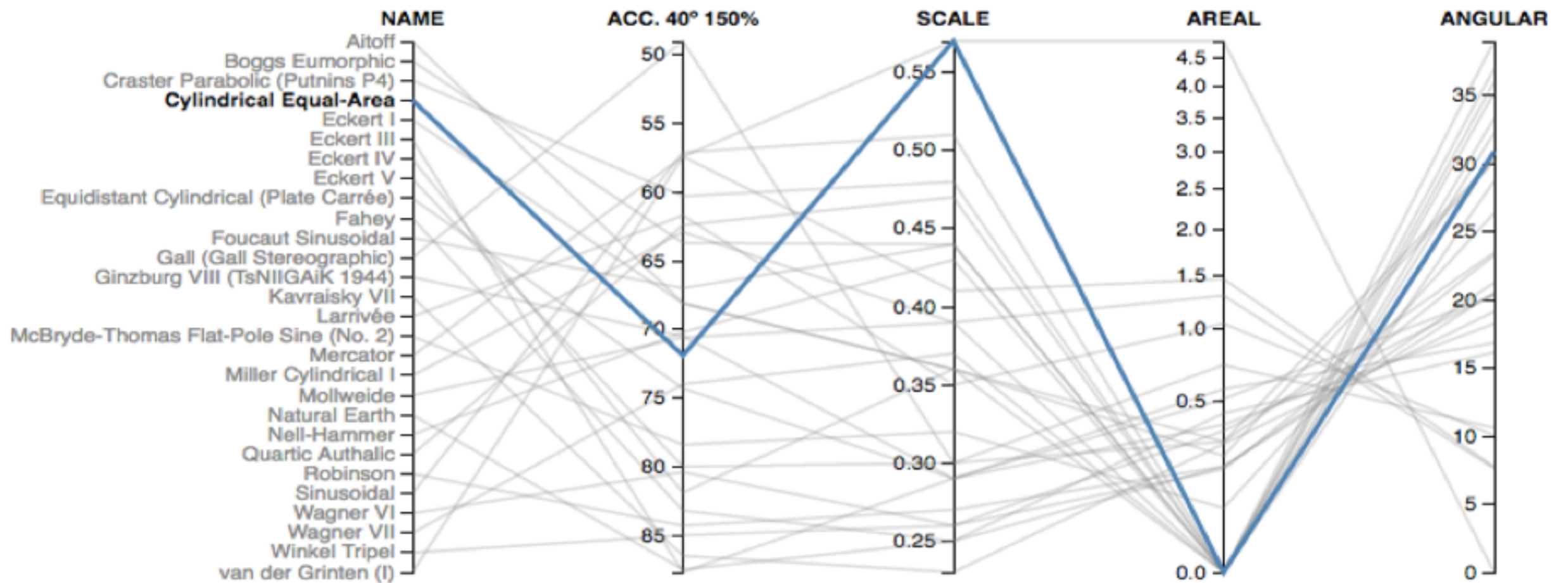
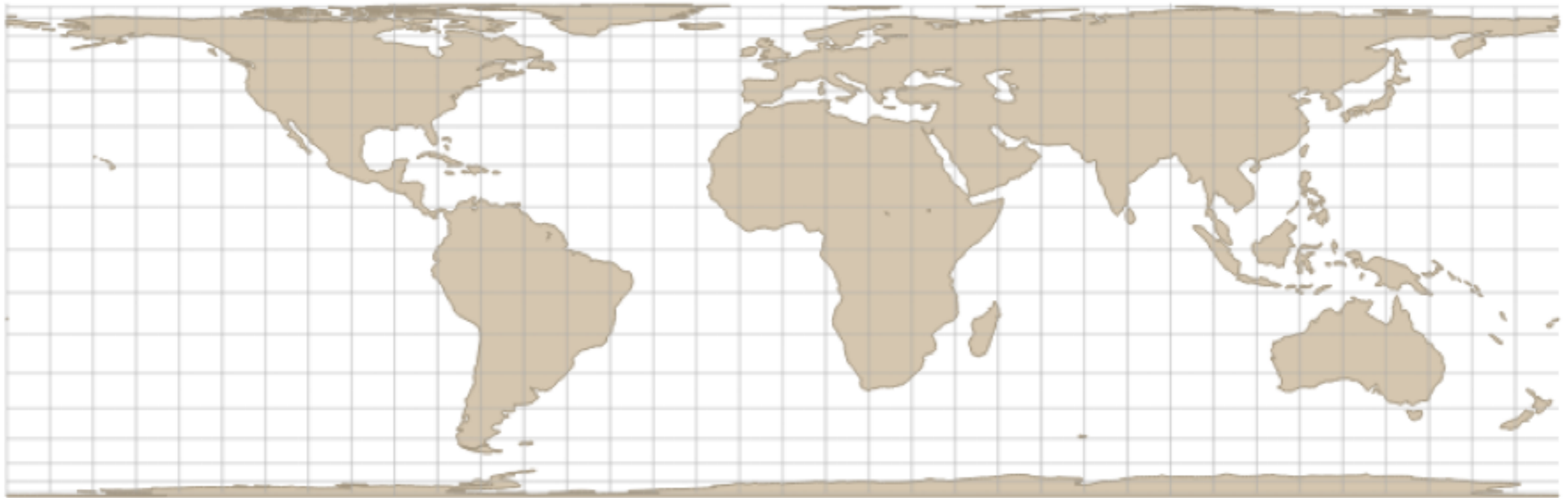


