Preferred citation style for this presentation

Frei, A. (2006) Distance, mode and frequency of contact in egocentric social networks, *Cosmobilities Network Meeting 2007: Mobilities, space, and inequality*, Basle, September 2007.

Distance, mode and frequency of contact in egocentric social networks

A Frei

IVT
ETH
Zürich

September 2007

Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Project team

- COST 355 – A. Frei and KW Axhausen
- ifmo, Berlin – T. Ohnmacht, A Frei and KW Axhausen
- Horizon-Programme (UK DfT) – J Larsen, J Urry and KW Axhausen

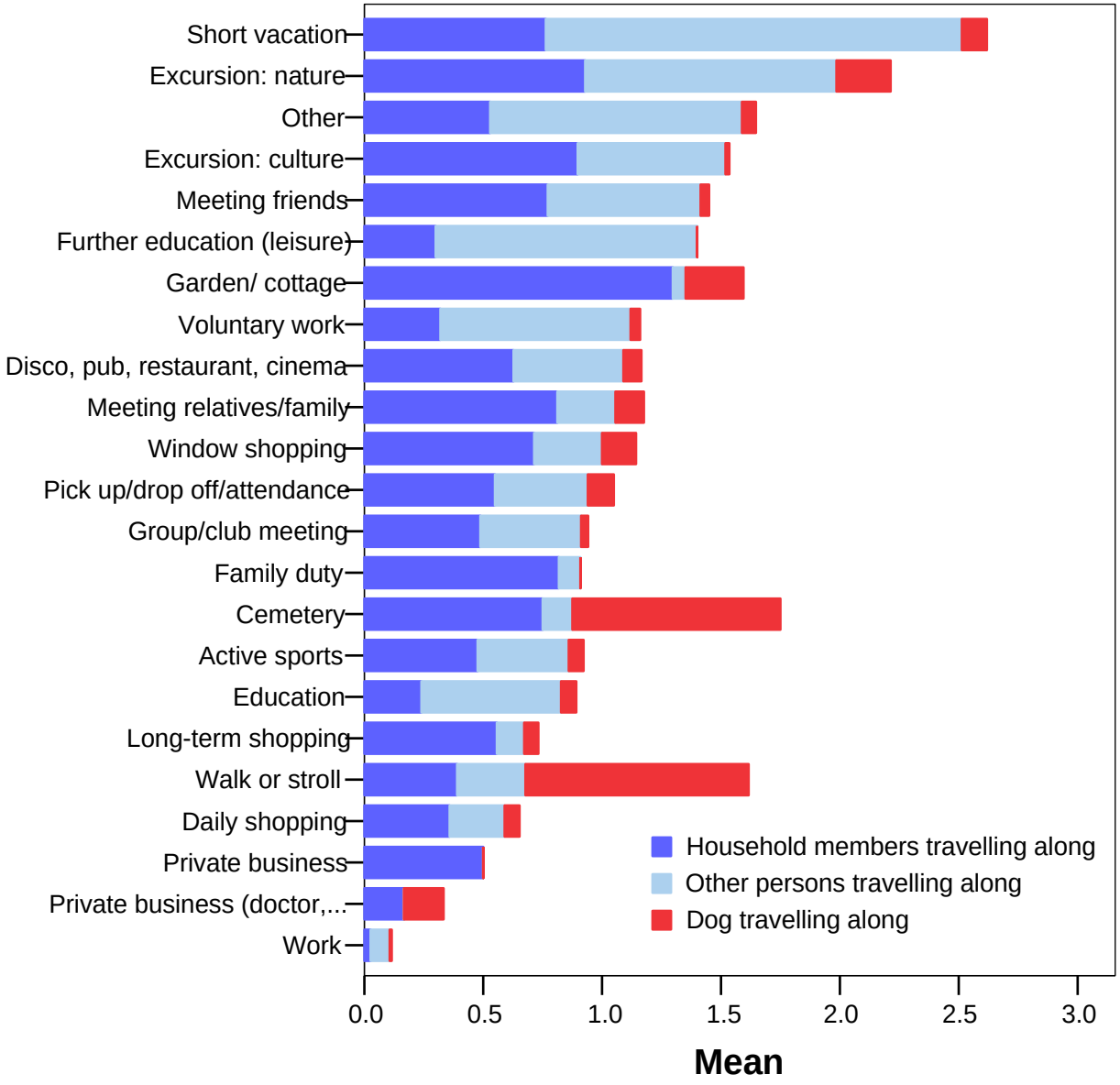
How to explain travel ?

- Distribution of activities
- Distribution of land use patterns

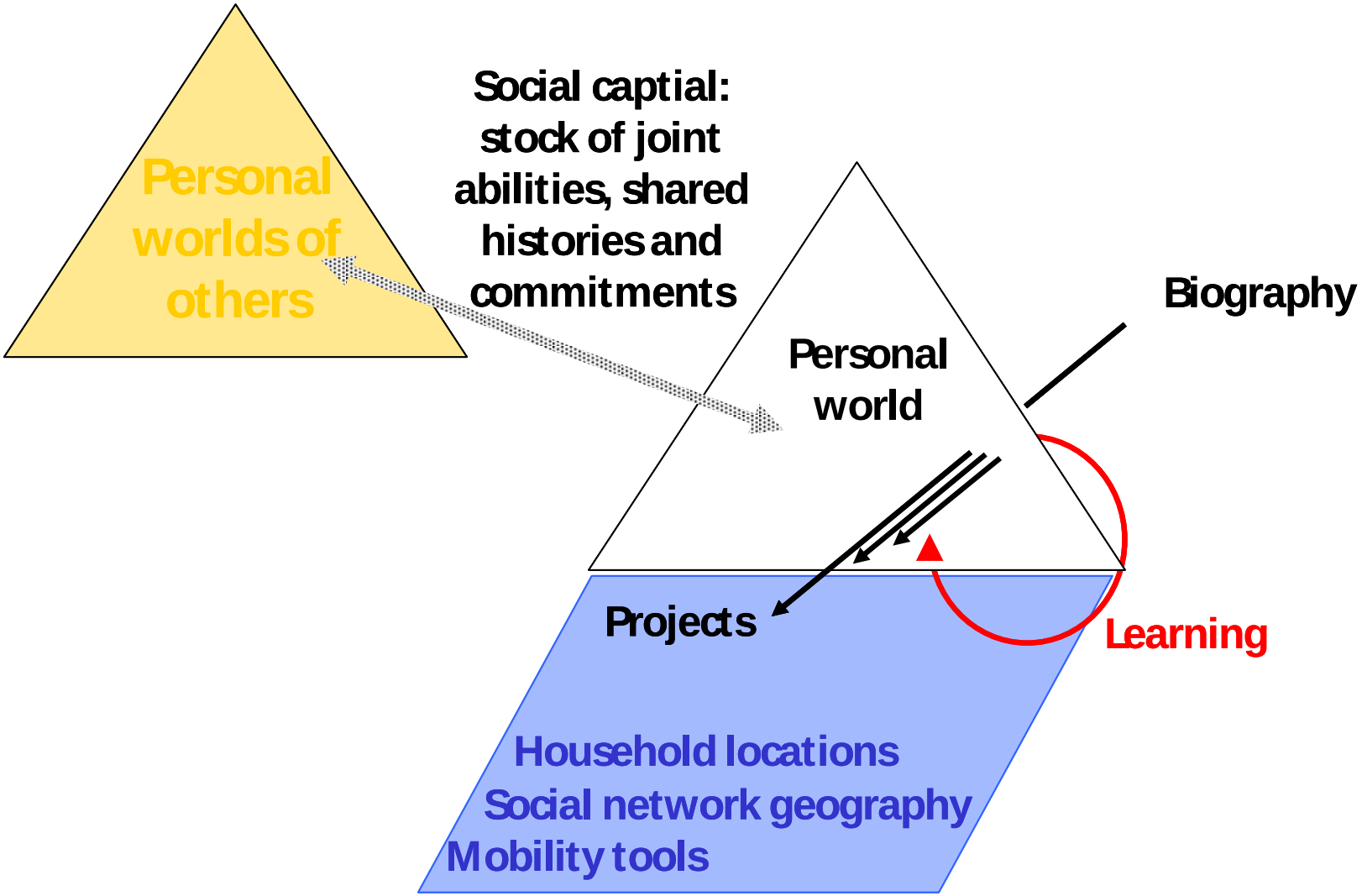
- Generalised costs on the available infrastructure

- Budget constraints
- Capability constraints

Number of accompanying travellers (2003 Thurgau)



Context: Networked actor



Items to capture the social network geographies

- Name generators
- Name interpreters
  - Type and length of contact
  - Frequency by mode of contact
  - Home location
  - Description of the last face-to-face contact

