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Capturing the geographies of social networks: Current measurement experiences

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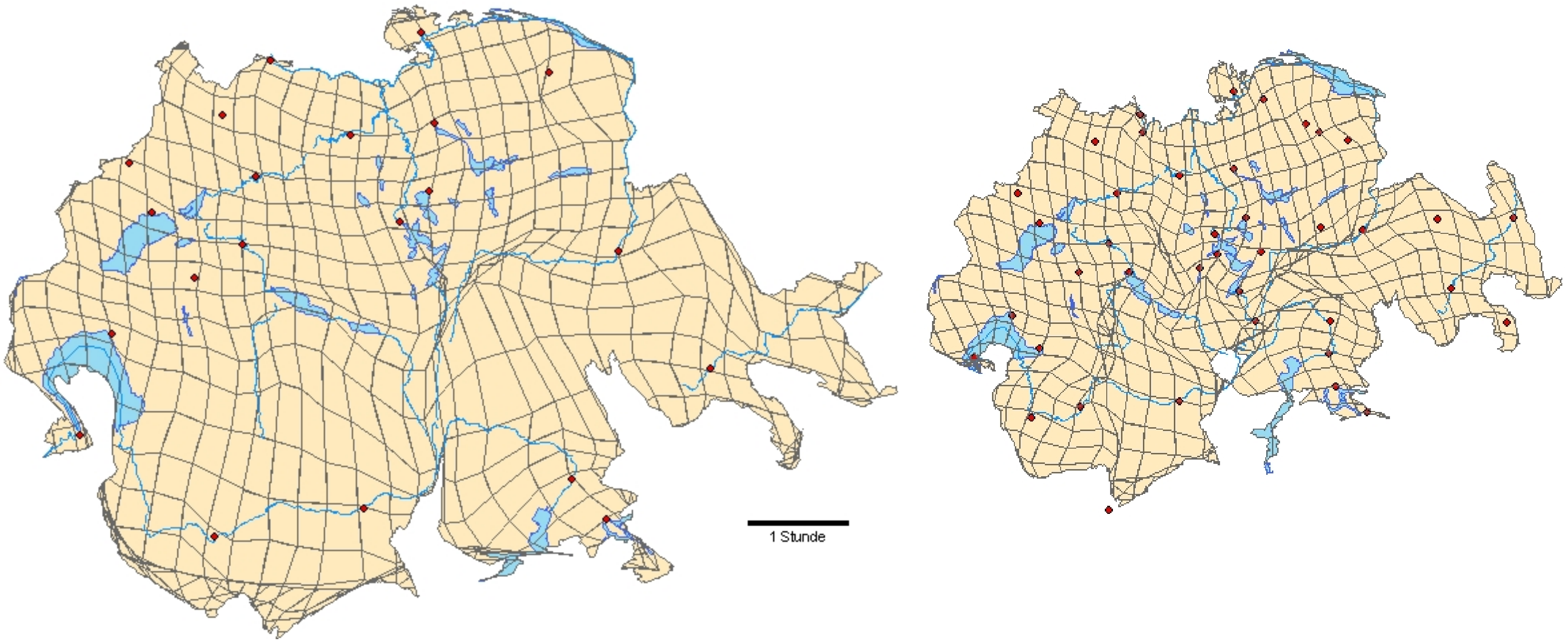
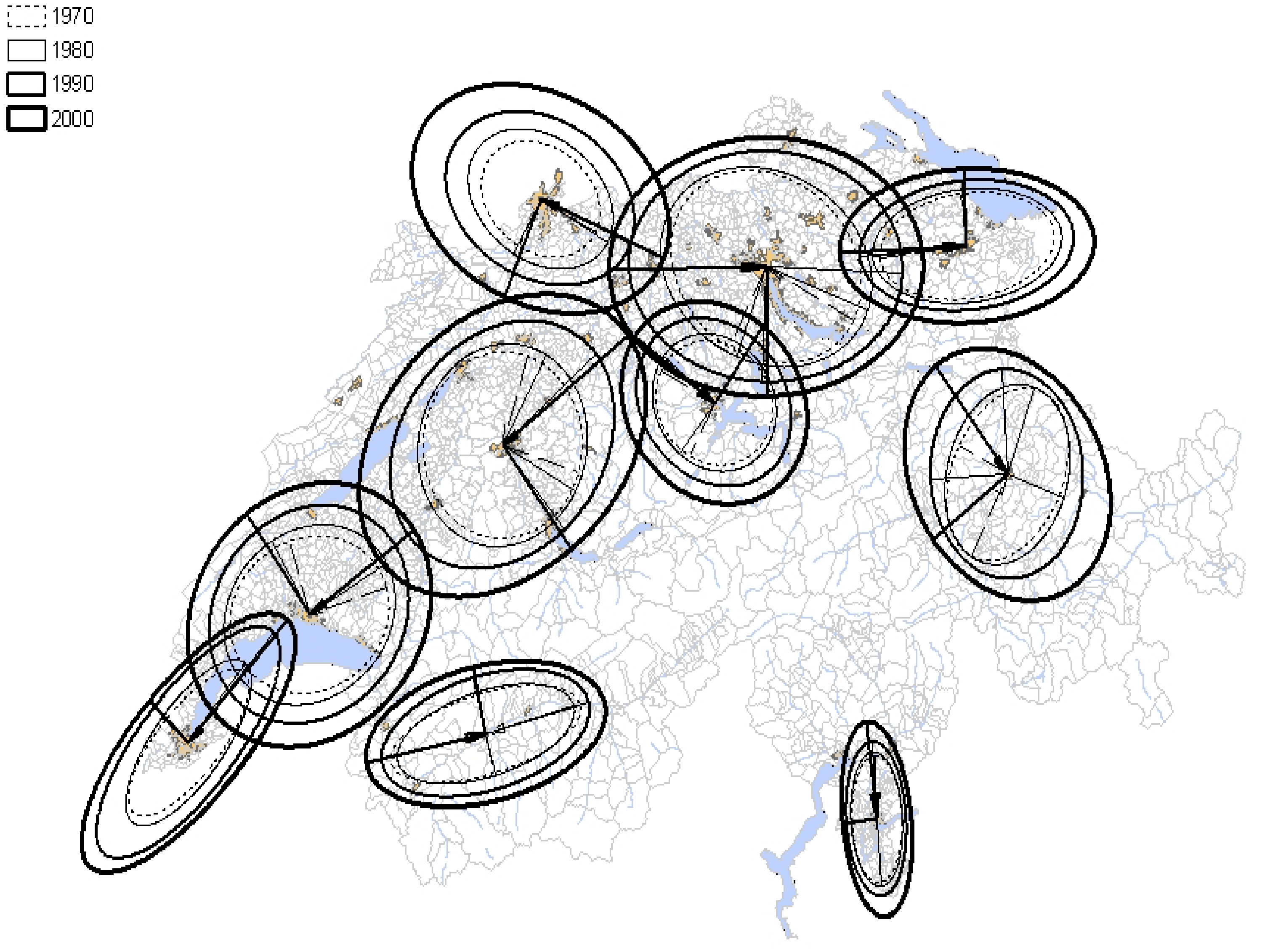
Trends: Road travel time scaled Switzerland (1950 & 2000)



Scherer, 2004

Trends: Swiss Suburbanisation since 1970



Adapted from Botte, 2003

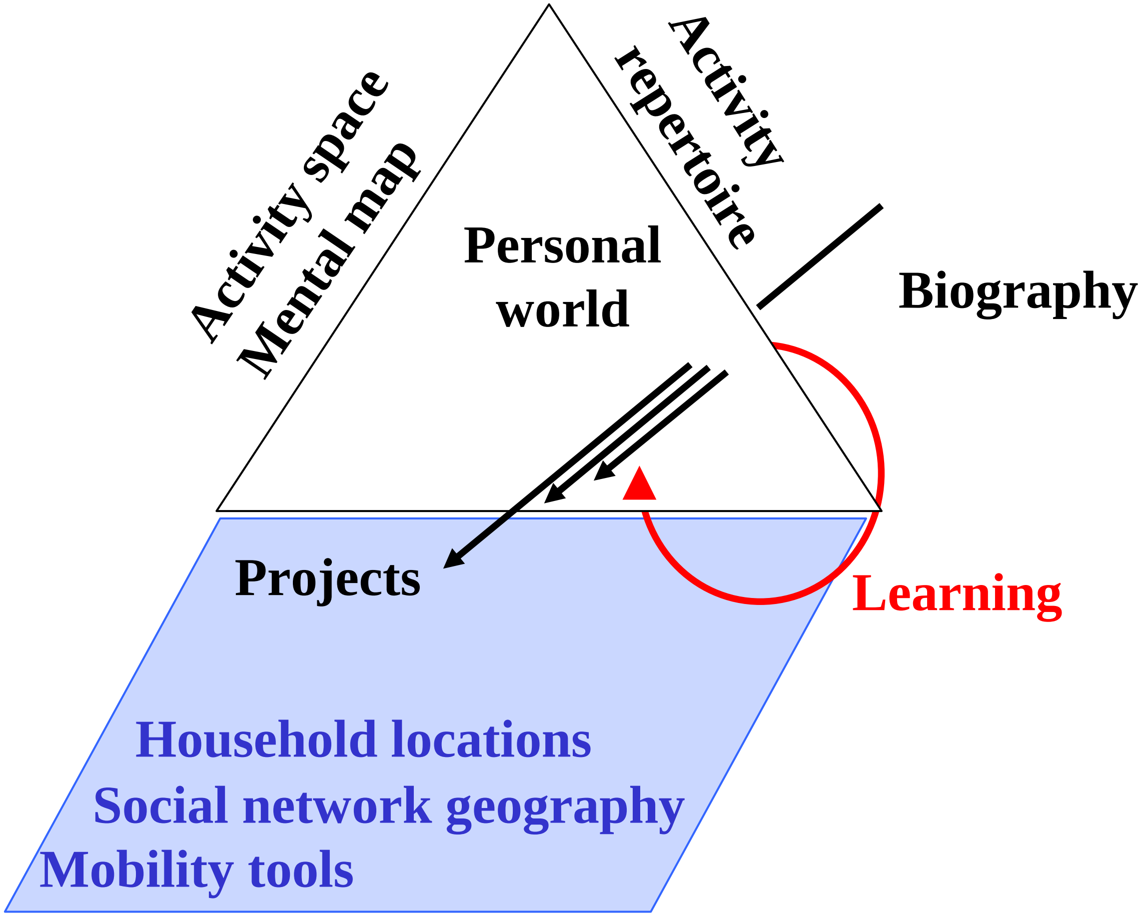
Research questions about „social network geography“

- How disperse are the locations of the contacts of a person or firm ?
- How quickly has the dispersion changed ?
- How quickly will it change in the future ?

Methodological questions

- How can we measure this dispersion ?
- Do the measure relate to other concepts of interest ?

Concepts



Activity space
Mental map
Activity
repertoire
Personal
world
Biography
Learning
Projects
Household locations
Social network geography
Mobility tools

What are the challenges ?