# Electoral System of the World

by votefair, [http://www.fairvote.org/electoral\\_systems](http://www.fairvote.org/electoral_systems)

<http://a.tiles.mapbox.com/v3/fairvote.geography-class/page.html#2/49.6/60.1>

- winner takes all
- open list proportional
- closed list proportional

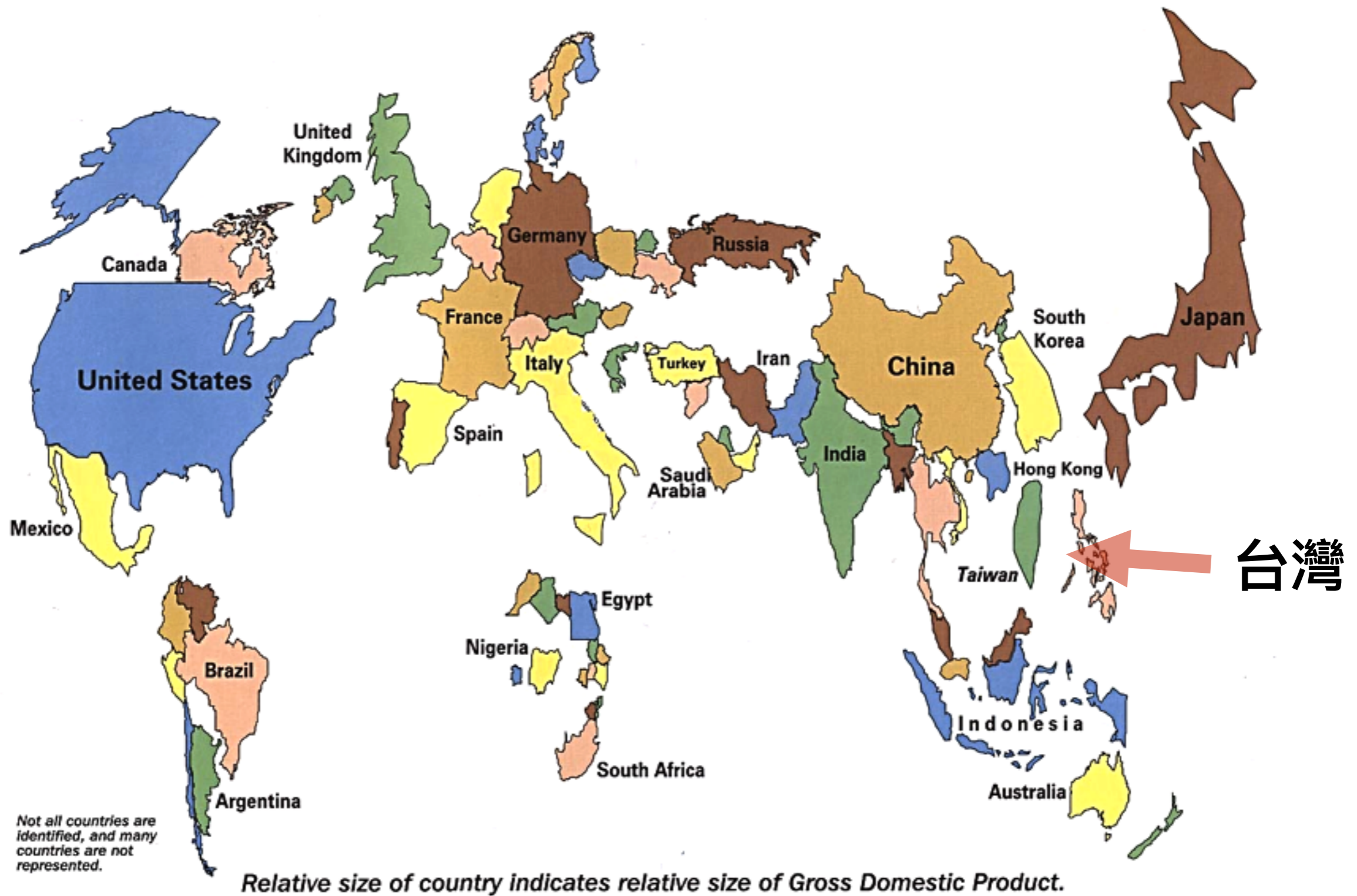


# Map Projection Comparison

<http://bl.ocks.org/syntagmatic/ba569633d51ebec6ec6e>



Figure 5. Market Size by Gross Domestic Product, 1995



## Market Size by GDP, 1995

adopted from "Handbook of International Economic Statistics"

<https://blog.richmond.edu/livesofmaps/2014/11/03/map-of-the-week-market-size-by-gross-domestic-product-1995/>

