

## 2 - Crowd-sourced online data

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MAX-PLANCK-INSTITUT  
FÜR DEMOGRAFISCHE  
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# Agenda

1. Q&A
2. Crowd-sourced data
3. User-generated family trees
4. Limitations and bias

## Q&A

- ▶ Download the course materials
- ▶ Knit an Rmarkdown document
- ▶ Review the assignment instructions
- ▶ Other?

Crowd-sourced data

## What is crowd-sourced data?

- ▶ ‘Bottom-up’ user-generated content
- ▶ Usually large
- ▶ Available online - may have been produced offline
- ▶ By-product of decentralized activity

## Examples in this session

1. Recruitment platforms
2. Online activism in the UK
3. Knowledge building in Wikipedia
4. Family history research

## Crowd-sourcing as recruitment

**Aim:** Strategies for recruiting iPhone users to participate in a web survey through Craigslist, Google AdWords, Facebook, and Amazon Mechanical Turk.

- ▶ Pull-method (cash-based platforms): recruits were more cost efficient and committed to the survey task
- ▶ Push method (ad-recruitment): recruits were more demographically diverse

Antoun, C., Zhang, C., Conrad, F.G., and Schober, M.F. (2016). Comparisons of online recruitment strategies for convenience samples: Craigslist, Google AdWords, Facebook, and Amazon Mechanical Turk. *Field Methods* 28(3):231–246.

## Crowd-sourcing as recruitment: representatives

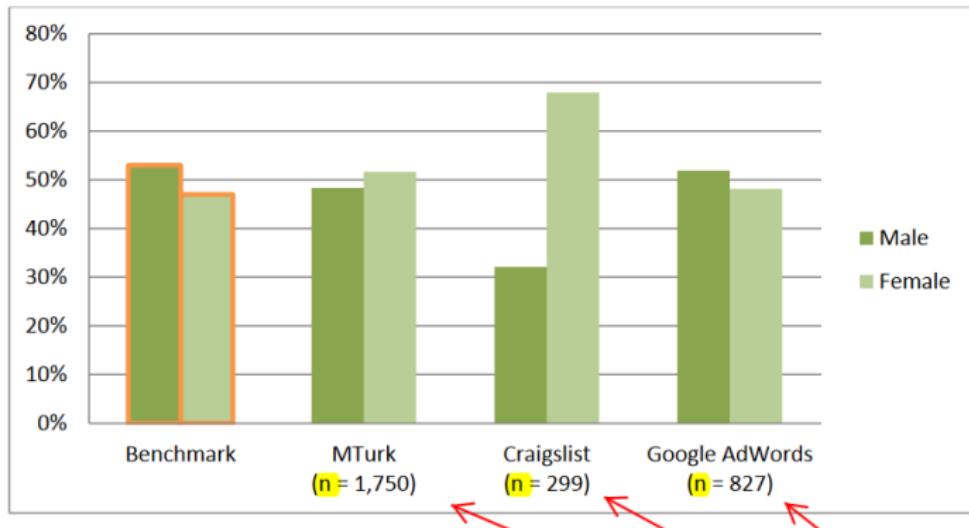


Figure 1: By sex

Antoun, C., Zhang, C., Conrad, F.G., and Schober, M.F. (2016). Comparisons of online recruitment strategies for convenience samples: Craigslist, Google AdWords, Facebook, and Amazon Mechanical Turk. *Field Methods* 28(3):231–246.

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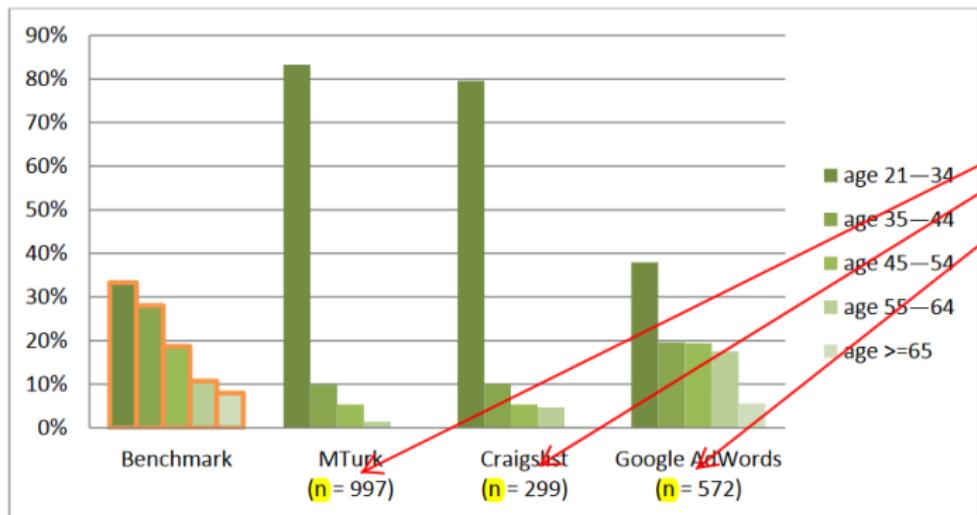
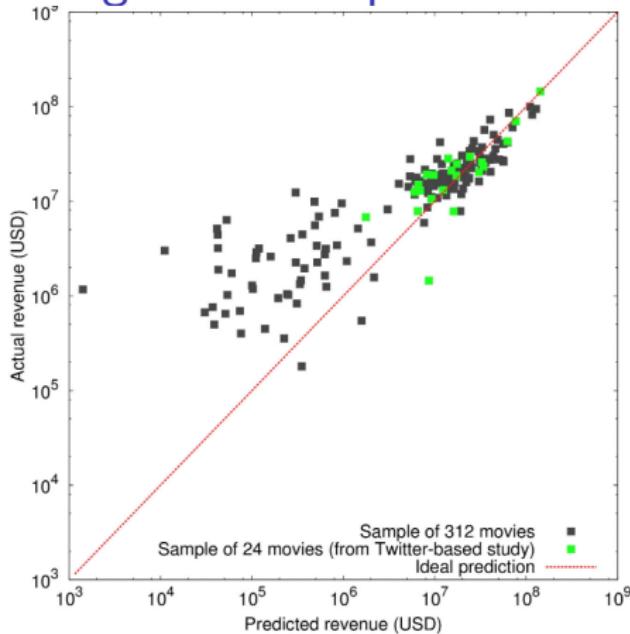