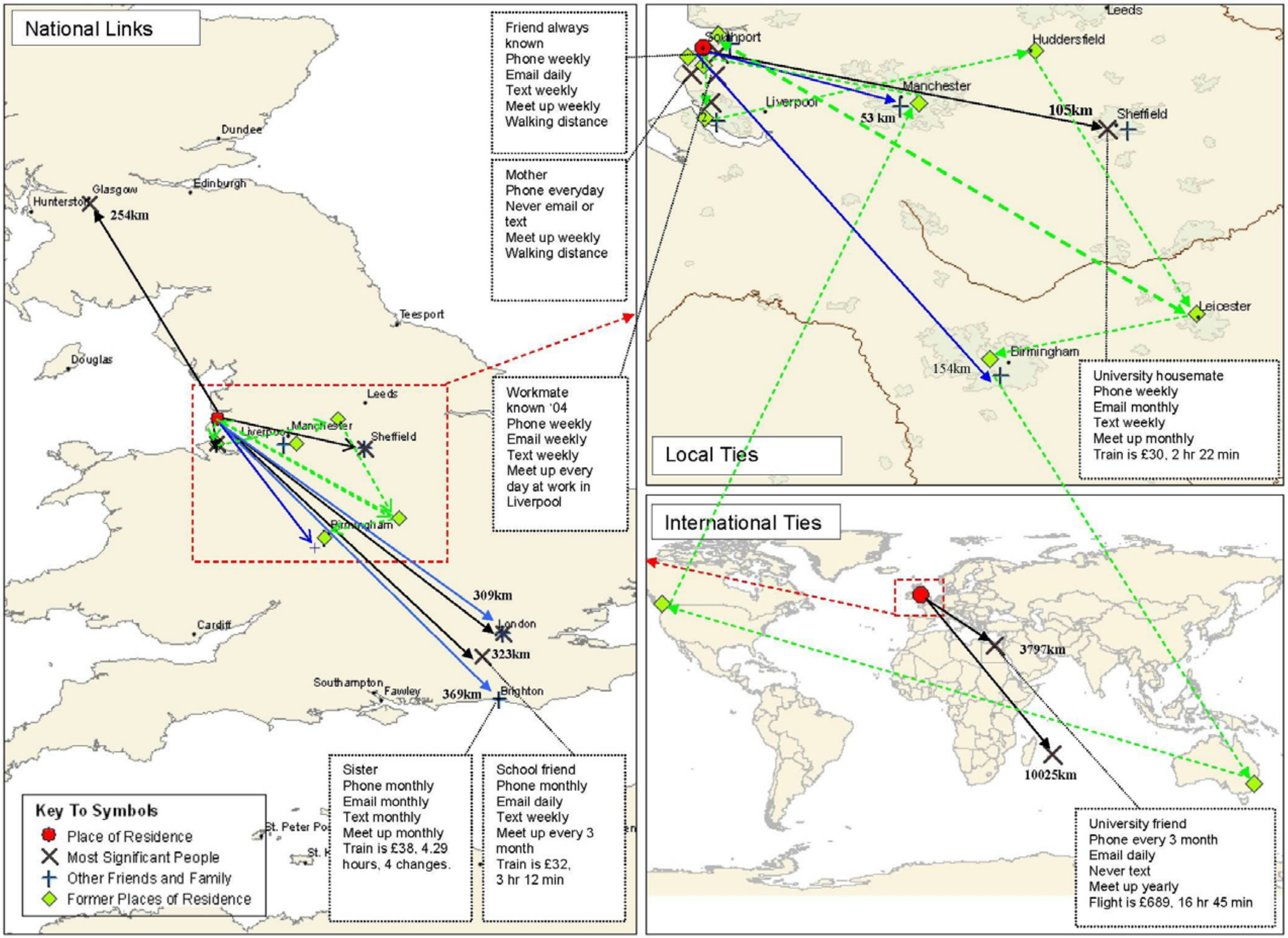
Personal world and social network geography:

- Measurement
- Measures

Mobility biographies:

- Retrieval and reconstruction
- Measures

Biography of a male architect, early-30ies



Measurement

Personal world as „mental map“ and „activity repertoire“:

- Sketching
- Think aloud protocols
- Spatial tasks

Personal worlds as „activity space“ of visited locations:

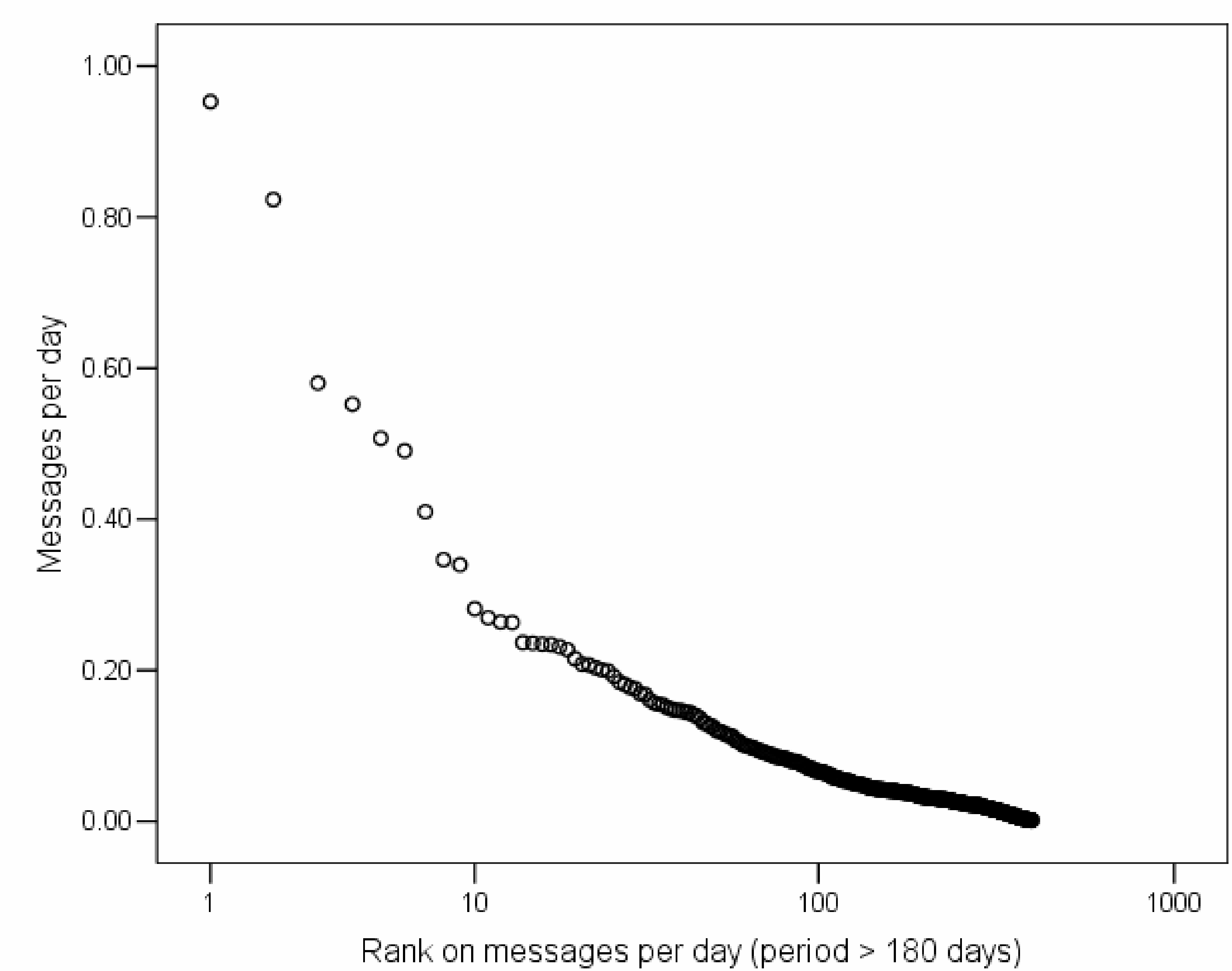
- Diaries
- GPS/GSM tracing
- Data traces (payments of all kinds, CCTV, phone and pc use)

Measurement

Social network geographies:

- Name generators
- Traces of contacts (email, SMS, IM, internet chat, letters, phone records, etc.)
- Diary – based prompting

Contacts and contact frequency – emails to kwa (Outlook)



