The Science of choice. How to model the decision-making process?

Rostock, October 28 to 30, 2015

Organized by the IUSSP Scientific Panel on Microsimulation and Agent-based Modeling
and the
Max Planck Institute for Demographic Research

IUSSP Panel of Microsimulation and Agent-based Modeling
· *Chair:* Frans Willekens (MPIDR)
· *Members:* Alexia Fürnkranz-Prskawetz (Vienna Institute of Demography) and
Jakub Bijak (University of Southampton)

· *Workshop coordinator:* Anna Klabunde (MPIDR)

· *Administrative and secretarial support:* Ms. Ute Papenhagen

Workshop Report

The workshop focused on life decisions, i.e. decisions that shape the life course. The following life decisions were listed in the call for papers:

- Choice of lifestyle: how to live and behave?
- What friends to choose and how to build a friendship network?
- When to start a long-term partnership and who to partner with?
- Whether to get married, cohabit, or "live apart together" (LAT)?
- Whether to have children or not? To have another child?
- What occupation to choose?
- What job offer to accept? Is it time for a job change?
- Whether to buy or to rent a home?
- When to retire?
- Whether to emigrate or not? Where to emigrate?
- How to prepare yourself for life contingencies?
- Whether to save for old-age care or rely on family and friends?

Life decisions are made under uncertainty. The collection of evidence and the choice between alternative options take time, resources and experience. The access to these prerequisites differs between people, as does the attitude towards uncertainty: from risk-aversion to risk-seeking.

The aim of the three-day workshop was to discuss (a) perspectives on how individuals make decisions and (b) alternative probability models of decision-making processes. Decisions are embedded in a context: Contextual factors and processes influence the decisions individuals make. The outcome of the decision process consists of two components: the decision and the time-to-decision (decision time or deliberation time).

The workshop brought together researchers from different disciplines with different perspectives on decision-making. Presentations included theoretical contributions, experimental studies, regression-based methods, interview methods and simulation studies. Disciplinary background and education influence the theoretical perspective on decision-making. Major theories from economics, social psychology and demography were covered during the workshop. Economic theories covered included random utility theory and its offspring – discrete choice models, and their extensions to hybrid choice models. Social psychological theories included the theory of reasoned action developed by Fishbein and Ajzen, and the Rubicon model developed by Heckhausen. Theories that originated in demography to describe the emergence and diffusion of new forms of behaviour were covered too. They included the proposition by Coale that three preconditions for behavioural change exist: readiness, willingness and ability (RWA). An important observation was that, although these theories have different roots, they have much in common. Irrespective of the discipline, extensions of these theories incorporate perspectives from other disciplines resulting in a perspective on decision-making that is increasingly interdisciplinary.

Forty researchers from 11 countries attended the workshop.

Professor Joan Walker of the University of California, Berkeley, gave a keynote address on *Modeling Choice*. She showed how discrete choice models evolved to models with increased behavioural realism. In hybrid choice models, revealed preferences and utility depend on values, attitudes, norms and habits. These psychological factors, neglected in traditional discrete choice models, are generally unobserved. The presence of latent variables generated an interest in structural equation modelling of discrete choice. Recent research incorporates the theory of planned behaviour (TPB) into discrete choice models. Intentions, which in the TPB predict behaviour, act as mediators between the psychological factors and the choices. Choices people make often depend on past experience and previous choices. These dependencies are captured in dynamic models with latent states (hidden Markov models).

The keynote lecture was followed by presentations on life choices. The following choices were discussed:
- The decision who to enter a relationship with (3 papers)
- The decision to migrate (3 papers)
- The decision to have a child (3 papers)
- The retirement decision (1 paper)

Four papers addressed decision making in couples and families. One paper focused on the collection of qualitative data on decision-making processes in African households. Four papers specifically addressed the implementation of decision-making processes in simulation models and agent-based models. The authors of one paper presented a new domain-specific modelling language for agent-based modelling in demography that integrates individuals, households/families and communities in a multilevel framework. Authors of another paper introduced the concept of *Bayesian agent*, a cognitive agent whose mental model of the world consists of probability distributions of random variables that describe the world and who uses new information and Bayesian inference to update internal representations of the world.