Items to characterise the mobility biography

- Home and second home locations
- Work and school locations
- Household composition
- Mobility tools
- Income

Representativeness of the data

Variable	Survey Mean	Population Mean	Difference
Age	50.76	46.90	+8.2%

Variable	Survey Share	Population Share	Difference
Males	43.6%	46.4%	-2.80%
Education			
N.A.	5.2%	2.6%	2.60%
Obligatory schooling	8.0%	12.5%	-4.50%
Vocational training	31.8%	42.3%	-10.50%
Highschool diploma	8.3%	9.2%	-0.90%
Further technical training	20.8%	15.6%	5.20%
University degree	26.0%	17.8%	8.20%
Car available			
Always	44.6%	42.8%	1.80%
Frequently and rarely	17.0%	18.4%	-1.40%
Public transport season tickets			
50% discount card (Halbtax)	49.5%	37.9%	11.60%
National season (GA)	24.6%	14.2%	10.40%
Regional season	13.8%	18.7%	-4.90%

As observed in the Microcensus Travel 2005 (Bundesamt für Statistik und Bundesamt für Raumentwicklung, 2007)

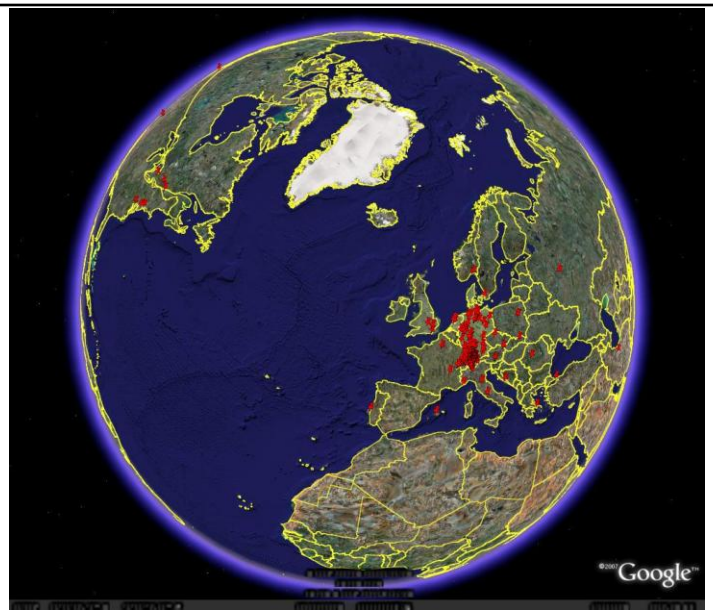
Comparison of the instrument

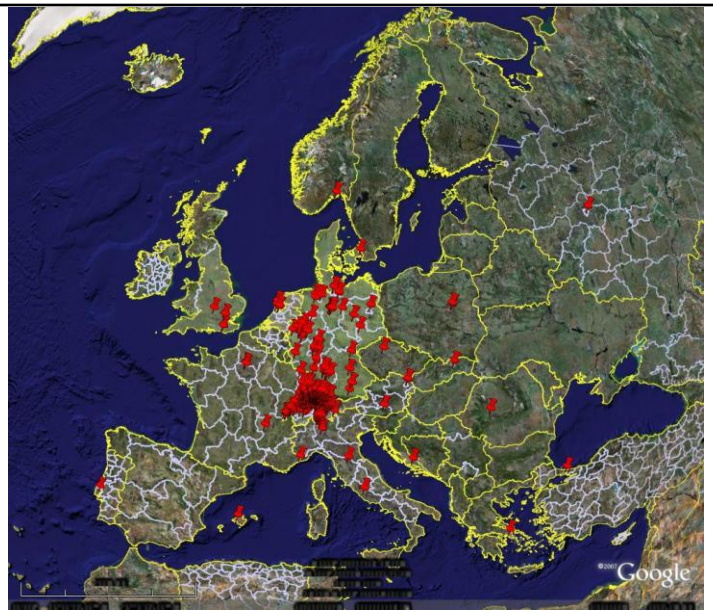
Variable	East York	NCCS	GSS	IVT
Instrument				
Name-generator	1 prompt (feel close to)	11 prompts	1 prompt (discuss important matters)	4 prompts
Generator limitation	6	No limitation	5	No limitation
Ego-centric network				
Size (Ø)	4.70	18.48	3.01	12.35
Share of relatives (Ø)	0.50	0.44	0.61	0.31
Share of weak ties (Ø)	0.18	0.32	0.23	0.48
Duration (Ø)	>10 for 57%	16	-	20.6
Contact freq. per year (Ø)	150.4	-	194.6	59.0

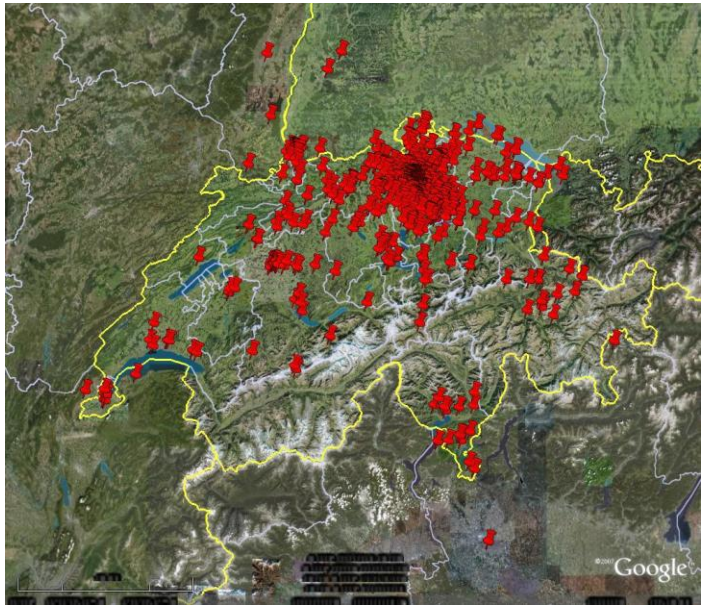
Negative binominal regression of the number of relationships

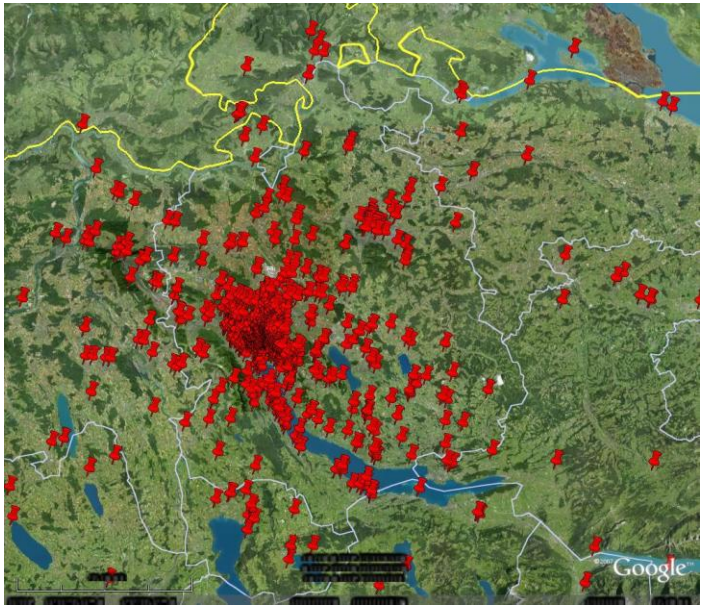
Variable	Mean	St.dev.	Beta	Sign.
Constant			3.092	0.000
Age [years]	53.283	19.163	-0.040	0.002
$Age^2/1000$ [$years^2/1000$]	3.208	2.081	0.352	0.005
Annual or monthly public transport ticket [y/n]	0.853	0.893	0.242	0.042
Number of relocations []	5.963	3.116	0.038	0.003
University degree [y/n]	0.247	0.430	0.178	0.055
Part time employed [y/n]	0.170	0.382	-0.256	0.020
Retiree [y/n]	0.327	0.469	-0.302	0.045
Children < 18 y [y/n]	0.250	0.434	0.177	0.021
N	300			
Adjusted R^2	0.13			