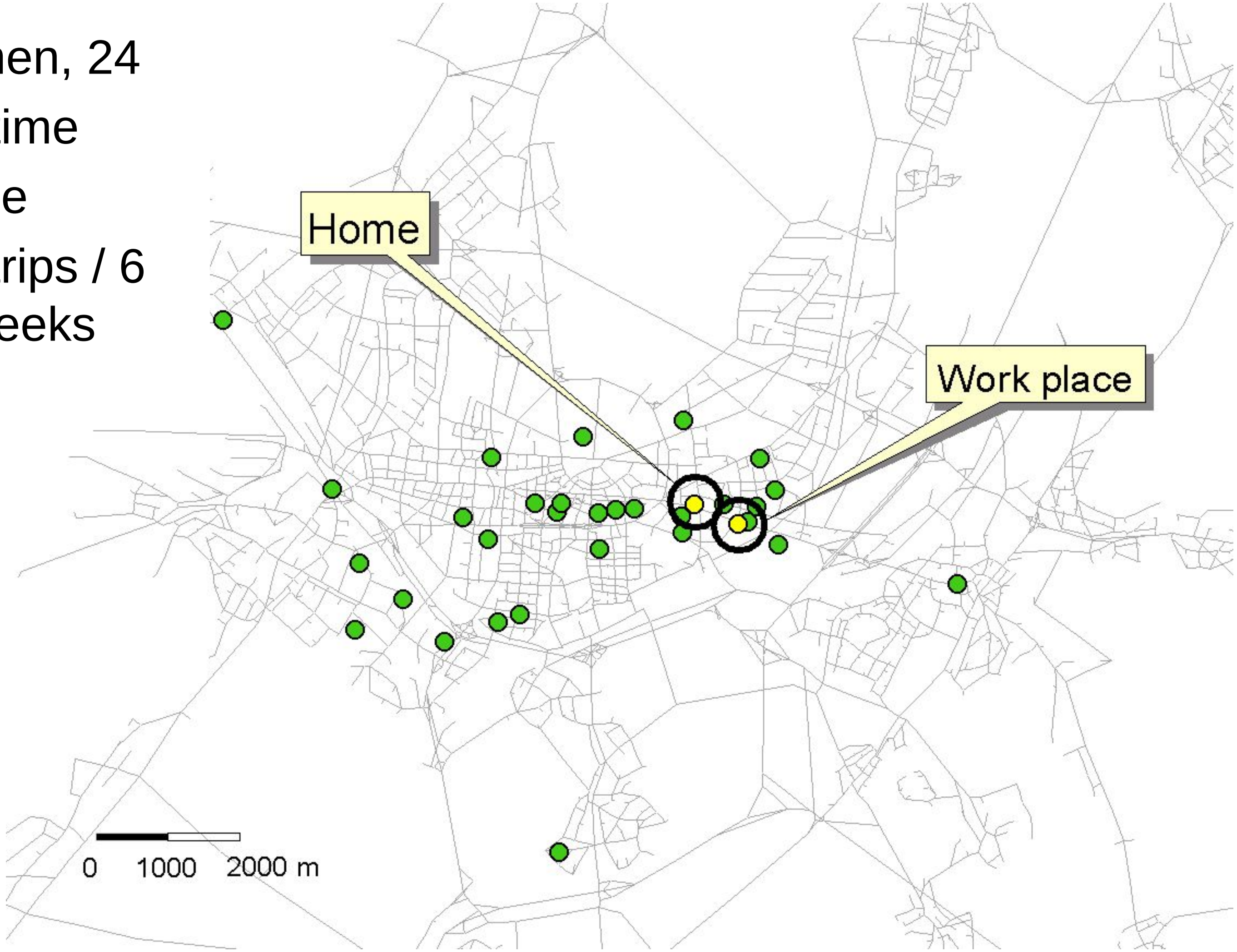
Example of an activity space

Women, 24

Full-time

Single

216 trips / 6 weeks



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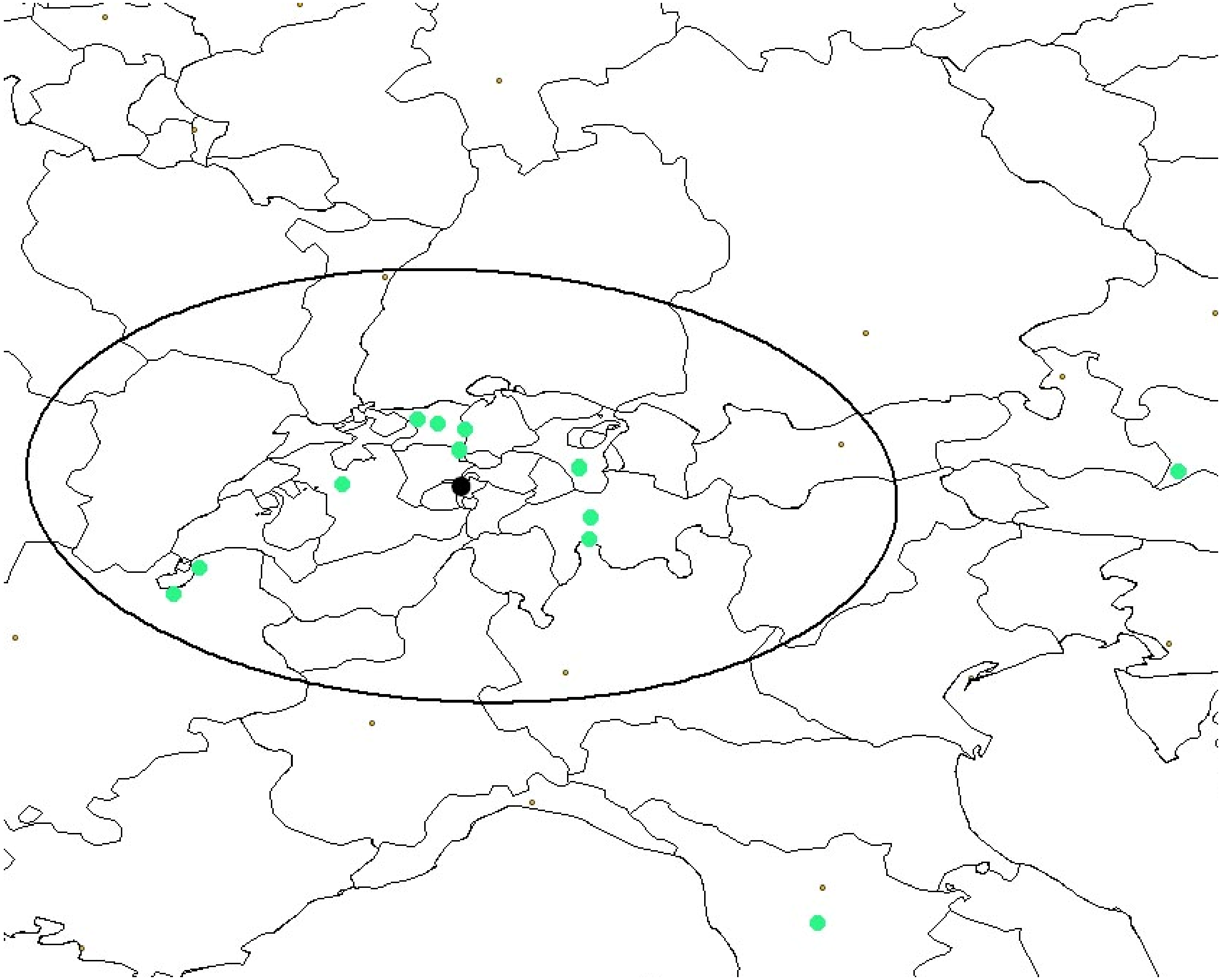
Example of a social network geography



Female, 28,

4 moves,

Ohnmacht, 2004

Measures

Requirements:

- Low dimensional (scalar)
- Describe size, orientation and spread
- Consistency with behavioural possibilities (theoretical intent)
- Ease of calculation

How to measure ?

Parametric:

- 95% confidence ellipse (form and type of distribution)

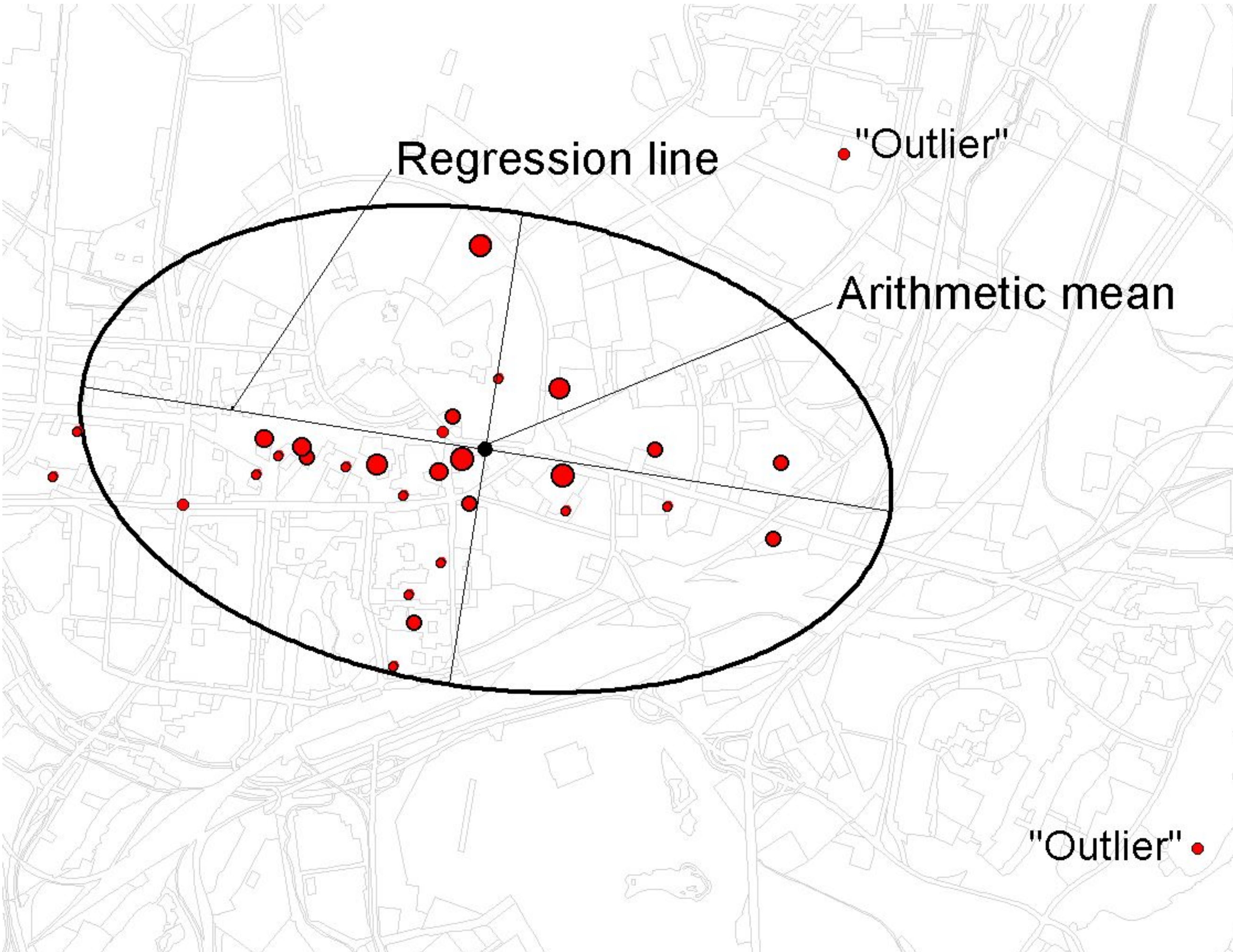
Semiparametric:

- Inclusion geometries (form of geometry)
- (Weighted) shortest path networks (structure of path)
- (Percentage) Minimum convex poligons (convexity)
- Kernel density estimator (form of estimator)
- Mean harmonic home ranges (form of estimator)

Non-parametric

- Observed path geometries

Measures: Confidence ellipse



Schönfelder, 2006

Measures: Kernel densities

Schönfelder, 2006

Measures: Inclusion geometries

Find:

$\min A_i(\beta_{i1} \ldots\ldots \beta_{in})$

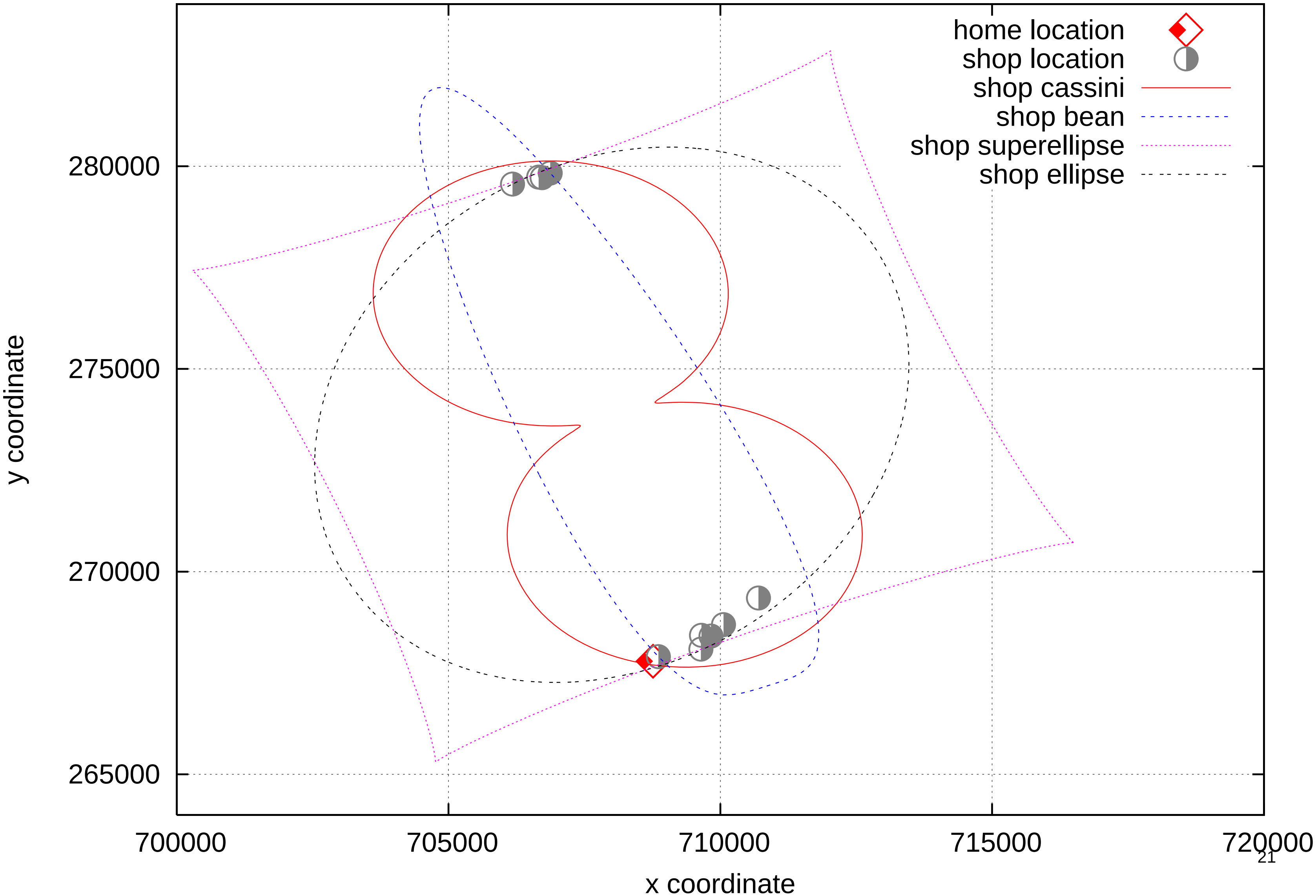
s.t.

