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Social networks and travel: Frequencies, modes and distances

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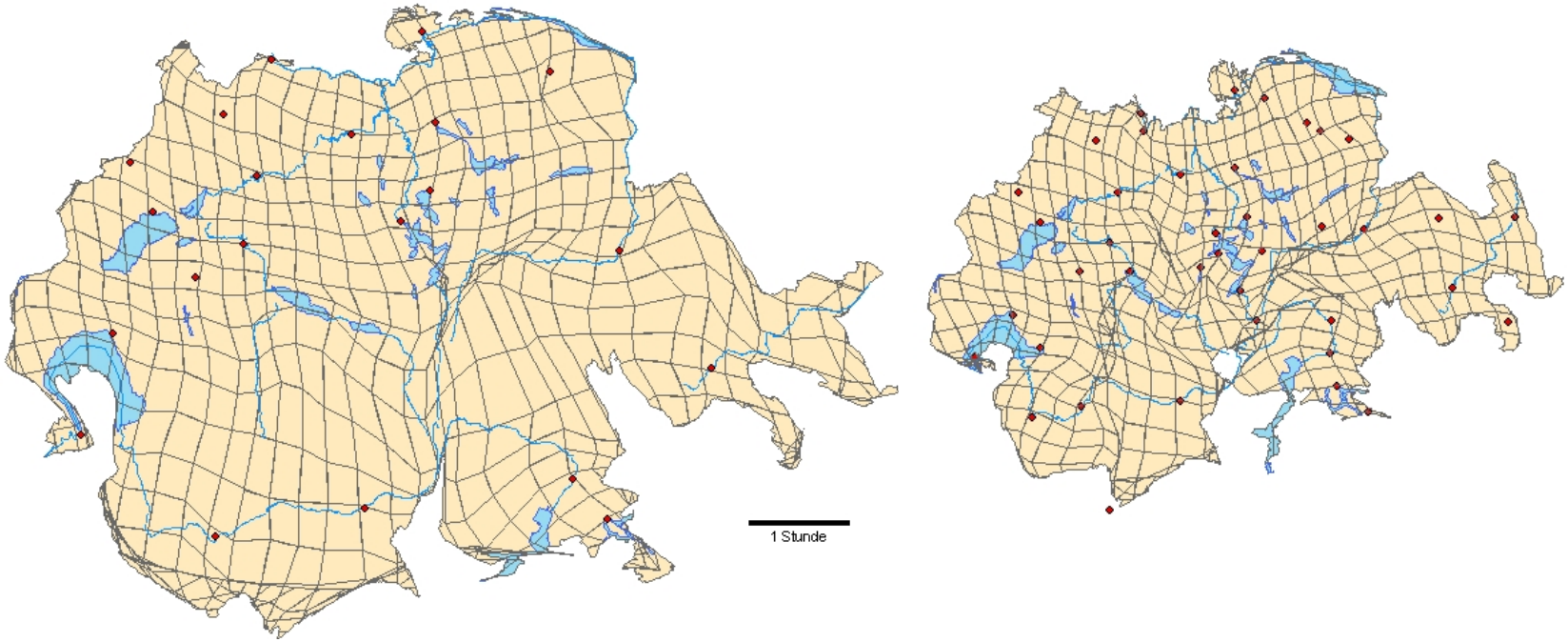
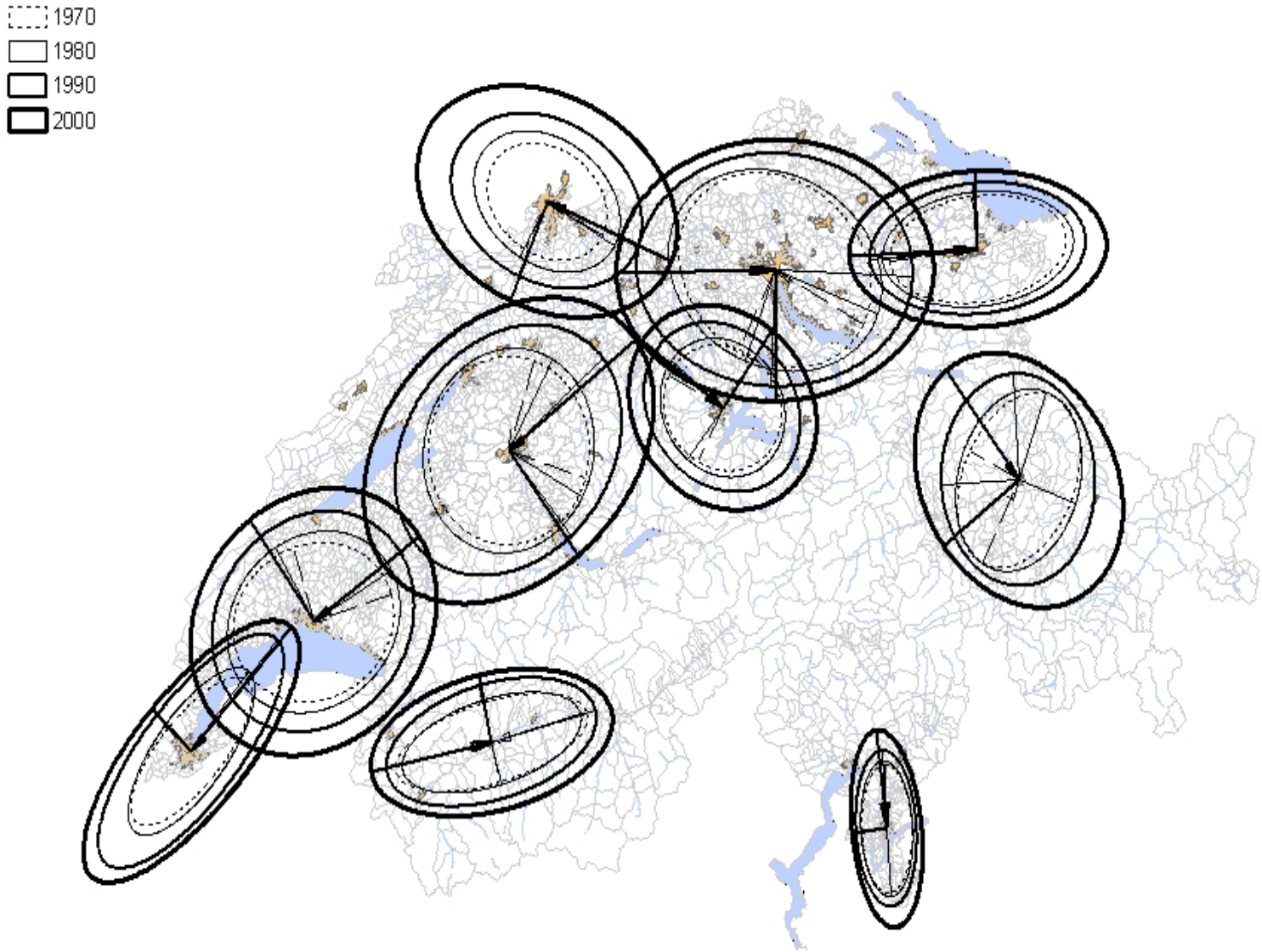
- J Urry, Lancaster University