Geocoded home locations

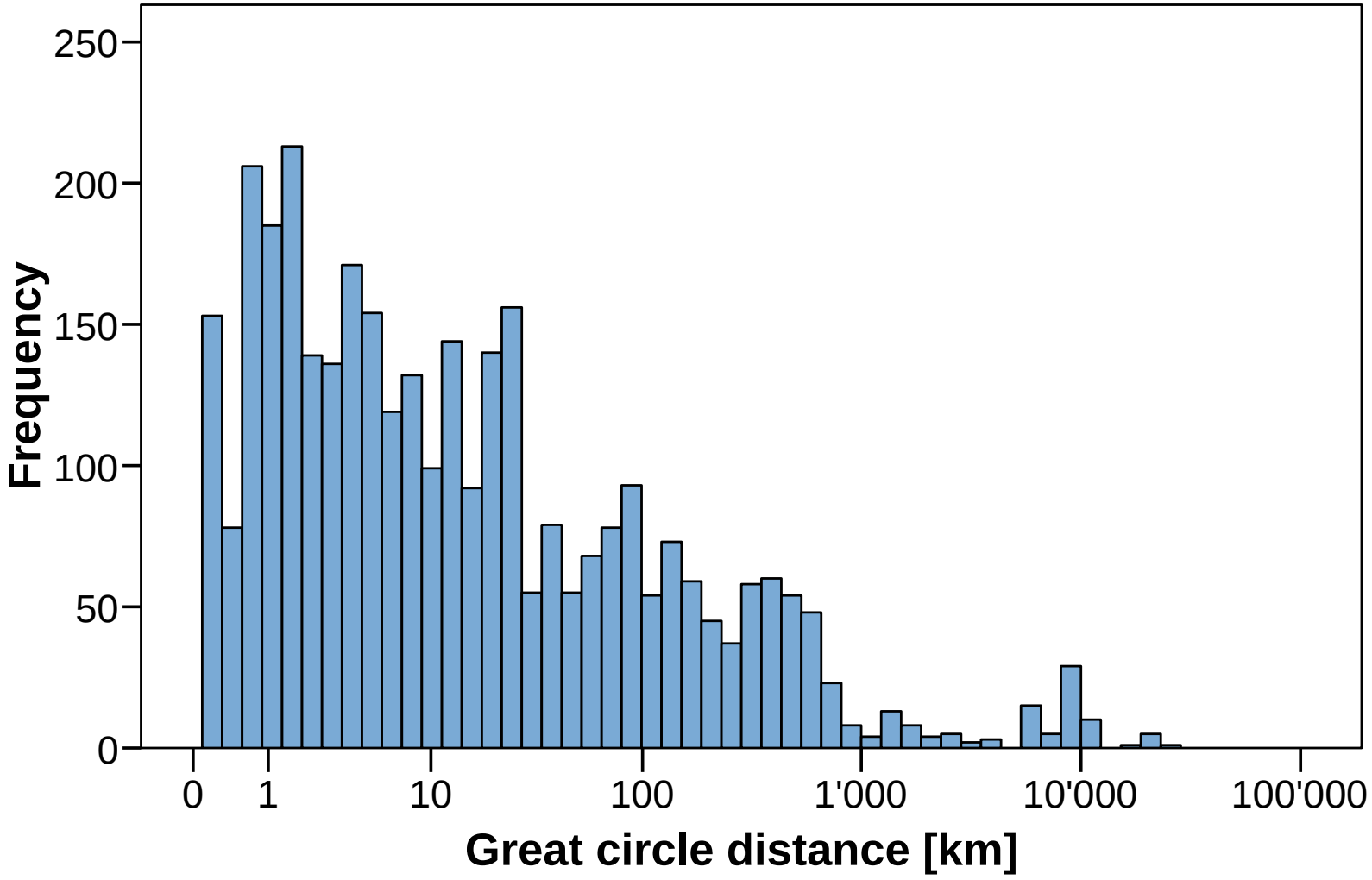




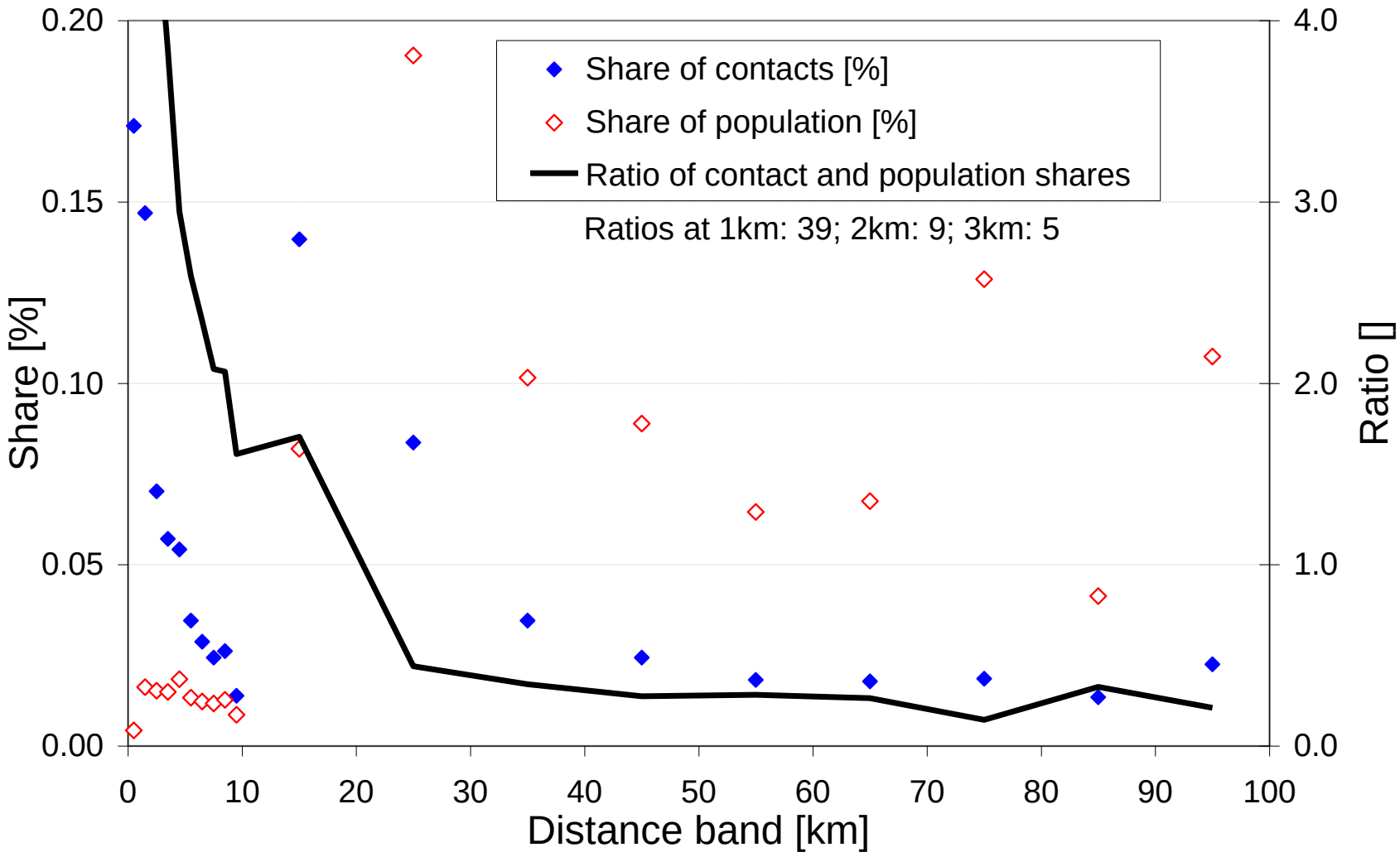




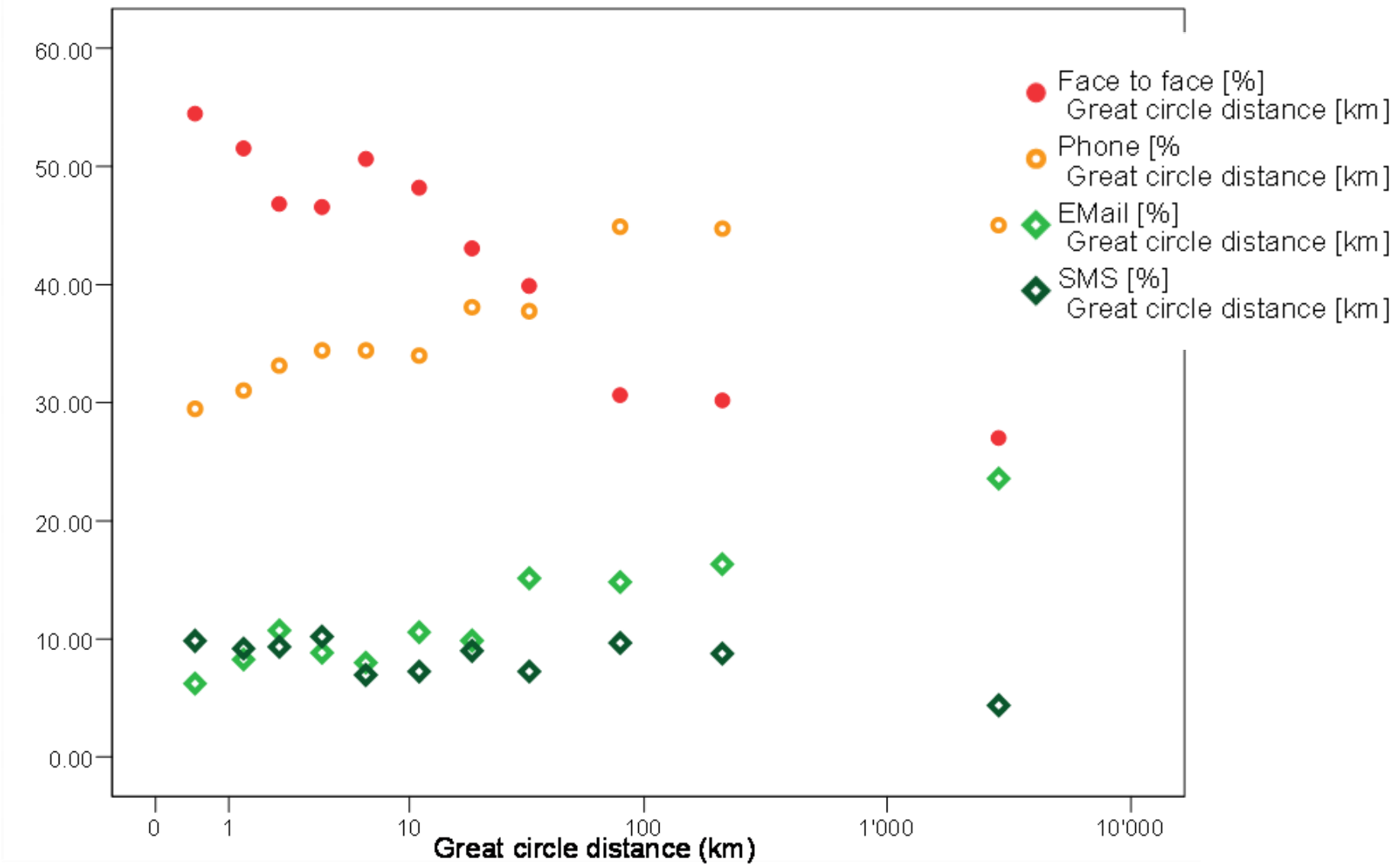
Distance distribution



Contacts and population shares by distance band around Zürich



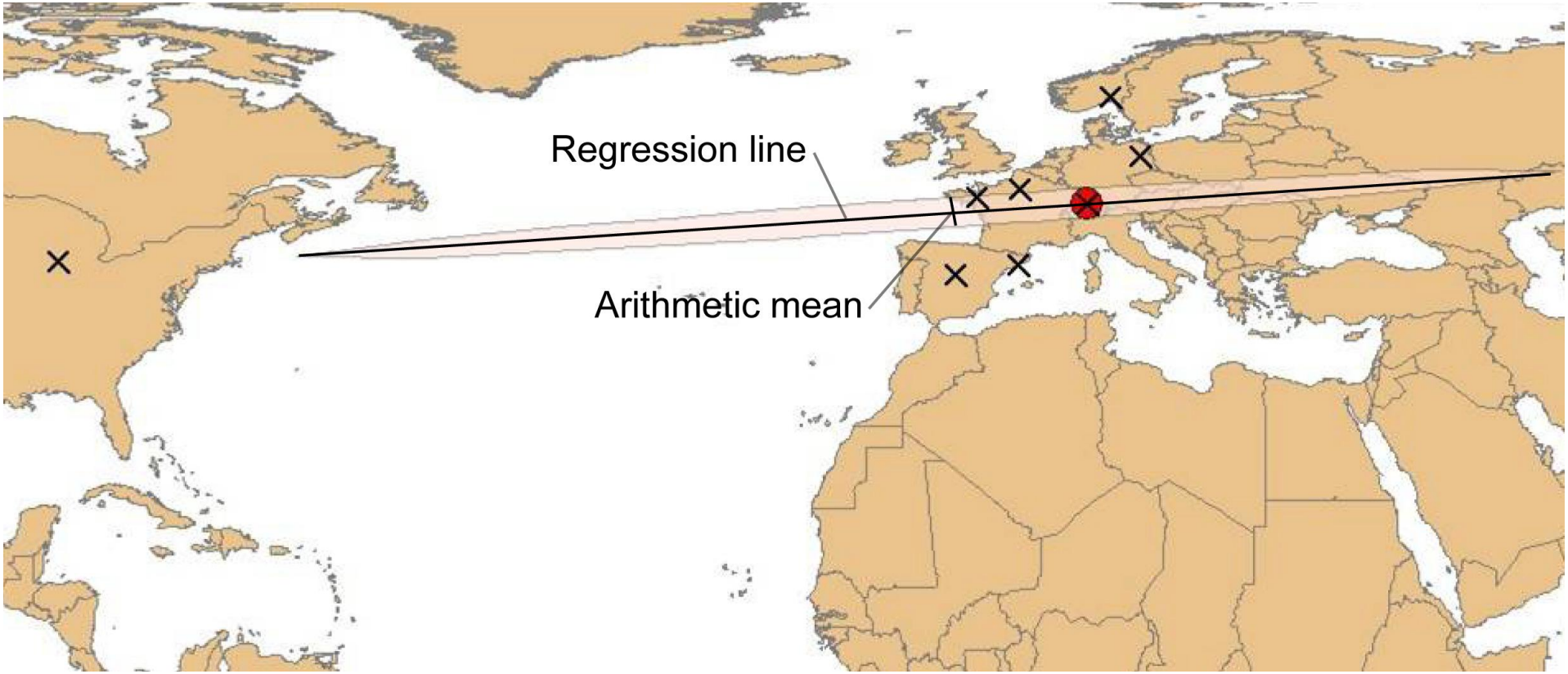
Market share by contact mode



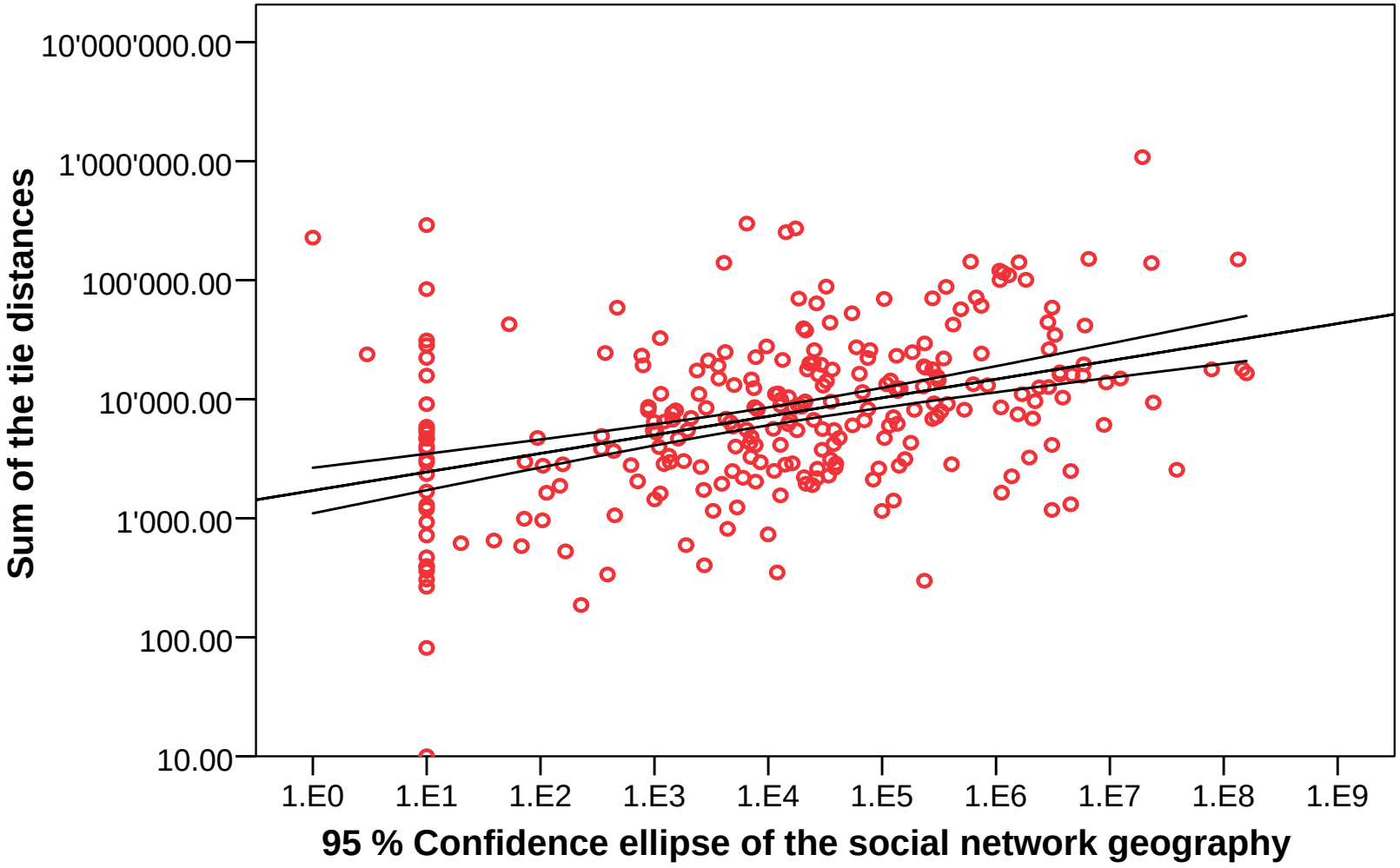
Market share elasticities

Variables	Face-to-face	Phone	SMS	Email
Duration of contact	-0.01	0.15	**-0.34**	**-0.43**
Within 2.5km of respondent	**0.04**	0.00	**-0.12**	**-0.09**
Ln(Great circle distance)	**-0.19**	0.09	**-0.35**	**0.34**
Workmate	**-0.06**	0.00	0.04	**0.10**
Family member	**-0.06**	**0.05**	0.01	-0.03
Under 30 years	0.00	-0.01	**0.08**	**-0.08**
30 to 44 years	-0.02	0.03	0.03	-0.04
60 years and older	**0.05**	**0.02**	**-0.29**	**-0.38**
Number of moves	**0.23**	-0.02	**-0.58**	**-0.41**
High school	**0.01**	**-0.03**	-0.01	0.02
Vocational training	0.05	**-0.06**	0.05	**-0.11**
More then 6000 sFr/month	0.05	-0.02	**-0.11**	**-0.12**
Driving licence	**0.13**	**-0.13**	-0.04	-0.04
Car always available	-0.04	**0.05**	-0.08	0.00
National season ticket	-0.03	0.01	-0.03	**0.07**