The workshop revealed important commonalities of decision-making processes pertaining to life choices. The choices people make are outcomes of complex decision processes under conditions of uncertainty. Part of the uncertainty derives from unobserved characteristics of

alternative options, changes in preferences and resources, new information that may become available, incomplete information in significant others and varying influences of these persons. Understanding decision-making requires a dynamic approach that accounts for the time taken to make choices (e.g. to accumulate evidence and to learn about choices others made) as well as the choices that are made. The analytical framework that captures these two dimensions is the competing risks model, which is becoming increasingly popular in the modeling of cognitive and choice processes. The integration of the economist's random utility models, the social psychologist's theories of action, and the cognitive psychologist's model of accumulation of information provide an excitingly new direction of research into the mechanisms of decision-making underlying life choices. The Bayesian approach is very well suited for the modelling of decision-making processes because an individual updates the belief and subjective probabilities, that drive decision-making under uncertainty, with new information and new experiences.

The workshop revealed a growing interest among demographers in behavioural mechanisms and the incorporation of these mechanisms in demographic models. Agent-based modeling offers a framework for a mechanism-based approach to demographic modeling. It offers an opportunity to effectively integrate (a) theories of individual behaviour, social interaction and social change, (b) data on individuals and populations, and (c) demographic models.
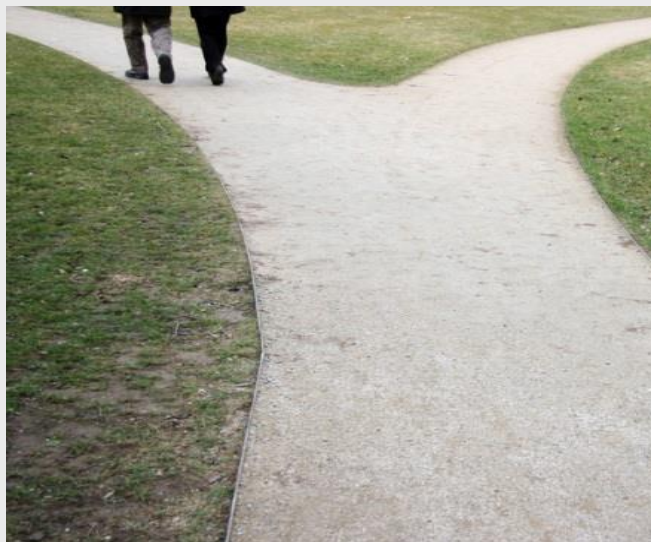
WORKSHOP PROGRAM

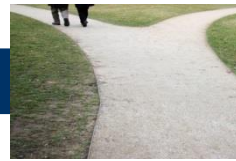# The science of choice

How to model the decision-making process?

Rostock, October 28 to 30, 2015

VENUE

Max-Planck-Institute for Demographic Research
Konrad-Zuse-Straße 1
18057 Rostock
⌨ demogr.mpg.de

Wednesday, October 28
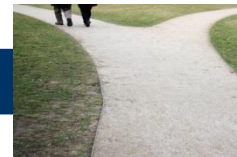
Presentations will be 30 minutes, followed by a 15 minutes discussion.