Figure 2: By age group

Antoun, C., Zhang, C., Conrad, F.G., and Schober, M.F. (2016). Comparisons of online recruitment strategies for convenience samples: Craigslist, Google AdWords, Facebook, and Amazon Mechanical Turk. *Field Methods* 28(3):231–246.

# Extrapolating from Wikipedia

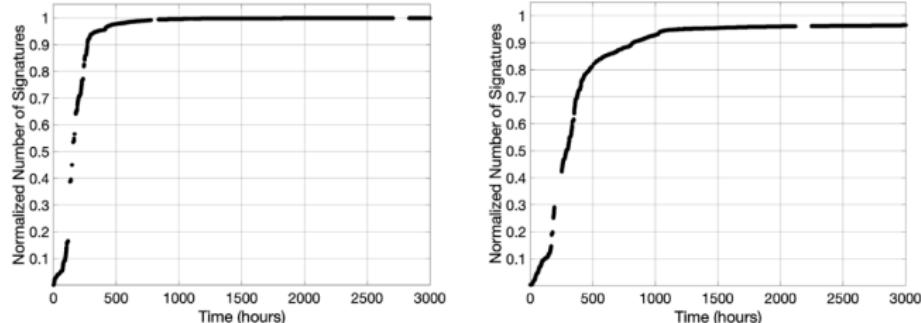


**Figure 5.** First weekend box office revenue in the U. S. against its predicted value by the Wikipedia model at  $t = -30$  days. Green dots are representing the smaller sample of 24 movies common in Twitter and Wikipedia studies, and black dots are movies from the 2010 sample of 312 movies. Note that negative predicted revenues for some of the very unpopular movies could not be shown in the logarithmic scale.  
doi:10.1371/journal.pone.0071226.g005

**Figure 3:** Predicting movie revenues by editor's activity

Mestyán, M., Yasseri, T., and Kertész, J. (2013). Early Prediction of Movie Box Office Success Based on Wikipedia Activity Big Data. PLoS ONE 8(8):e71226.

# Understand crowd-source directed behaviour



**Figure 3 Growth of the number of signatures for 2 example petitions.** Left panel: 'Stop the badger cull' and right panel: 'Reconsider West Coast Mainline franchise decision'.

**Figure 4:** Cumulative number of signatures in two online petitions in the UK

Yasseri, T., Hale, S.A., and Margetts, H.Z. (2017). Rapid rise and decay in petition signing. EPJ Data Science 6(1):20.