Overlapping  
Non-contiguous



Non-overlapping  
Non-contiguous



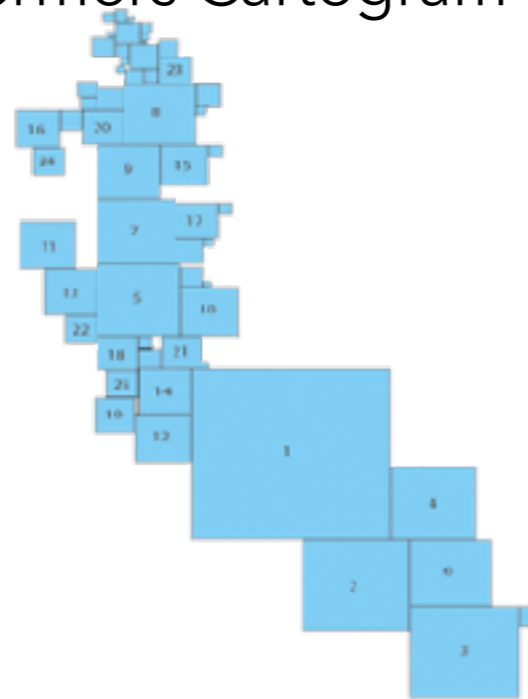
Contiguous



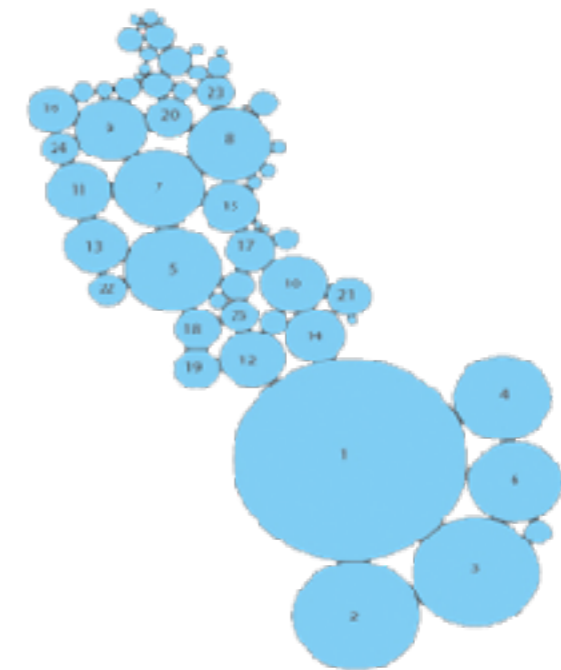
Graduated Symbol Map