Area A_i covering p% of all observed points

with:

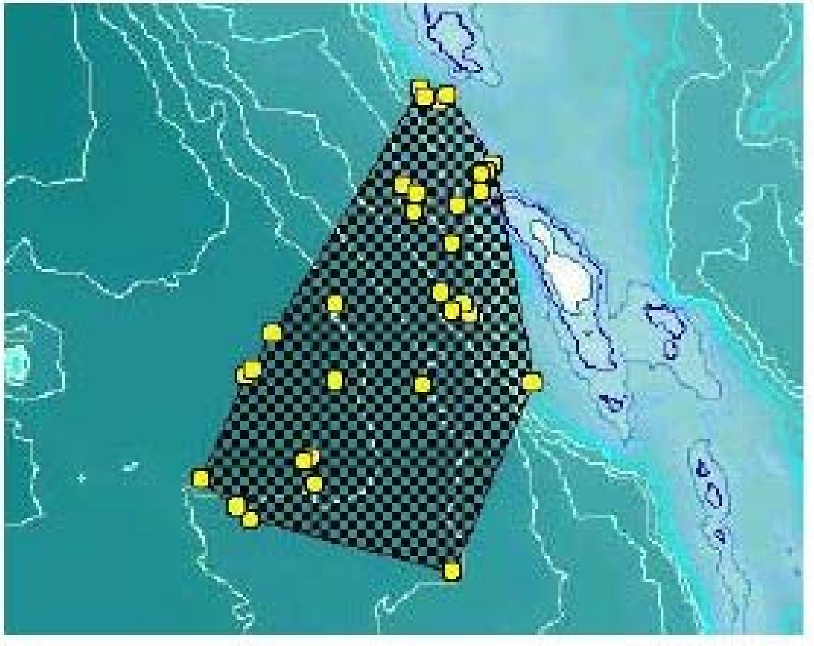
i	:	Type of geometry (Ellipse, bean, Cassini ...)
p	:	Predetermined share, e.g. 95%

Measures: Inclusion geometries

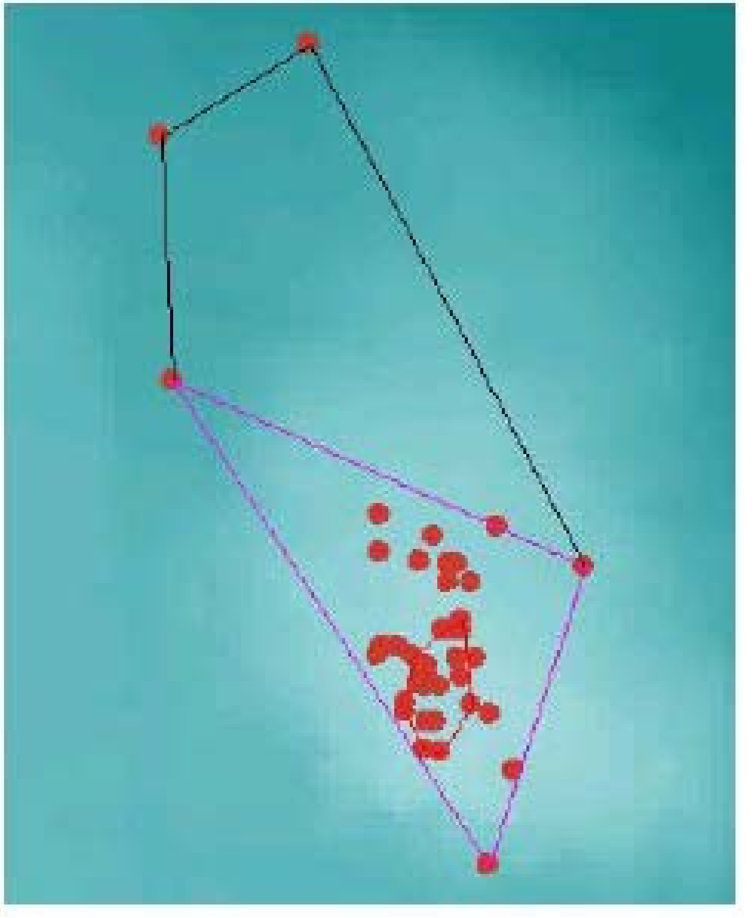


Rai et al., 2007

Measures: Minimum convex poligons (MCP)