## Online genealogies

# A genealogy is the history of a population

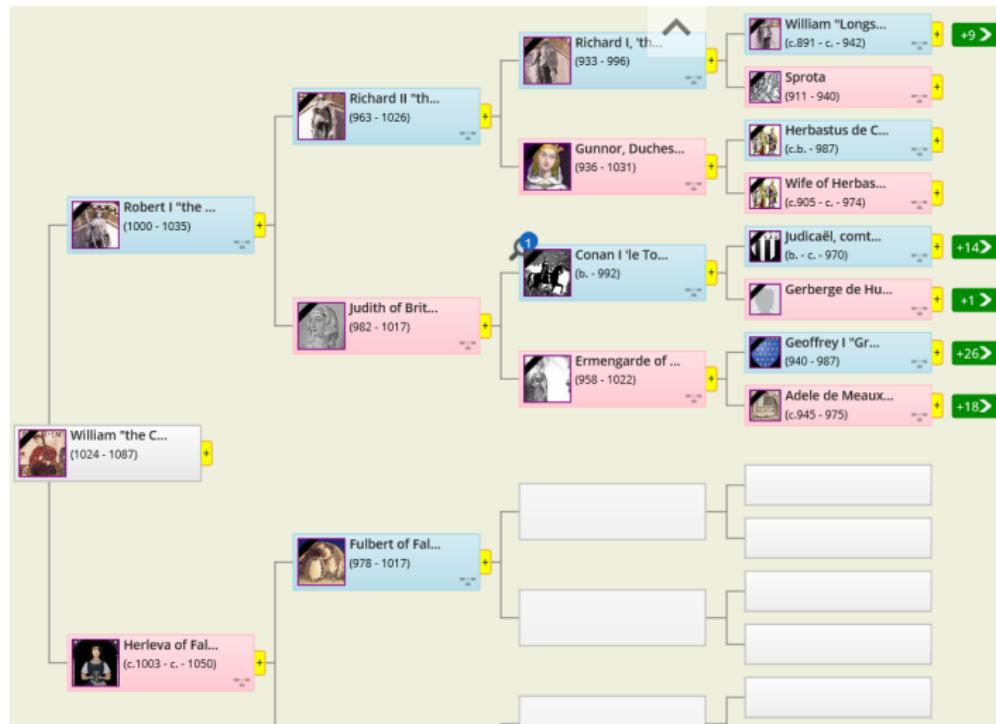


Figure 5: A Geni.com family tree

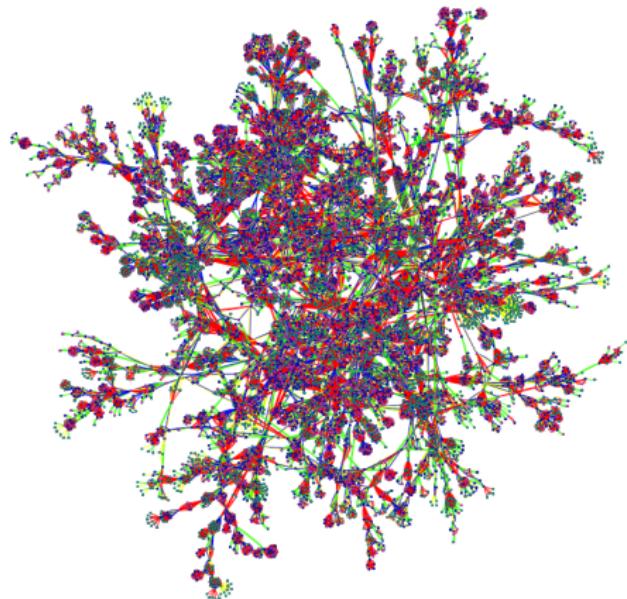


Figure 6: Cool dataviz, but what do we learn from the data?

Fire, M. and Elovici, Y. (2015). Data mining of online genealogy datasets for revealing lifespan patterns in human population. ACM Trans. Intell. Syst. Technol. 6(2):28:1–28:22.

# Demographic measures from online genealogies

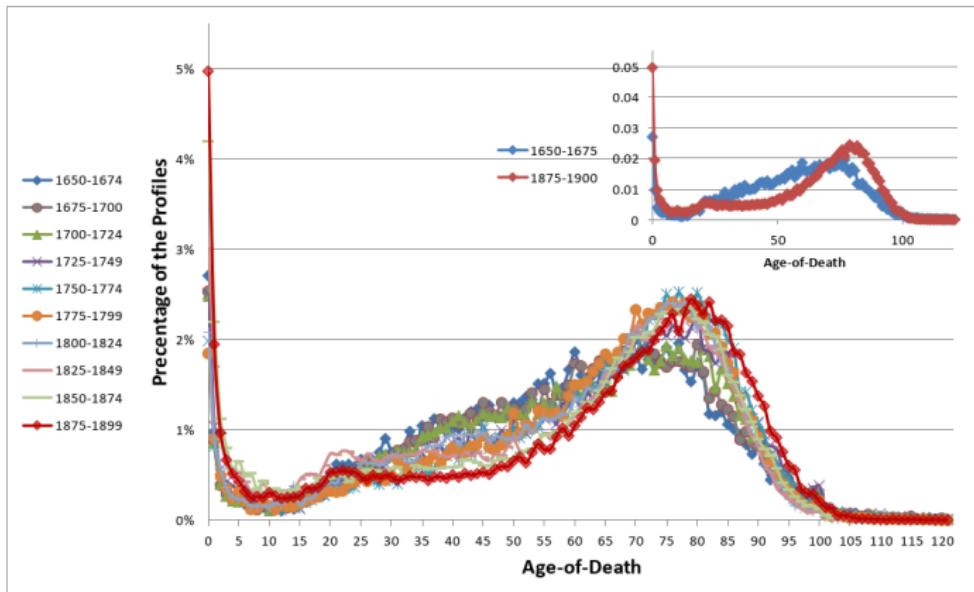


Figure 7: Lifespan Variation ('world')

Fire, M. and Elovici, Y. (2015). Data mining of online genealogy datasets for revealing lifespan patterns in human population. ACM Trans. Intell. Syst. Technol. 6(2):28:1–28:22.

# Demographic measures from online genealogies

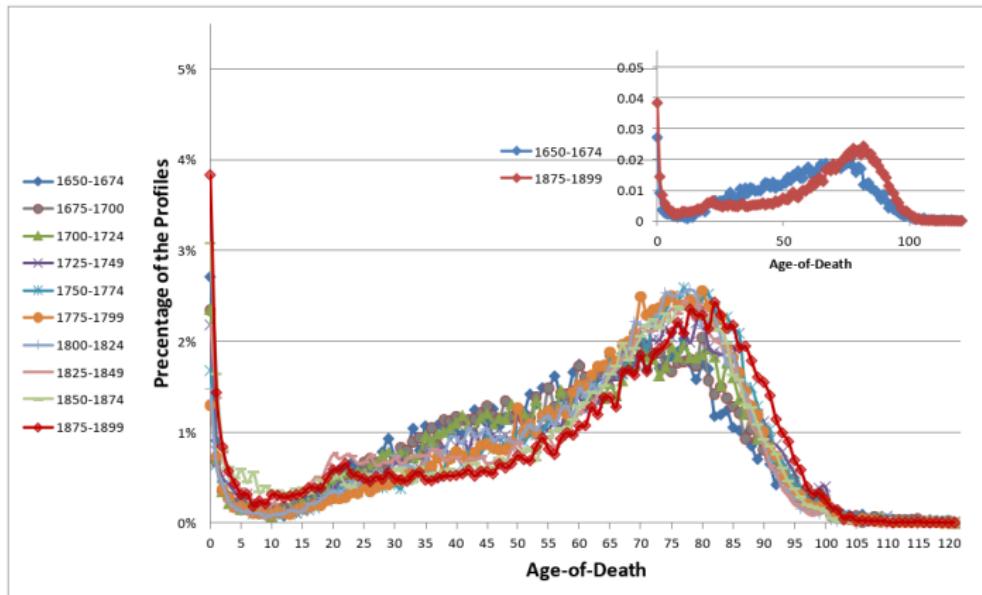


Figure 8: Lifespan Variation ('USA') - what's the difference??