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



Scherer, 2004

Trends: Swiss Suburbanisation since 1970



Adapted from Botte, 2003

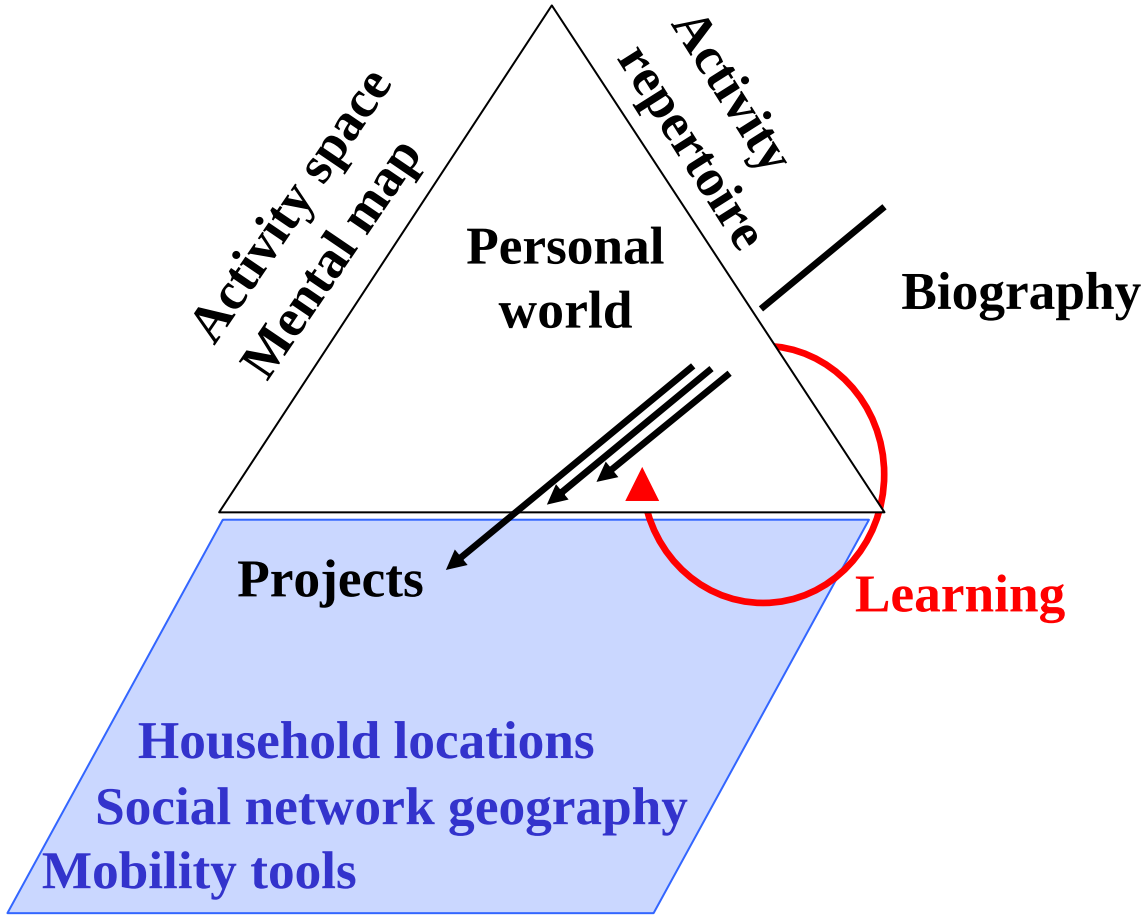
Research questions about „social networks“

- How many persons belong to them ?
- 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 ?
- How and how often are people in contact ?

Methodological questions

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

Concepts


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

What are the challenges ?

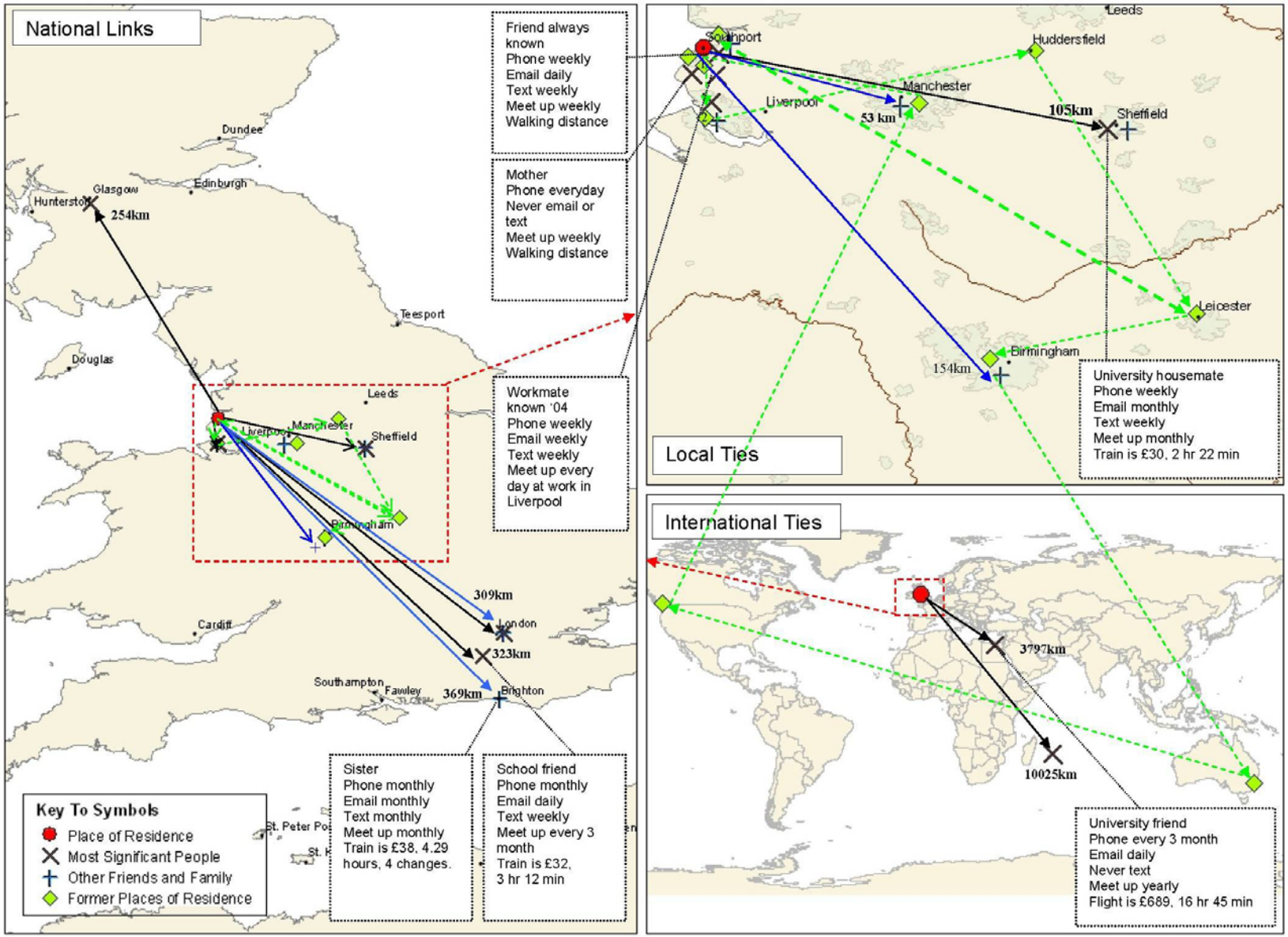
Personal world and social network geography:

- 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:

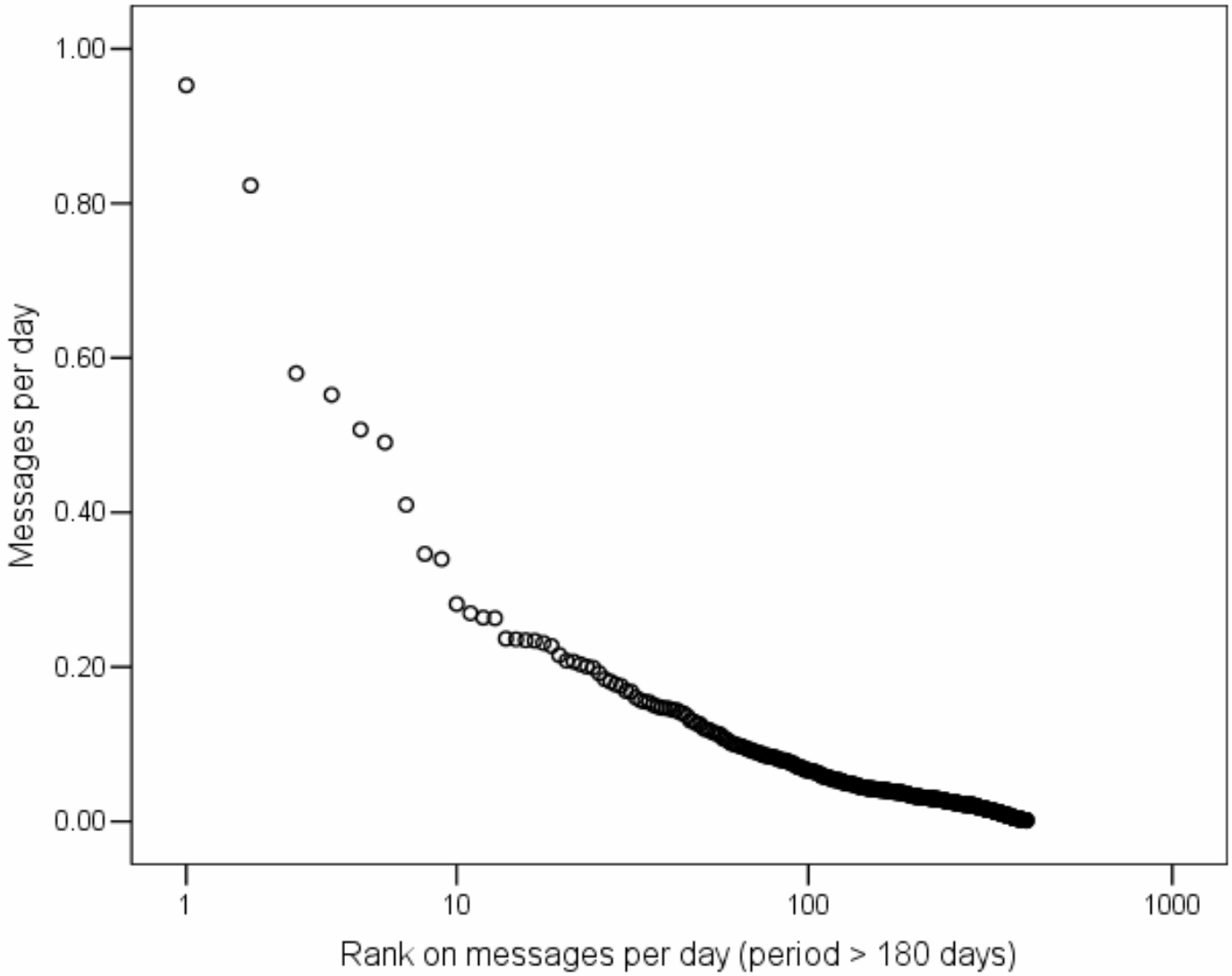
- Diaries
- GPS/GSM tracing
- Data traces (payments of all kinds, CCTV, phone and pc use)