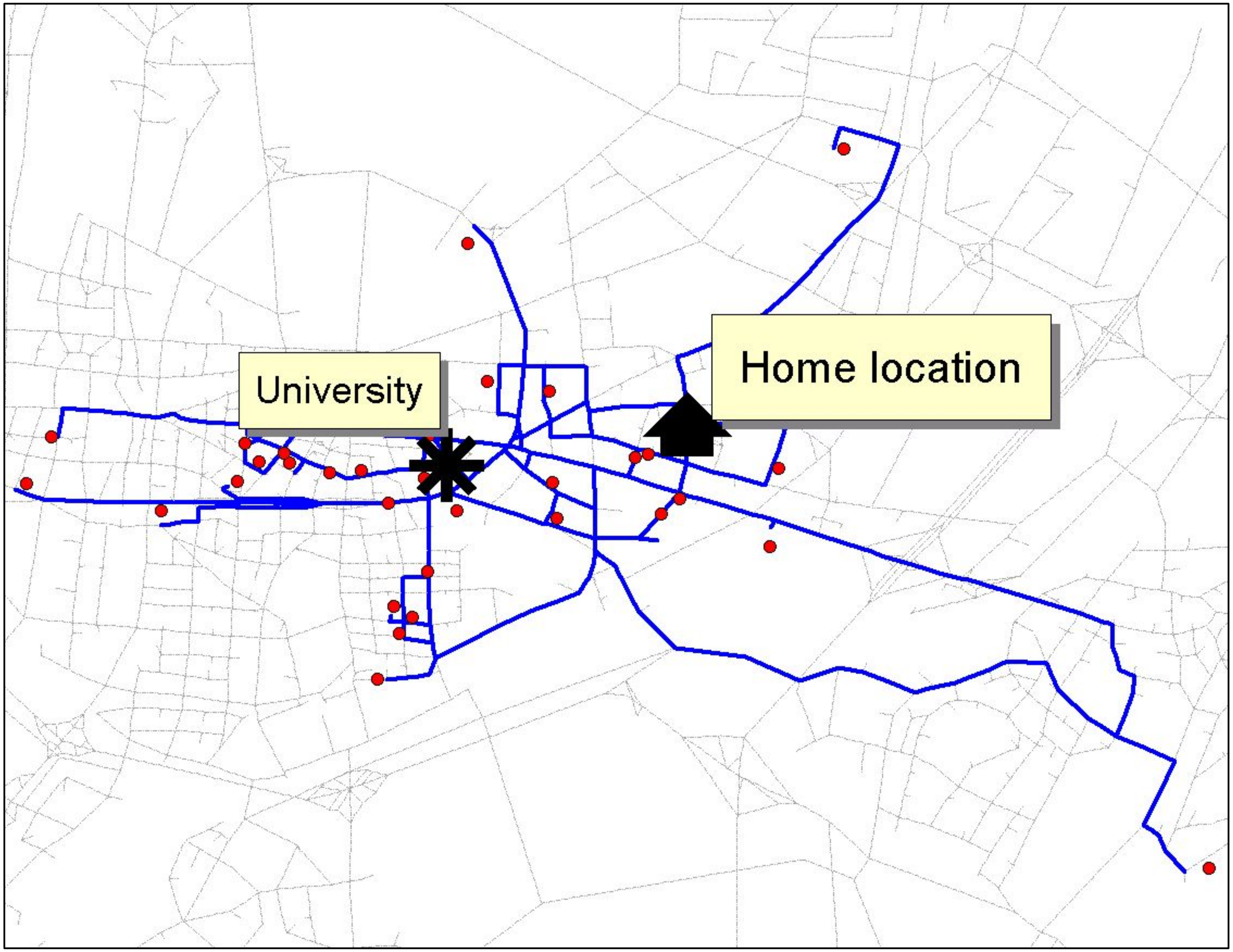
MCP



Percentage MCP

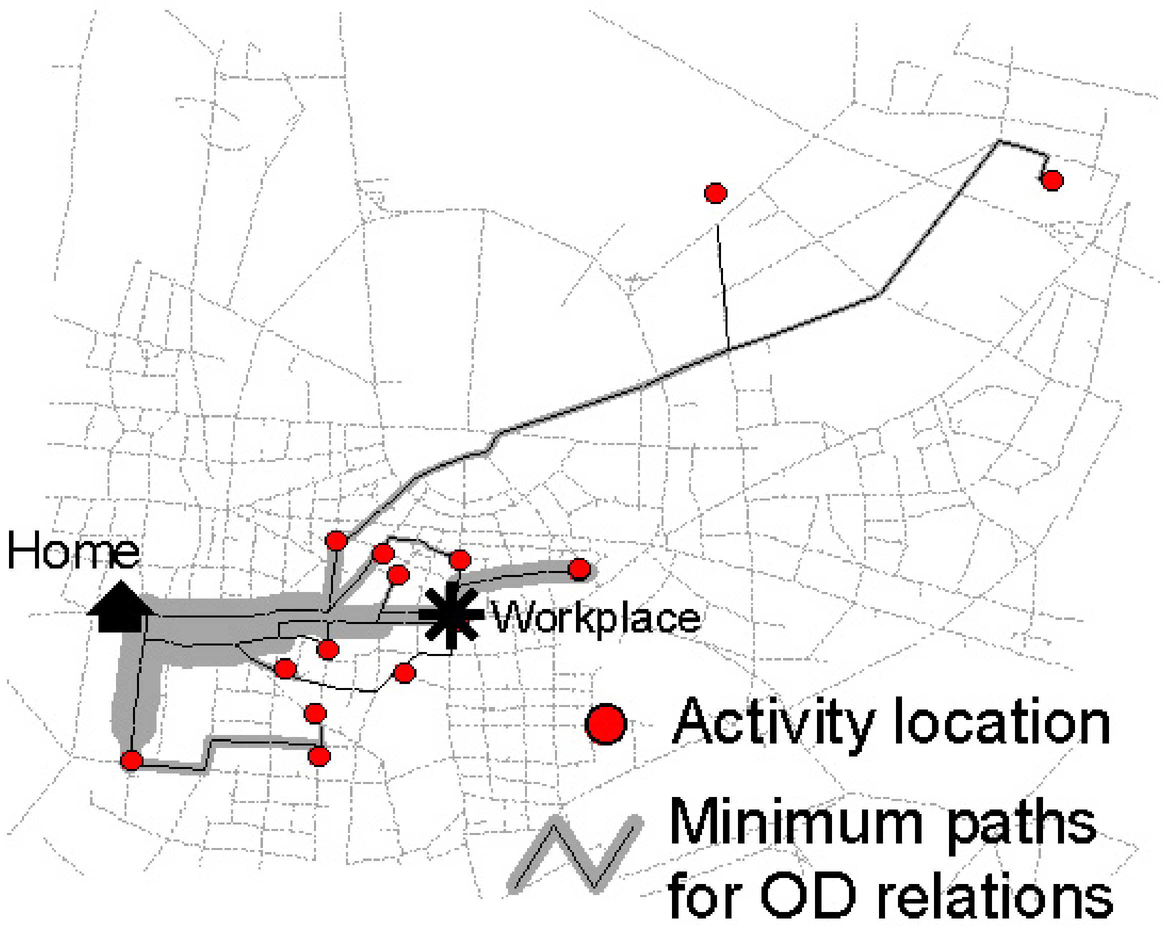
Schönfelder, 2006

Measures: Shortest path network



Schönfelder, 2006

Measures: Weighted shortest path network



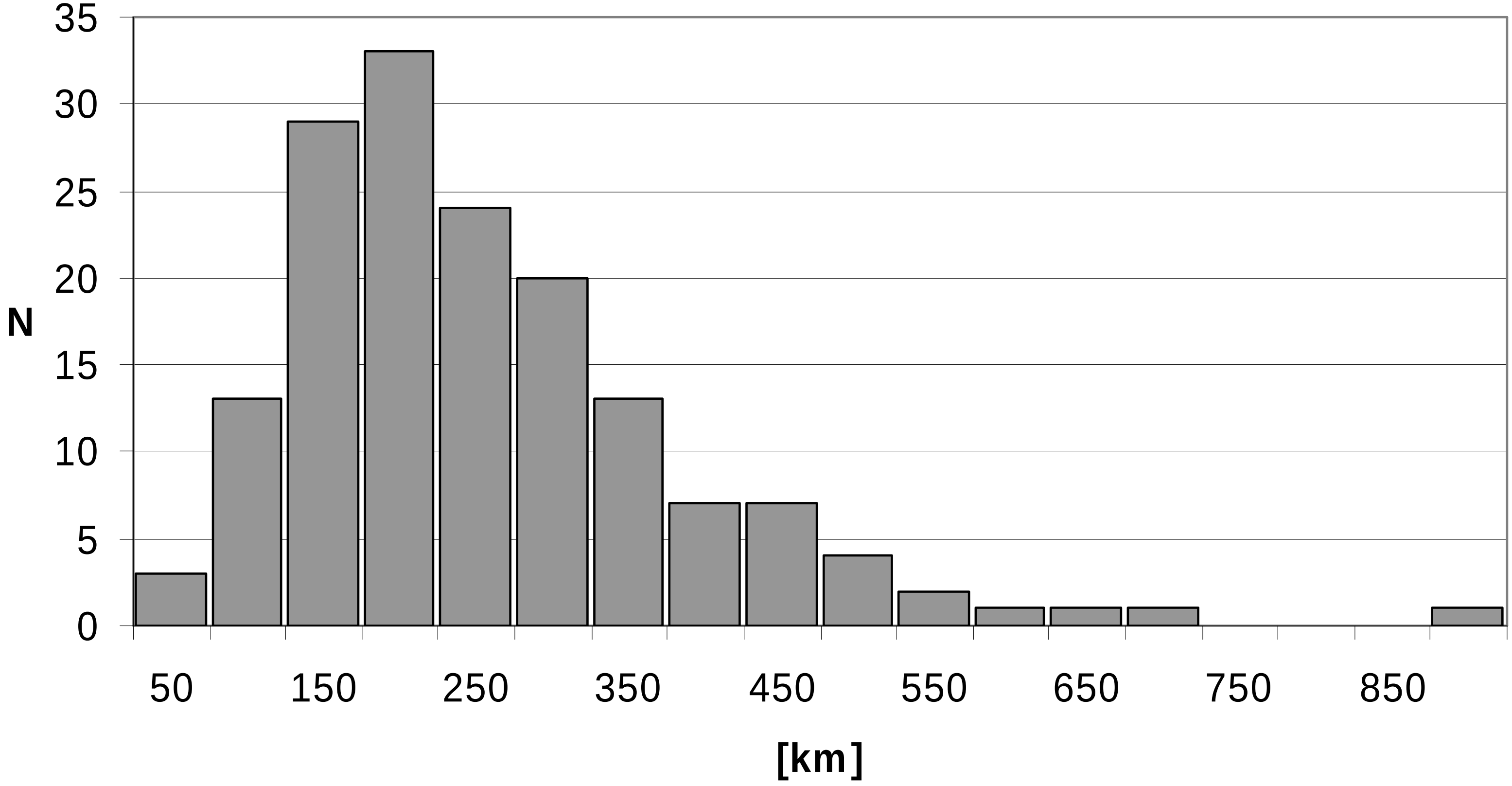
Schönfelder, 2006

Application: Activity spaces

Data source:

- Mobdrive: 6 week continuous travel diary
- Karlsruhe and Halle
- Fall 1999

Size of activity spaces: Shortest path network



* Observed O-D-relations, Mobidrive, Karlsruhe subsample

Pearson‘s correlation of the measures (Karlsruhe)

	SPN	SPN weigh-ted	95% Ellipse
Area of Kernel density >0	.775	.808	.394
Length of SPN (unweighted)		.928	.652
Length of SPN (weighted by number of journeys)			.594

Application: Social network geographies

Items to capture the social network geographies

- Name generators
- Name interpreters
    - Type and length of contact
    - Frequency by mode of contact
    - Home location
    - Second homes
    - Detailed descriptions of face-to-face contacts

Items to characterise the mobility biography

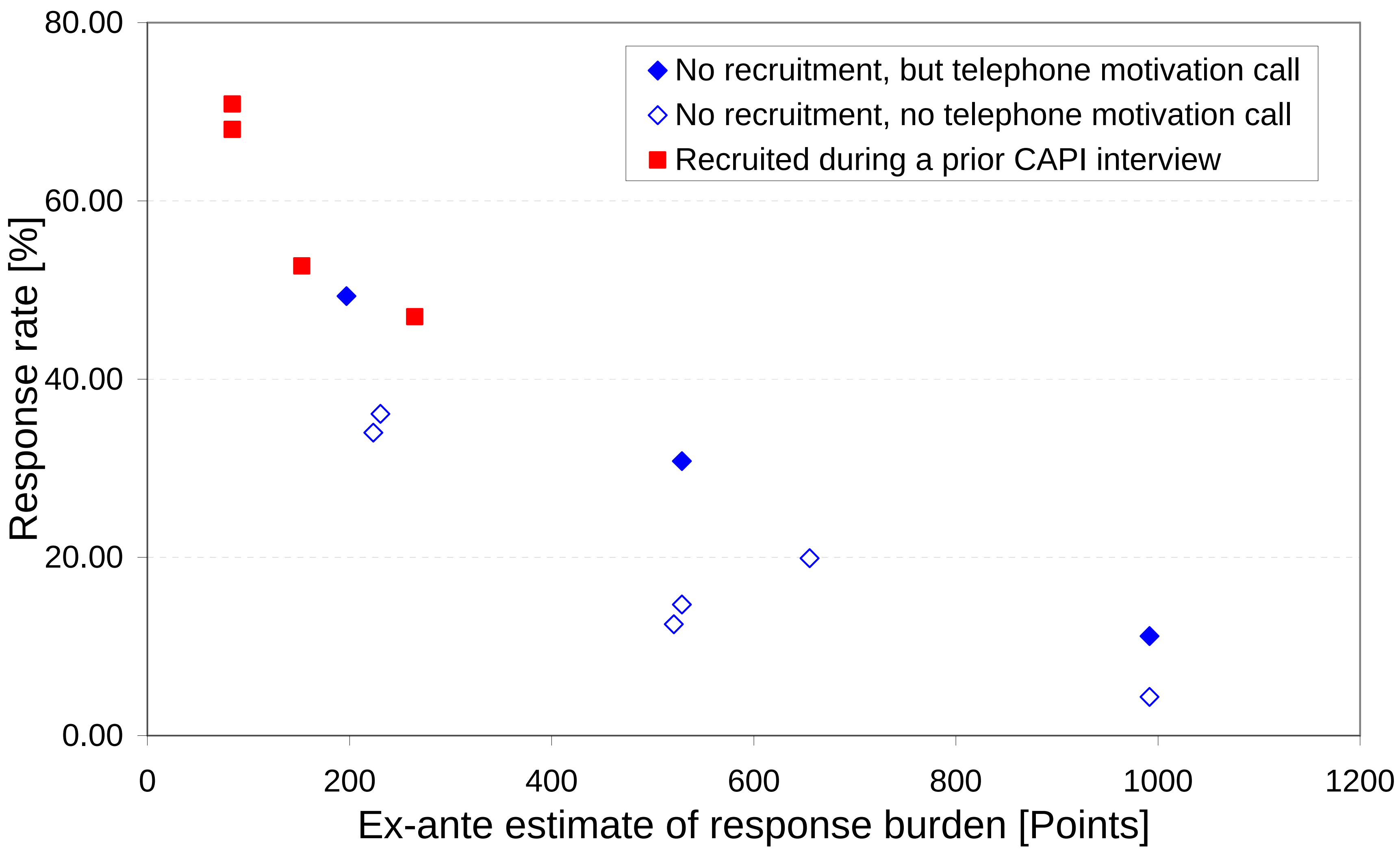
- Home and second home locations

- Work and school locations

- Household composition
- Mobility tools
- Main mode (to work/school)
- (Major holidays)

- Personal income
- Household income

Response burden and response rate



Zürich experiment

Phase	Pretest	Main study	Share [%]	Share of telephone contacts [%]
Sample	150	4’200	100%	
Wrong address	0	56	1.3%	
Not reachable by phone	36	1’486	35.3%	
Telephone contact	113	2’714	64.6%	100%
Recruited	14	318	7.5%	11.7%
Face-to-face interviewed	13	305	7.3%	11.2%
Written form returned	13	294	7.0%	10.8%

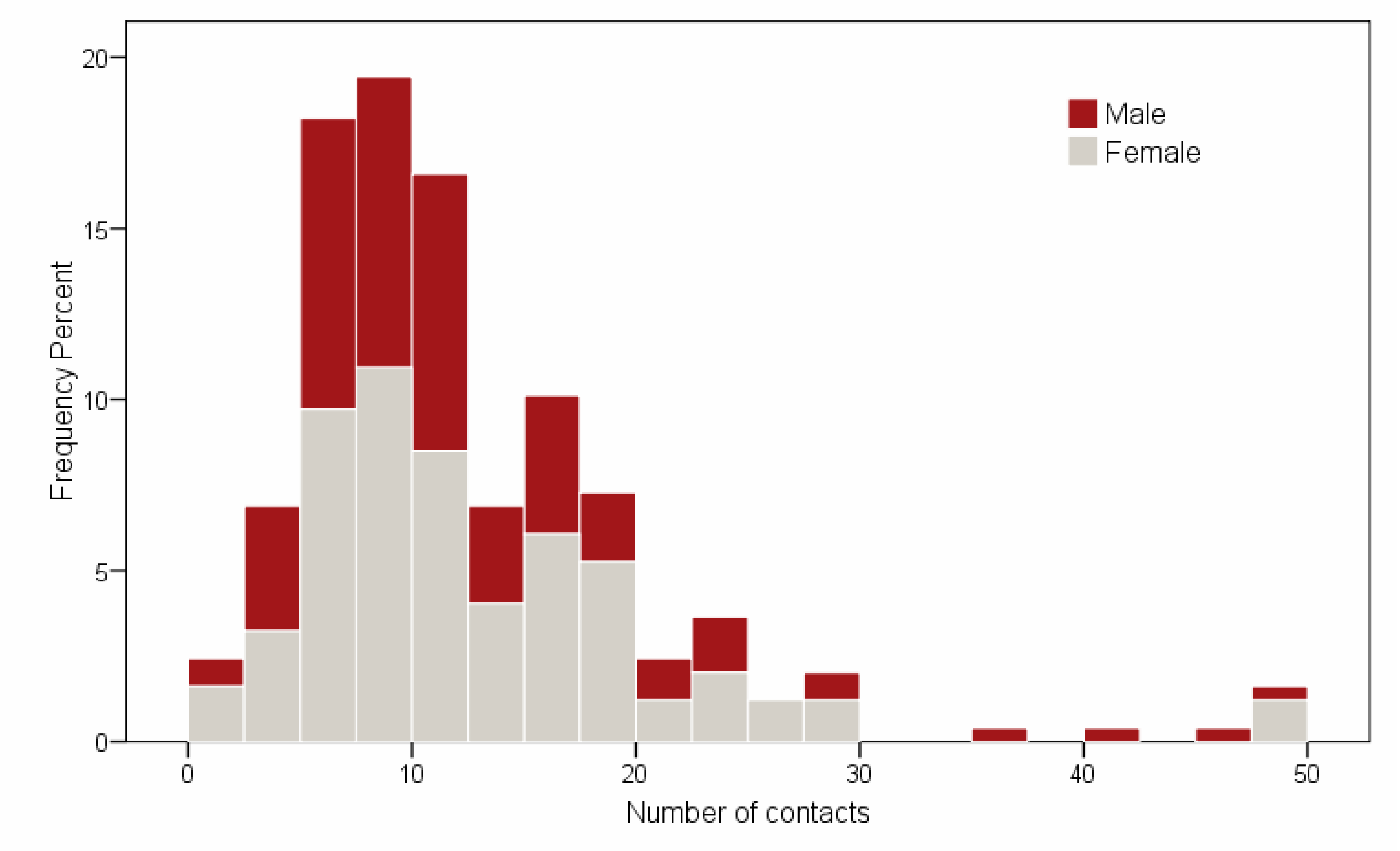
Data available

- ifmo:
  - “Persons with whom you had contact”
  - (f-to-f frequency, location, mobility biography)