Fire, M. and Elovici, Y. (2015). Data mining of online genealogy datasets for revealing lifespan patterns in human population. ACM Trans. Intell. Syst. Technol. 6(2):28:1–28:22.

# Geni.com: a social network for genealogists



**William "the Conqueror" FitzRobert, Duke of Normandy, King of England** MP

French: Roi d'Angleterre Guillaume FitzRobert, le Conquérant

Gender: Male  
Birth: October 14, 1024  
Château de Bayeux, Falaise, Calvados, Normandie, France

Death: September 09, 1087 (62)  
Prieuré de Saint-Gervais, Rouen, Seine-Maritime, Haute-Normandie, France (Wounds suffered at the siege of Mantes)

Place of Burial: Abbatiale Saint-Étienne, Abbaye aux Hommes, Caen, Calvados, Basse-Normandie, France

Immediate Family:

- Son of Robert I "the Magnificent", Duke of Normandy and Herleva of Falaise
- Husband of Matilda of Flanders
- Father of Robert II "Curthose", Duke of Normandy; Adeliza de Normandie, Princess of England; William II "Rufus", King of England; Cecilia, Abbess of Holy Trinity; Richard and 5 others
- Brother of Adelaide of Normandy, Countess Of Aumale
- Half brother of Robert de Mortagne, Earl of Cornwall; Odo, Bishop of Bayeux; Jeanne de Conteville; Rohesia deConteville; Muriel de Conteville and 2 others

**Matches** ?

[Research this Person](#)

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[Contact Profile Managers](#)

[View Tree](#)

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[Edit Profile](#) ?

Figure 9: Everyone's relative

# Built on top of (private) genomic data

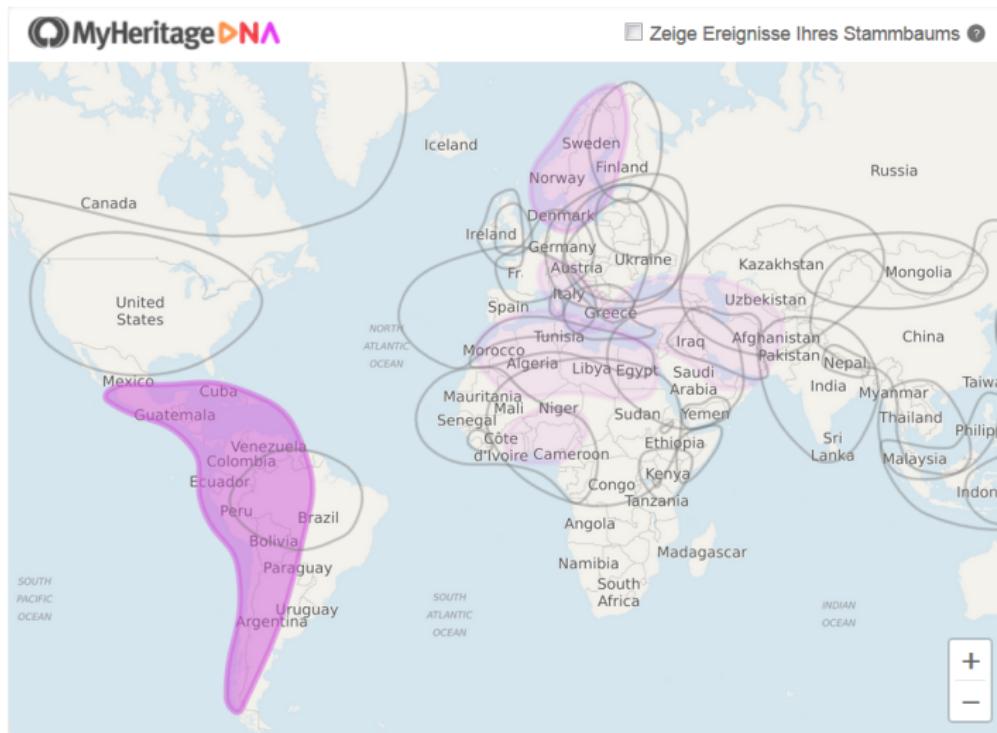


Figure 10: 'Ethnicity' estimates

## Our example: Familinx data

1. Genealogy-driven social media data
2. Goal: register entire population of the world
3. 86M unique profiles over last 400 years
4. Curated, with quality checks
5. Geo-coded events - 55% Europe; 30% North America

Kaplanis, J., et al. (2018). Quantitative analysis of population-scale family trees with millions of relatives. *Science* 360(6385):171–175.

