ICS PhD Project 2:
A life-course simulation approach to understanding fertility outcomes

ICS
RUG / UU / RU / UvA

Aim
To get a better understanding of fertility outcomes (i.e. how many children people want and have) through theory-driven life course simulation models that combine insights from sociology on social determinants and from reproductive medicine on biological determinants of reproduction.

Theoretical background
Sociological research has produced a sophisticated body of work on the many characteristics associated with fertility outcomes—how many children people have and when. These range from the social environment during upbringing to partnership trajectories in later life, from social interactions with friends to family policies in society, and from biological differences to differences in values. Despite these advancements, there is no systematic way in which the relative importance of these characteristics can be quantified, hindering cumulative science. Moreover, these characteristics typically only explain a minor fraction of variation in fertility outcomes. This is exemplified by the failure of current models to predict even short-term fluctuations in fertility outcomes.
One reason for this lack of understanding is that traditional statistical techniques are not designed to incorporate the complex interactions between biological and social factors and the sequential path of events over the life-course, which limits their use in advancing theory. In this project, lifecourse simulation models, a form of agent-based models, are applied to get a better understanding of fertility outcomes. These models of fertility combine insights from the social sciences and reproductive medicine. They simulate reproductive histories from adulthood to the end of the reproductive period as a sequential path of events. The credibility of these simulation models comes from the fact that model parameters and outcomes are empirically-calibrated to population estimates of fertility, and on the biological ability to have children.
Life-course simulation models can provide formal tests of competing theories because they require implementation of hypothesised and known mechanisms. For instance, education and fertility are strongly related and many mechanisms are proposed to underly this association. No dataset exists that allows distinguishing these causes. Lifecourse models can implement several mechanisms simultaneously, in addition to adding biological realism, to better account for observed patterns and advance understanding. Such models can also uniquely quantify the inherent unpredictability in fertility outcomes. This cause of variation is often overlooked, even though it constrains how much variation can possibly be explained by theory. This PhD project is part of the "Understanding fertility outcomes by quantifying the (un)predictable" project (VIDI grant awarded to Gert Stulp).

Research design
The first stage of this project involves building simulation models that incorporate recent findings from sociology and reproductive medicine and compare the outcomes of these models to real-world outcomes (with a focus on the Dutch setting, using data from CBS, LISS panel, and GGS). The second stage of this project involves applying these models to test competing social theories on fertility behaviour and to quantify unpredictability in fertility outcomes. A modelling infrastructure will be set-up in R, through R-packages.

Profile
- A degree in quantitative social science or a related field
- Affinity with family sociology or demography
- Experience with programming language R
- Experience with github or making R-packages is desired

Literature

- Balbo, N., Billari, F. C., & Mills, M. (2013). Fertility in advanced societies: A review of research. European Journal of Population, 29(1), 1–38. https://doi.org/10.1007/s10680-012-9277-y
- Habbema, J. D. F., Eijkemans, M. J. C., Leridon, H., & te Velde, E. R. (2015). Realizing a desired family size: When should couples start? Human Reproduction, 30(9), 2215–2221. https://doi.org/10.1093/humrep/dev148

Project initiators
Gert Stulp (project leader, RUG), Anne Gauthier (RUG), René Veenstra (RUG)

Location
Department of Sociology, University of Groningen