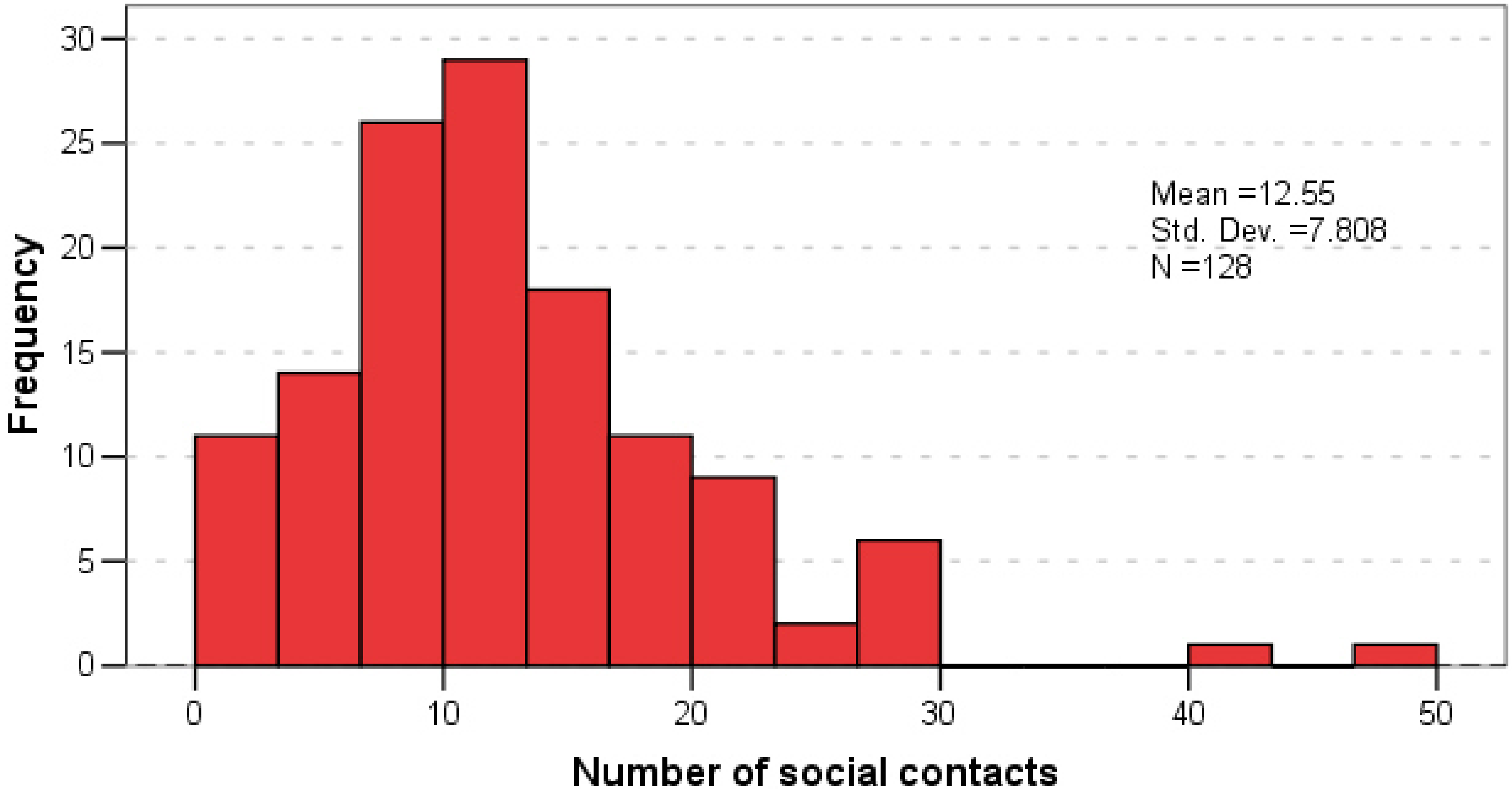
- DfT:
  - Family, non-local friends, most important persons
  - (location, frequency by mode, mobility biography)

- COST 355:
  - Important people, people with leisure contacts
  - (location, frequency by mode, mobility biography)

Contacts (COST 355 only)



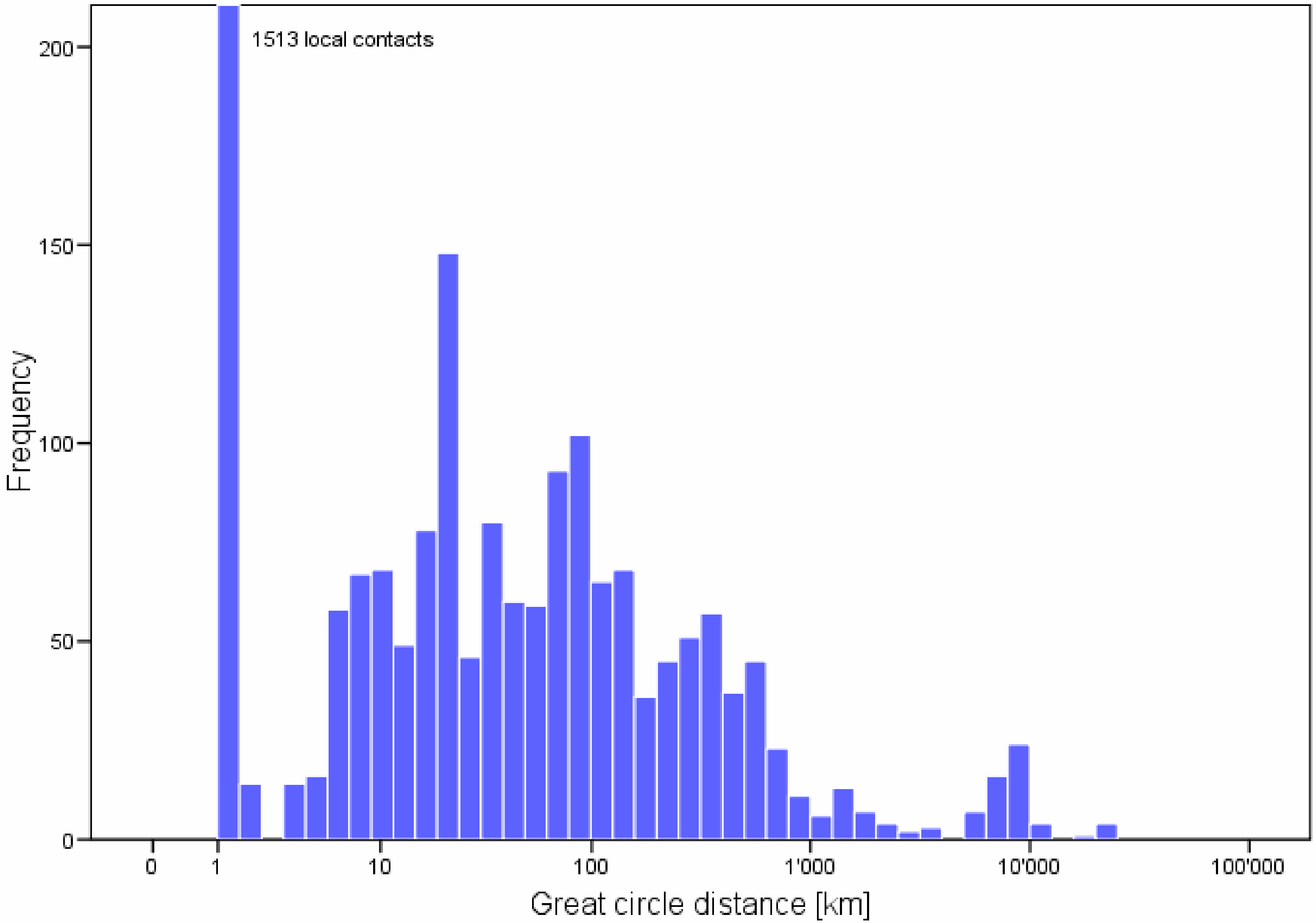
Contacts (subsample COST 355; ifmo; Horizon)



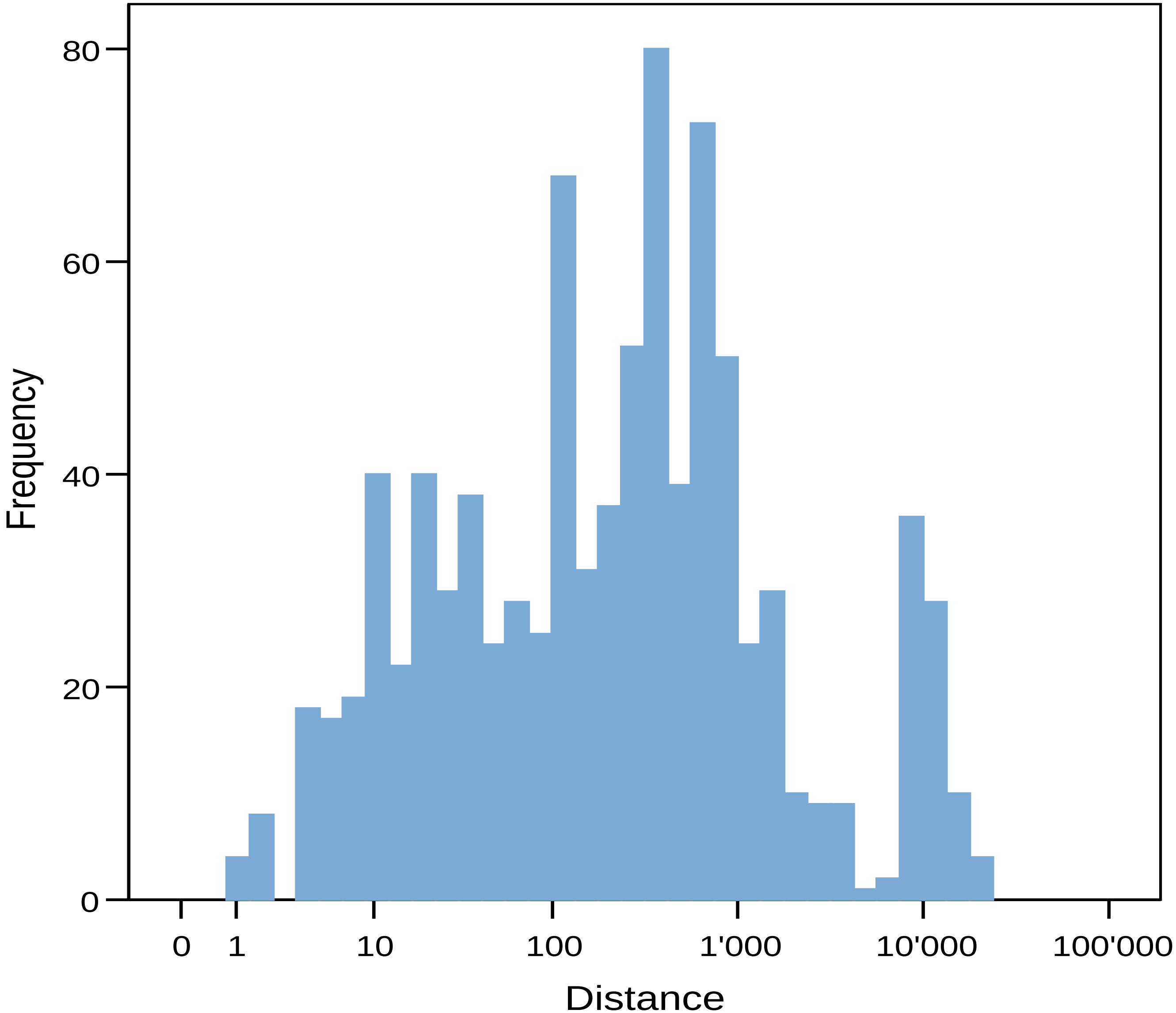
Poisson regression of the number of social contacts

