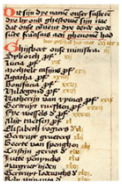
First names and models of cultural evolution



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a question and an observation

what gouverns the choice of parents
in naming their children

when name frequencies in the population
strictly follow a (simple) mathematical description

cultural evolution/transmission

- dissemination of cultural traits over time
  ceramics, tools, housing, language, names
- theory and models need data for testing

first names

- in use for millennia
  - linguistic expression of identity and culture
  - chosen by a significant part of the population (parents)
  - relatively rapid changes over last centuries/decades
  - data is available
- given in a social context
  - social learning and transmission
  - evolution: names come and go

onomastics meets cultural evolution

onomastics: data on and knowledge of first names

research on cultural transmission: models

what can we learn from each other

models of cultural evolution

are probabilistic
and use quantitative data

generation (or time step, year of birth)

- copies properties of the previous generation
  with random fluctuation, and additional biases
- introduction of new features – new names
  invented or from other cultures
  with innovation probability
- result: names come and go

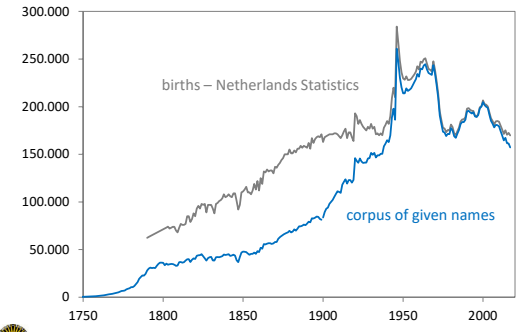
what is on offer on first names

one of the best documented cultural traits
over the last centuries

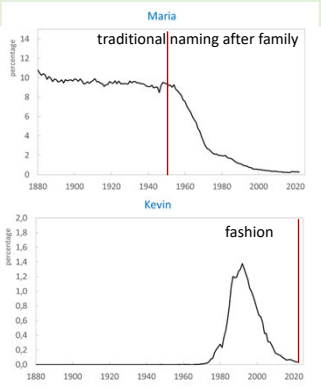
- complete
  - everyone has a first name
  - currently fully documented in the civil registration
  - in time and place
- dynamical
  from traditional to fashionable naming
  during the previous century in the Netherlands

Dutch corpus of given names 1790-2023

(26.8 million persons, https://nvb.meertens.knaw.nl/)



cultural change in the naming process



reference year

1950
vertical transmission
from previous generations

2023
horizontal transmission
from contemporary names

changes in first name popularity

by generation (boys)

	1925	1950	1998	2023
1	Johannes	Johannes	Thomas	Noah
2	Jan	Jan	Tim	Luca
3	Cornelis	Cornelis	Daan	Lucas
4	Hendrik	Hendrik	Kevin	Liam
5	Willem	Willem	Max	Levi
6	Pieter	Petrus	Nick	Sem
7	Gerrit	Wilhelmus	Johannes	Daan
8	Petrus	Antonius	Rick	Noud
9	Jacobus	Gerardus	Jan	Mees
10	Wilhelmus	Gerrit	Tom	James
11	Adrianus	Adrianus	Lars	Sam
12	Gerardus	Pieter	Niels	Adam
13	Antonius	Jacobus	Bram	Finn
14	Hendrikus	Franciscus	Dennis	Milan
15	Jacob	Hendrikus	Mike	Luuk
16	Johan	Peter	Jesse	Zayn
17	Dirk	Theodorus	Jeroen	Mason
18	Franciscus	Robert	Robin	Bram
19	Marinus	Johan	Ruben	Mats
20	Theodorus	Marinus	Bart	Guus

changes in first name popularity

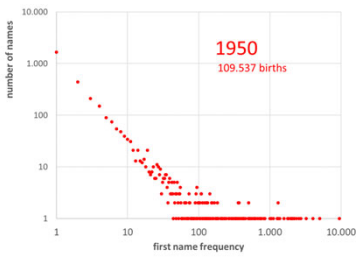
by generation (girls)

	1925	1950	1998	2023
1	Maria	Maria	Sanne	Julia
2	Johanna	Johanna	Lisa	Olivia
3	Anna	Anna	Anouk	Sophie
4	Cornelia	Elisabeth	Anne	Emma
5	Wilhelmina	Cornelia	Iris	Mila
6	Elisabeth	Wilhelmina	Laura	Nora
7	Catharina	Catharina	Kim	Yara
8	Hendrika	Hendrika	Demi	Noor
9	Adriana	Petronella	Romy	Saar
10	Petronella	Adriana	Julia	Tess
11	Jacoba	Margaretha	Anna	Milou
12	Geertruida	Jacoba	Lotte	Sara
13	Helena	Geertruida	Maria	Evi
14	Margaretha	Helena	Eva	Luna
15	Alida	Yvonne	Emma	Zoë
16	Antonia	Marianne	Amber	Elin
17	Aaltje	Antonia	Johanna	Liv
18	Grietje	Theodora	Naomi	Anna
19	Neeltje	Christina	Nina	Lina
20	Trijntje	Alida	Sophie	Maeve