Measurement

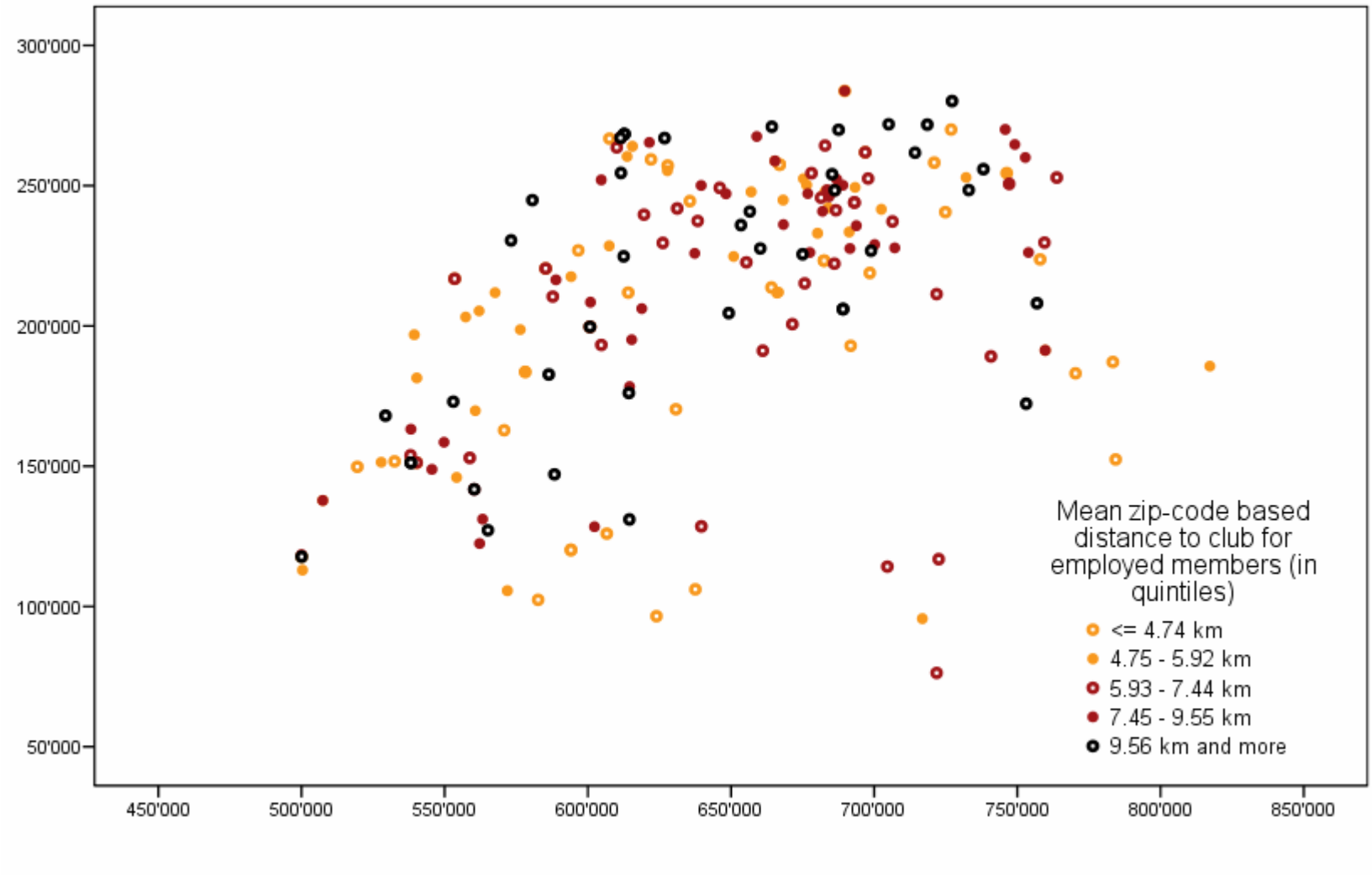
Social network geographies:

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

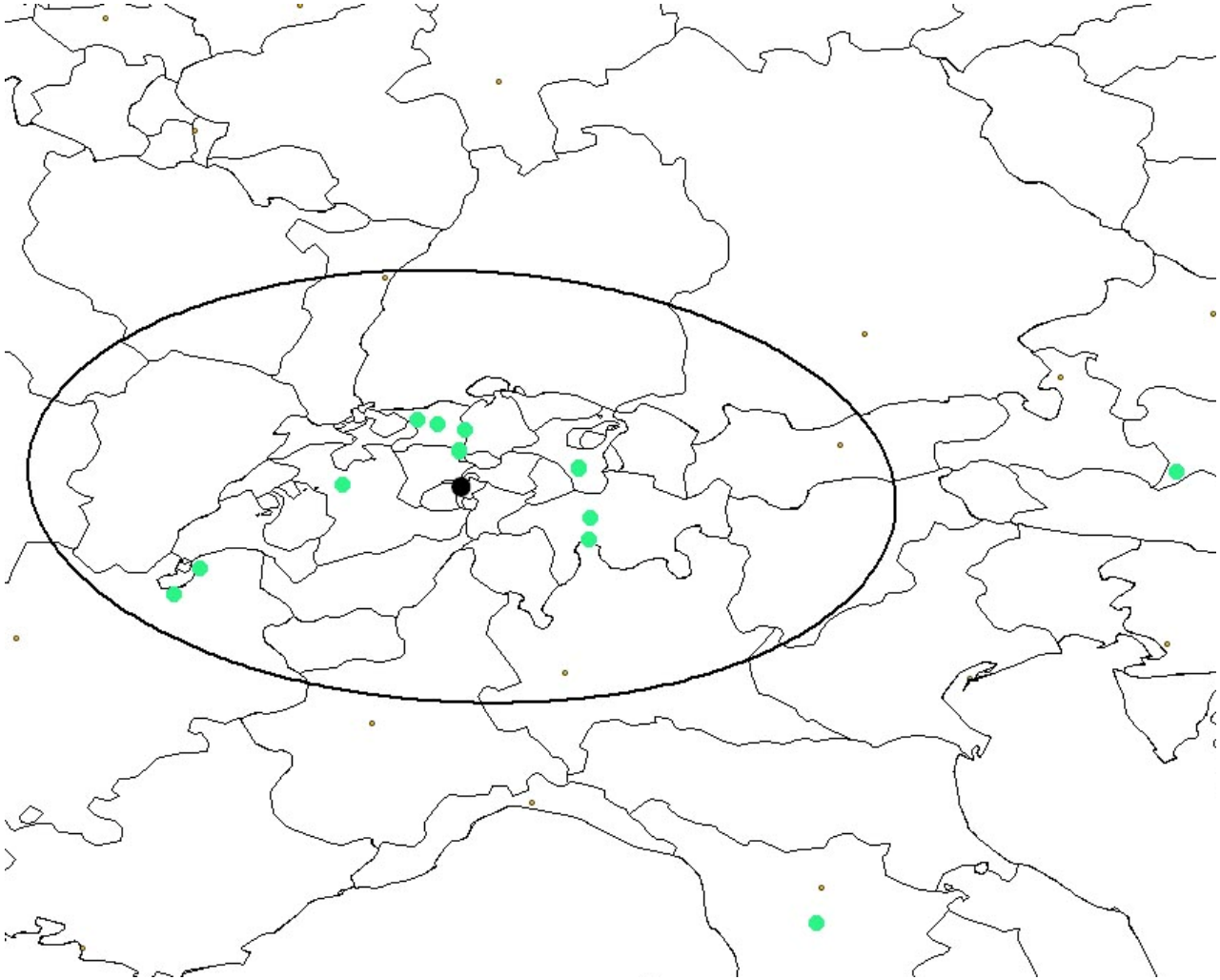
Contacts and contact frequency – emails to kwa (Outlook)