10:30-10:45	Welcome (Frans Willekens)

10:45-12:15   **Keynote Lecture:**
Joan Walker
Modeling Choice

12:15-13:00   Lunch

13:00-15:15   **Session: The decision who to enter a relationship with**
Chair: Stefanie Kley

Sebastian Pink and Lars Leszczensky
Ethnic segregation of friendship networks in school: Testing a rational- choice argument of differences in ethnic homophily between classroom- and grade-level networks

André Grow and Jan van Bavel
Mate choice and preferences: The reversal of the gender gap in education and its consequences for union formation and stability in Europe

Lucky Singh
Examining the association between social network and mental health among older adults: Evidence from a rural Indian setting

15:15-15:45   Coffee

15:45-18:00   **Session: The decision to migrate**
Chair: Jakub Bijak

Anna Klabunde, Frans Willekens, Sabine Zinn and Matthias Leuchter
Life course modeling extended by behavioral rules - Migration from Senegal to Southern Europe

Ruth Achenbach
A qualitative model of return migration decisions of highly skilled Chinese in Japan

Stefanie Kley
Facilitators and constraints at each stage of the migration process

19:00   Conference Dinner

Thursday, October 29

09:00-10:30   **Session: Implementation of decision-making in simulation studies I**
Chair: Frans Willekens

Jonathan Gray, Jason Hilton and Jakub Bijak
Choosing a choice model: Reflections on modelling decisions and behaviour in agent-based models

Tom Warnke, Anna Klabunde, Sebastian Plath, Oliver Reinhardt, Frans Willekens, and Adelinde Uhrmacher
Modelling and simulating decision processes with a domain specific language

10:30-11:00   Coffee

Thursday, October 29

11:00-12:30   **Session: Implementation of decision-making in simulation studies II**
Chair: Anna Klabunde

Martin Klein
Modeling investment choices: The case of roof-top solar photovoltaics in Germany

Ingo Wolf and Tobias Schröder
Social life versus enjoyment of nature: Modeling competing psychological needs underlying housing decisions as parallel constraint satisfaction

12:30-13:30   Lunch

13:30-15:00   **Session: Decision-making in couples**
Chair: André Grow

Christian Schmitt and Pia Schober
Fertility decision making, bargaining power and preference reconciliation in couples

Naa Dadua Dodoo and Francis Dodoo
More than just 'final say': Developing a survey measure of the process of household decision-making in Ghana

15:00-15:30   Coffee

15:30-17:00   **Session: Decisions involving strategic interaction and bargaining from a theoretical   perspective**
Chair: Sebastian Pink

Linh Chi Nguyen and Luciano Andreozzi
Evolution of behaviors in repeated bargaining game. A computer simulation study

Geeske Scholz
Social influence in the decision process

19:00   Informal dinner and get-together in a traditional Rostock pub

Friday, October 30

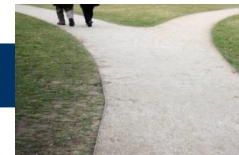**09:00-10:30**   **Session: The decision to have a child**
Chair: Thomas Fent

Maria Rita Testa and Dimiter Philipov
Intended family trajectories and education

Ridhi Kashyap
An application of the 'ready, willing and able' framework to sex ratio at birth distortions: A simulation approach

10:30-11:00	Coffee

11:00-12:30   **Session: Decisions related to the working life**

Chair: Alexia Fürnkranz-Prskawetz

Sebastian Bähr, Martin Abraham, Katharina Diener and Gerhard Krug

Do fathers' flexible working schedules influence their decision to support mothers' return to employment? A factorial survey analysis

Meritxell Sole, Concepció Patxot, Guadalupe Souto and Martin Spielauer

The retirement decision in a context of reforms and economic crisis: a microsimulation approach

12:30-13:30	Lunch
13:30-14:00	Summary and further steps
14:00	End of workshop

VENUE

Max-Planck-Institute for Demographic Research
Konrad-Zuse-Straße 1
18057 Rostock
🖥 demogr.mpg.de

CONFERENCE DINNER (Wednesday)

Zwanzig12
Schnickmannstr. 14
18055 Rostock
🖥 zwanzig12.de

GET-TOGETHER (Thursday)