Dutch population data of first names
(by year of birth)

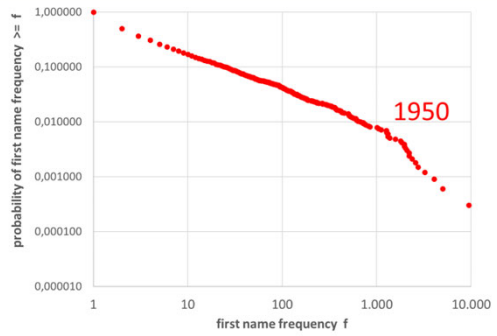
boys

- many rare names
- few popular names



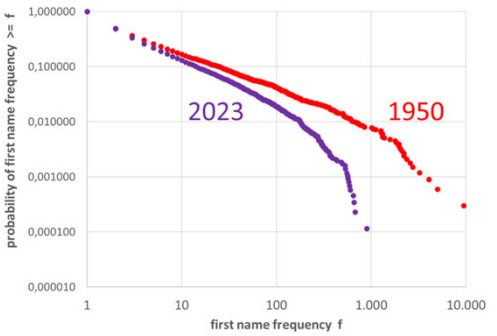
probability distribution boys

probability of number of first names with frequency >= f



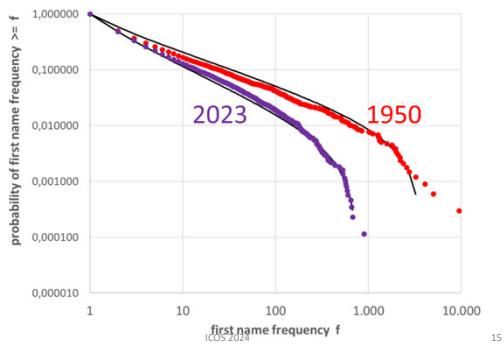
probability distribution boys

probability of number of first names with frequency >= f



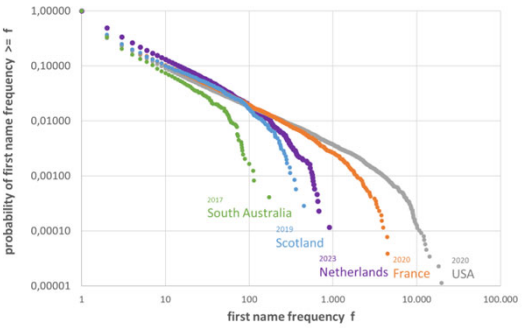
probability distribution boys

powerlaw approximation



probability distribution boys international

of first name with frequency >= f



properties (the Netherlands)

1950

- traditional naming after family
  - vertical copying from previous generations
- most popular name for ~10% of all boys (*Johannes*)
- rare names exist as well

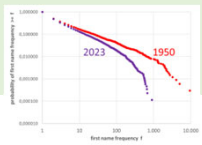
2023

- fashion cycles in naming
  - high innovation, horizontal copying from same generation
- most popular name given to about 1% of all boys (*Noah*)
  (1% found for many Western European countries)

which cultural transmission model can reproduce the properties of these two distributions?

base line model: cookbook

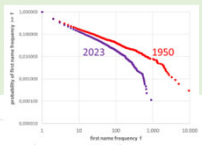
- choose population size and birth rate
- copy names from the previous generation
  based on the probability of the name in the previous generation with some random fluctuation
- introduce new names
  with some likelihood
- repeat process until stability

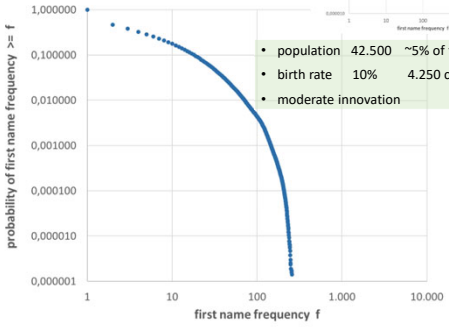


in search of the influence of

- innovation probability
- bias towards (anti)conformism
- bias towards prestige
- connectivity among the population (social network properties)