Administrative data: Weekly meeting of service clubs



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)

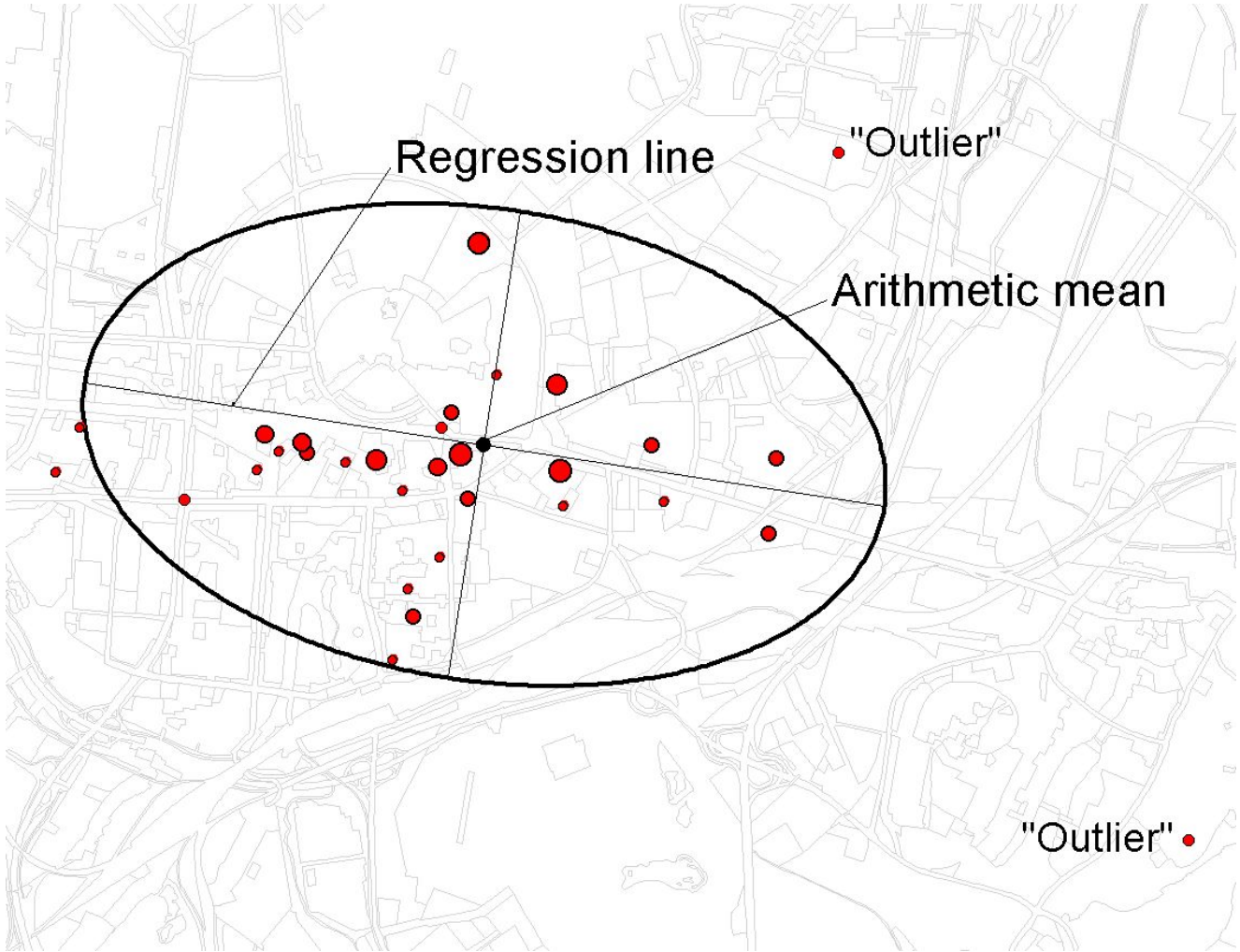
Semiparametric:

- 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



Measures: Inclusion geometries

Find:

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

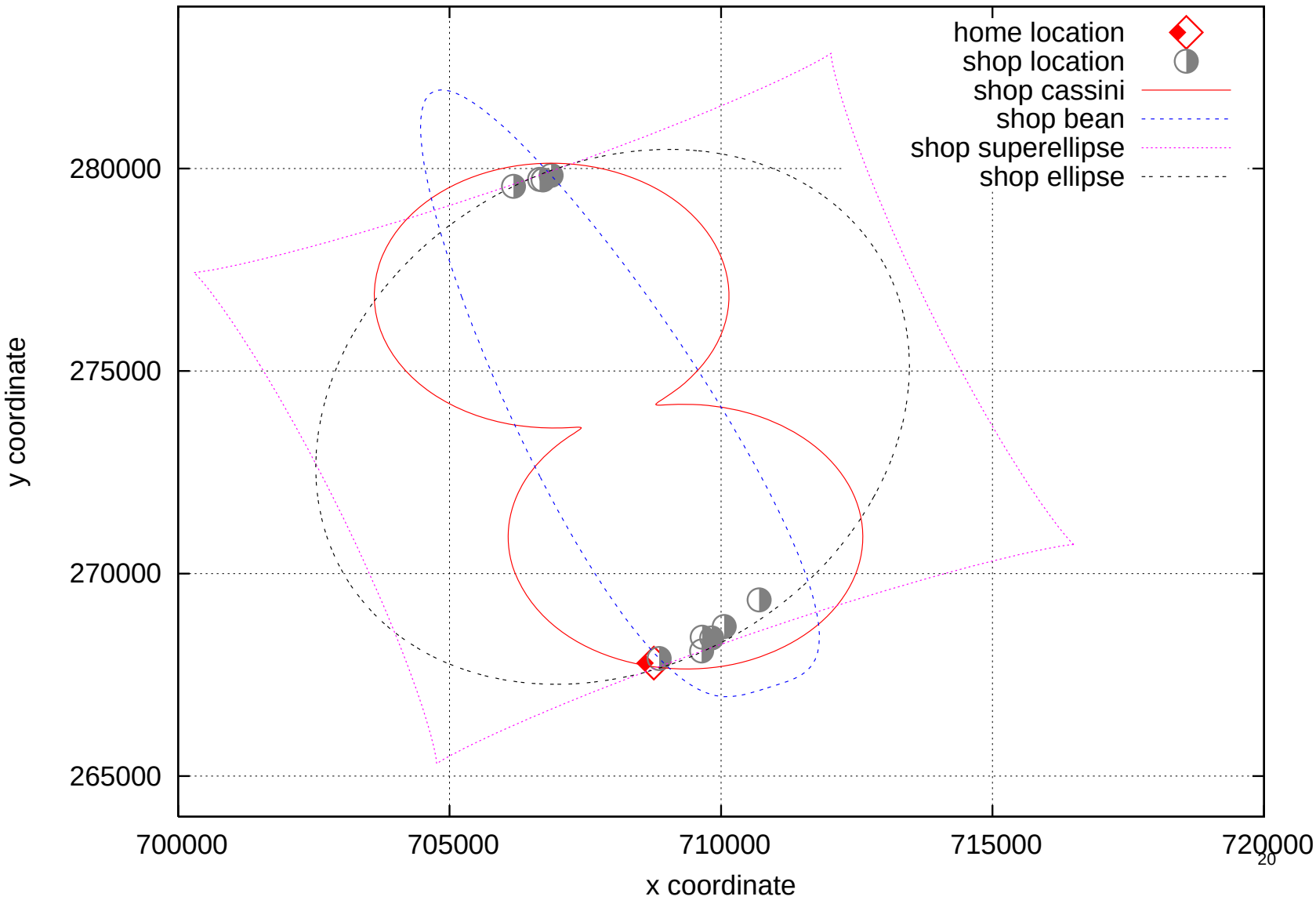
s.t.