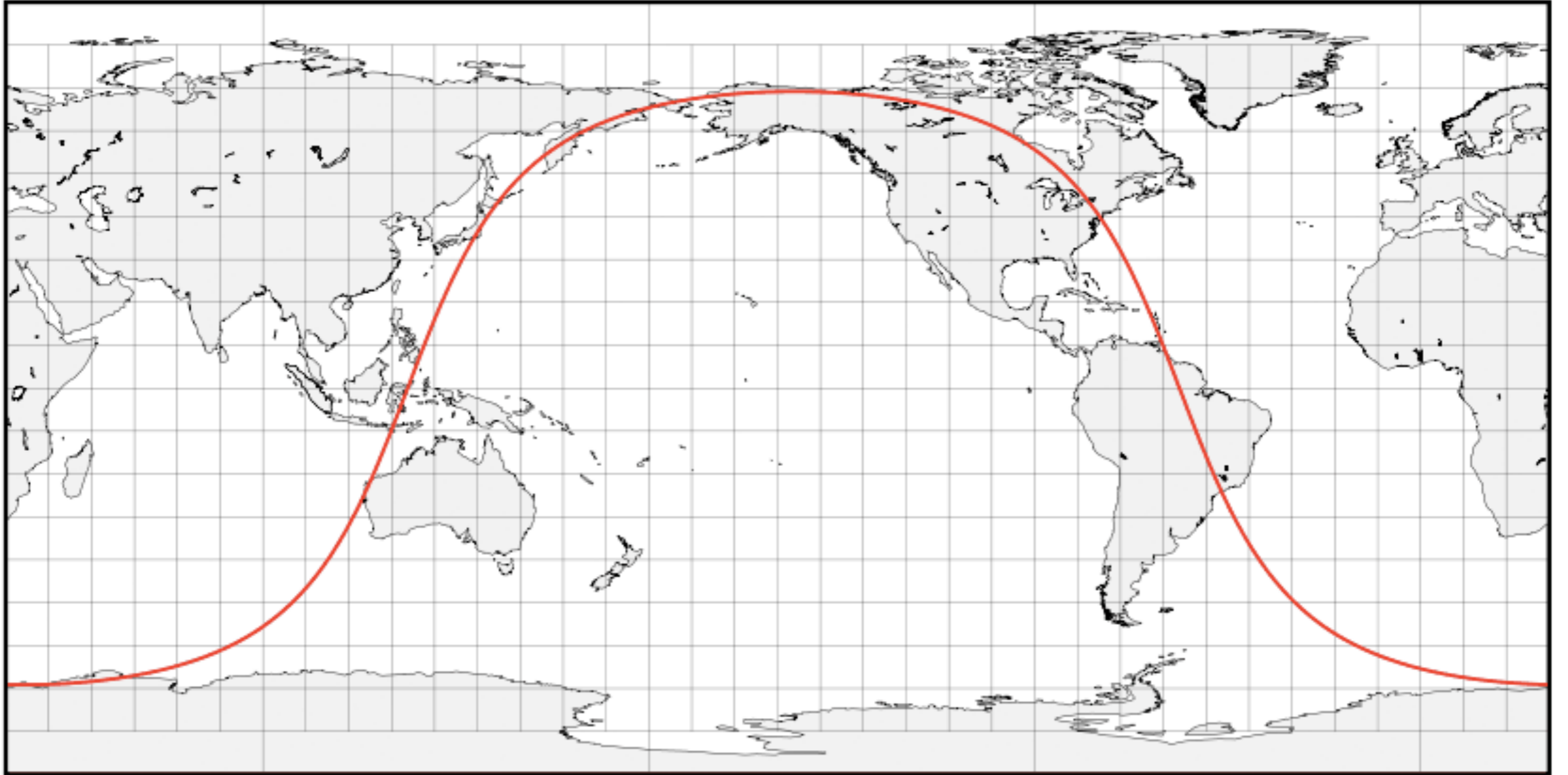
Dermers Cartogram

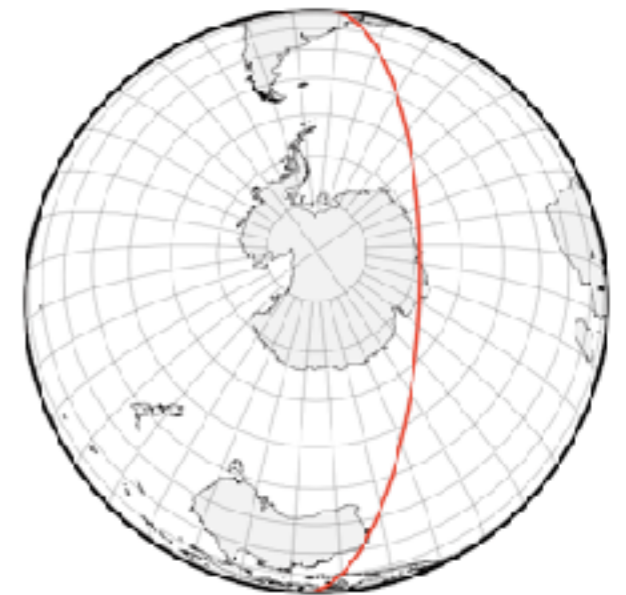
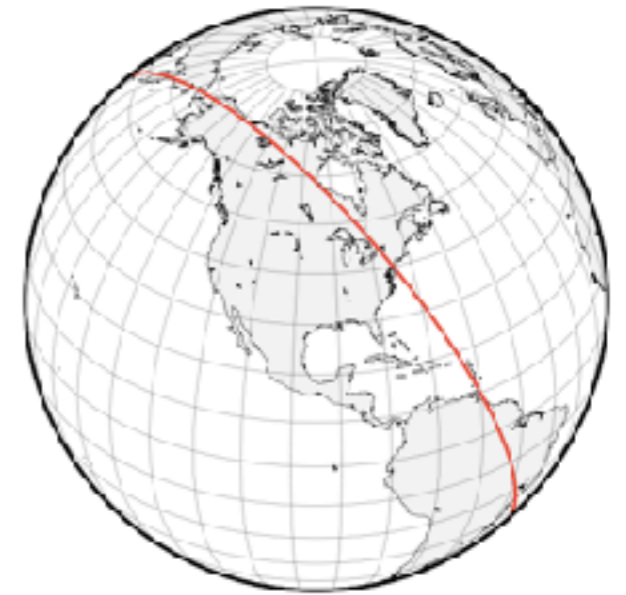