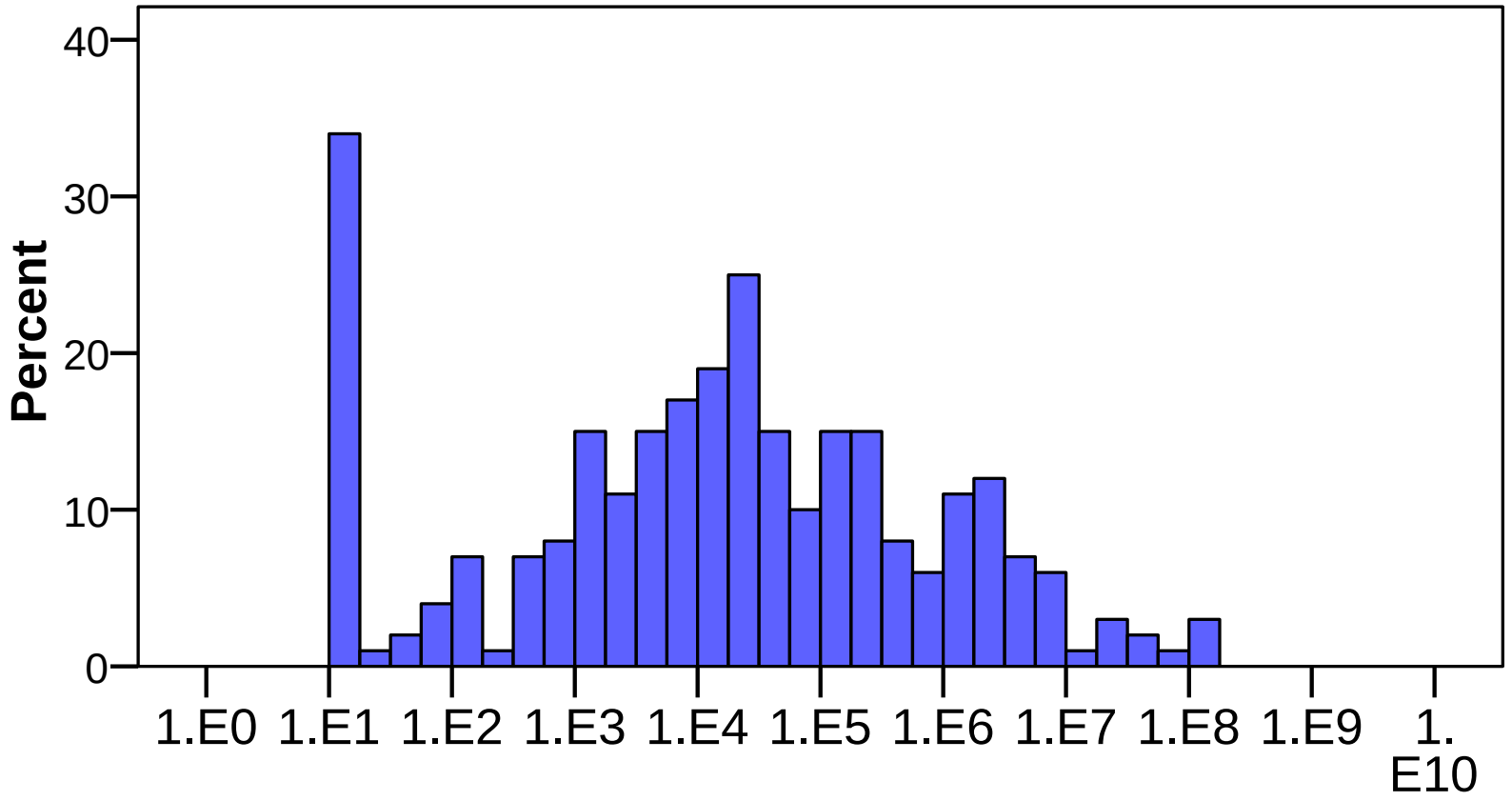
Confidence ellipse



Size of social geographies vs. Distance



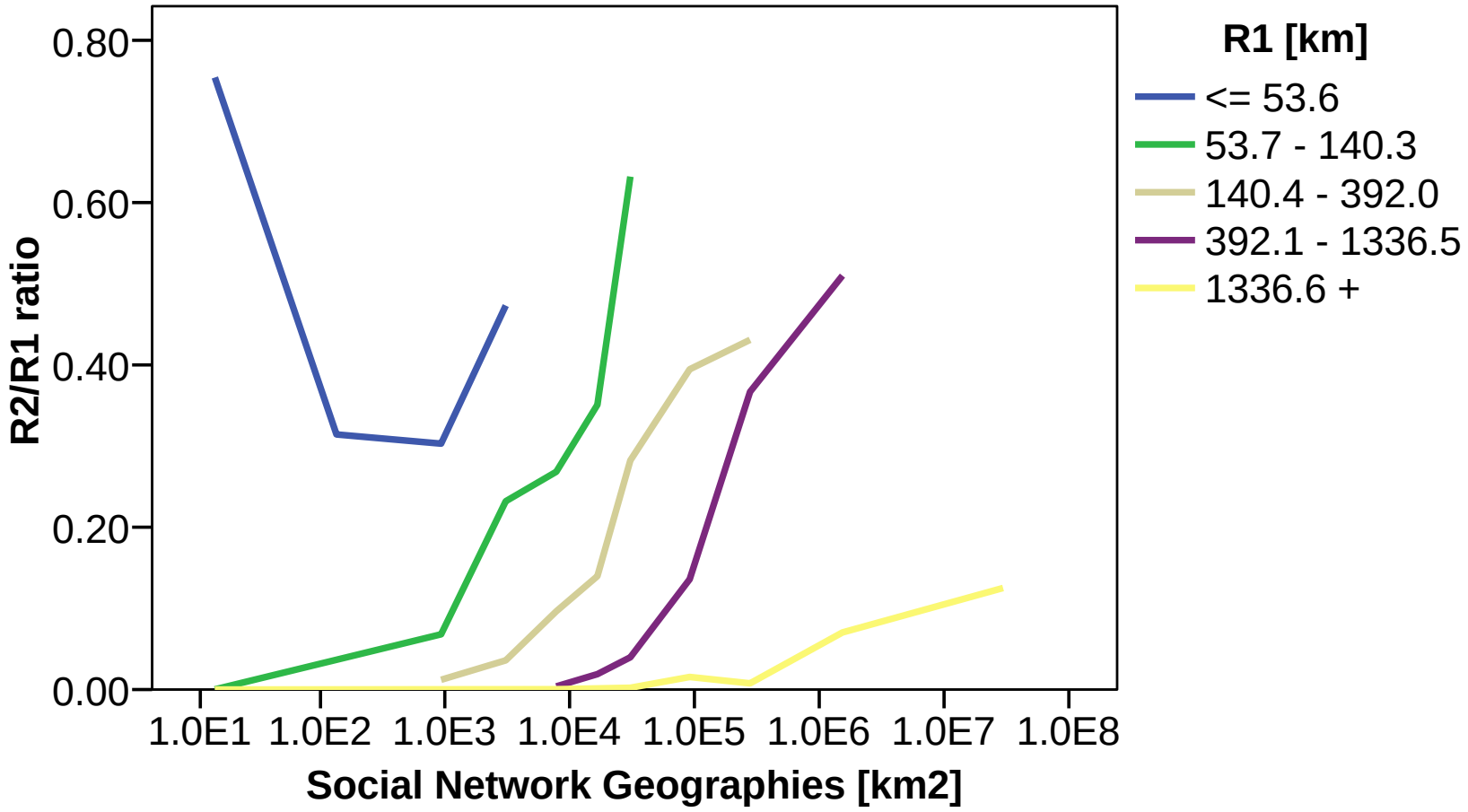
Distribution of the social geographies



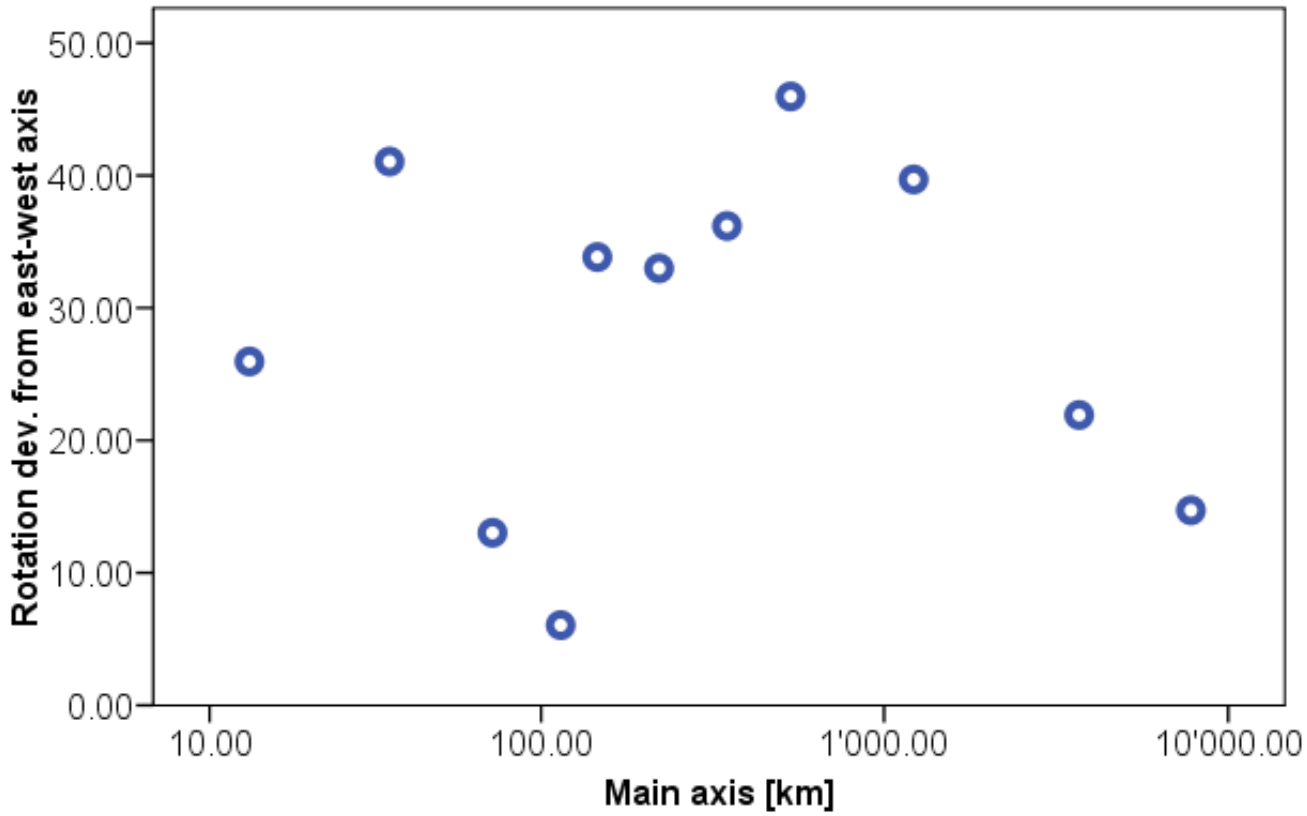
95%-confidence ellipse of the social network geography

Germany: 357; U.S.A: 9’629 [10^3 km^2]

Size vs. main/minor axis (R1/R2) ratio



Orientation of the social geographies



Only values from the 1st thirtile of the axis-ratio are shown (< 0.09).

Tobit regression of the Ln (social geographies)

			Tobit model	
Variable	Mean	St .dev.	Beta	Sign.
Constant	-	-	9.929	0.00
Age [years]	53.430	19.305	-0.296	0.00
$Age^2/1000$ [$years^2/1000$]	3.226	2.099	2.946	0.00
Car ownership [y/n]	0.472	0.500	1.609	0.01
Number of relationships []	12.406	8.454	0.201	0.00
Education/workplace changes []	3.336	2.475	0.289	0.02
Further technical training [y/n]	0.213	0.410	2.485	0.00
University degree [y/n]	0.245	0.431	2.617	0.00
Income >6000 sFr./month [y/n]	0.262	0.441	-1.643	0.028
N				286
Goodness-of-fit			Adjusted R^2=0.25	

Conclusions

- Today's possibilities makes it easy to include spatial components in measuring social networks
- Persons mix local, regional and international contacts for their social capital and their social life
- I&C technologies influences the contact selection by distance
- Size of social geographies can be explained to some extend with the biographies and the socio-demographics

