Preferred citation style

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Long-term commitments and their effects on daily travel behaviour

KW Axhausen

IVT
ETH
Zürich

April 2002

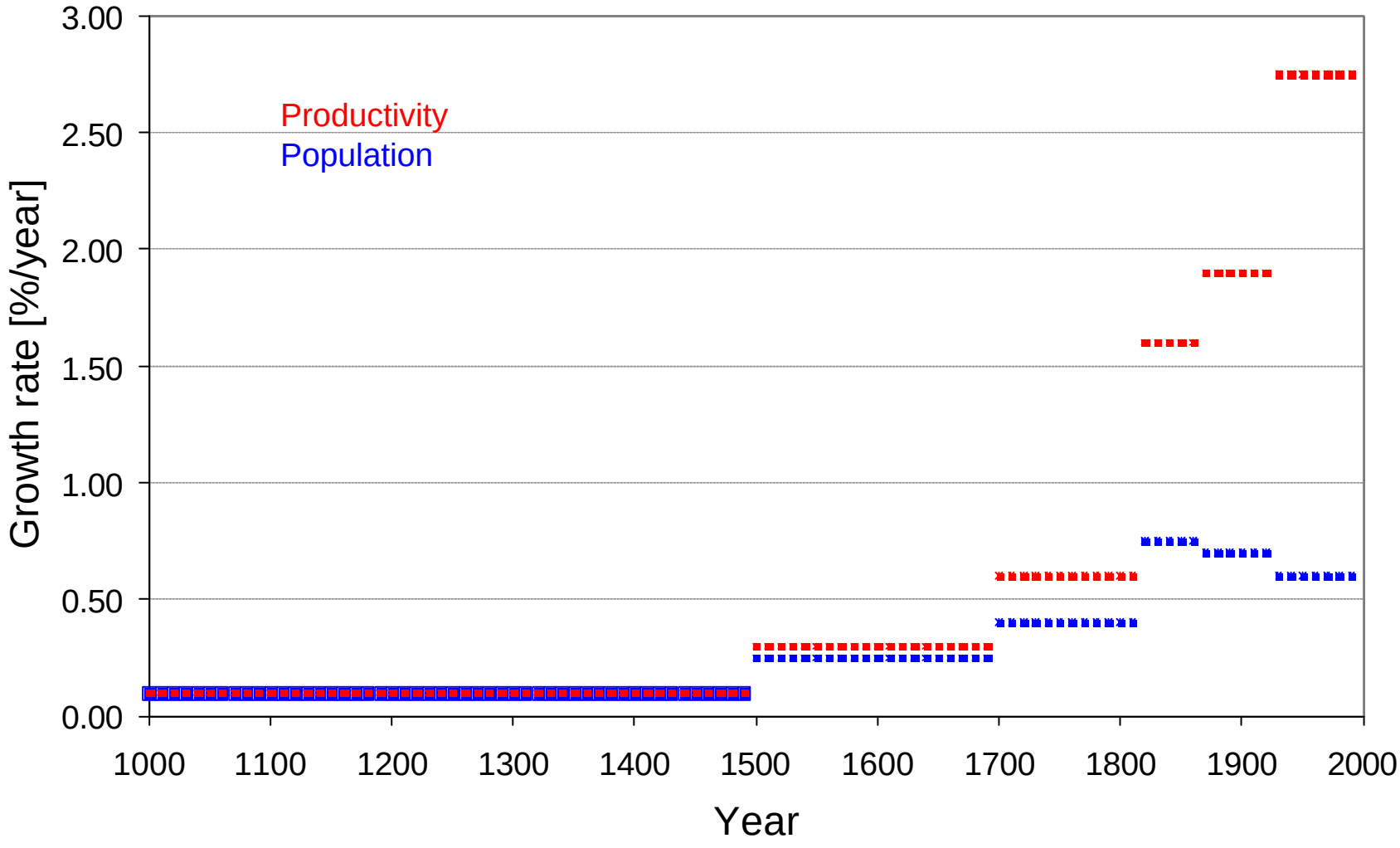
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Structure

Three parts:

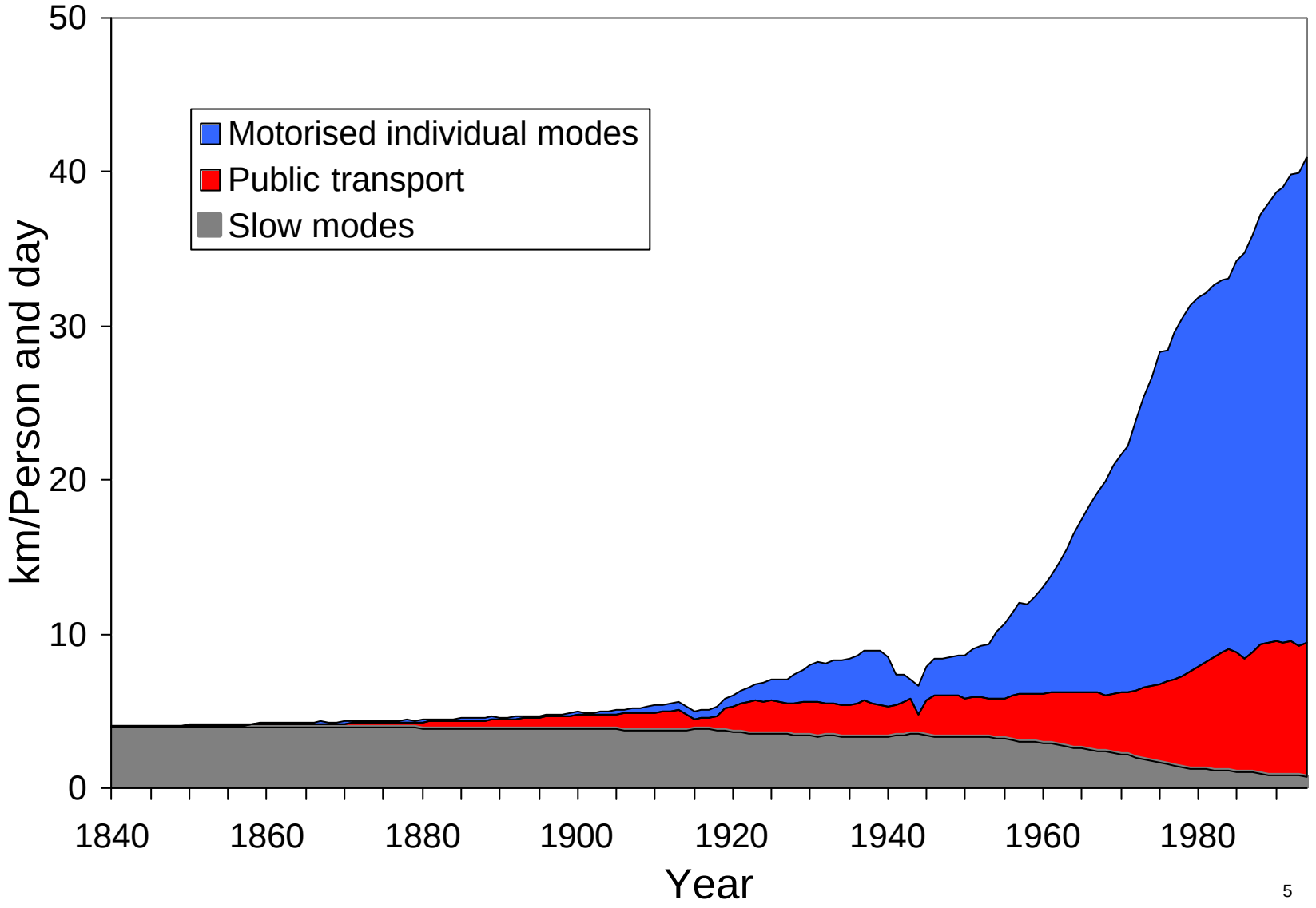
- A look back
- Long term commitments and their impacts
- Social networks and their impacts

A look back: Productivity growth since 1000 (W Europe)