## Geographic distribution in Familinx

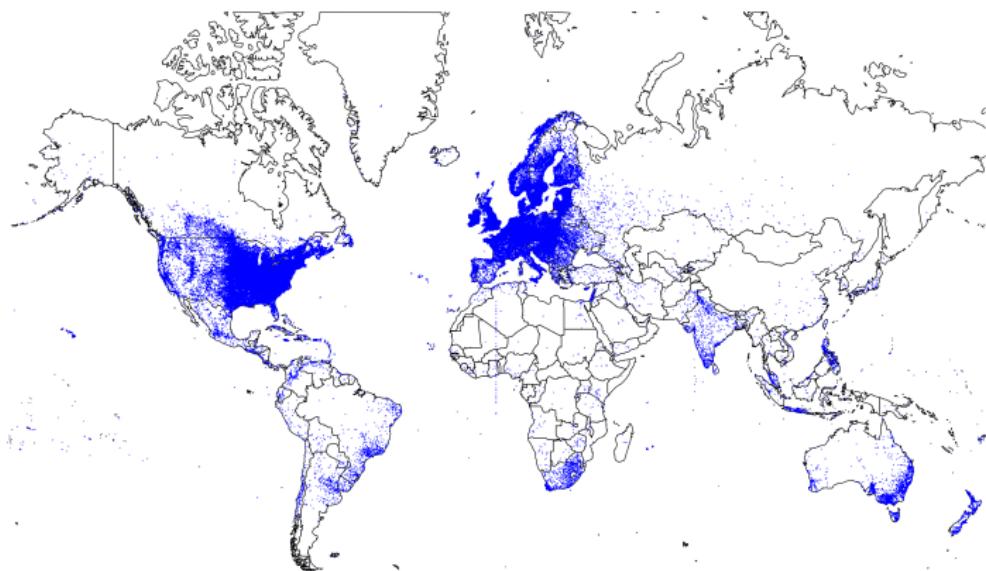


Figure 11: Birth events worldwide

# Population alive by age group (all countries)

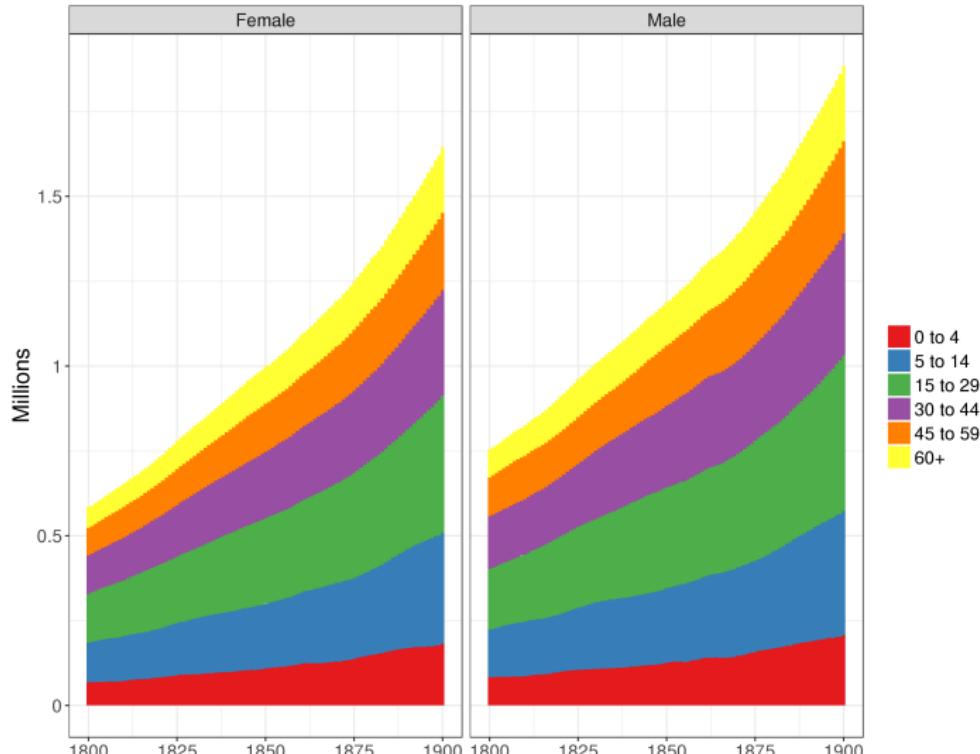


Figure 12: Yearly censuses from Familinx data

# The data generating process

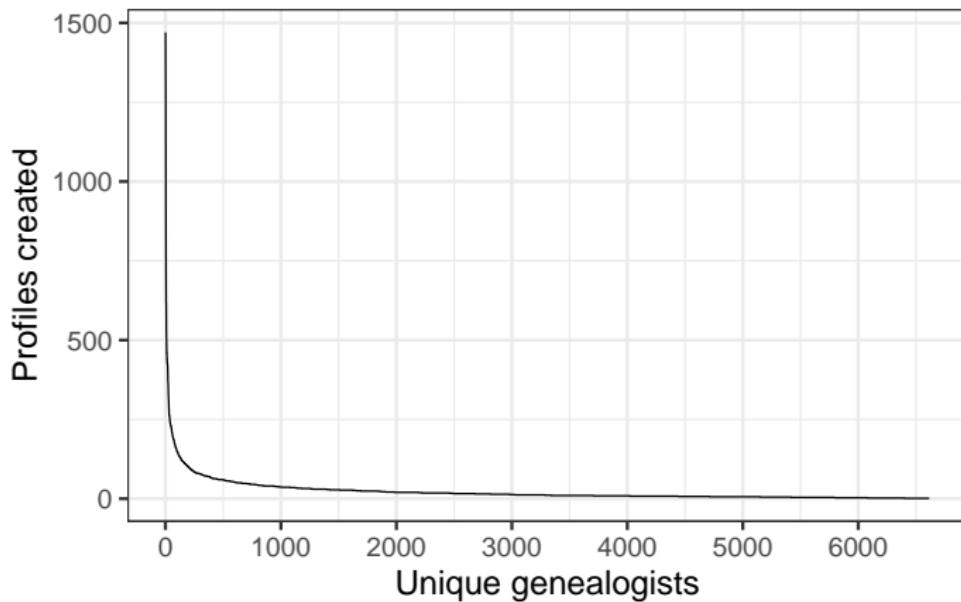
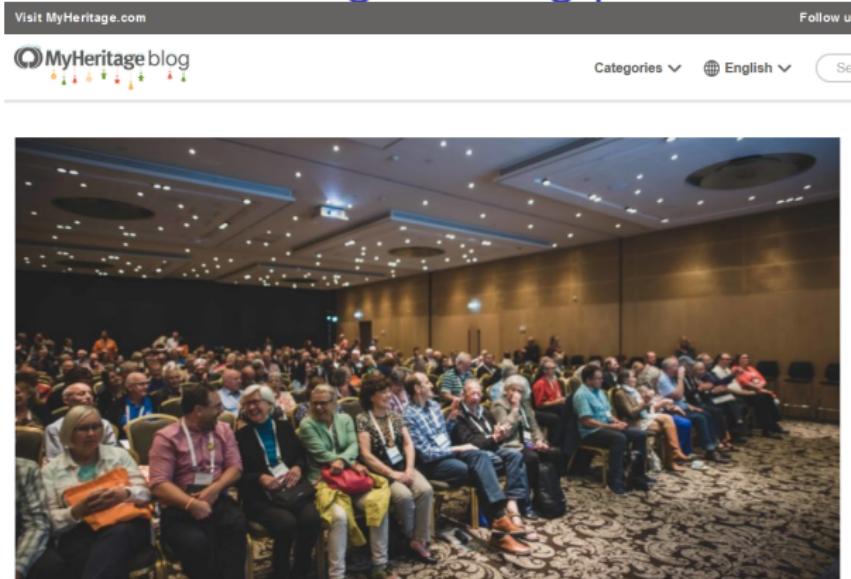


Figure 13: Power law function of genealogists

# A closer look at the data generating process



## MyHeritage LIVE 2019 Recap

By Esther · September 12, 2019 · Events And Webinars

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Figure 14: The crowd-sourcers, median age: 65