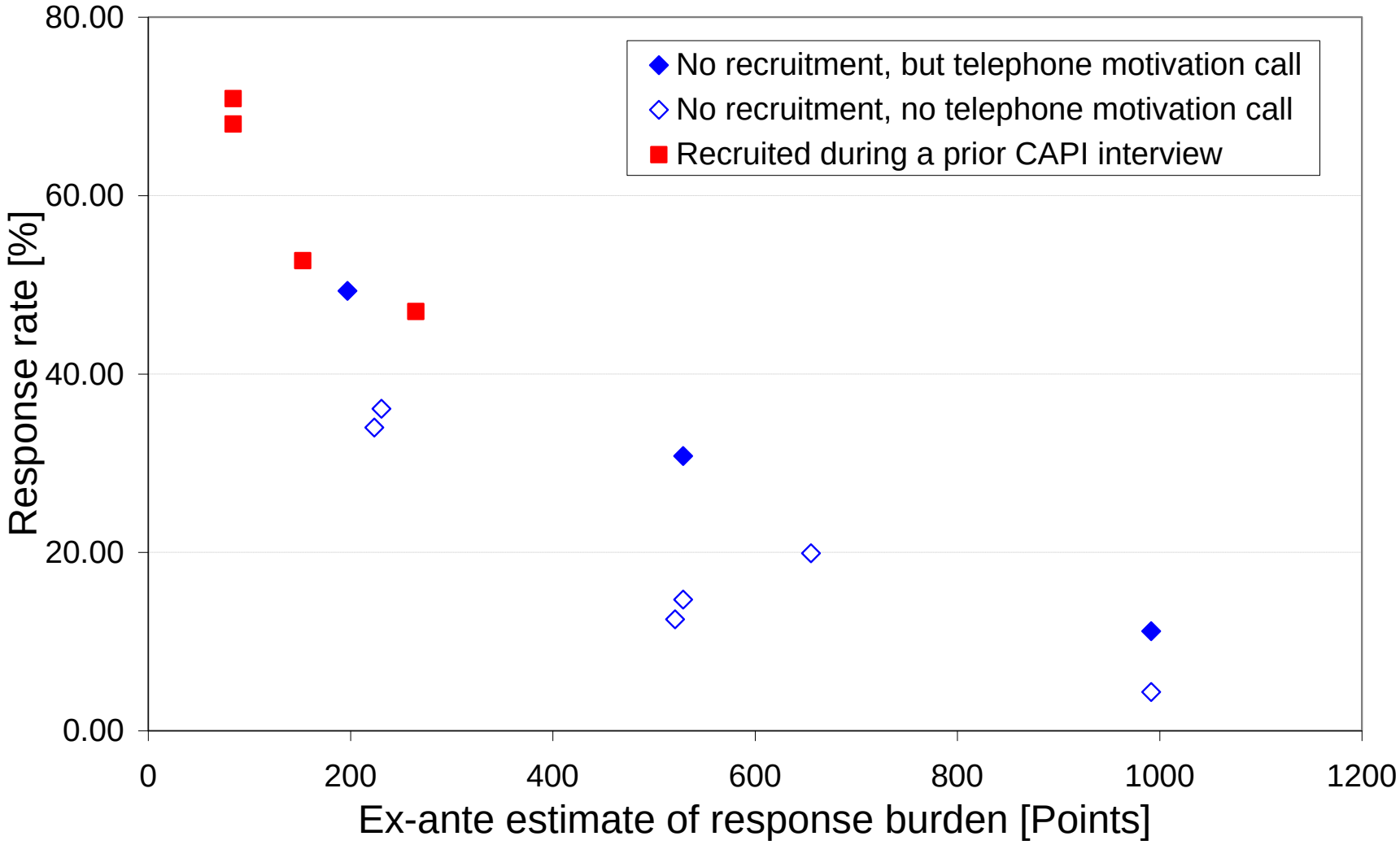
Appendix

Zürich experiment

Recruitment rates for survey on social networks and mobility biographies

Phase	Pretest	On-going main study	Share of total	Share of reached by phone
Sample	150	4’200	100%	
Wrong address	0	56	1.3%	
Not reachable by phone	36	1’486	35.3%	
Reached by phone	113	2’714	64.6%	100%
Recruited	14	318	7.5%	11.7%
Interviewed	13	305	7.3%	11.2%
Post-interview questionnaire returned	13	294	7.0%	10.8%

Response burden and response rate



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)

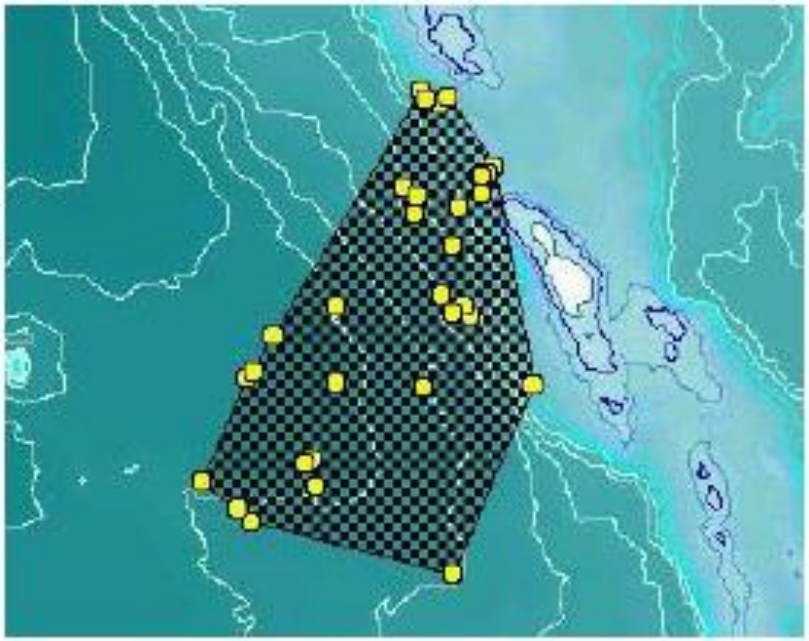
Semiparametric:

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

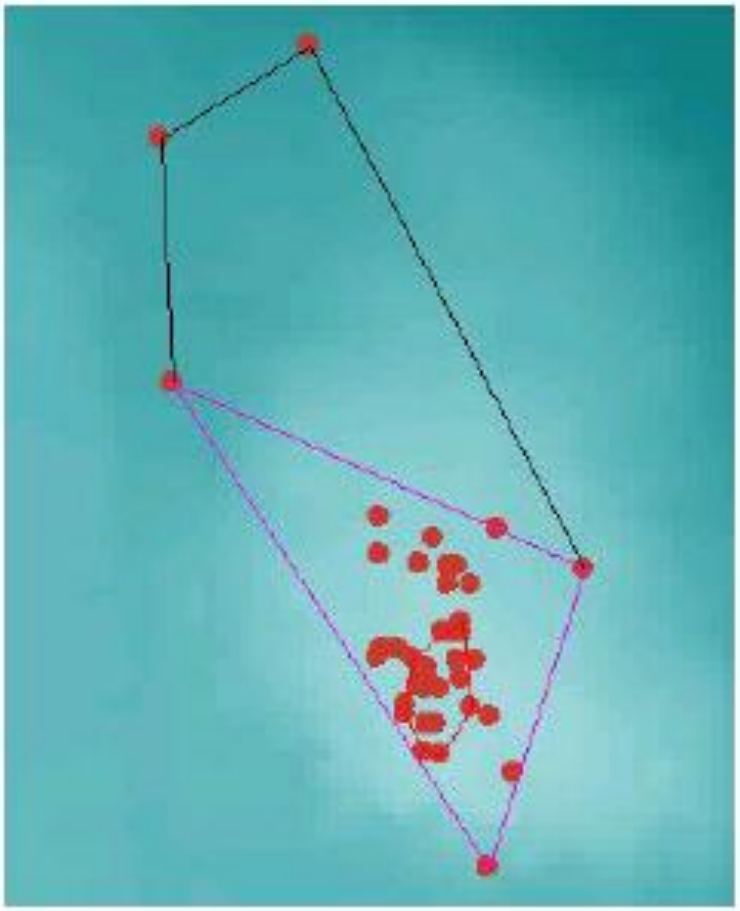
Assessment: Measuring activity spaces

- Wide-ranging distributed places can be measured with the confidence ellipse
- The symmetry of this measurement leads to too big spaces
- Inclusion geometries can relief the symmetry problem

Measures: Minimum convex polygons (MCP)