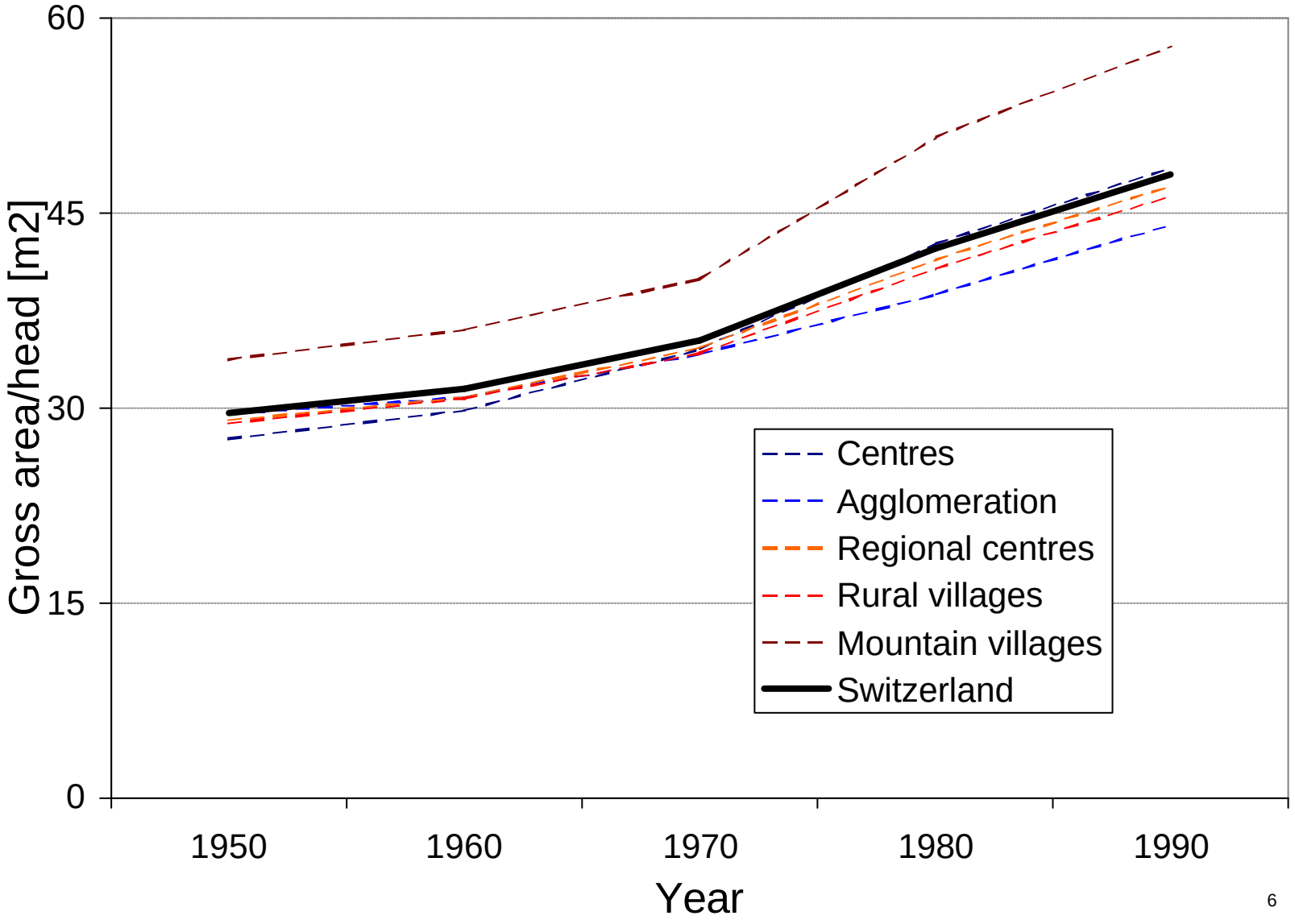
Galor und Weil (2000)

A look back: pkm/day since 1850 (France)



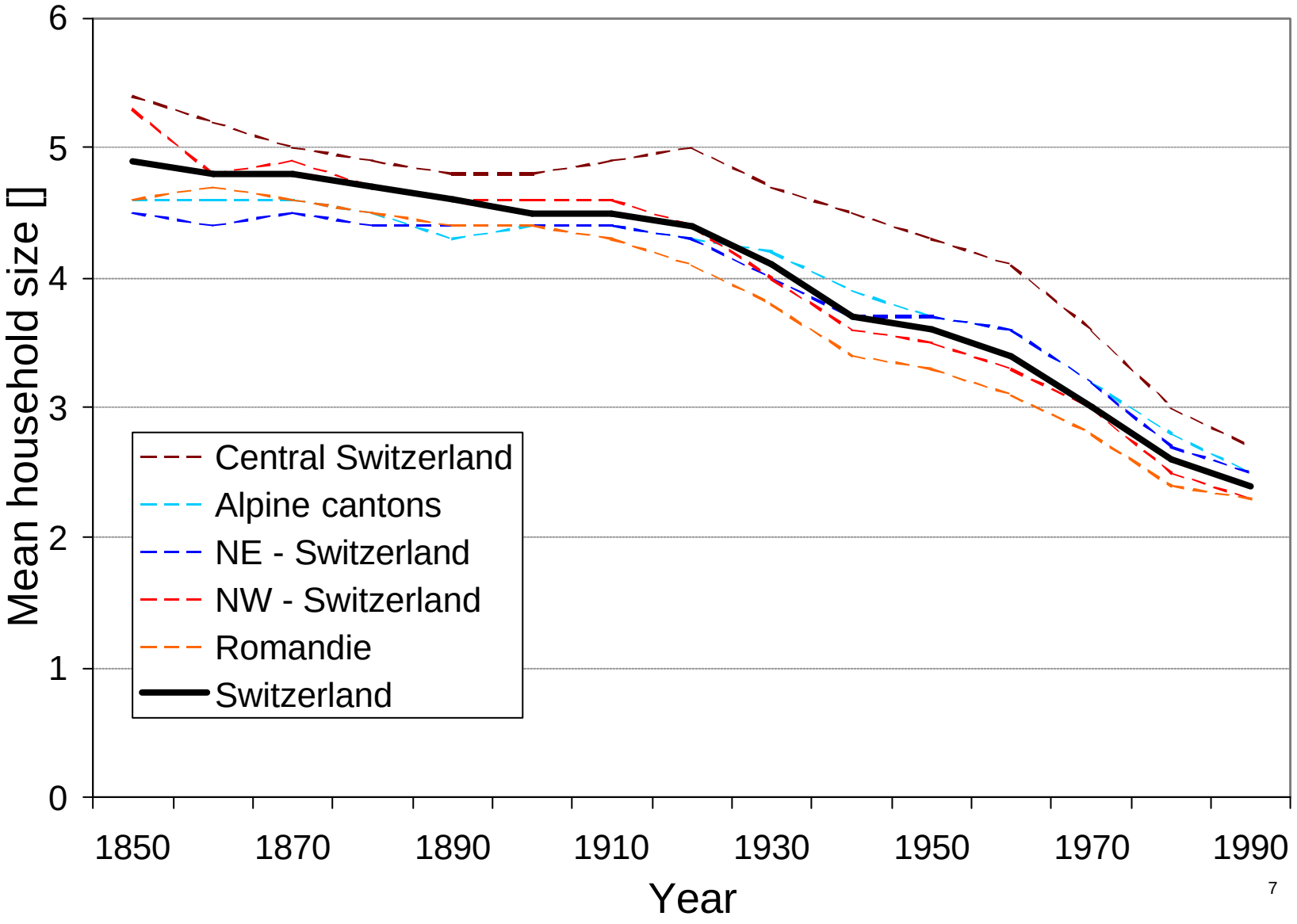
Gruber (1998)

A look back: Average consumption of housing (CH)



Rumley (1984); Keller

A look back: Household size (CH)



Siegenthaler and Ritzmann-Blickenstorfer (1996)

Summary for the look back

Extraordinary income streams have been created and are consumed (in part) as

- Travel (Speed)
- More (and dispersed) housing
- Long-distance communication
- Longer lives with less work

- Independence/Isolation

Commitments

Issue:

- How to deal with the different time frames of transport related decisions ?
- How to deal with commitments ?

Examples:

- Mode choice
- Activity spaces (Schönfelder)
- Ownership of mobility tools (Simma, König, Scott)

Self-selection is pervasive

Well known, but generally ignored

Why ?

- Vastly different typical time horizons to various commitments (life style and life cycle) because of
  - Search and transaction costs
  - Costs of change
- Dependency on past behaviour and information (i.e. risk assessments)
- Taste differences (styles)

Why worry ?

Requirement of dynamic models

- Simulations of route choice given destination choice
- Simulation of activity programmes given household tasks
- Choice of mode given season ticket ownership
- Choice of new housing given the work location

Out of principle

- Biased parameter estimates
- Wrong inference about causality

What can we do ?

Two full strategies:

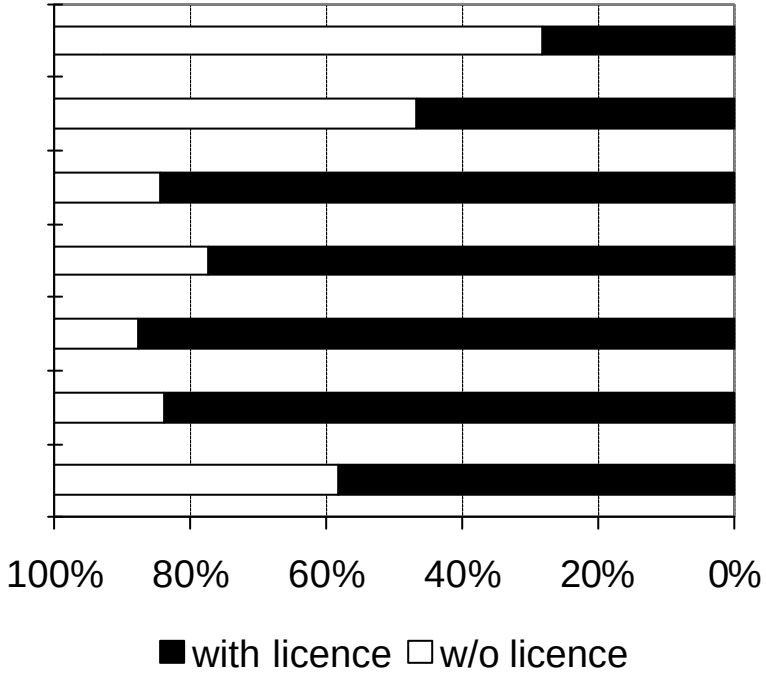
- Models of choice set composition
- Models of group membership (e.g. car and season ticket ownership)

Two partial strategies:

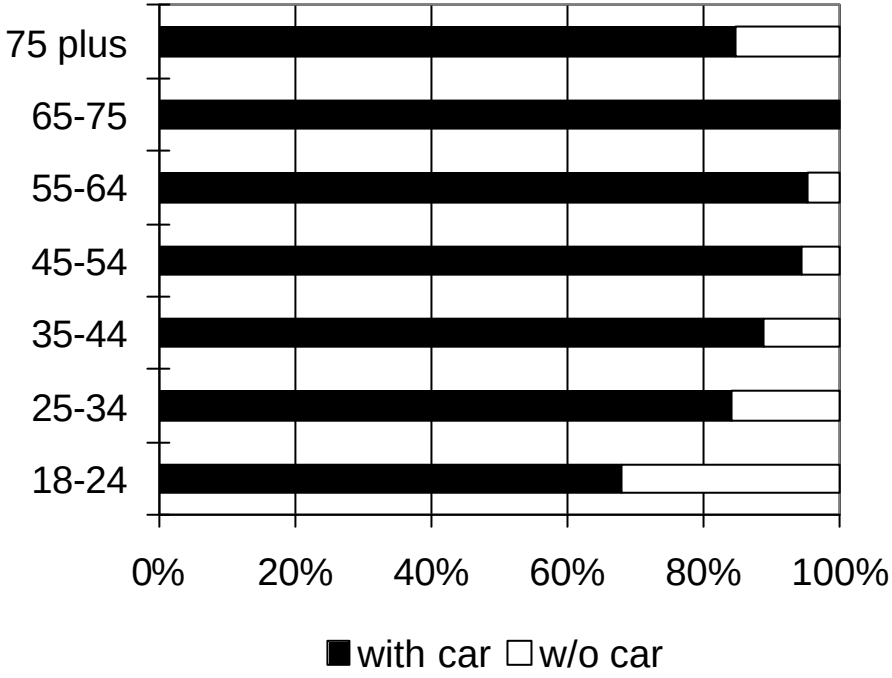
- Employing user-specified choice sets/limits (Swait, 2001)
- Inclusion of variables describing the commitments and tastes

Example: Car ownership given licence holding

Swiss residents over 18 y.

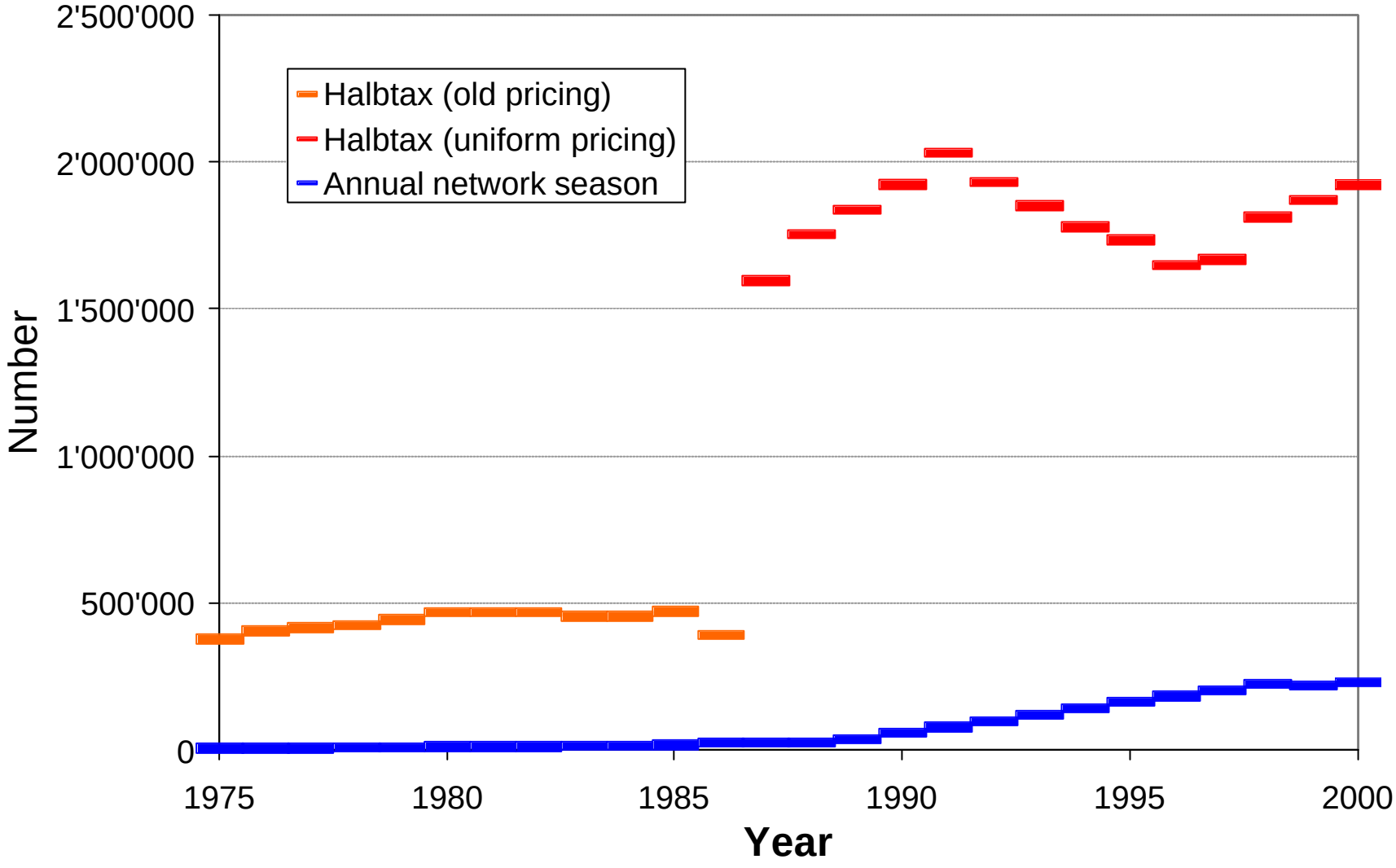


Licence holders

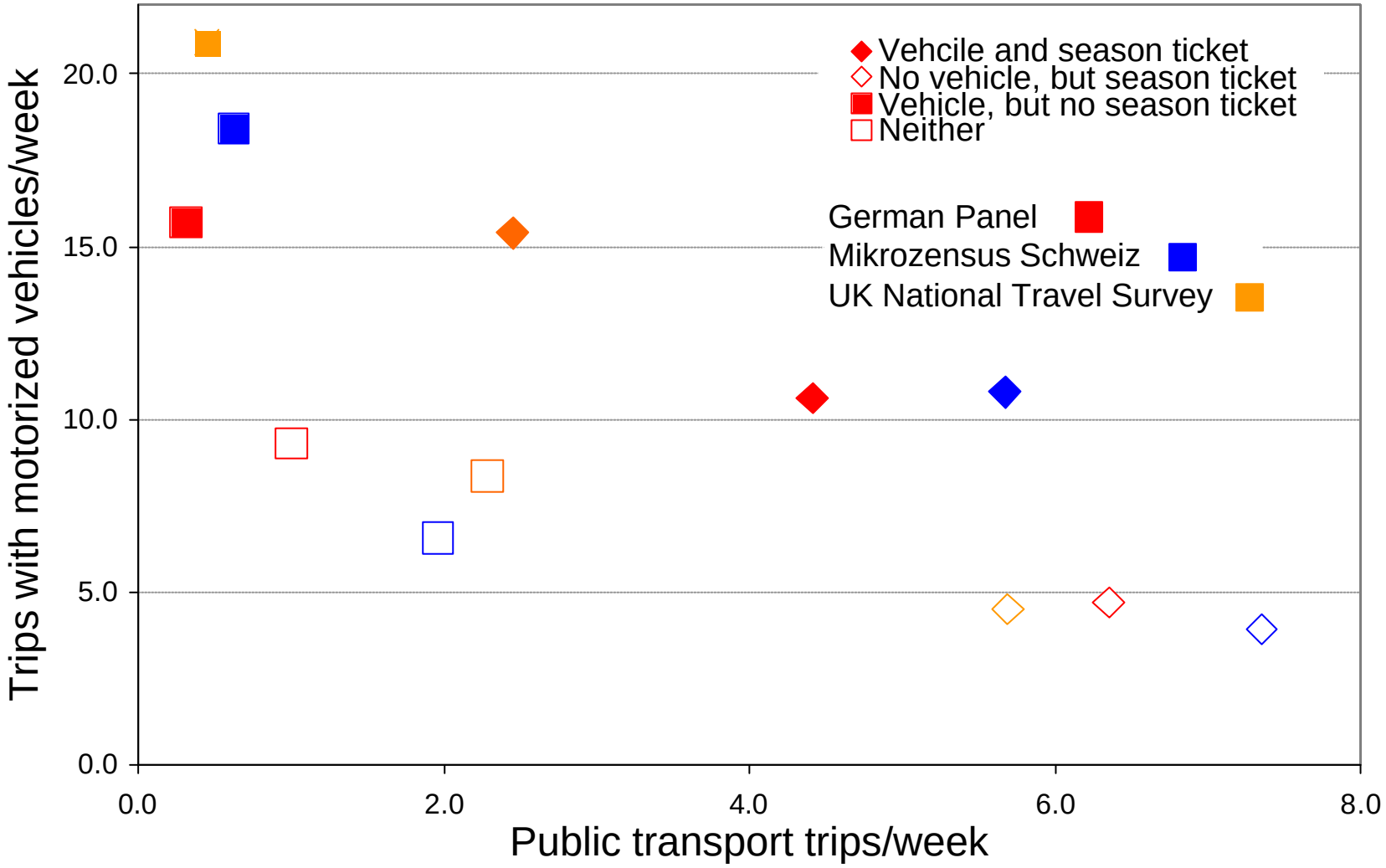


Daten: Axhausen (1999, 2001)

Example: Swiss railway season and discount tickets



Example: Mode choice



Example: Activity spaces

Method:

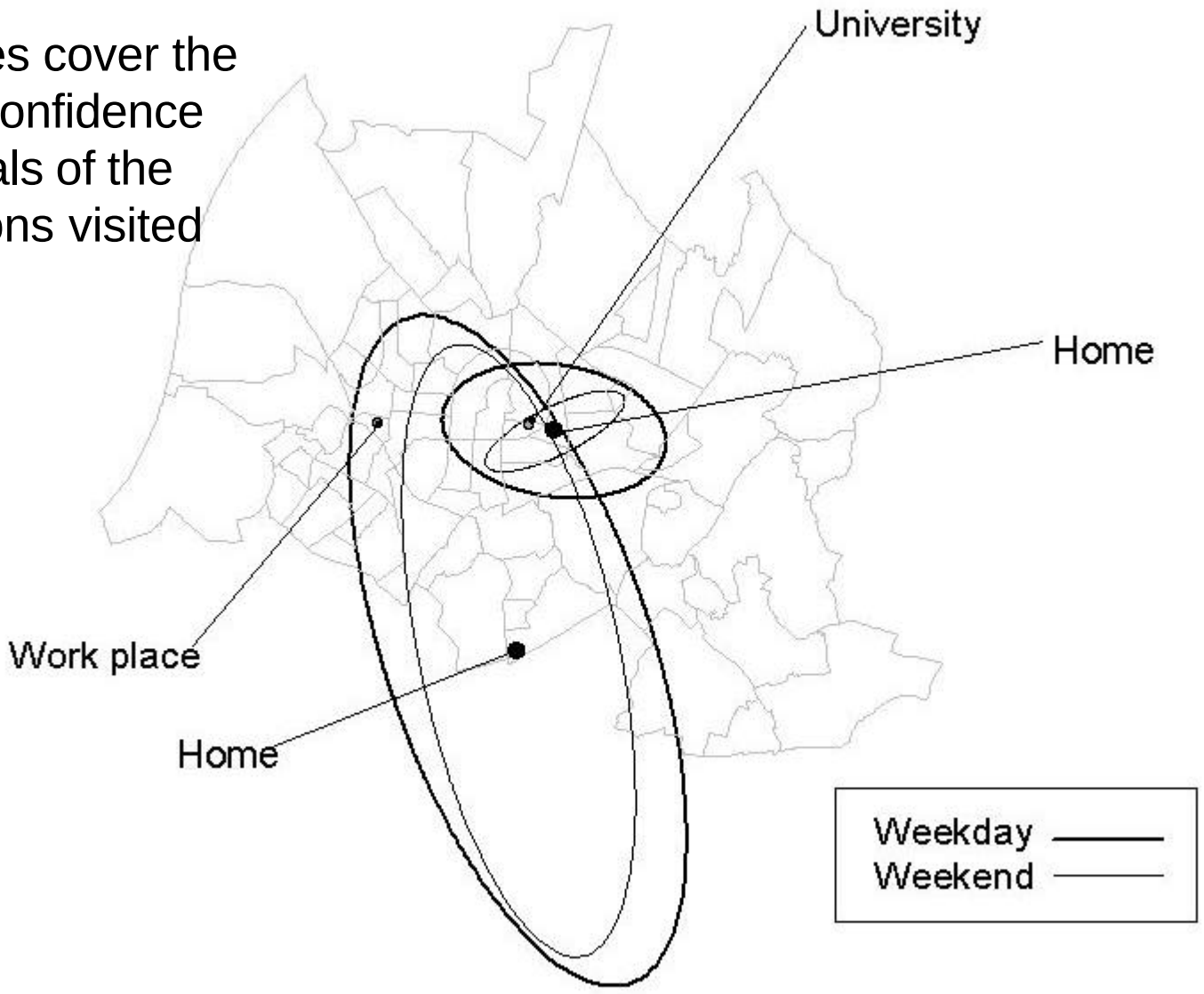
- Approximation of activity space by x,y - confidence interval

Data:

- Mobidrive (Partner: PTV AG, Karlsruhe; ISB, RWTH Aachen)
- Six-week travel diary
- 361 persons in Karlsruhe and Halle
- Spring and autumn 1999

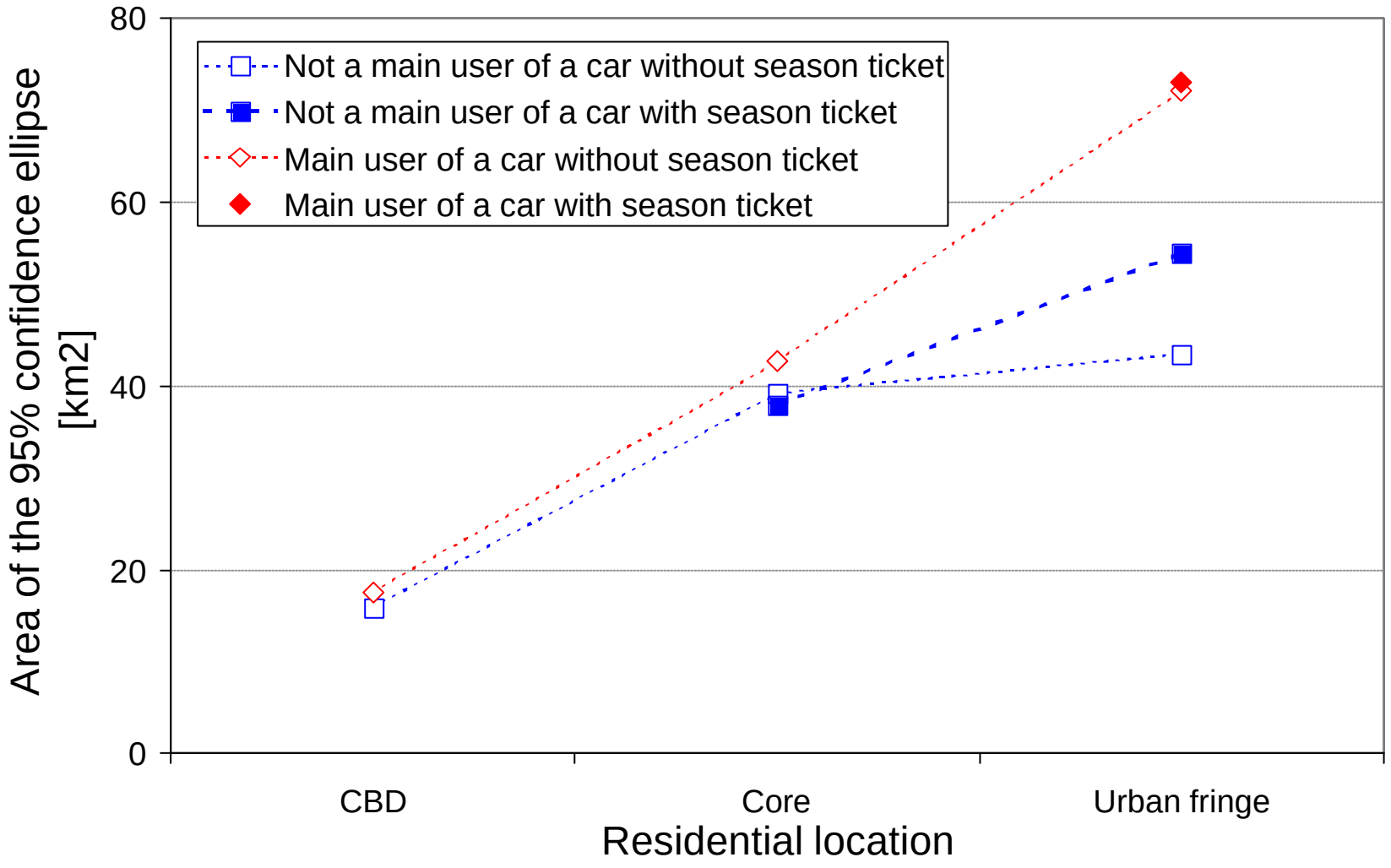
Daily life: Example activity spaces (Karlsruhe 1999)

Ellipses cover the 95% confidence intervals of the locations visited



Schönfelder

Example: Size of activity space by location type



Data source: Surveys of the Mobiplan project

Partner:

- ISB, RWTH Aachen
- IfS, Universität Karlsruhe
- PTV AG, Karlsruhe

Two sources:

- Survey of recent movers (Karlsruhe and Halle)
- SR survey of mobility tool acquisition

Both winter/spring 2000/2001

Mobiplan: SR survey of mobility tool acquisition

Respondent task:

- Selection of the number and type of vehicles and season tickets for all household members given a specified housing supply

Approach:

- Internet-based survey tool, which allowed iterative adjustment of the selections
- Eight situations for each respondent

Mobiplan: SR survey of mobility tool acquisition

Sample:

- 60 participants of a larger software evaluation
- 106 respondents for the SR experiment
- Quota sample (age, household size)

Variables/choices:

- Housing supply (type, location type, size and cost)
- Location (time distance to work and shopping - car and pt)
- Public transport quality (distance to stop, average headway)
- Usage costs of both modes

- 5 types of car
- 2 types of season ticket (monthly, yearly)

Mobility tool acquisition: Modelling approach

Requirement:

- Consistent representation of correlation between the two choices

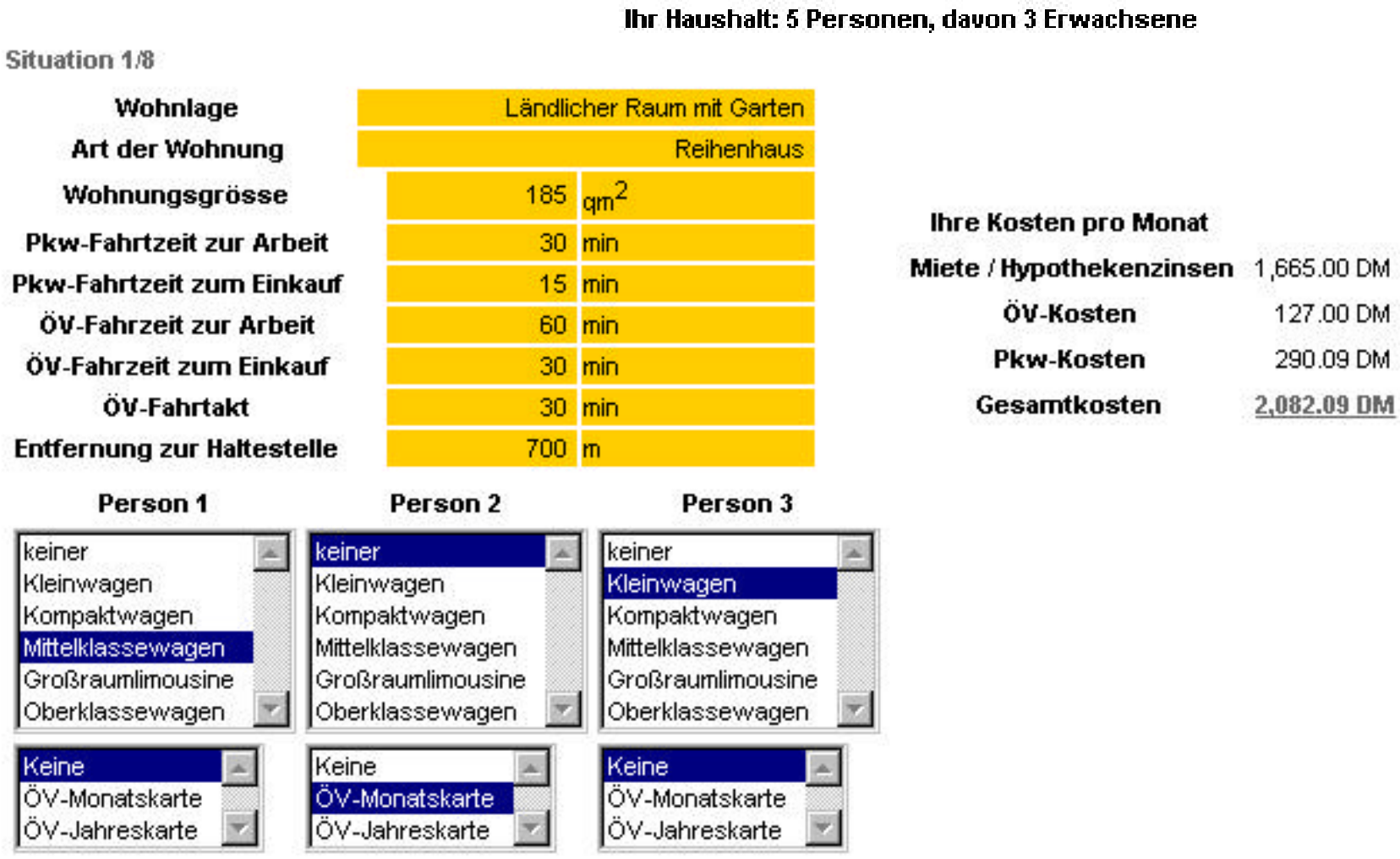
Approach:

- Bivariate ordered probit:
  - Number of cars
  - Number of season tickets

  No account of costs of the different types of car

  Estimation: Gauss 3.6 (Darren Scott)

Screen shot


Ihr Haushalt: 5 Personen, davon 3 Erwachsene
Situation 1/8
Wohnlage
Ländlicher Raum mit Garten
Art der Wohnung
Reihenhaus
Wohnungsgrösse
185
qm2
Pkw-Fahrtzeit zur Arbeit
30
min
Pkw-Fahrtzeit zum Einkauf
15
min
ÖV-Fahrzeit zur Arbeit
60
min
ÖV-Fahrzeit zum Einkauf
30
min
ÖV-Fahrtakt
30
min
Entfernung zur Haltestelle
700
m
Ihre Kosten pro Monat
Miete / Hypothekenzinsen
1,665.00 DM
ÖV-Kosten
127.00 DM
Pkw-Kosten
290.09 DM
Gesamtkosten
2,082.09 DM
Person 1
Person 2
Person 3
keiner
Kleinwagen
Kompaktwagen
Mittelklassewagen
Großraumlimousine
Oberklassewagen
Keine
ÖV-Monatskarte
ÖV-Jahreskarte

Mobility tool acquisition: Bivariate ordered probit

Variable	SR Data Set		RP Data Set	
Number of Season Tickets				
Constant Term	1.155	**	-0.390	**
Household Characteristics				
Two members with daily commitments	0.693	**	0.468	**
Three members with daily commitments	1.064	**	1.275	**
Four members with daily commitments	1.975	**	1.110	**
Income remaining after housing costs [DM per month/5000]	-0.800	**		
Residential Location Characteristics				
Suburb	-0.542	**		
Fringe	-0.874	**	-0.515	**
Distance to nearest transit stop [km]	-0.450	*	-0.420	**
Threshold Values				
One and two season tickets	1.366	**	1.090	**
Two and three season tickets	3.000	**	2.116	**
Correlation Coefficient	-0.593	**	-0.466	**
$?^2(0)$	0.359		0.363	
$?^2(C)$	0.218		0.148	

Mobility tool acquisition: Bivariate ordered probit (SR data)

ıriable	**Cars**		**Season Tickets**	
ɔnstant Term	-0.624	**	1.152	**
ɔusehold Characteristics				
Two members with daily commitments	0.751	**	0.722	**
Three members with daily commitments	1.863	**	1.122	**
Four members with daily commitments	2.134	**	1.999	**
Income remaining after housing costs [DM per month/5000]	0.642	**	-0.836	**
ɛsidential Location Characteristics				
Suburb	0.649	**		
Fringe	1.241	**		
Distance to nearest transit stop [km]			-0.509	**
Travel time difference to work [min/10]	-0.128	**	0.166	**
Travel time difference to shop [min/10]			0.570	**
reshold Values				
One and two items	1.937	**	1.399	**
Two and three items	3.538	**	3.065	**
ɔrrelation Coefficient			-0.579	**
(0)			0.366	
(C)			0.227	

Commitments: Conclusions

- Strong substitution between types of mobility tools
- Strong interaction with location and service characteristics
- Positive income elasticity of car ownership

Social networks: Draft categorisation

- Family
- Friends
- Hobby (Animal care)
- Sport
- Civic engagements
- Church

- Neighbours

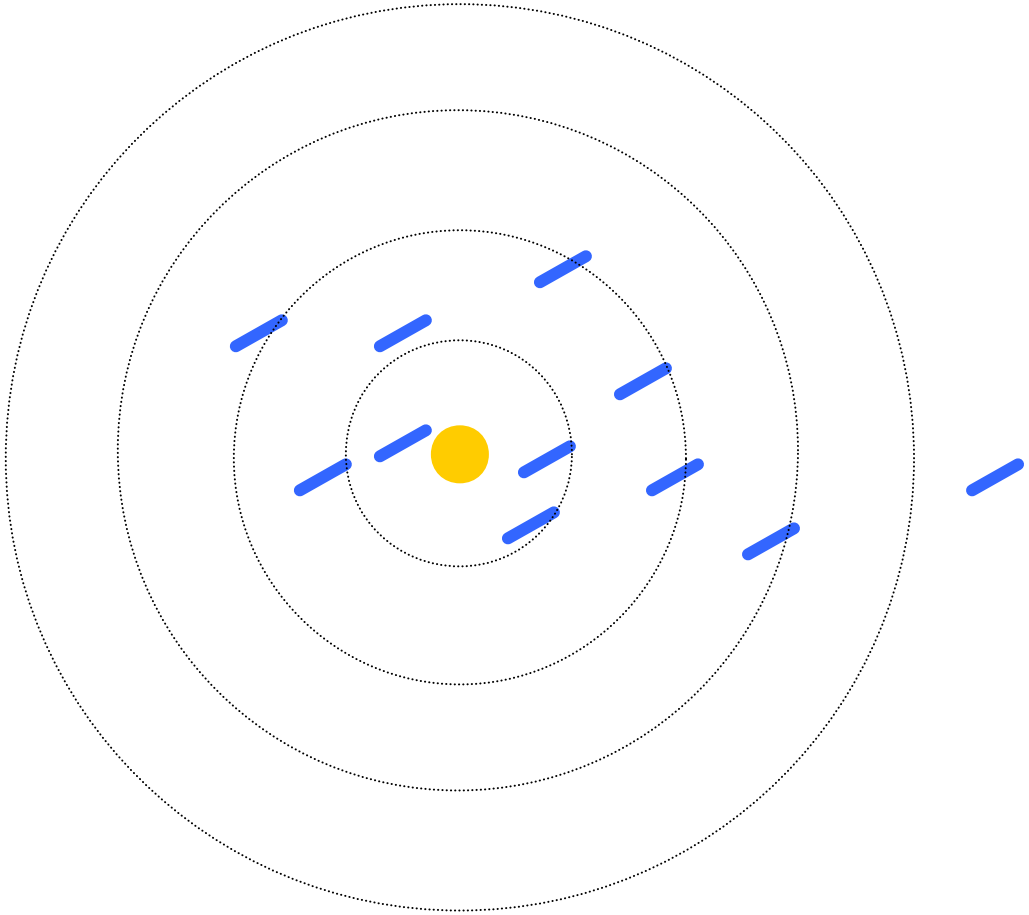
- School/education
- Work (one or multiple networks ?)
- (Military/Civilian service)