<https://blog.myheritage.com/2019/09/myheritage-live-2019-recap/>

## The Swedish sample

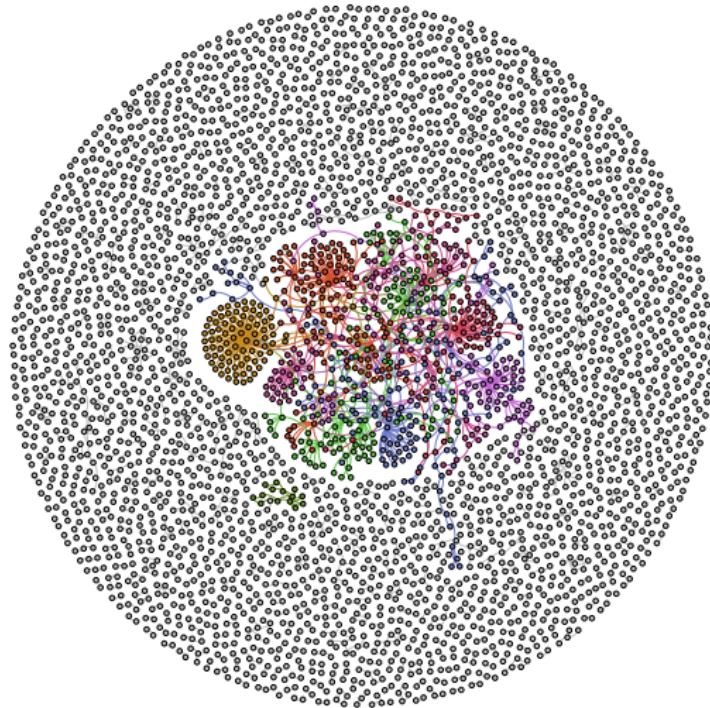


Figure 15: Subsetting a genealogical network

# Exploring FamiliNX

```
library(data.table); library(tidyverse); library(knitr)

# Read sample FamiliNX data using data.table
fread("../Assignment/Data/sweden_genealogy.csv") %>%
  # To get a sense of the structure of the data:
  select(profileid, father, mother, birth_year, death_year)
  slice(1:4) %>%
  kable()
```

profileid	father	mother	birth_year	death_year
136	NA	NA	NA	NA
264	57536639	69836161	1875	NA
708	83768131	48140261	NA	NA
722	NA	NA	1694	1767