MCP

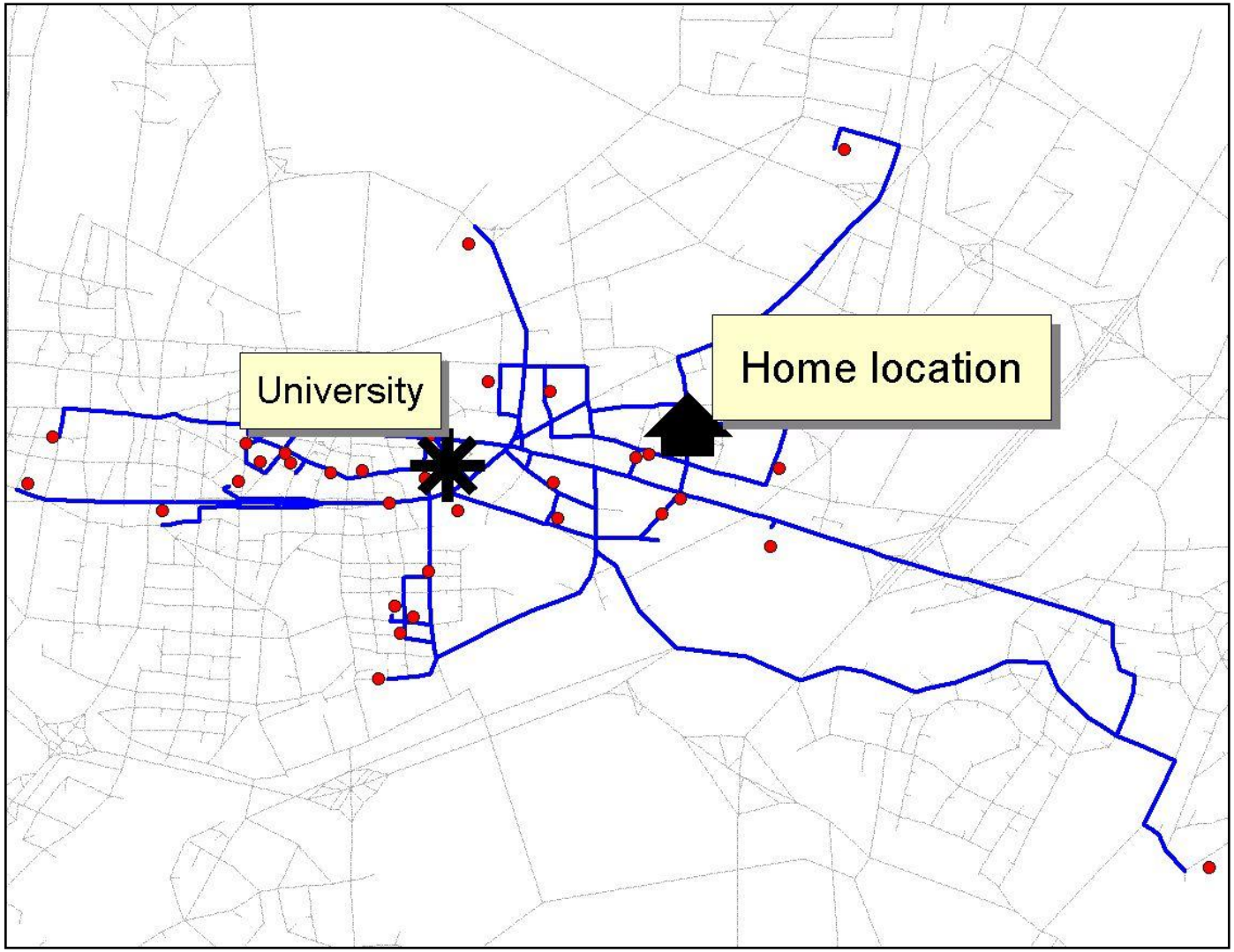


Percentage MCP

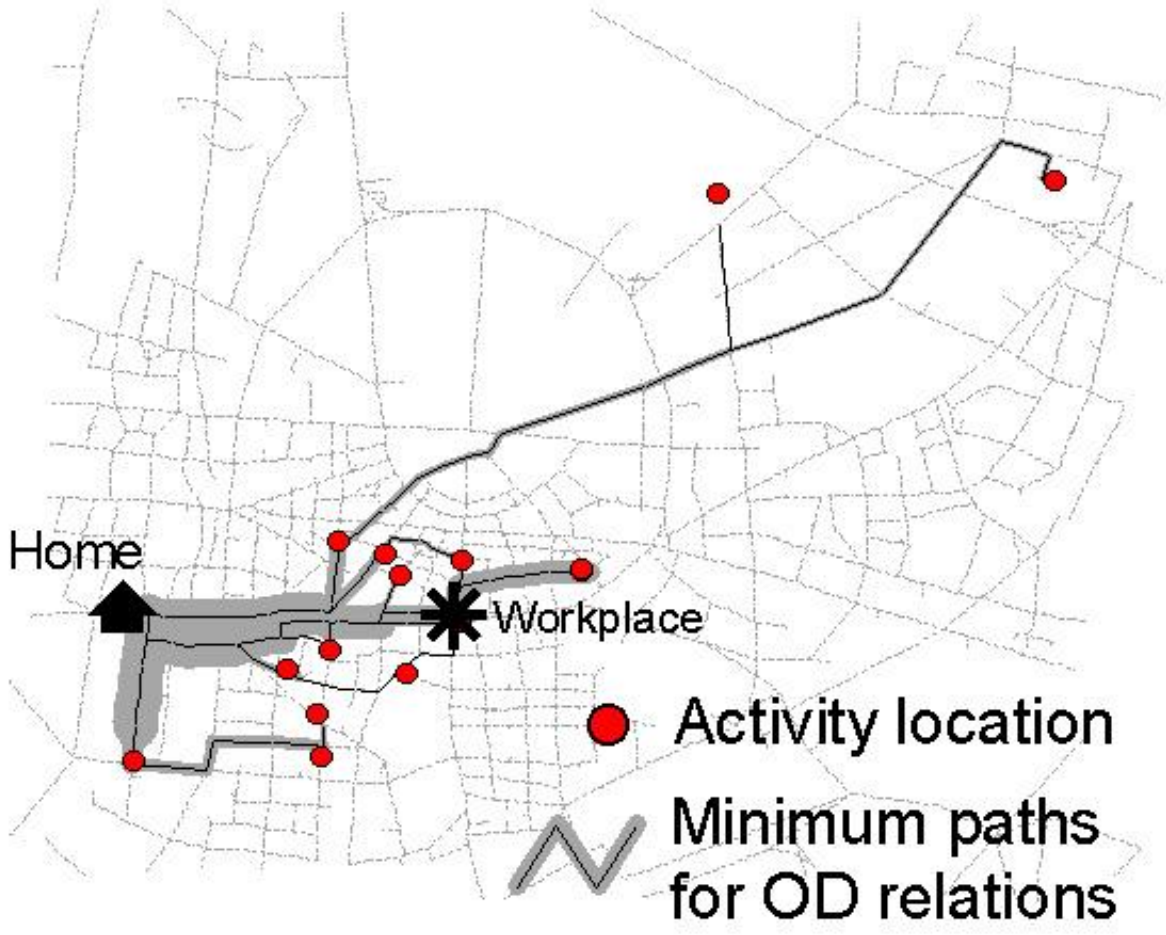
Measures: Kernel densities

Schönfelder, 2006

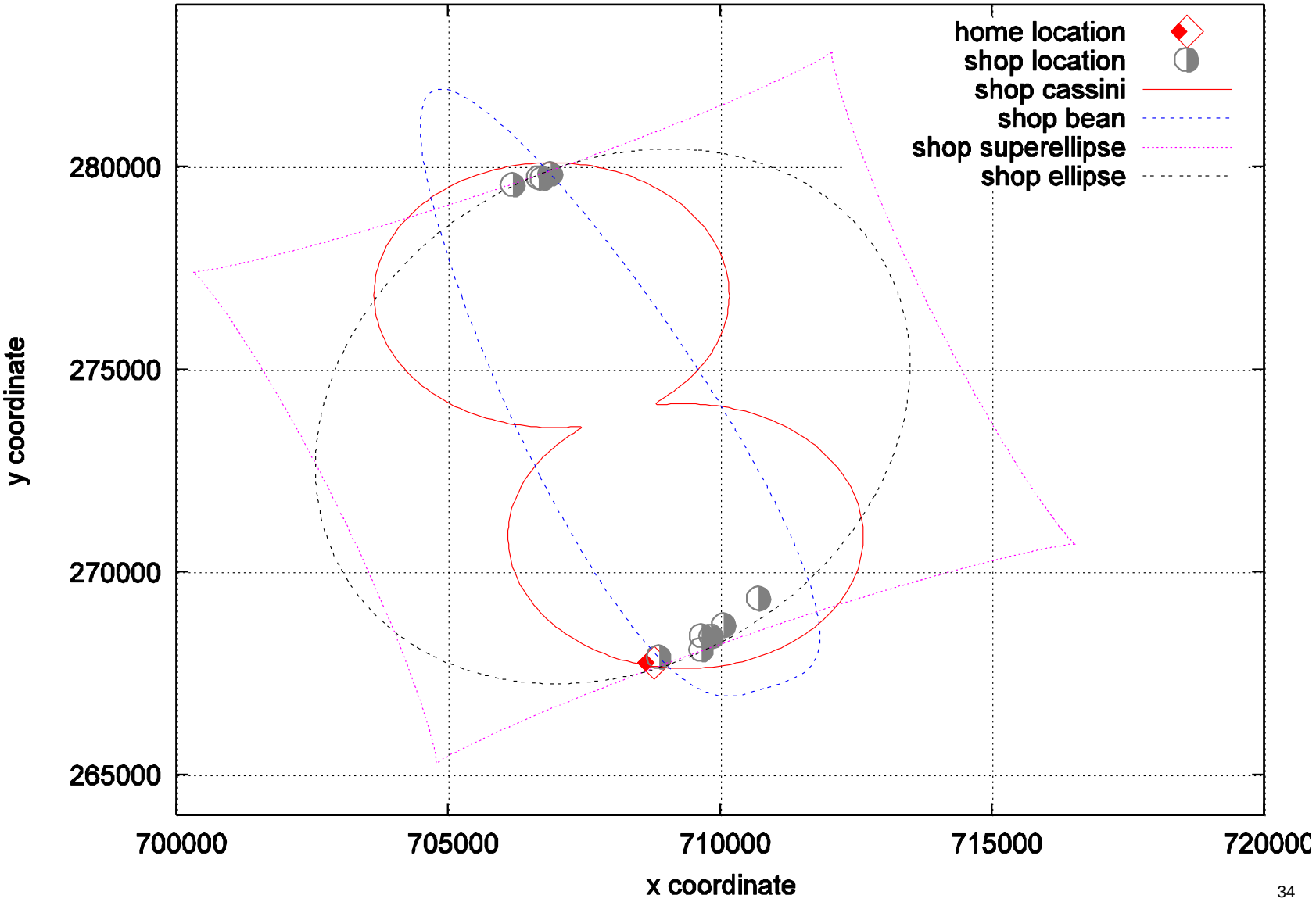
Measures: Shortest path network



Measures: Weighted shortest path network



Measures: Inclusion geometries



Example geography of a 35 old female