MAX-PLANCK-INSTITUT FÜR DEMOGRAFISCHE FORSCHUNG

MAX PLANCK INSTITUTE FOR DEMOGRAPHIC RESEARCH

Kinship 3.0: A data-driven approach

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[1] ***MPIDR, Lab of Digital and Computational Demography***

Section 1

Kinship studies

Google says:

kinship

/ˈkɪnʃɪp/

noun
noun: **kinship**

blood relationship.
synonyms: relationship, relatedness, being related, family ties, family connections, blood relationship, blood ties, common ancestry, common lineage, kindred, connection; More

- a sharing of characteristics or origins.
  plural noun: kinships
  "they felt a kinship with architects"
  synonyms: affinity, sympathy, kindred, rapport, harmony, understanding, alliance, association, empathy, closeness, fellow feeling, bond, community, communion, compatibility, link, accord, friendship, togetherness; More

Translate kinship to Choose language

Use over time for: kinship

Kinship is more than blood

The lived experience of kinship is a central component of our social history. It has been studied extensively:

1. Anthropology: descent and affinity
2. Socio-biology and evolutionary perspectives
3. Formal demography
4. Computational approaches
5. More to come...

Kinship describes interactions between real people

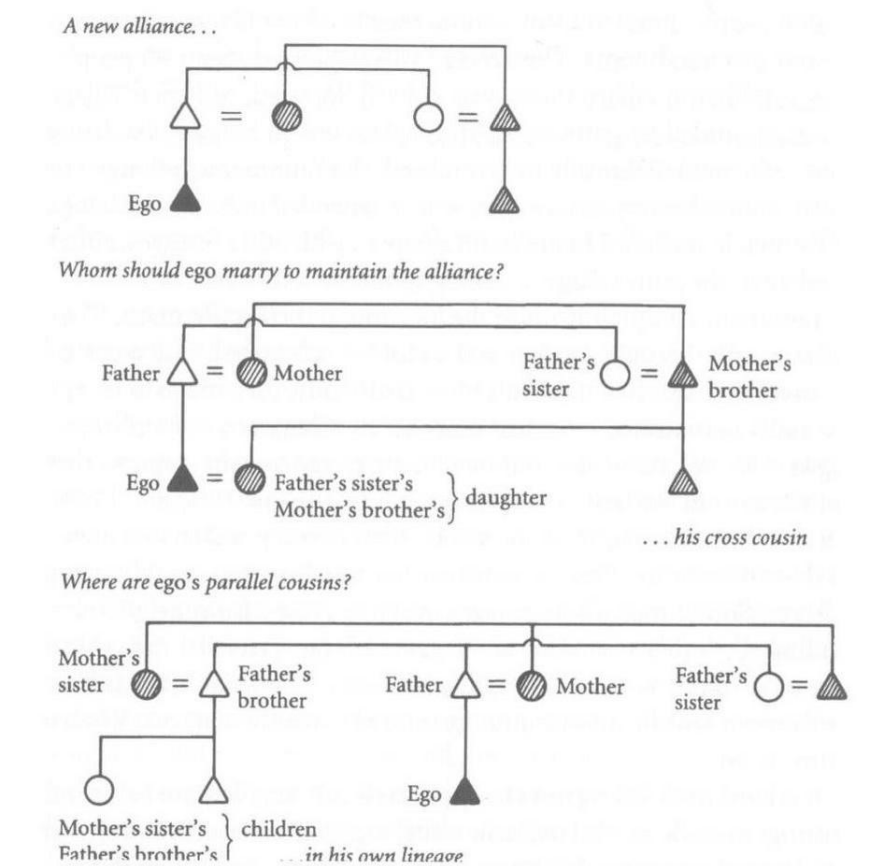

Figure 3.1 Development of a Yanomamö marriage alliance

Source: *Levi-Strauss (1949) The Elementary Structures of Kinship*

Kinship in anthropology

- Descent and social organisation (Radcliffe-Brown, Malinowski, Leach)
- Marriage and alliances (Levi-Strauss)
- Evolutionary perspectives (Fox, Sears)
- Critical and post-modern approaches

To which area of science does this speak to?