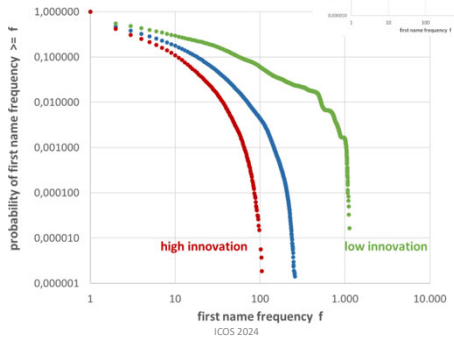
reference model



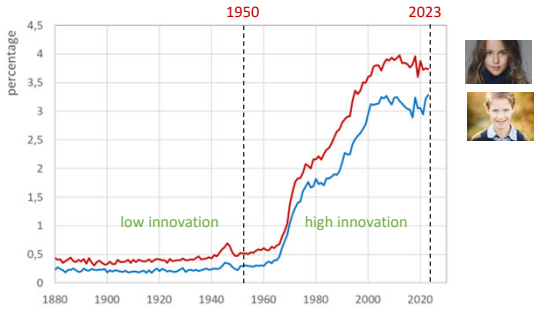


- population 42.500 ~5% of full population
- birth rate 10% 4.250 children
- moderate innovation

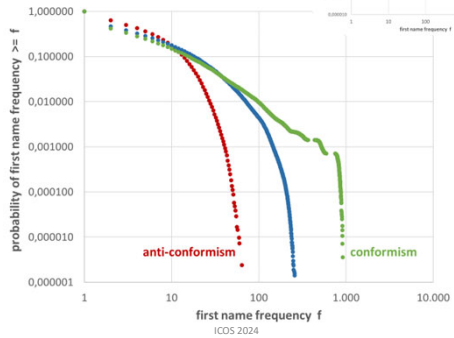
innovation



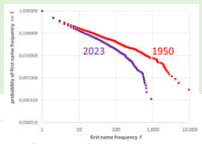
new first names

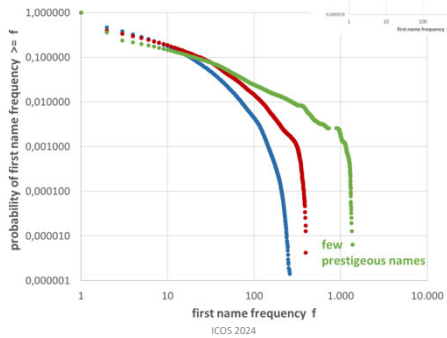


conformism bias

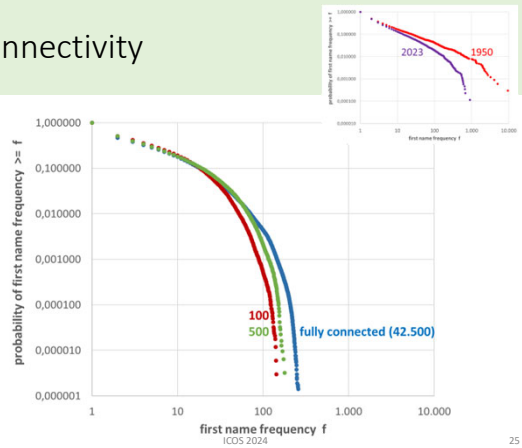


prestige bias





connectivity



in conclusion

naming can be modelled as
probabilistic copying with innovation and biases:

- innovation is the major driving force
  - its influence can highly vary in time (in years and centuries)
  - the name inventory varies accordingly
  - rare names will show in all times
- small social networks
  are sufficient to disseminate names across the entire society
- biases
  (anti)conformity and prestige play a role

although most parents think they make their own choice
for beautiful names of their children

their preferences are highly socially guided,
with a mathematical precision
that is not yet fully understood in its complexity

Abstract

In the domain of first name selection, we observe two principal strategies:
copying, which operates on a continuum from the vertical transmission **of first names known in the family** to the horizontal transmission of societal names, and the innovation of entirely new names **(in the society concerned)**.
This study scrutinizes the intersection of vertical and horizontal transmission processes, a confluence that has profound implications for the cultural evolution of naming practices. Specifically, we aim to elucidate how the simultaneous presence of these transmission modes can obscure the analytical clarity of measures such as turnover — the rate at which names enter or exit popularity lists — and progeny distribution — the likelihood of a name being chosen relative to its existing frequency.
Our research addresses the need to differentiate between the influences of vertical and horizontal transmissions to accurately interpret name frequency data, a critical factor that traditional models often overlook.
By analyzing a comprehensive dataset of first names in the Netherlands from 1920 to 2020, which includes uniquely assigned names **(hapaxes)**, we endeavor to untangle these intertwined transmission processes. The refined understanding gleaned from our investigation not only contributes to the methodology of cultural evolution studies but also sets the stage for comparative analysis with data from the USA (Acerbi and Bentley, 2014), South Australia (O'Dwyer and Kandler, 2017), France, and Belgium, thus shedding light on aspects of name transmission dynamics across cultures.