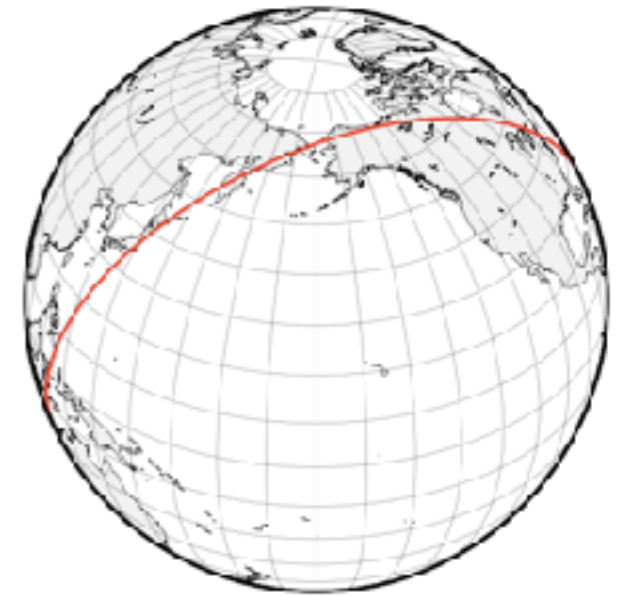
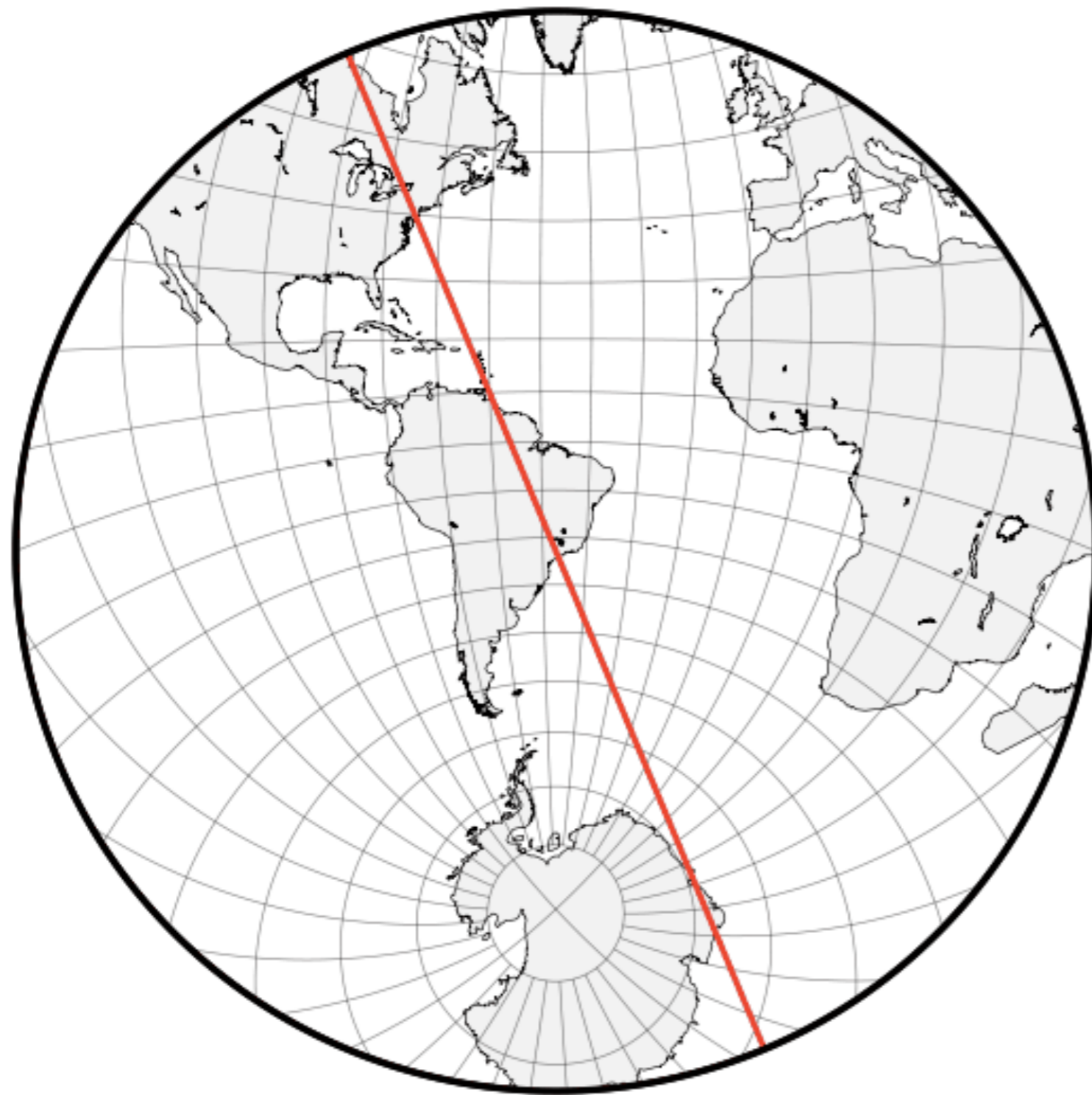