- Social support and (intergenerational) transfers
  1. Size and composition of kinship
  2. Relatives provide emotional, economic, information resources
  3. (Some) concepts and methods can be generalised
- Effects of the absence of relatives (i.e. kin mortality)
  1. Time lived with relatives, generational overlap, *sandwich generations* [1]
  2. Life-course perspective, e.g. losing a a child or a mother at early age
  3. Relevant in changing demographic regimes

[1] Margolis, R. 2016. The Changing Demography of Grandparenthood, Journal of Marriage and Family, 78:3

Section 2

Mathematical abstractions (Kinship 1.0)

THEORETICAL POPULATION BIOLOGY 5, 1–27 (1974)

Family Formation and the Frequency of Various Kinship Relationships

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NATHAN KEYFITZ AND THOMAS W. PULLUM

Harvard University

Received January 19, 1970

A set of age-specific rates of birth and death implies expected numbers of kin. An individual girl or woman chosen at random out of a population whose birth and death rates are specified can be expected to have a certain number of older sisters, younger sisters, nieces, cousins; expressions for these values are provided for both total kin and kin who are still living. Included also are the probabilities of living mother, grandmother, and great grandmother for girls and women of various ages. The methods are applicable to the size of the nuclear and the extended family. All formulas have been programmed and specimen numerical values are given.

(3.2.a), we obtain the following formula for the expected number of nieces born to younger sisters:

$$\int_{\alpha}^{\beta} \left[\int_{0}^{a} \left\{ \int_{\alpha}^{a-y} l_z m_z \, dz \right\} (l_{x+y}/l_x) \, m_{x+y} \, dy \right] W(x) \, dx. \qquad (4.2.a)$$

Again, l_x in parentheses could be cancelled with the l_x contained in $W(x)$ to give a variant form. If we are concerned with the expected number of these nieces who are alive at time t, the factor l_{a-y-z} should be included in the innermost integral of (4.2.a) to produce (4.2.b).

Table V shows our numerical results for nieces, combining those born to older

TABLE V

Expected Number of Nieces Ever Born and Still Alive, by Age of Woman, for Three Selected Countries

	Nieces ever born			Nieces still alive		
Age	United States 1967	Venezuela 1965	Madagascar 1966	United States 1967	Venezuela 1965	Madagascar 1966
0	0.0092	0.0536	0.0616	0.0090	0.0498	0.0446
5	0.0336	0.1712	0.1661	0.0328	0.1592	0.1198
10	0.0954	0.4434	0.3820	0.0931	0.4120	0.2735
15	0.2203	0.9659	0.7632	0.2150	0.8968	0.5417
20	0.4228	1.8105	1.3407	0.4124	1.6791	0.9415

New applications: lived experience of kin death

e.g., average child age at mother's death:

$$M_{a,t-a} = \sum_{x=15}^{49} \left(\underbrace{\frac{f_{x,t-a-x} K_{x,t-a-x}}{\sum_{x=15}^{49} f_{x,t-a-x} K_{x,t-a-x}}}_{\text{distribution of mothers}} \times \underbrace{\frac{l_{x+a,t-a-x}}{l_{x,t-a-x}}}_{\text{mother's survival}} \right)$$

(Alburez-Gutierrez, Zagheni, and Kolk)

Section 3

Computers (Kinship 2.0)

Advent of microsimulation

There were plenty of formulas in my assembly, but abstract formulas is what they could well have remained. (...) What saved my hard work from this fate was the advent of the computer.

Nathan Keyfitz Memoir

- CAMSIM (open-population simulator)
- SOCSIM (closed model)
- Agent-based models
- etc...