Braugasthaus „Zum alten Fritz"
Warnowufer 65
18057 Rostock
🖥 alter-fritz.de

REGISTRATION

Ute Papenhagen
✉ decisionmaking@demogr.mpg.de
☎ +49 (0) 381 2081-270

List of Participants

First Name	Last Name	Affiliation	E-Mail
Ruth	Achenbach	University of Hamburg	achenbach.ruth@googlemail.com
Sebastian	Bähr	Friedrich-Alexander-University Erlangen-Nuremberg / Institute for Employement Research (IAB), Nuremberg	sebastian.baehr@wiso.uni-erlangen.de
Nuria	Calduch Verdiell	Institute of Demography in Barcelona (CED)	calduchnuria@gmail.com
Daniel	Ciganda	Pompeu Fabra University, Barcelona	dciganda@gmail.com
Gianni	Corsetti	Italian National Institute of Statistics (Istat), Rome	giacorsetti@istat.it
Edwin	Cuéllar Caicedo	National University of Colombia, Bogotá	ejcuellarc8@gmail.com
Katharina	Diener	Institute for Employment Research (IAB), Nuremberg	Katharina.Diener@iab.de
Naa Dodua	Dodoo	Regional Institute for Population Studies, University of Ghana, Legon, Accra	ndodoo@ug.edu.gh
Thomas	Fent	Austrian Academy of Sciences (ÖAW)	thomas.fent@oeaw.ac.at
André	Grow	University of Leuven	andre.grow@soc.kuleuven.be
Ridhi	Kashyap	Max Planck Institute for Demographic Research, Rostock / University of Oxford	Kashyap@demogr.mpg.de
Martin	Klein	German Aerospace Center (DLR), Stuttgart	m.klein@dlr.de
Stefanie	Kley	University of Oldenburg	stefanie.kley@uni-hamburg.de
Brian W.	Miller	Colorado State University, Fort Collins	brian.miller@colostate.edu
Linh Chi	Nguyen	University of Trento	linhchi.nguyen@studenti.unitn.it
Sebastian	Pink	Mannheim Centre for European Social Research (MZES) / University of Mannheim	sebastian.pink@uni-mannheim.de
Corrado	Polli	University of Rome	corrado.polli@gmail.com
Matthias	Reeg	German Aerospace Center (DLR), Stuttgart	matthias.reeg@dlr.de
Oliver	Reinhardt	University of Rostock	oliver.reinhardt@uni-rostock.de
Christian	Schmitt	University of Rostock / German Institute for Economic Research (DIW), Berlin	christian.schmitt2@uni-rostock.de
Geeske	Scholz	University of Osnabrück	gescholz@uos.de
Lucky	Singh	National Institute of Medical Statistics (NIMS), New Delhi	lucky.5bhu@gmail.com
Meritxell	Solé	University of Barcelona	meritxell.sole@ub.edu
Maria Rita	Testa	Vienna University of Economics and Business	maria.rita.testa@wu.ac.at
Nashrul	Wajdi	University of Groningen	n.wajdi@rug.nl
Tom	Warnke	University of Rostock	tom.warnke@uni-rostock.de
Ingo	Wolf	University of Applied Sciences Potsdam / Freie Universität Berlin	wolf@institutfutur.de
Ke	Zhou	Duke-NUS Graduate Medical School, Singapore	zhouke@u.duke.nus.edu
Jakub	Bijak	University of Southampton	J.Bijak@soton.ac.uk
Alexia	Fürnkranz-Prskawetz	Vienna University of Technology	afp@econ.tuwien.ac.at
Jason	Hilton	University of Southampton	jdh4g10@ecs.soton.ac.uk
Joan	Walker	University of California, Berkeley	joanwalker@berkeley.edu
Anna	Klabunde	Max Planck Institute for Demographic Research, Rostock	klabunde@demogr.mpg.de
Frans	Willekens	Max Planck Institute for Demographic Research, Rostock	willekens@demogr.mpg.de
Matthias	Leuchter	Max Planck Institute for Demographic Research, Rostock	leuchter@demogr.mpg.de