Dorling Cartogram



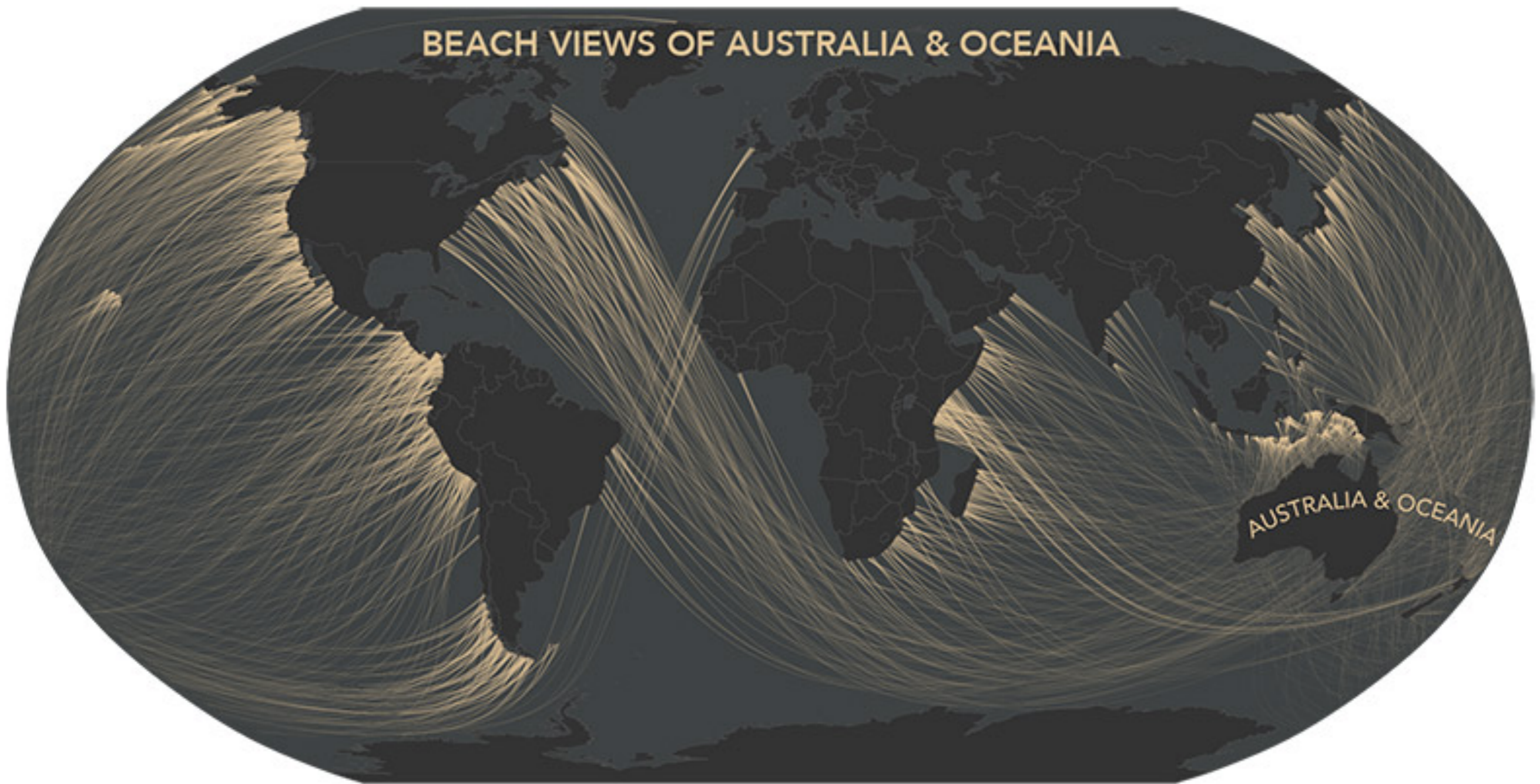
# Cartogram Types











# Beyond the Sea

By Andy Woodruff on 24 March 2016

<http://andywoodruff.com/blog/beyond-the-sea/>







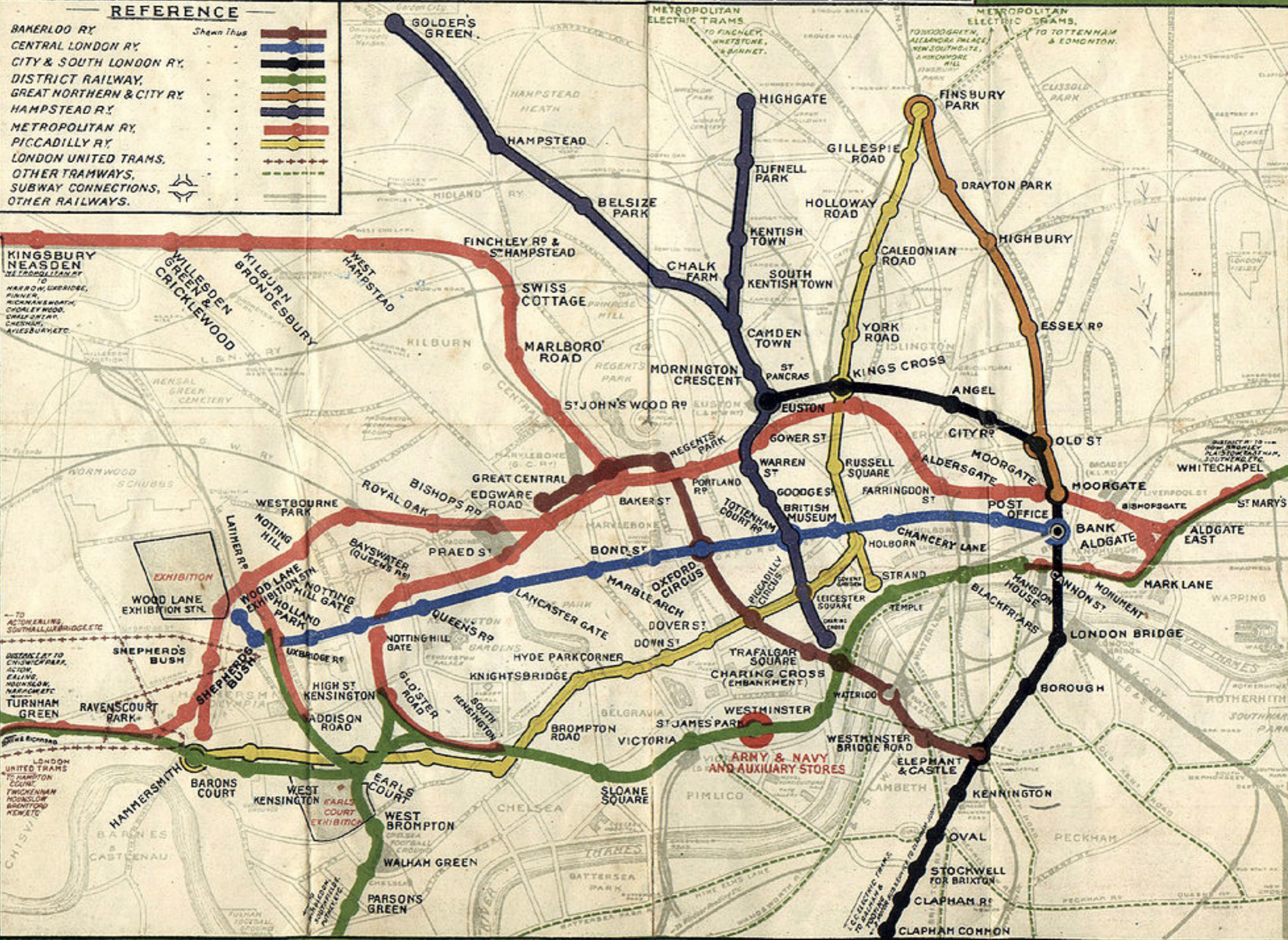


# London Underground Map

Henry Beck, 1933. topological map is a type of diagram that has been simplified so that only vital information remains and unnecessary detail has been removed.

**REFERENCE**

- BAKERLOO RY. *Shown Thus*   
 CENTRAL LONDON RY.   
 CITY & SOUTH LONDON RY.   
 DISTRICT RAILWAY.   
 GREAT NORTHERN & CITY RY.   
 HAMPSTEAD RY.   
 METROPOLITAN RY.   
 PICCADILLY RY.   