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

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

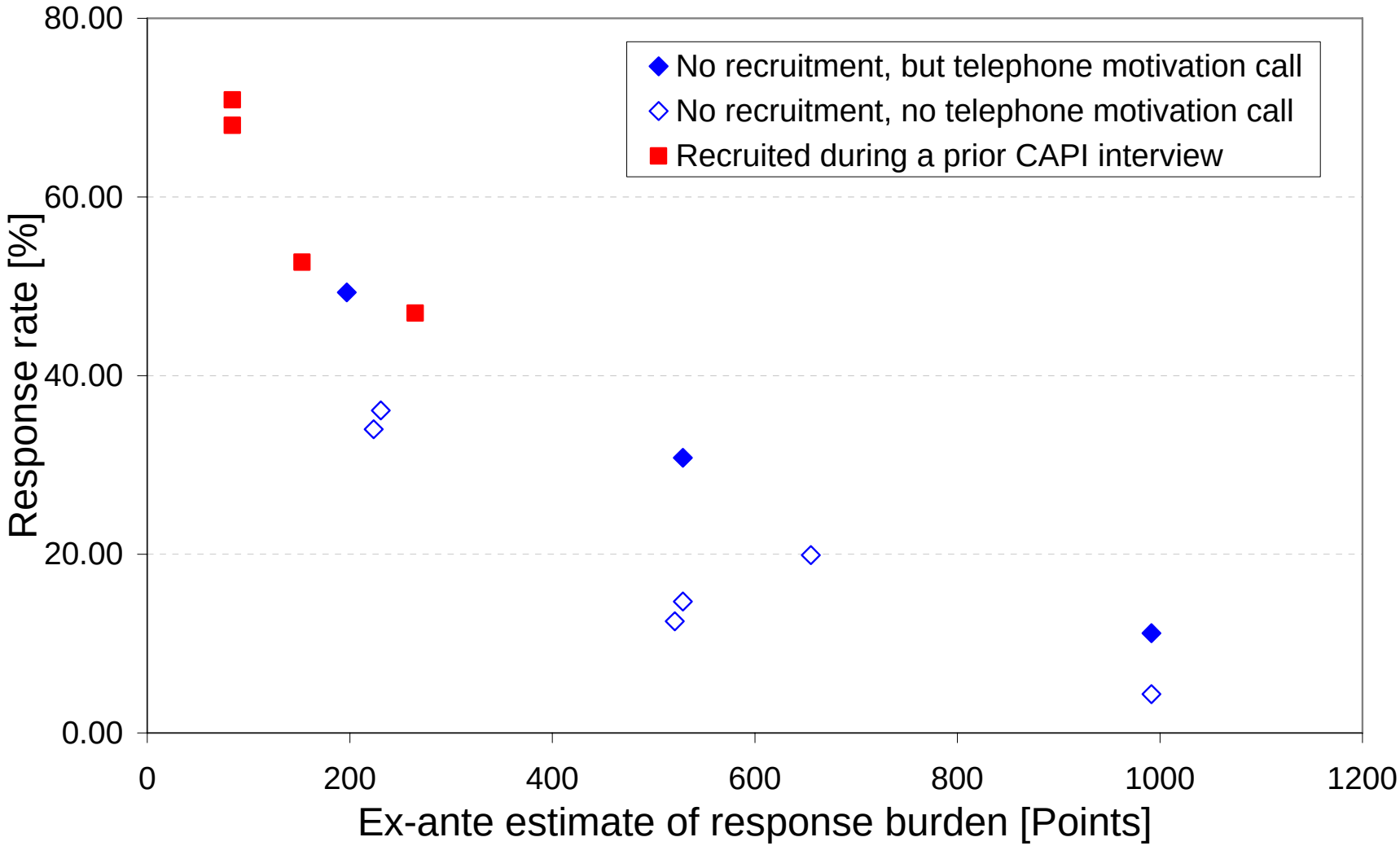
- Home and second home locations

- 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%

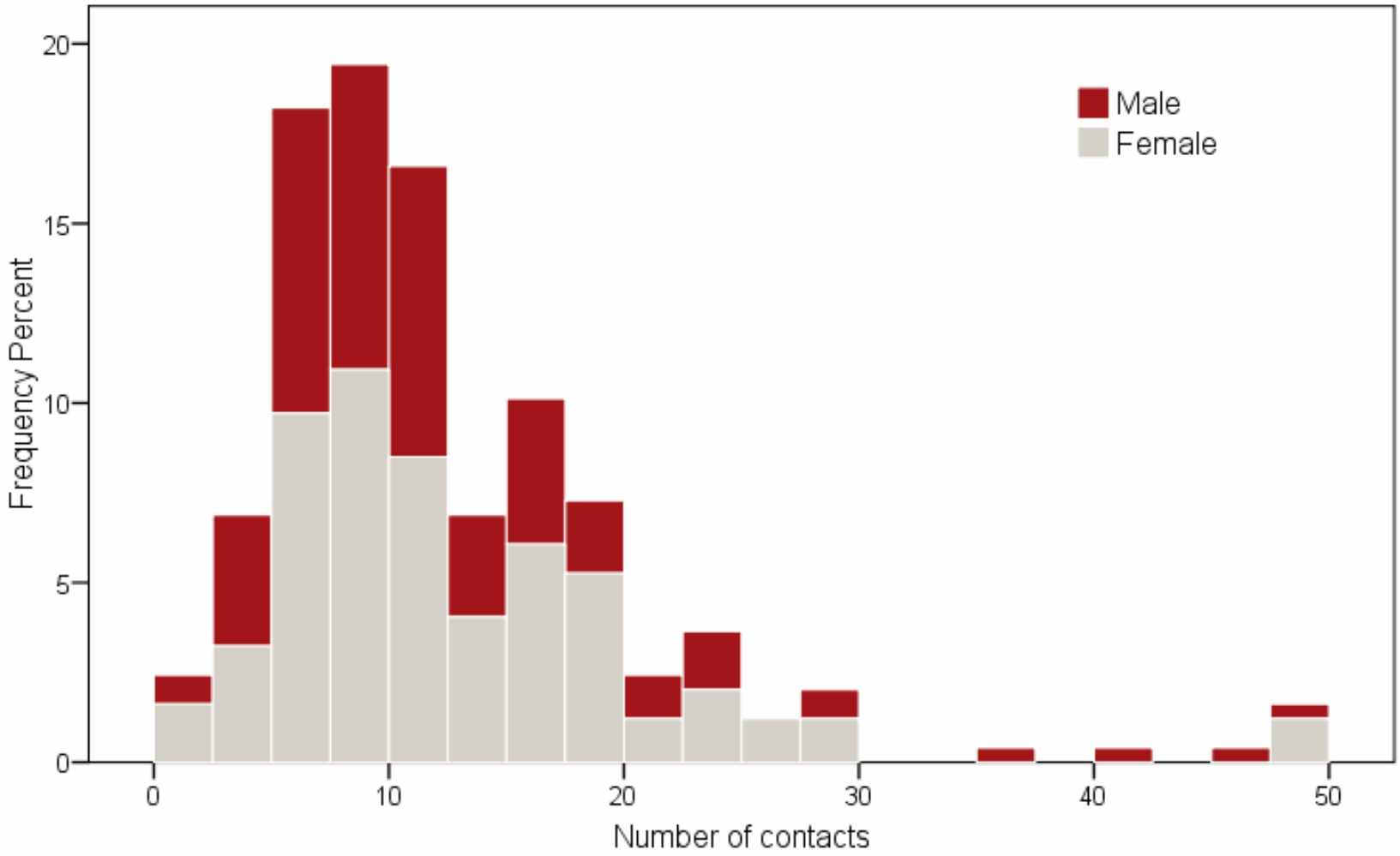
Data available

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

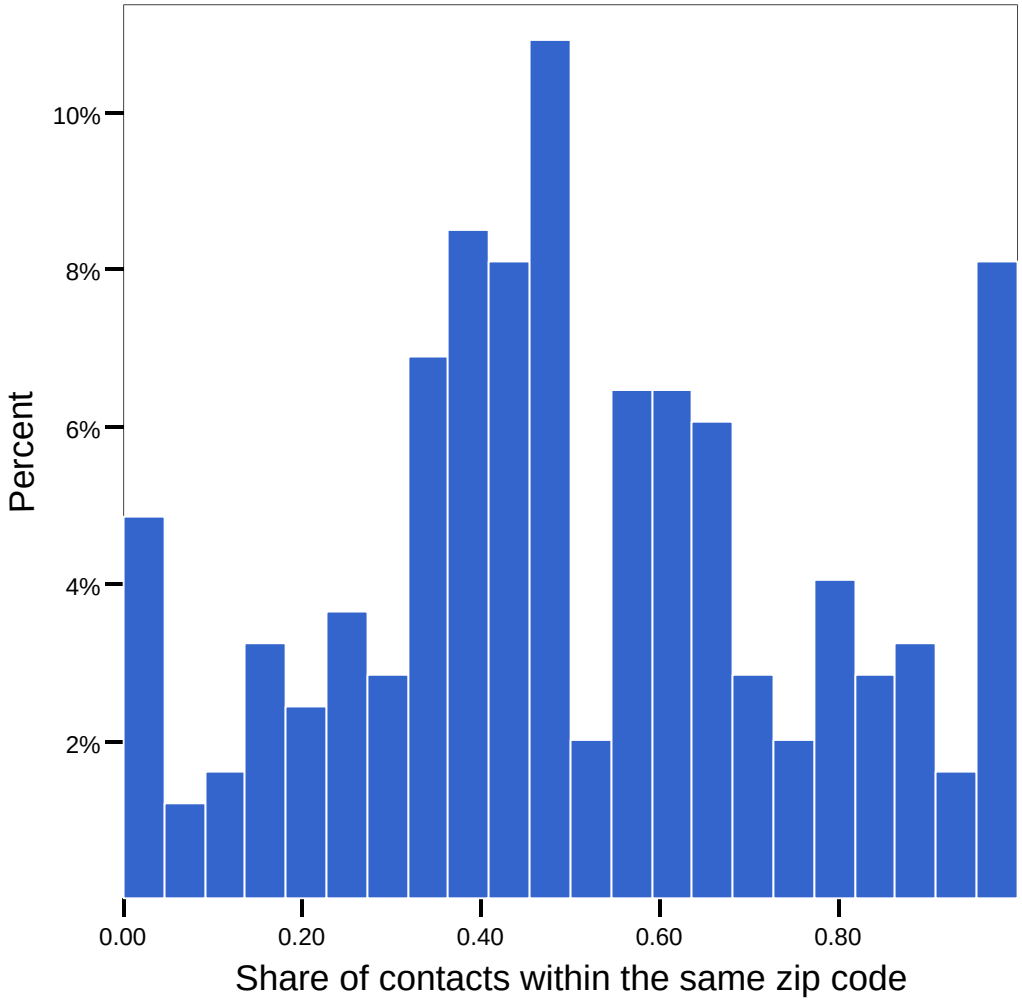
Contacts (COST 355 only)