DEMOGRAPHIC FOUNDATIONS OF FAMILY CHANGE*

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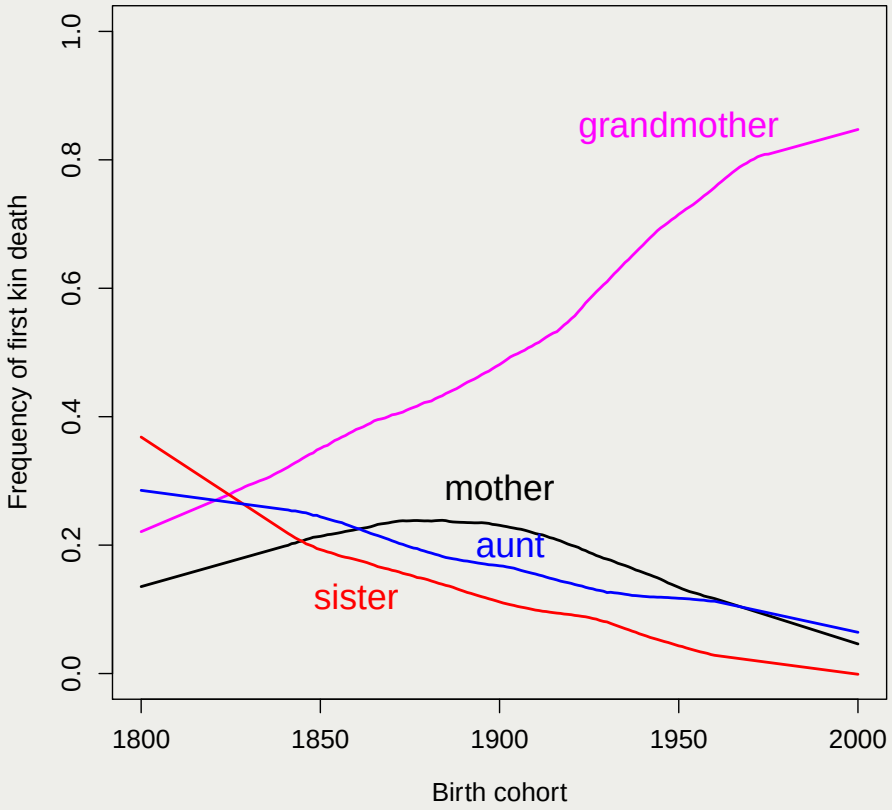
A longer life means that current cohorts can spend more years as members of a family in the statuses of parent, child, or spouse and in the combination of these statuses that defines the conjugal family. How much has this potential been realized? This question is addressed for the United States through a simulation of demographic conditions in 1800, 1900, 1960, and 1980. Despite declining fertility and higher divorce rates, women in the 1960 and 1980 cohorts spent more years in marriage and as parents than did earlier generations. They also spent more years as children of aged parents. But much of the potential offered by longer life spans has not been achieved. Not only did the number of years in marriage and parental statuses decline between 1960 and 1980, but current cohorts spend a smaller proportion *of their adult lives in them. On the basis of these results, we propose some scenarios of the ways that potential increases in the amount of time that people spend in family statuses may provoke social change.*

INTRODUCTION

Between 1800 and 1980, improvements in U.S. mortality nearly doubled women's expectation of life, from approximately 40 to nearly 80 years. It is reasonable to suppose that this change has affected family roles. Every individual is at some time a member of a family, and every society defines family roles. The rights and obligations associated with these roles are based not only on family membership but

been accompanied by changes in fertility and marriage. In 1800 couples on average bore about 8 children, by 1980 about 1.8. In 1800 women married at about age 20 and men 24 and then lived together until one of them died. In 1980, they married at about ages 23 and 25, and about half of married couples lived together until death, the other half until divorce. The joint effect of these trends is not obvious. Improvements in mortality, for example, mean

Microsimulating the experience of kin death



Source: *Emilio Zagheni*

Figure: Frequency of different types of kin death, Sweden (SOCSIM)

Section 4

Data-driven kinship (Kinship 3.0)

Models and simulations limited by data availability

Family history has usually been told in terms of the household, in large part because available data generally refer to groups that live together (...) But the household is not an adequate substitute for what we think should be at the core of family history: continuities and changes in family roles.

Watkins, Menken & Bongaarts, 1987 (cited above)

Register data

New opportunities:

- Enhance the data-driven study of kinship
- Use tools from kinship demography to study new problems
- Demographic & health outcomes $\sim$ kinship

Data: Multigenerational Swedish Register

- Establish population-level kinship ties
- Historical and modern registers
- New variables: SES, cause of death, etc.

A known limitation: the Whopper Assumption

HISTORICAL METHODS, Fall 1993, Volume 26, Number 4

Confessions of a Microsimulator

Problems in Modeling the Demography of Kinship

Steven Ruggles
Department of History
University of Minnesota

I could not, without effort, constrain myself to the task of either recalling, or constructing into a regular narrative, the whole burthen of horrors which lies upon my brain.