 LONDON UNITED TRAMS.   
 OTHER TRAMWAYS,   
 SUBWAY CONNECTIONS,   
 OTHER RAILWAYS. 





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# 台北捷運路網圖

# 地圖視覺化要點



1. 注意投影法與扭曲狀況
2. 考慮資料與面積的關係
3. 考量情境適度的簡化

# 圓餅圖要點

1. 表現整體與部份之比例
2. 橫軸左到右為趨勢方向
3. 總和為 100%
4. 從 12 點鐘方向開始
5. 順時針繞圓排序
6. 數量不宜多，2 ~ 7 為佳
7. 不適合跨圖表比較

# 折線圖要點

1. 用以表現趨勢
2. 橫軸左到右為趨勢方向
3. 避免座標裁切
4. 避免用在無序資料
5. 連接散布圖需標明方向
6. 刻度保持一致間距

# 面積圖要點

1. 概略表現資料
2. 適合相對性的比較
3. 數值與面積成正比
4. 避免圓以外的形狀
5. 避免用體積表現數值

# 長條圖要點

1. 用於無序資料
2. 避免座標裁切
3. 數據不宜過多
4. 資料宜排序後再呈現
5. 刻度保持一致間距

# 地圖要點

1. 注意投影法與扭曲狀況
2. 考慮資料與面積的關係
3. 考量情境適度的簡化



# 大原則

避免使用立體圖表

考慮更簡潔的呈現方式

凡事總有例外