- Service providers

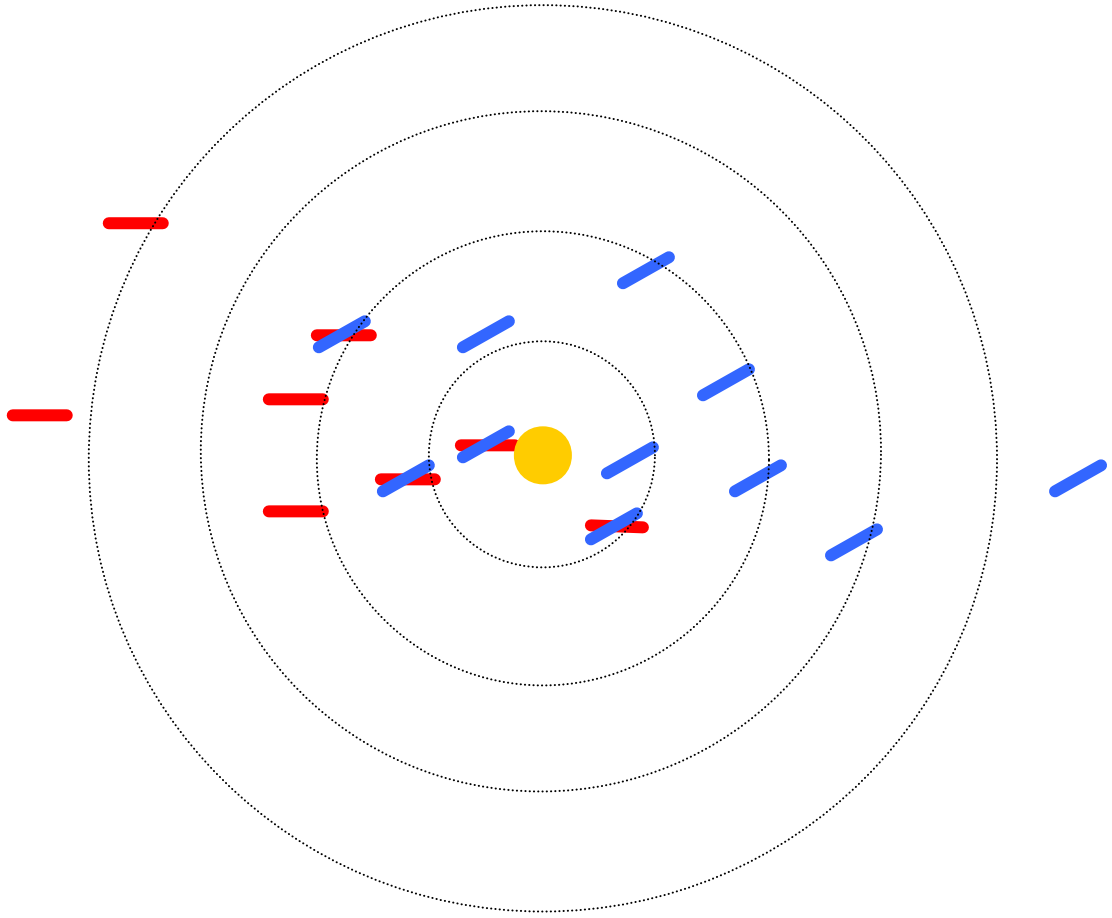
Social networks: Possible transport questions

- Physical spatial-temporal coherence/overlap (constraints)
- Replacement of physical and telecommunication-based contact
- Interaction frequency and spatial reach
- Interaction and information/knowledge transfer

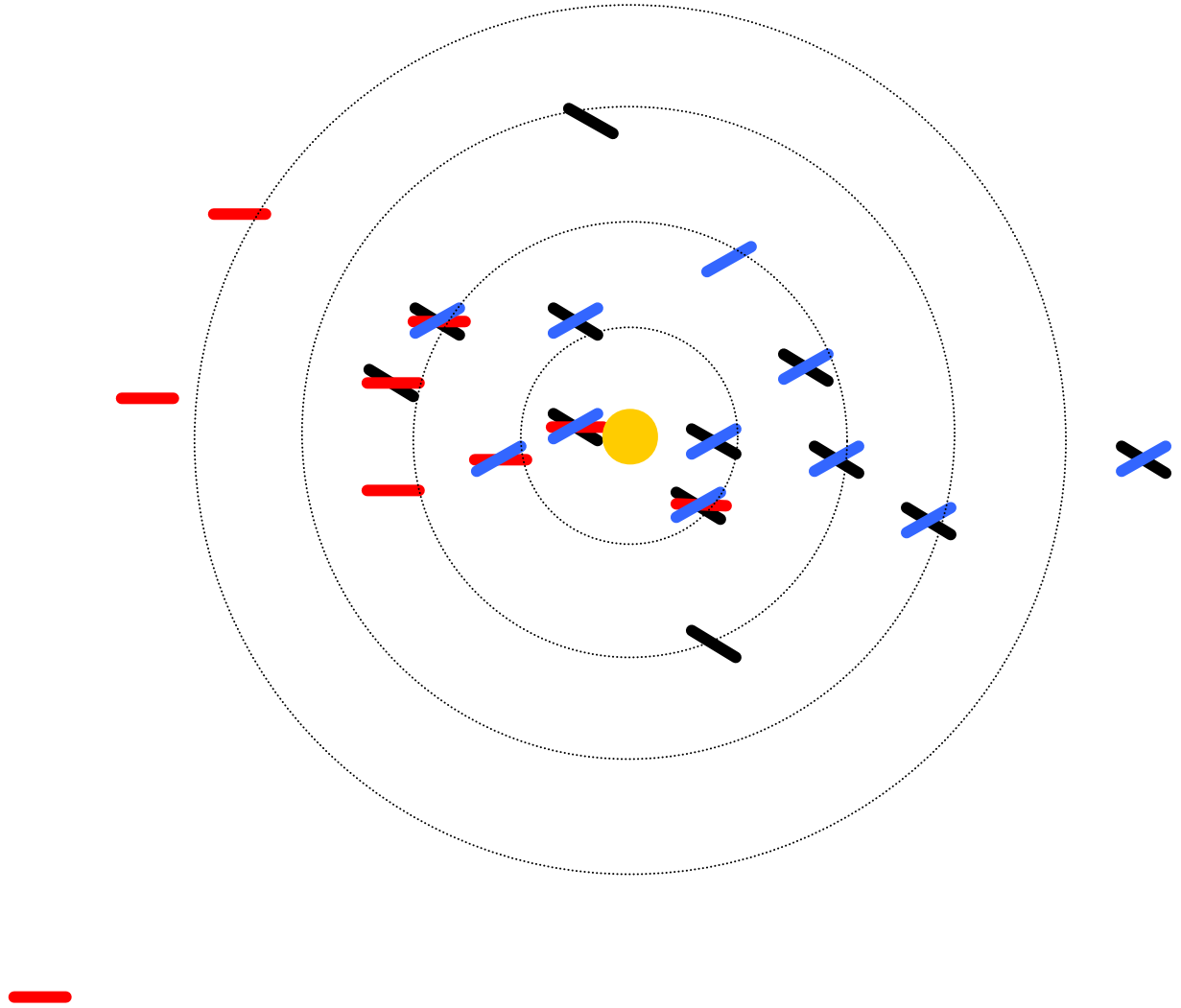
Question of spatial coherence (Network 1)



Question of spatial coherence (Networks 1 & 2)



Question of spatial coherence (Network 1, 2 & 3)



Social networks: Possible sociological questions

- Openness/replacement dynamics of the membership
- Structure and definition of the network boundaries
- Revival of contact/repair of links

- Shared skill/learning
- Transfer/transmission of reputation
- Transfer of resources/social capital

- Spatial and social reach (“6 degrees of separation” ?)

- (Time/money/social capital) Cost of maintenance

Social networks: Hypotheses

1. Local spatial-temporal coherence is lower than 1950

Why ?

- The unity of work, residence and „Sozialmileu“ has been broken for most people (e.g. long-distance commuting)
- Educational/employment paths are less uniform (in space)
- Mass customisation in travel (car), consumption and leisure (channel flood in entertainment)

Social networks: Hypotheses

2. The number of the current members is larger than in the past

Why ?