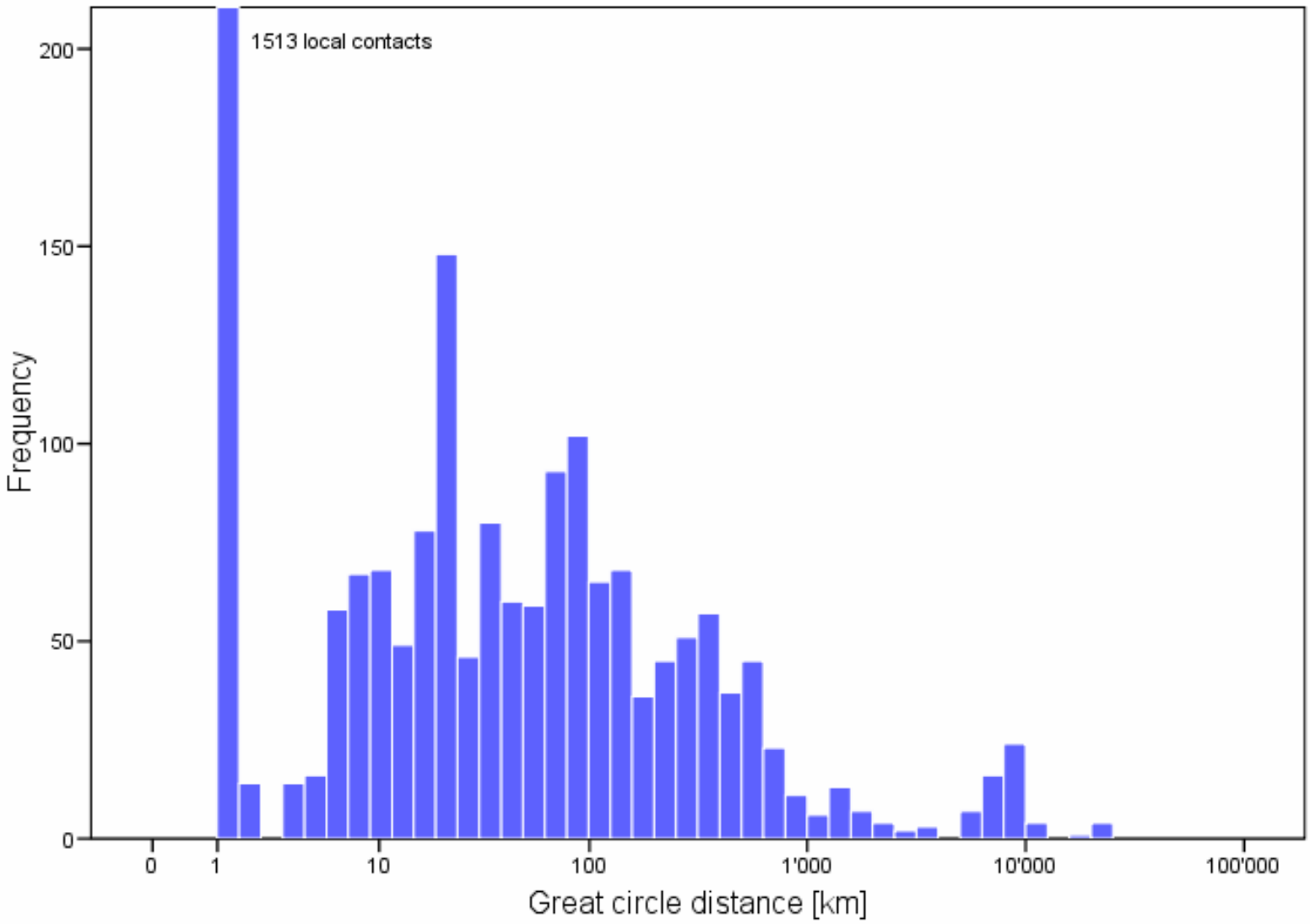
Poisson regression of the number of social contacts

Variable	beta	significance
Intercept	17.921	.000
Female	-.359	.024
Technical college	-2.903	.000
University	2.523	.000
Age	-.010	.022
Age squared/100	.001	.005
-2L – test statistic	620.9	.000

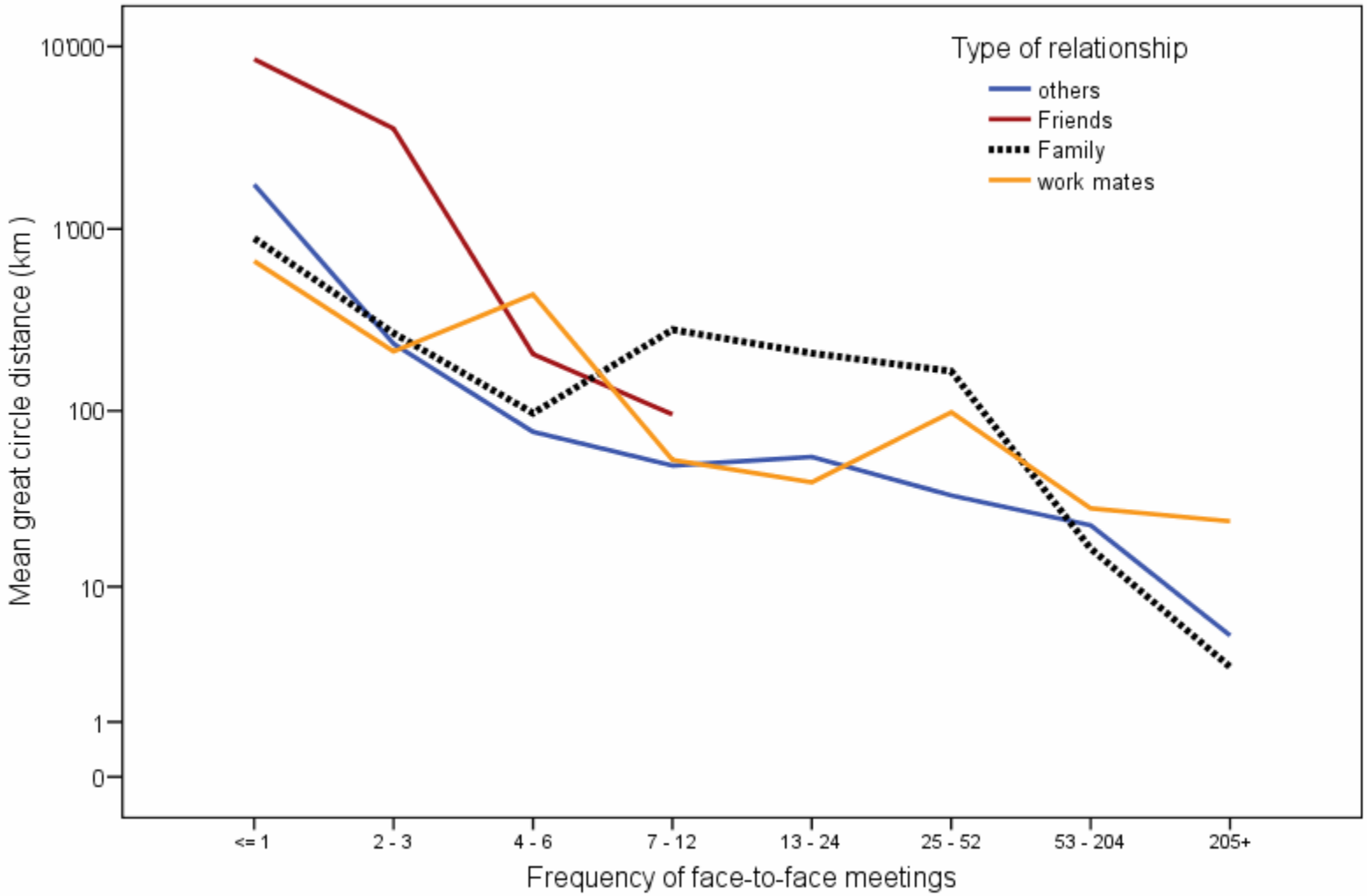
Share of local contacts among all contacts