Variable	Mean	St. dev	Beta	Standard-ised beta	Sign.
Constant	-	-	3.753	-	0.000
Age [years]	45.68	19.08	-0.051	-0.124	0.000
Age^2/1000 [$years^2$/1000]	2.44	0.09	0.401	0.102	0.000
Data_horizon [y/n]	0.19	0.39	-0.289	-0.015	0.000
Data_COST 355 [y/n]	0.57	0.50	-0.256	-0.016	0.000
Number of relocations [n]	5.82	2.74	0.037	0.013	0.000
University degree [y/n]	0.28	0.45	0.116	0.007	0.045
N	128				
Adjusted R^2	0.16				

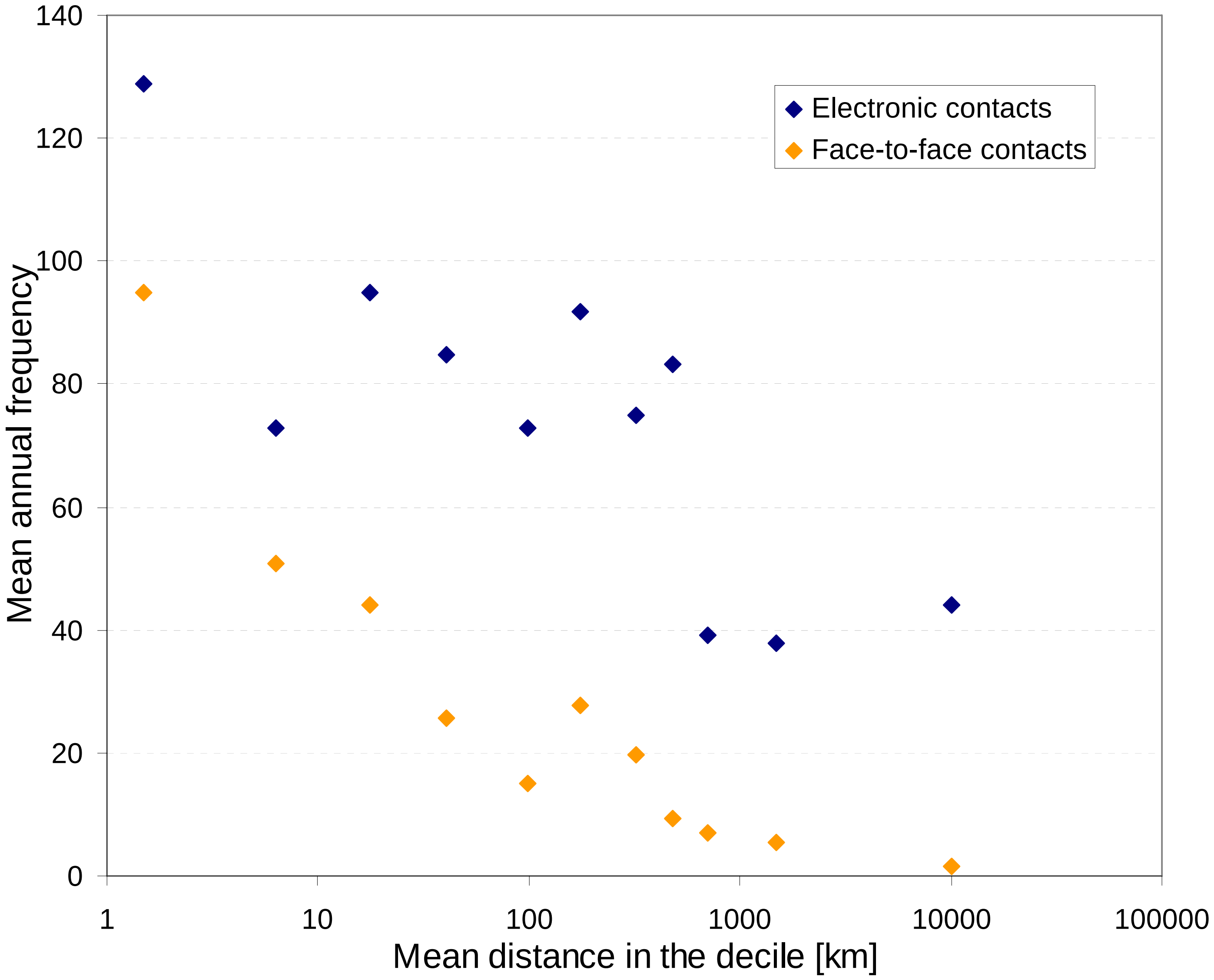
Current patterns: Distance to contacts (COST 355 only)



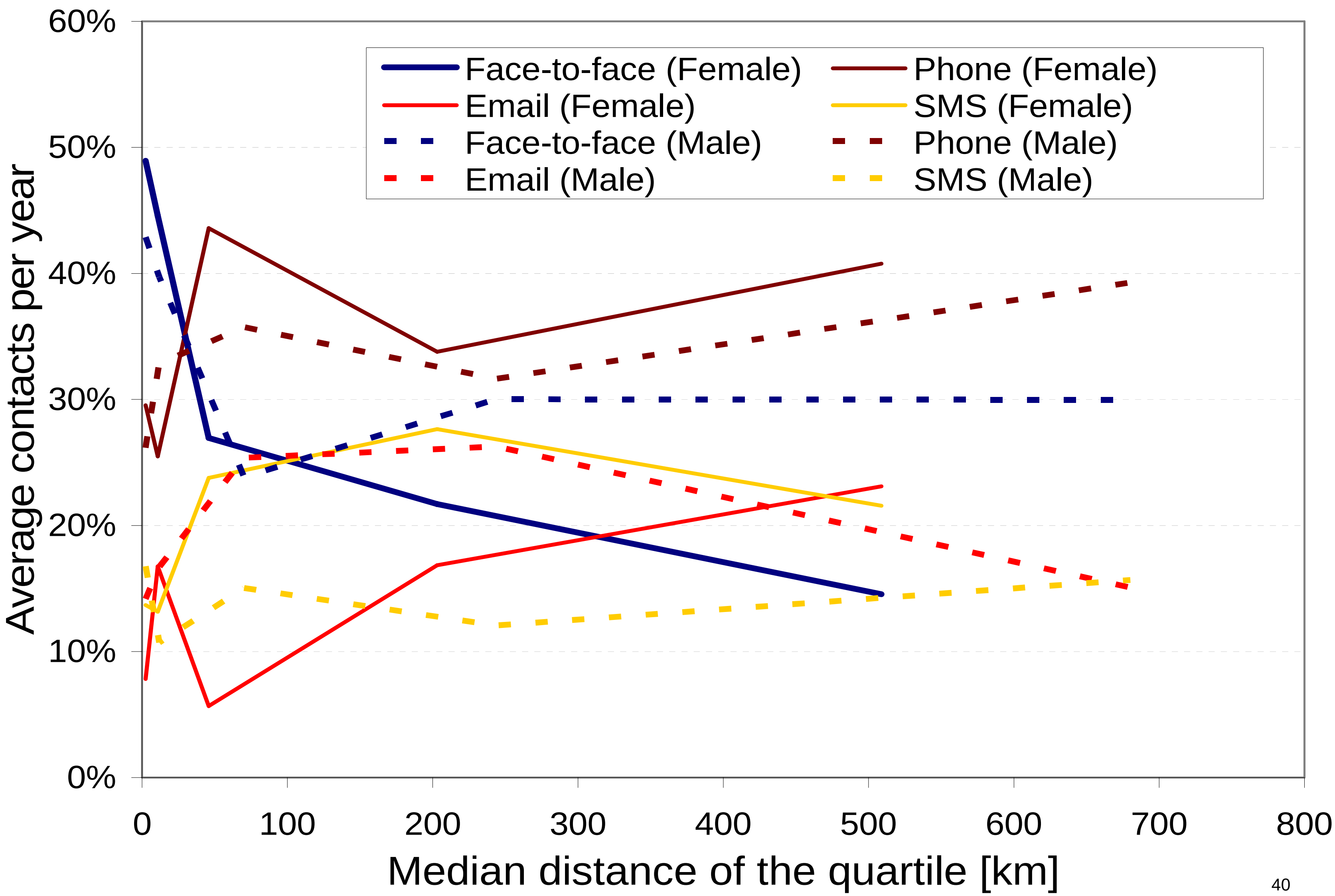
Distance distribution (subsample COST 355; ifmo; Horizon)