—*Thomas DeQuincey,* Confessions of an Opium Eater

Ever since Peter Laslett and John Harrison (1963) discovered that multigenerational households were rare in preindustrial northwestern Europe, historians and demographers have been trying to estimate the effects of

pendent of one another. That is, the characteristics of one member of a group of kin are assumed to be entirely uncorrelated with the characteristics of other members of the kin group. I call this the Whopper Assumption.[1]

Because of the Whopper Assumption, models of kinship will produce less variation in the frequency of kin of any particular type than would occur in a real population. Our models will generally underestimate both the proportion of people with many kin and the proportion

Whopper revisited: Correlated outcomes

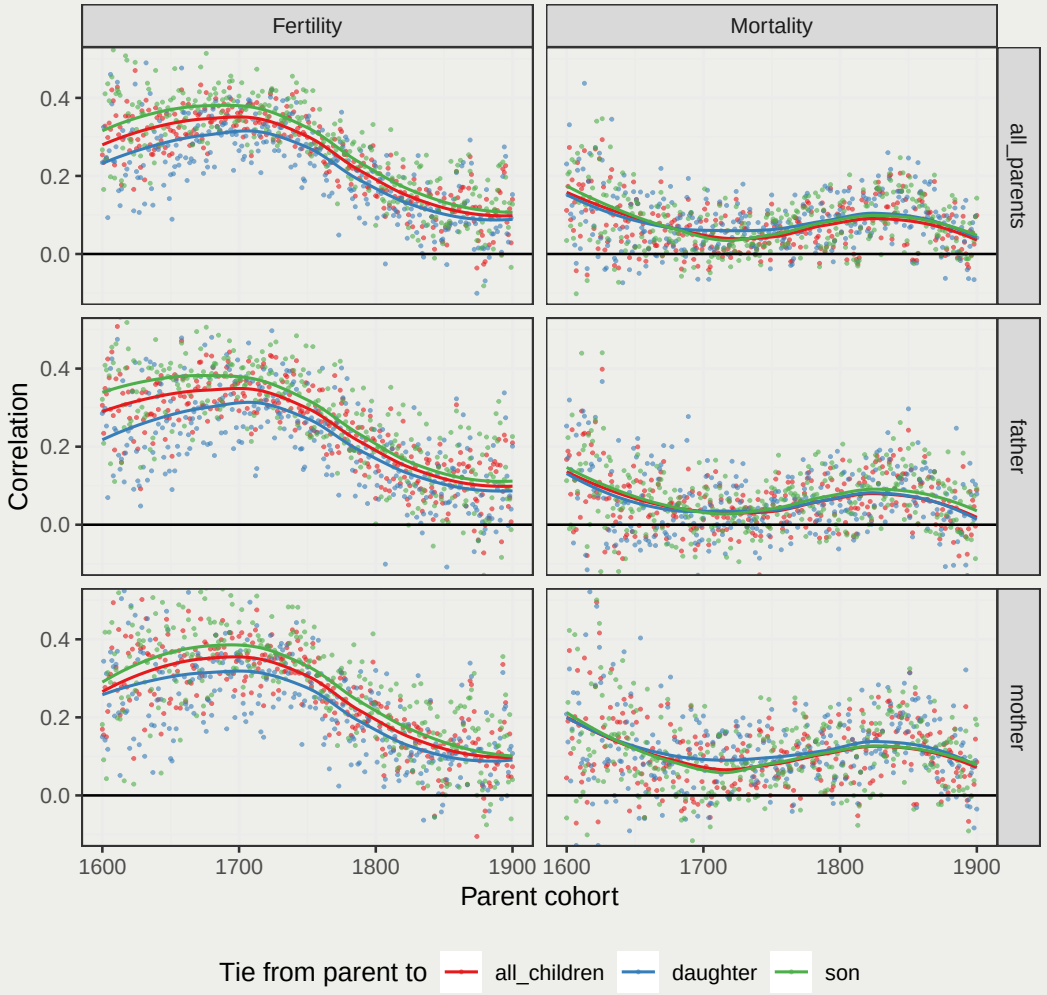
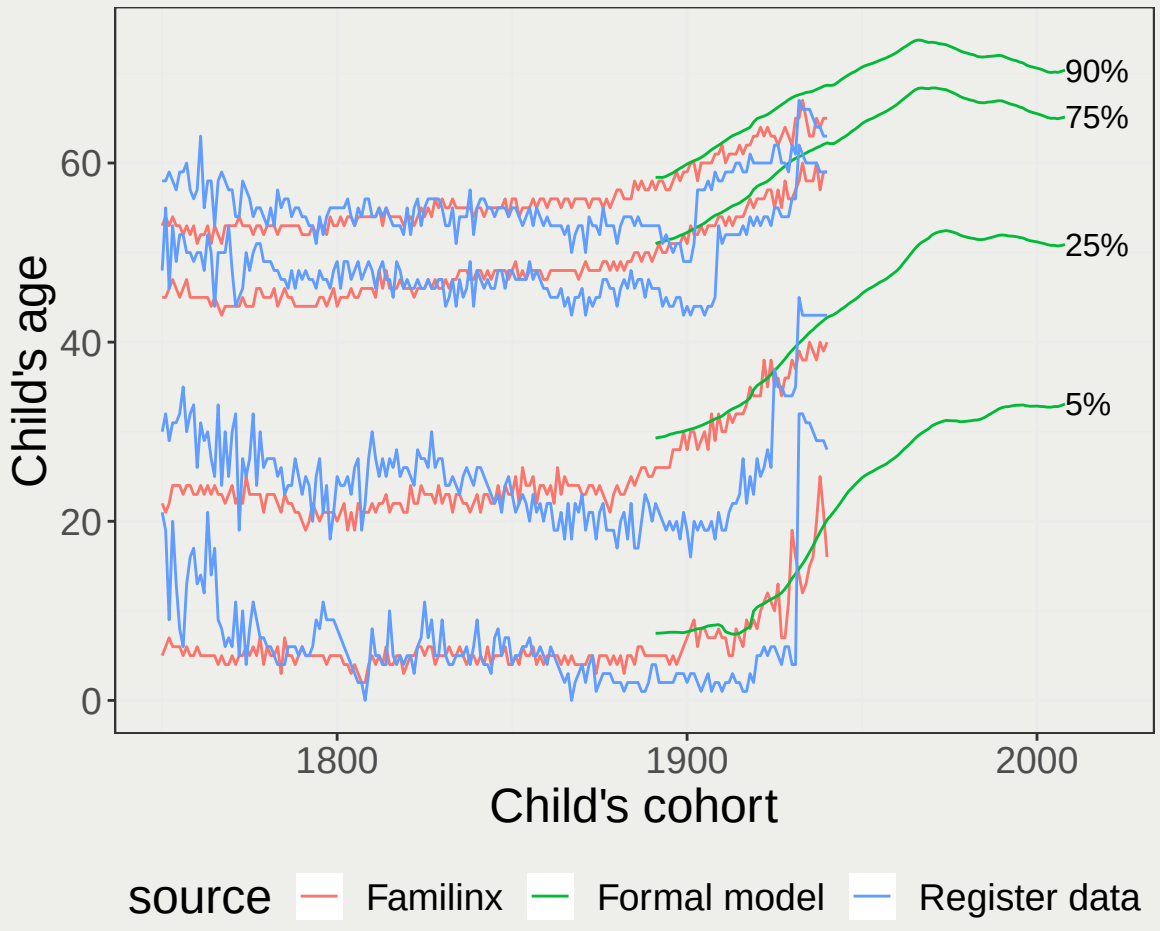


Figure: Inter-generational correlations, Sweden (author using Familinx data)

Experience of kin death in Sweden: 1800-2000



Source: *Author using demographic models and online genealogies*

Figure: Age at which percentiles of cohort experienced death of mother.

Some things I am interested in

- Incorporate intergenerational correlations in models of kinship availability and loss (e.g. correlated frailty models)
- Demographic outcomes: lived experience of kin death
- Exposure to mortality as inequality (Umberson, 2017, 2018)
- Support and exchange of resources: demographic basis of changes in size and composition of family networks

Thank you!

Tack så mycket!

 @d_alburez