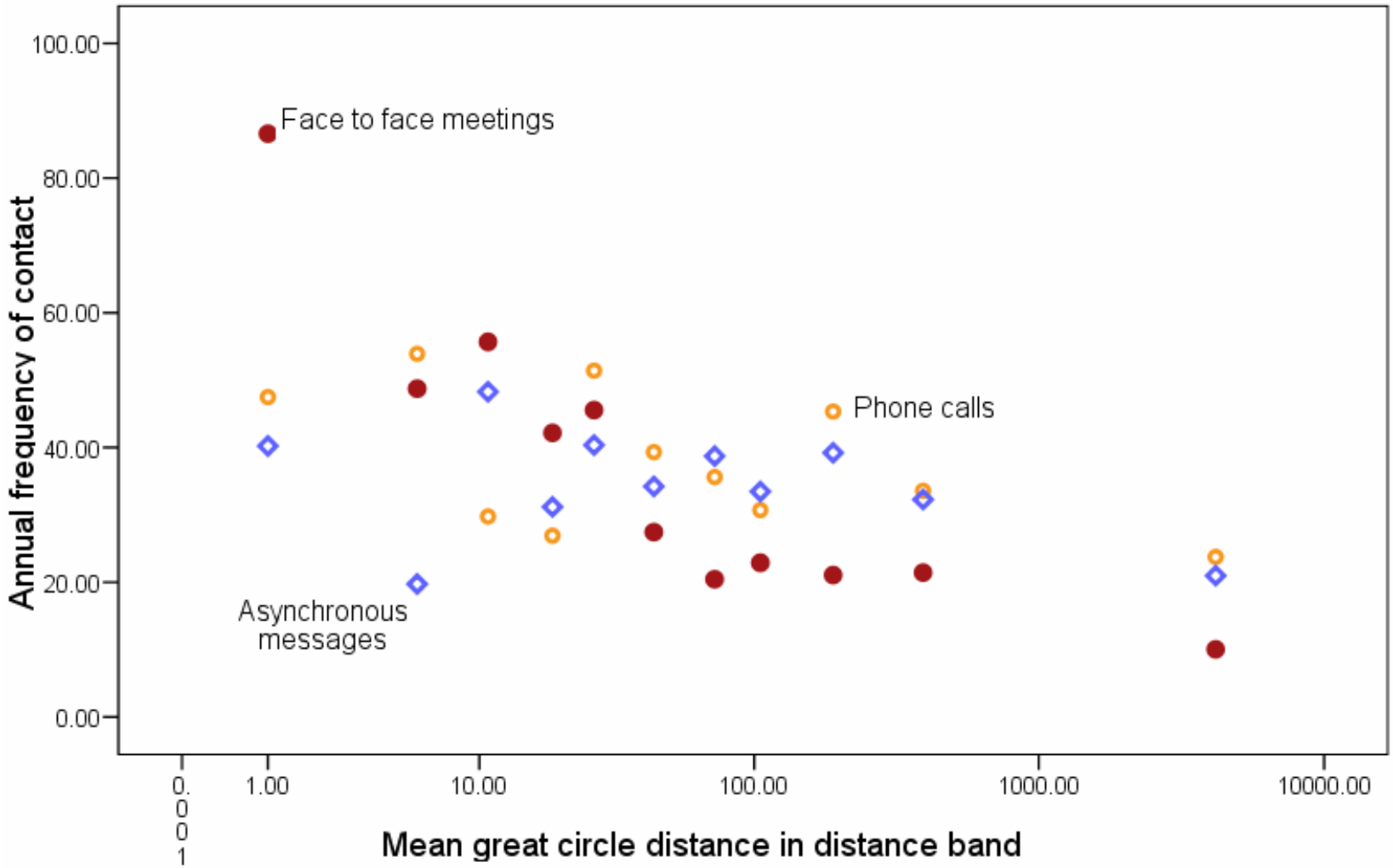
Current patterns: Distance to contacts (COST 355 only)



Distances and contact frequency



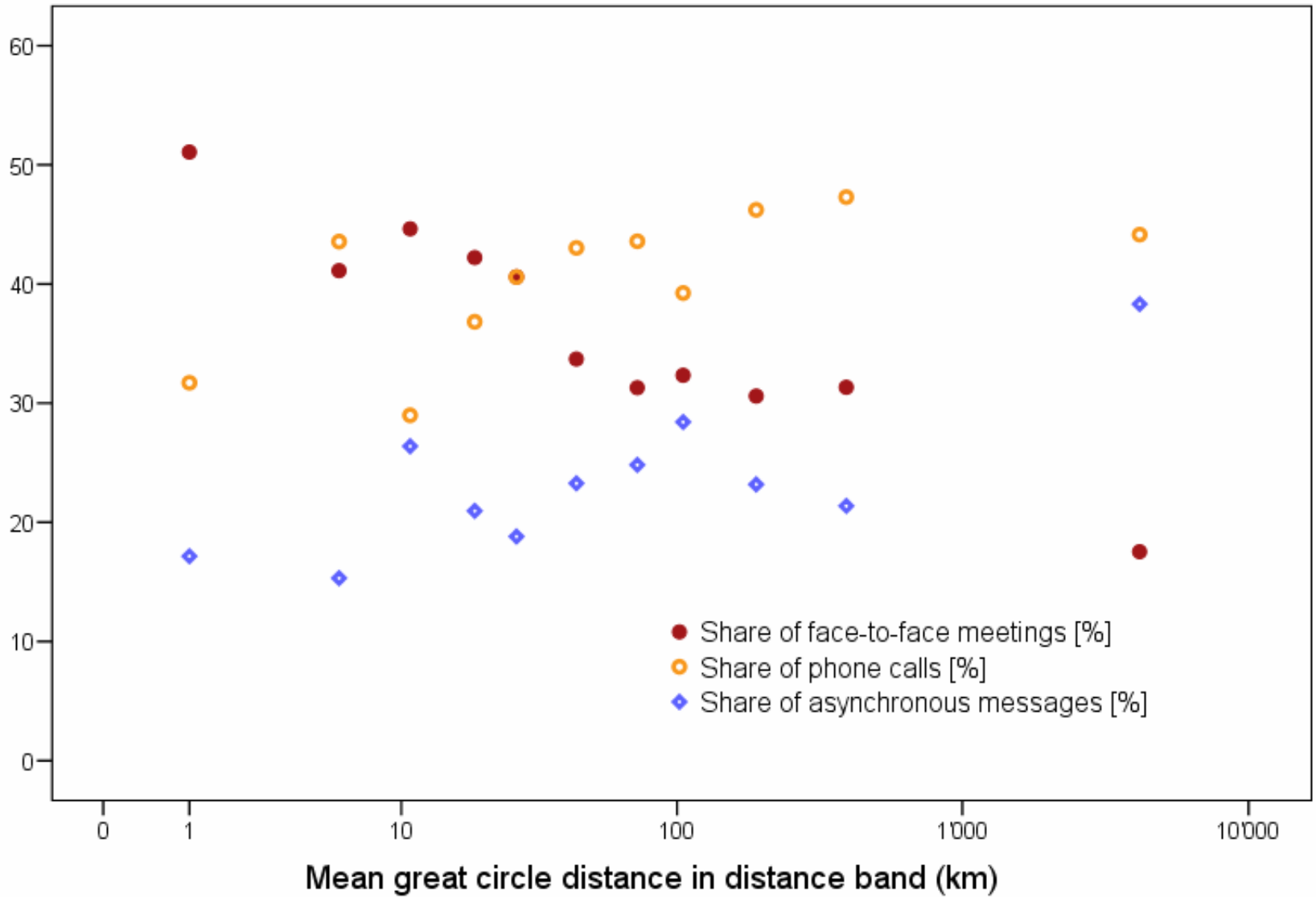
Contact frequency by mode (subsample)