Contact frequency by mode



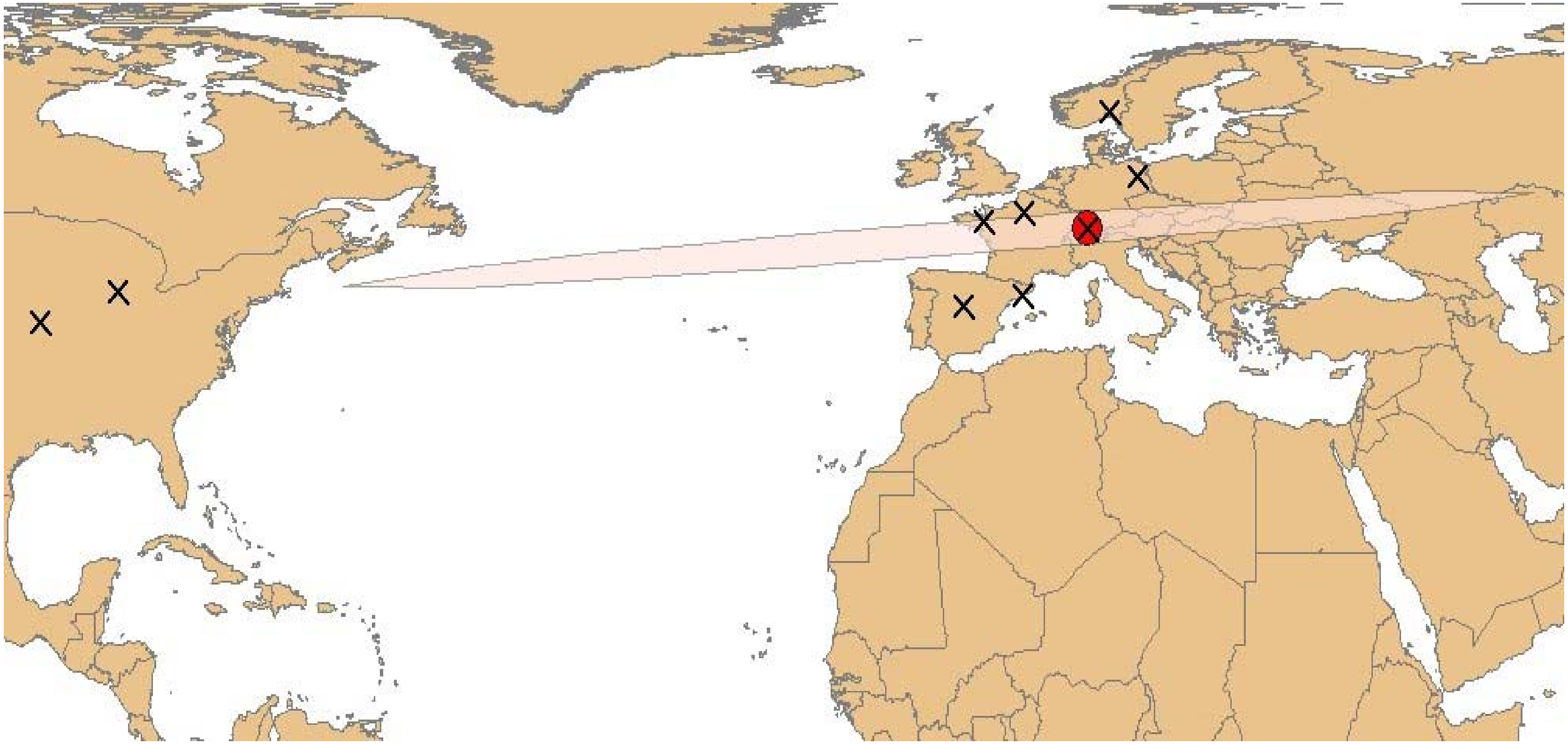
Market share by contact mode



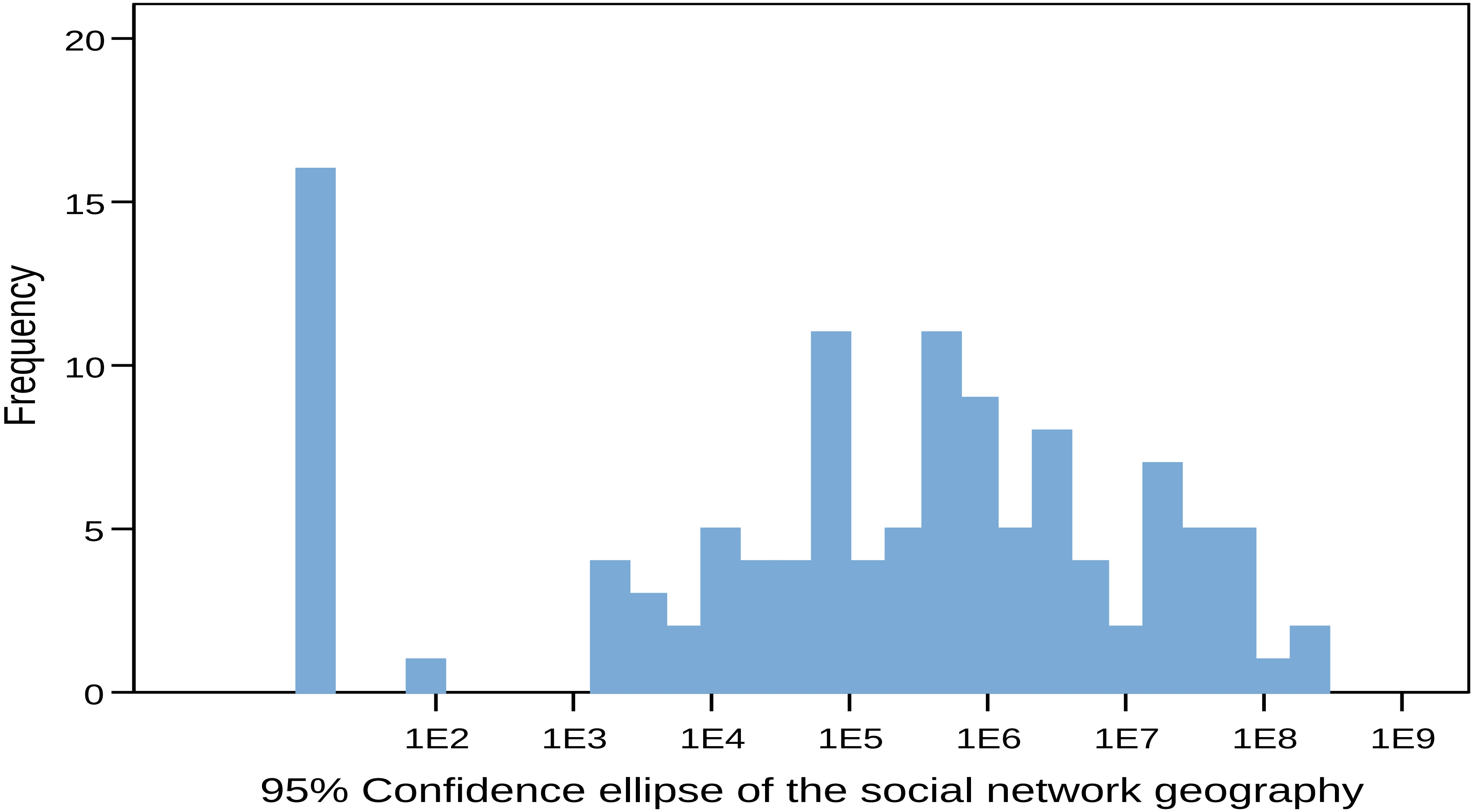
Probit results

Variable		Market shares of contact modes			
Category		Face-to-face	Phone	Email	SMS
Age		-.004	.004	.006	-.007
Sex: Male		-.127	-	.624	-.526
Educ-atio	Compulsory school	-.251	.186	.306	-.481
	Apprenticeship	-.171	.254	-.278	.086
	Baccalaureat	Reference	Reference	Reference	Reference
	Professional tertiary	-.384	.329	.106	-.092
	University degree	-.628	.915	-	-.587
Type of contact	Others and friends	.197	-.625	-2.126	-.459
	Family and partner	-	-.402	-2.344	-.355
	Work mates	.600	-1.055	-1.907	-.779
Ln (distance)		-.108	-	.132	0.31
Income		.028	-.048	.075	-.053
Income * Male		.048	-.021	-.138	.106
Adjusted R^2/Chi^2		10046	10235	13548	11690
N		381	381	381	381

Example geography of a 35 old female



Distribution of the social geographies (subsample)



Japan: 378; U.S.A: 9’629 [10^3 km^2]

Tobit results

Variable	Mean	St. dev	Beta	Standard-ised beta	Sign.
Data_ifmo [y/n]	0.26	0.43	2.309	0.184	0.048
Male [y/n]	0.57	0.50	2.293	0.212	0.021
Age [years]	44.72	18.92	-0.078	-0.277	0.002
University degree [y/n]	0.28	0.45	2.286	0.192	0.047
Car ownership [y/n]	0.52	0.50	3.842	0.358	0.000
Annual or monthly public transport ticket [y/n]	0.90	0.32	6.585	0.398	0.000
Number of relocations [n]	5.87	2.74	0.634	0.325	0.000
N	117				
Adjusted R^2	0.48				

Conclusions: Measurement

- Combined face-to-face interviews as a expensive but practicable survey method

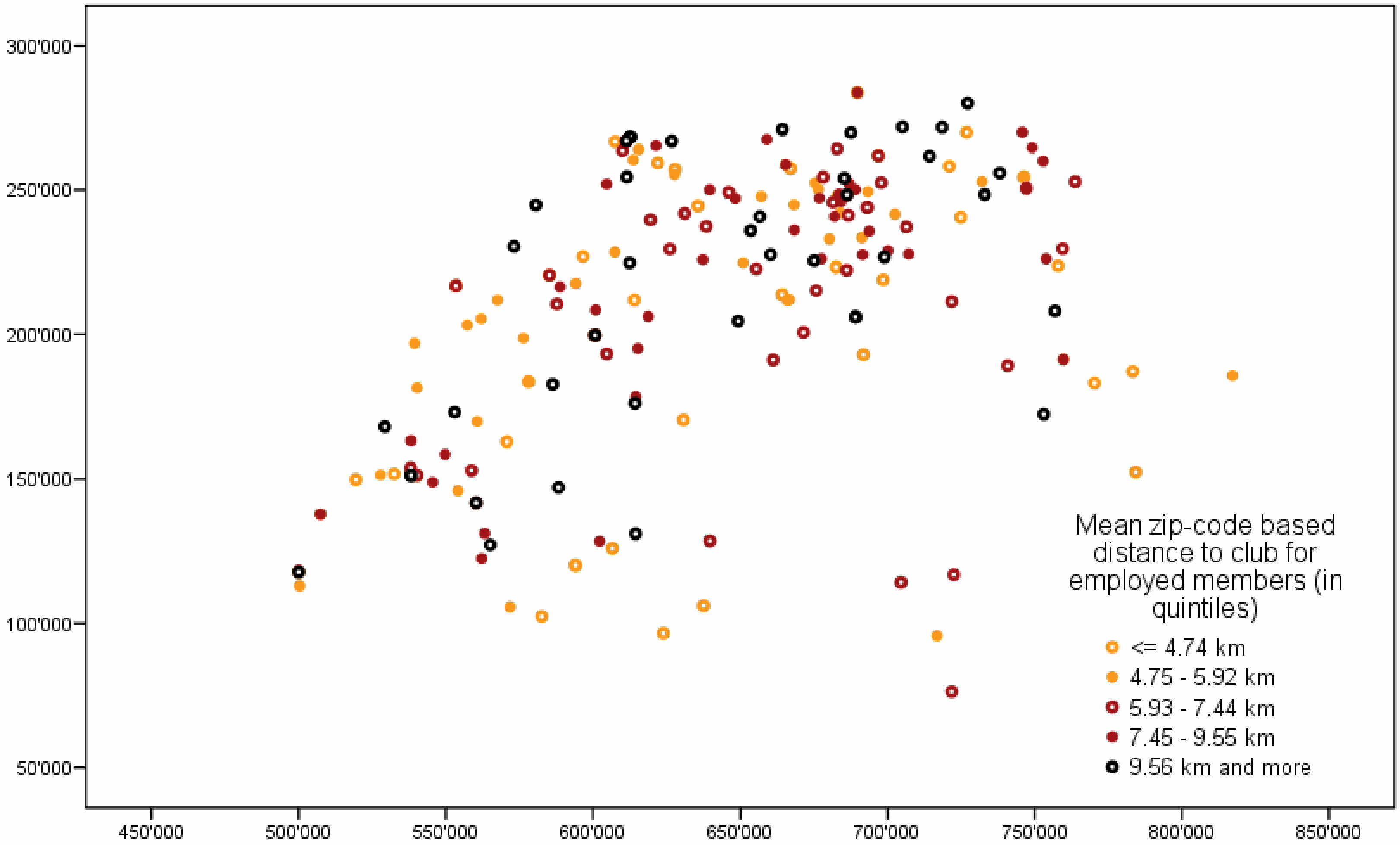
- Size of social geographies can be explained to some extent with the biographies and the socio-demographics

Policy implication

The planning fetish „neighbourhood", „community"

Perry, 1929

Status: Weekly meeting of service clubs



Status

The networked actors have chosen:

- To mix local and non-local contacts
- Maintain face-to-face contacts across the whole distance range
- Other modes of contact complement/substitute
- Maintenance of the personal social capital needs „leisure“ travel
- Current levels of social capital are tied to current cost structures

Implications of the non-local-bias of the networks

- Stronger selectivity of social contacts
- Higher „productivity“ of the social contacts maintained
- Less need to risk „investment“ on new contacts

Implications of the non-local-bias of the networks

- Local social action is more difficult to maintain or initiate
- Shift from a municipal to a regional understanding of “place”
- Recruitment biases for local (regional) policy makers

Implications of the non-local-bias of the networks

- Defines relatively high levels of skills and income to be perceived as being able to „keep up with Joneses“
- Increased chances of involuntary segregation (“social exclusion”)
- Less efficient local labour markets, more efficient regional labour markets

Implications of the non-local-bias of the networks

Likely lack of knowledge of immediate neighbours

Likely perception of a lack of safety in the immediate environment

Lack of a basis for confidence in the immediate environment

Local anomie should c.p. result in:

- Investment in personal safety (car ownership, „gating“, „fortification“)
- Reliance on market-produced third-party safety provision (policy, private security services)
- Reliance on market-produced third-party service provision (home care, longer opening hours of stores)

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