## Geographic distribution in our sample

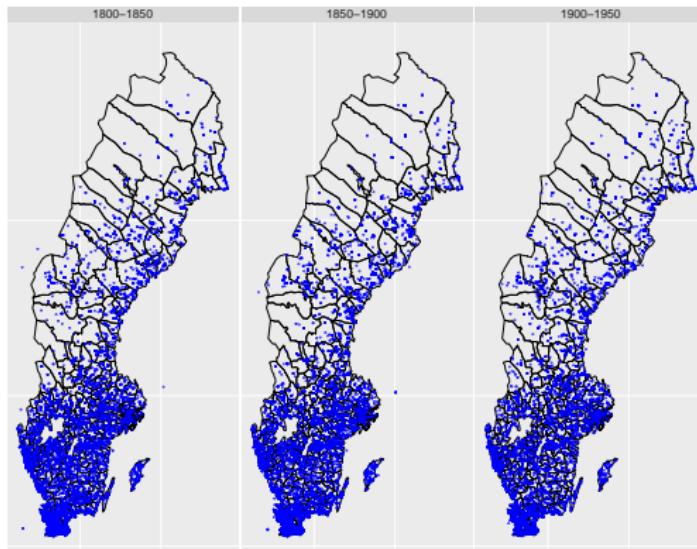
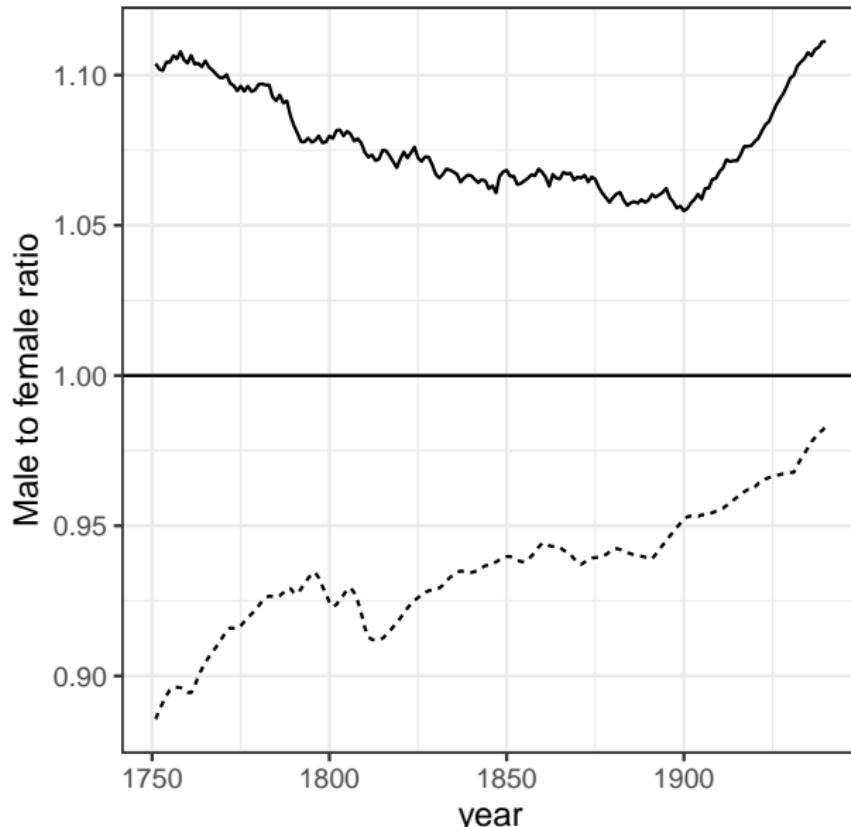


Figure 16: Birth events in Sweden over time

Diego Alburez-Gutierrez (2020)

## Male bias in online genealogies (Familinx)



## Correcting bias: an example using post-stratification weights

**Starting point:** Online genealogies are a non-representative sample of real-world genealogies.

- ▶ Online genealogies  $\neq$  offline genealogies
- ▶ Unknown 'weights' - derive from comparison to trusted sources
- ▶ Understand data-generating process

Wang, W., Rothschild, D., Goel, S., and Gelman, A. (2015). Forecasting elections with non-representative polls. International Journal of Forecasting, 31(3), 980-991.