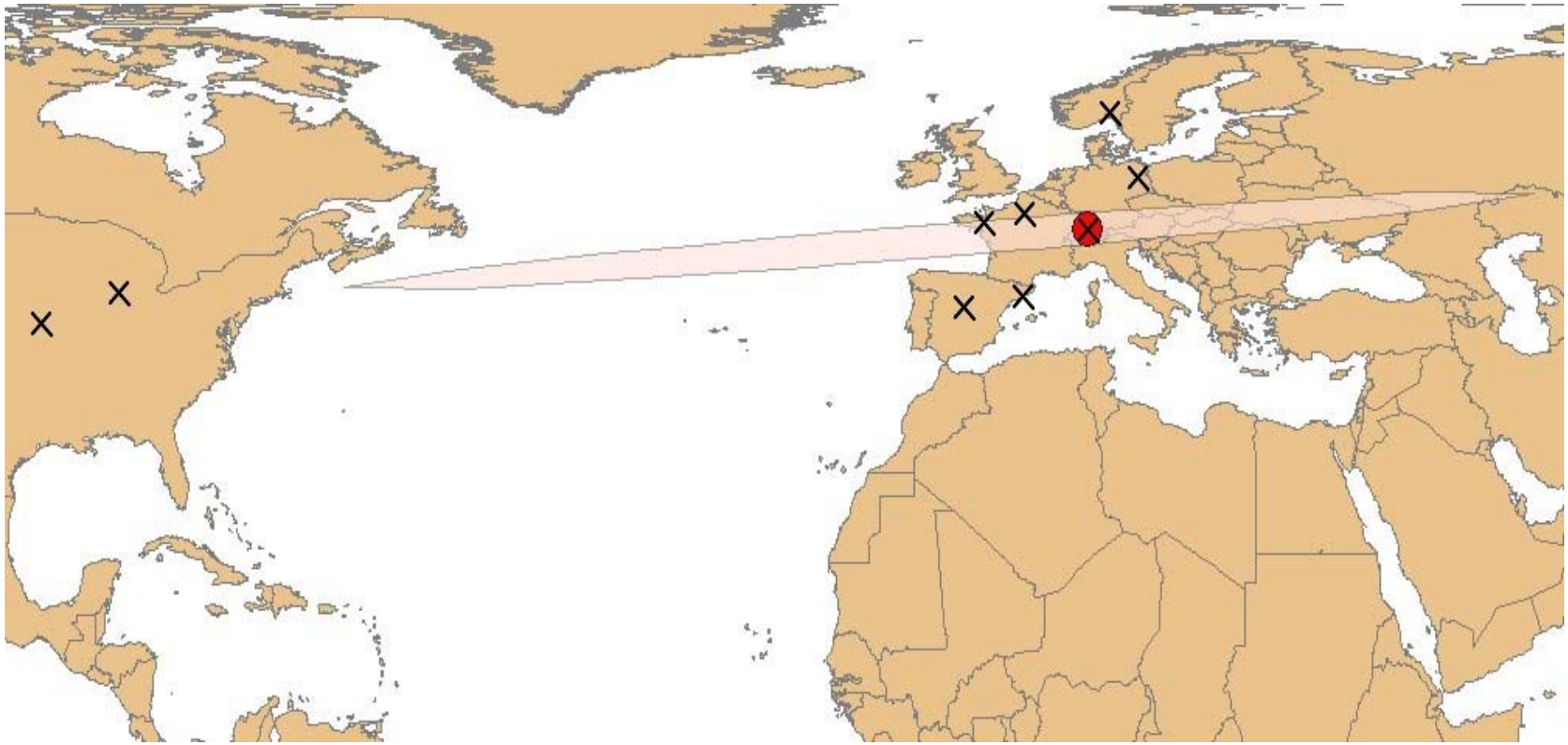
Regression results

Parameter	Asynchronous	Phone	Face to face
Intercept	72.965	36.008	86.358
Female	3.452	6.254	16.197
Age	-.960	-.048	-.408
Age squared/100	.046	.001	.019
N.A. (education)	24.760	11.524	13.322
Compulsory education	28.878	-7.000	23.267
Apprenticeship	20.509	-2.343	21.021
High school diploma	47.046	12.792	37.586
Technical college	13.005	.989	7.203
Other type of contact	-25.119	-7.276	-10.352
Friend	19.537	9.675	-5.366
Partner	102.554	116.324	170.790
Family	-17.047	15.959	.854
No income given	22.176	9.424	-5.389
Under 2000 sFr/Month	4.700	-5.210	-3.807
2000-6000 sFr/month	16.306	10.128	4.595
Female * No income given	-10.784	12.189	-7.773
Female * under 2000 sFr/month	-10.340	9.419	-23.420
Female * 2000-6000 sFr/month	-19.475	-15.959	-35.384
Ln(Great circle distance)	-1.279	-2.506	-10.561

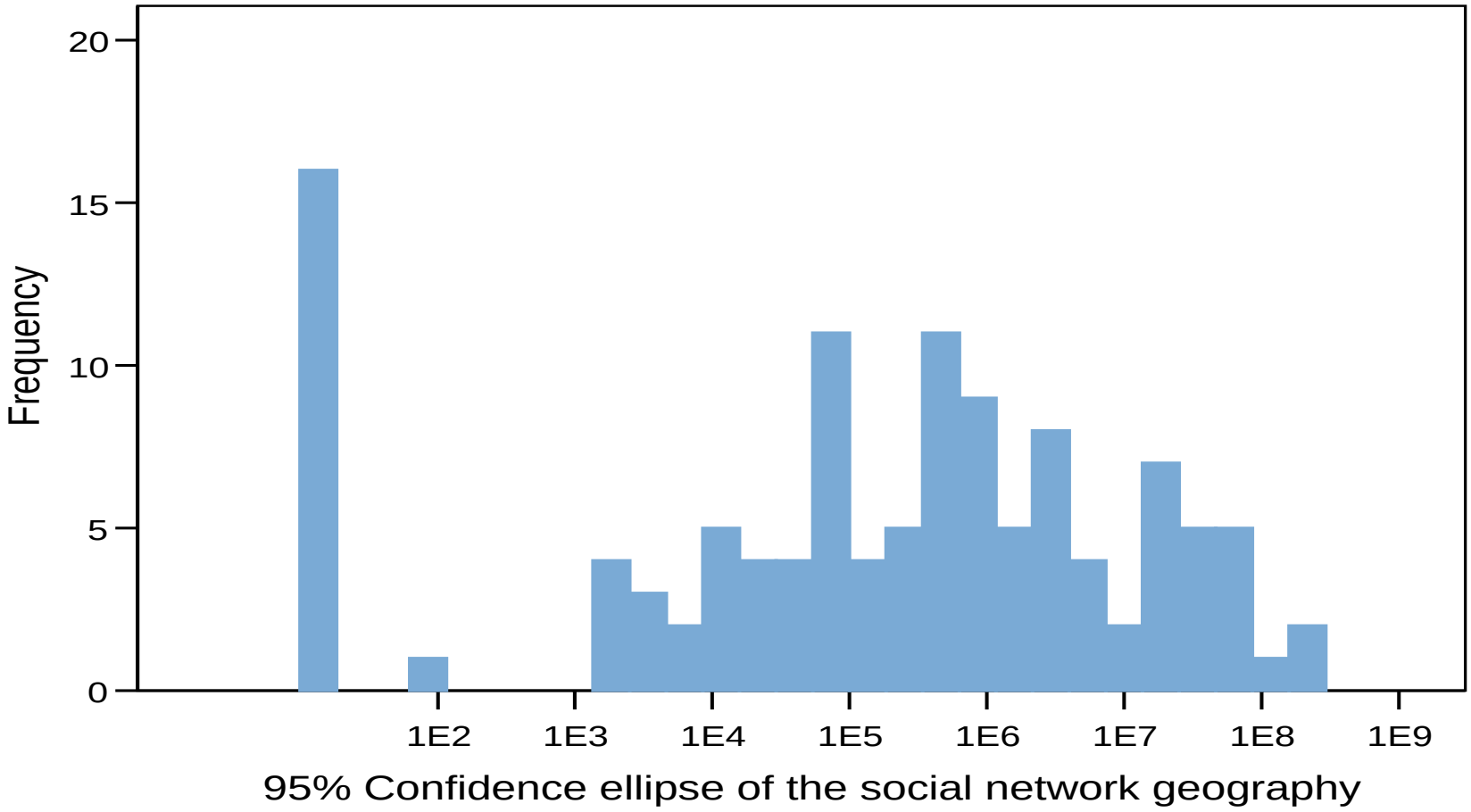
Market share by contact mode



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-demographic characteristics of the respondents

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