- Money costs of contact have been dramatically reduced (telephone, email, letter/xeroxing)
- Easier projection of self (email, xeroxing) allows more social grooming (Dunbar's about 100)
- Time/money costs of in-person contact with spatially distant contacts have become – relatively – affordable (i.e. cheap long-distance travel)

2* Statements about the contact intensity distributions are difficult, as the increase in leisure time might balance the larger number of members

Social networks: Hypotheses

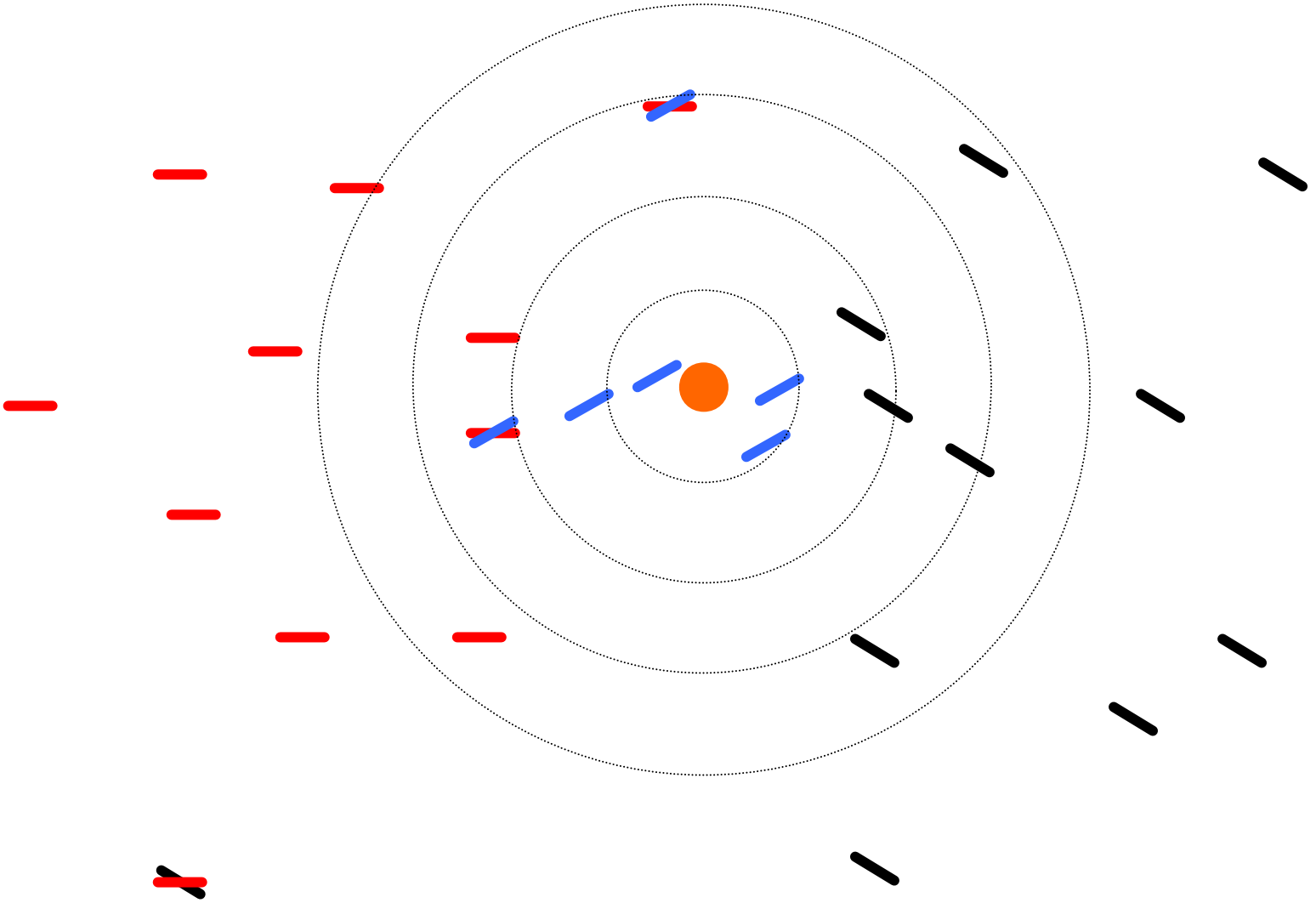
3. Time costs of network maintenance are larger than in the past

Why ?

- Less chance of chance encounters
- Lower local spatial network densities
- Less opportunity to use proxies for messaging
- Higher search costs (locating the person) (but for email, mobiles, answering machines)

- Higher time costs to get to most members of the net
- Longer catching-up times

Hypotheses visualised: Situation today (Networks 1-3)



Social networks: Externalities

- Stronger selectivity ?
- Less local inclusion ? (More commercial/institutional personal services ?)
- Less local generalised trust ? (feeling of safety and reliability)
- Car/paid travel dependence ?

(Concurrent) Spatial developments

Economically

- Increased specialisation of locations (regionally, internationally)
- Increased firm size in services and production
- Increased market sizes at all scales

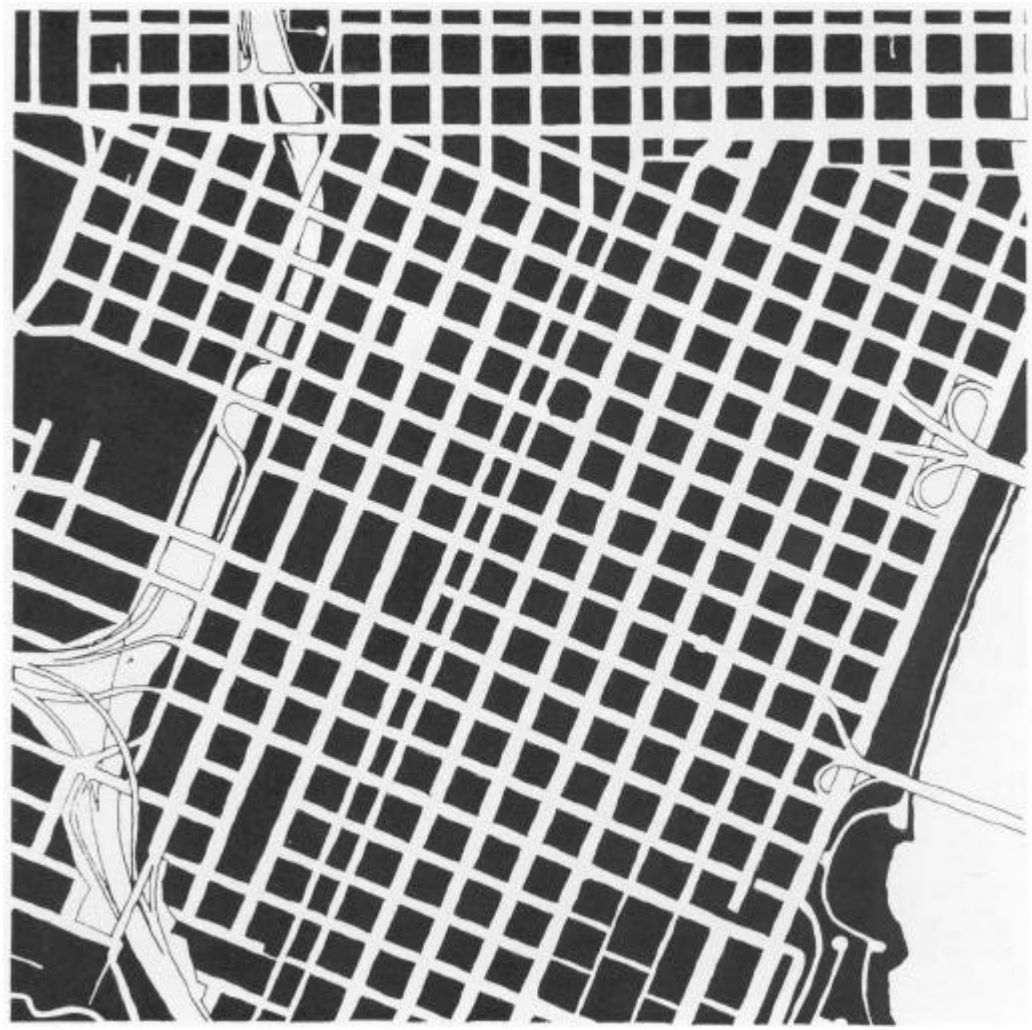
Urban

- Increased scales
- Lower local densities

Spatial developments: Externalities

- Car/paid travel dependence ?
- Transport emissions (Noise, CO2, HC etc.)
- Loss of the common pedestrian environment
- Arrival of the themed pedestrian environment
- Spatial segregation (locally, regionally)

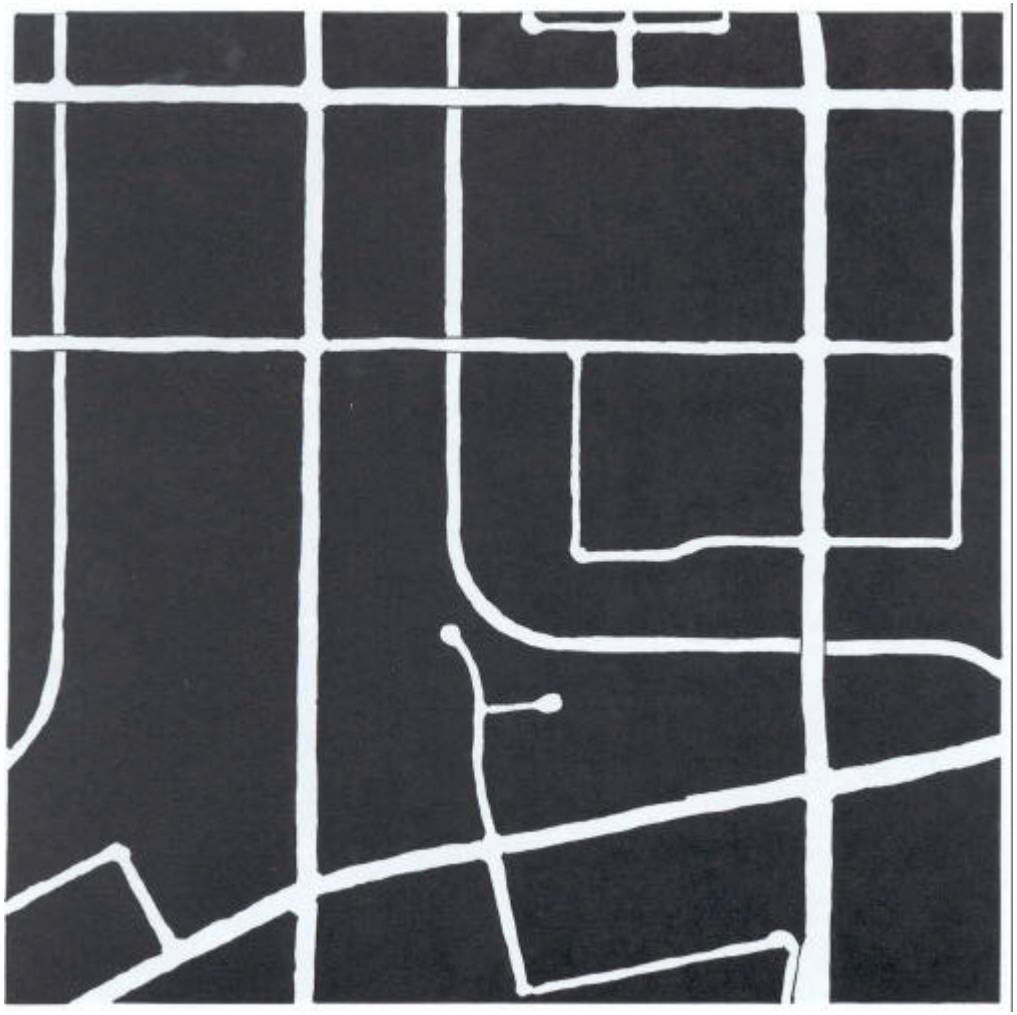
Urban structure: Portland, OR, circa 1860



1 Mile

Jacobs (1993) 238

Urban structure: Commercial Irvine, CA, circa 1980



1 Mile

Jacobs (1993) 221

Urban structure: Residential Irvine, CA, circa 1980

1 Mile

Jacobs (1993) 222

What now ?