## Enumerator - death events

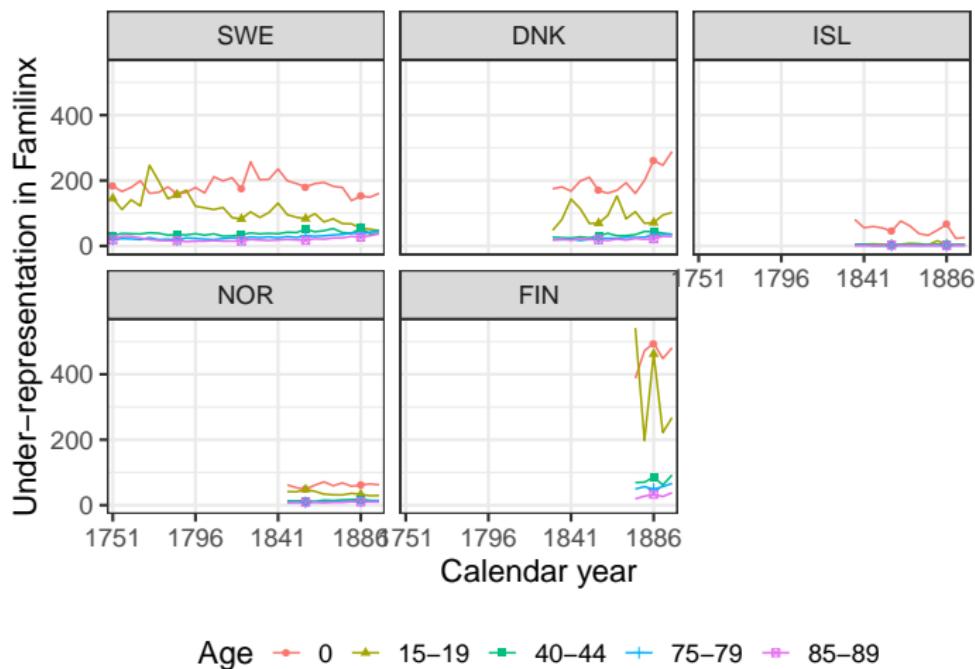


Figure 18: Observed deaths in four countries

## Denominator or exposure

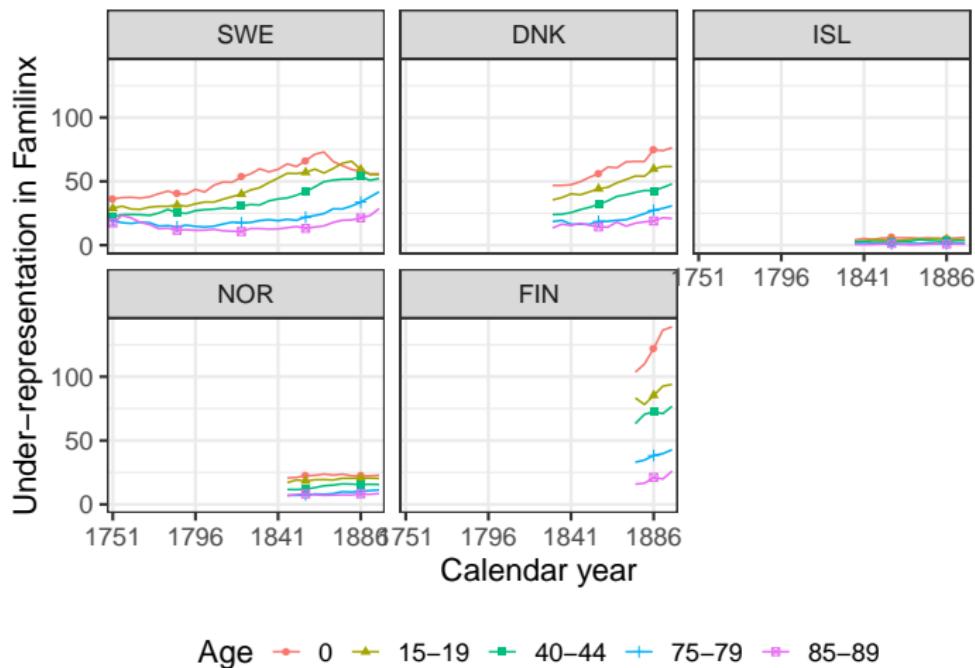
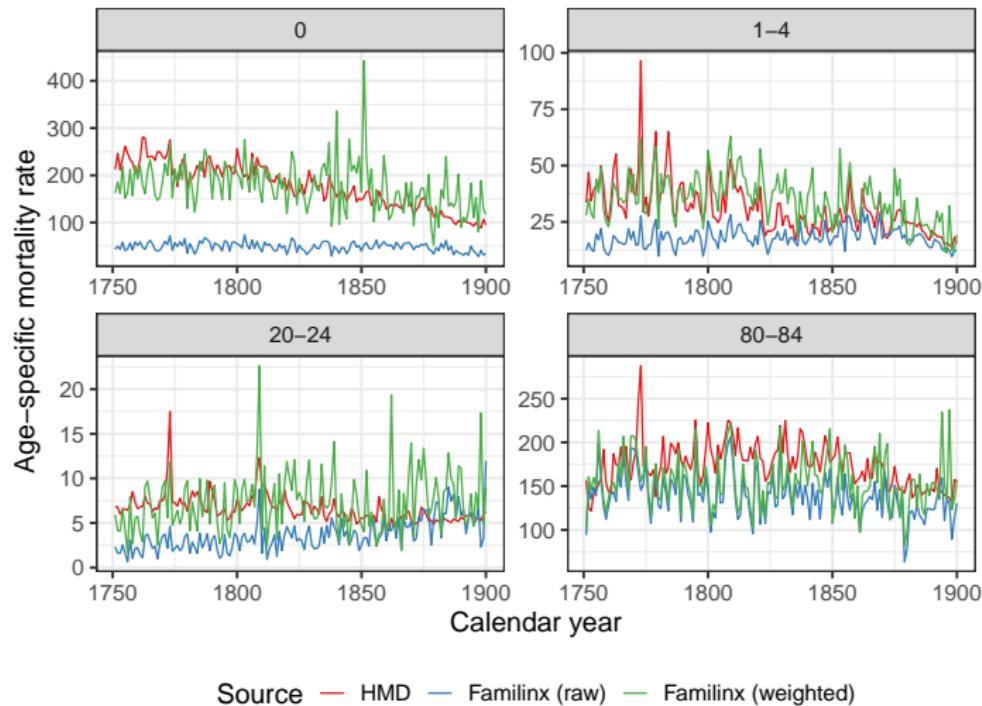


Figure 19: Population alive by age and sex in four countries

## 'Corrected' demographic rates (Sweden)



Source — HMD — Familinx (raw) — Familinx (weighted)

Figure 20: Weighted mortality rates

## Suggested homework

- ▶ Read Sofia Gil's tutorial on using the FB Marketing API:  
[https://github.com/SofiaG11/Using\\_Facebook\\_API](https://github.com/SofiaG11/Using_Facebook_API)
- ▶ Explore website:  
<https://www.digitalgendergaps.org/data/?report=2020-03-02>
- ▶ Start working on Exercise 1 from the final assignment