Transport:

- Better management of resources (demand-responsive operation)
- Demand-responsive pricing
- Pricing of externalities

Socially:

- Better time organisation
  - Common scheduling tools
  - Reorganisation of working time
- Demand-responsive service delivery

What now ?

Spatially:

- Better pricing of externalities
- Growth boundaries
- Rescaling of the environments
- Rebuilding the buildings/infrastructures of the post-war period

- (Subsidised) local service points/local shopping facilities

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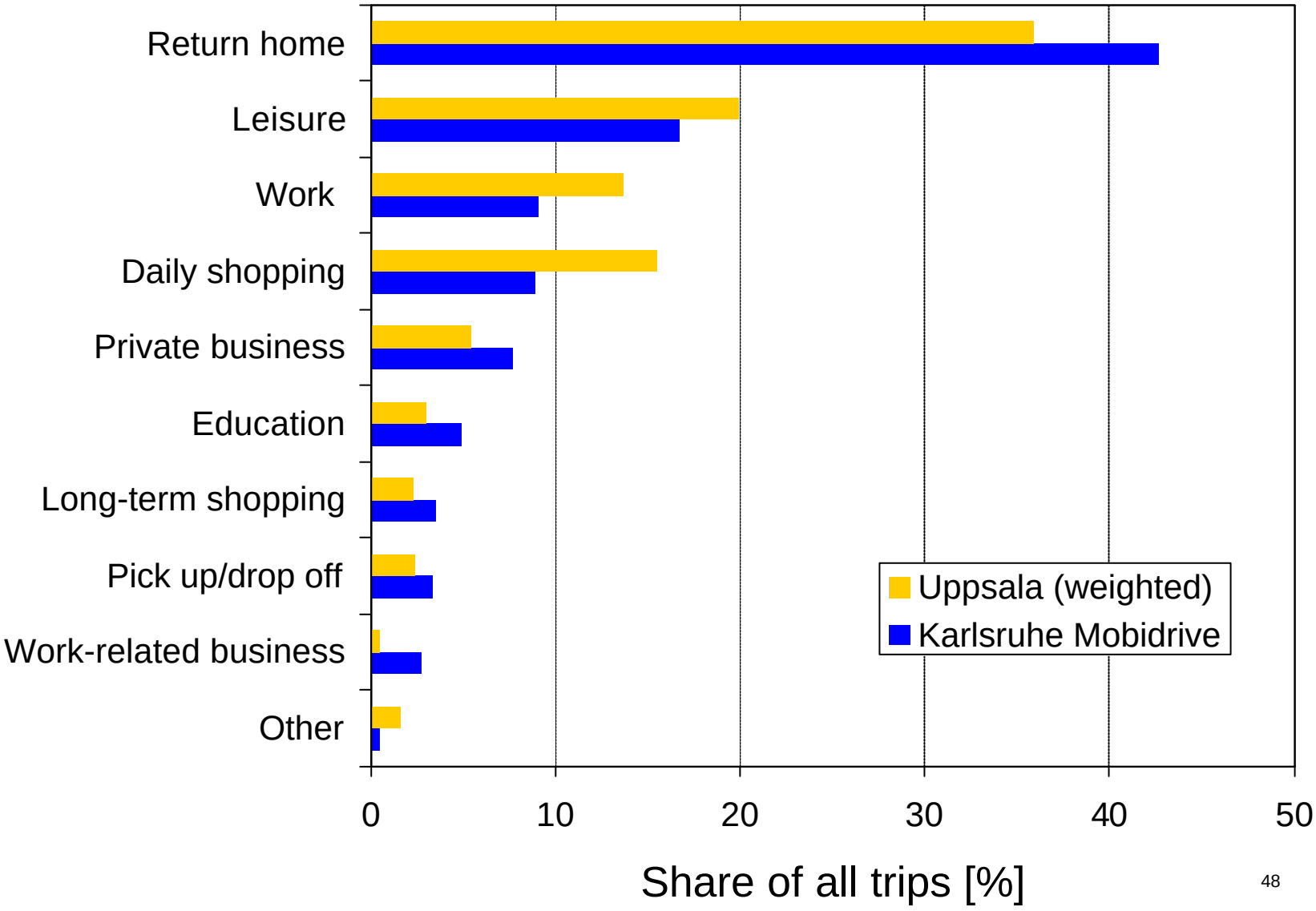
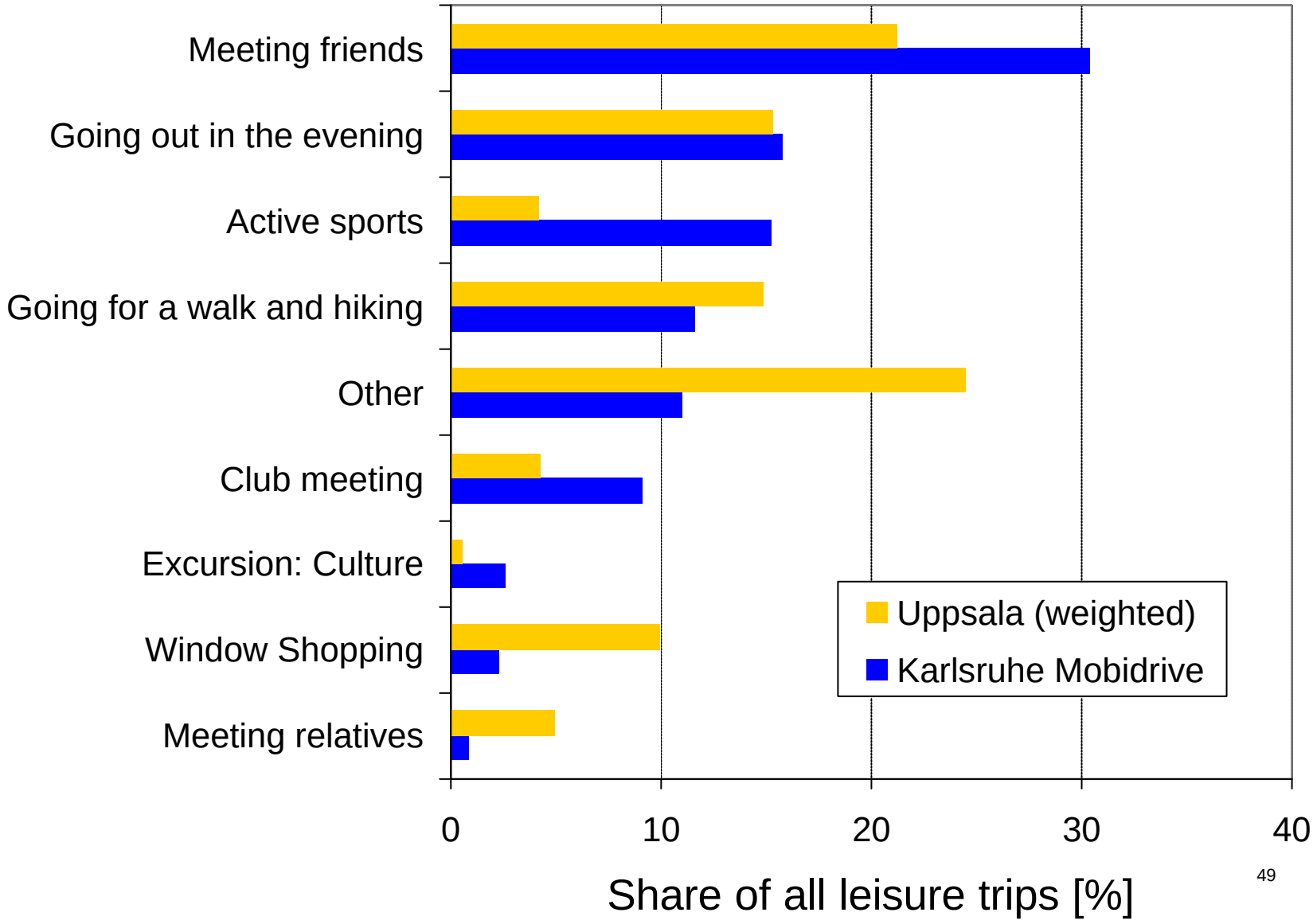
Appendix

Daily life: Trip purposes (Uppsala 1971/Karlsruhe 1999)



Schlich and Schönfelder

Daily life: Leisure (Uppsala 1971/Karlsruhe 1999)



Schlich and Schönfelder