

The spatiality of social networks

Christophe Sohn*, Olivier Walther*, Dimitris Christopoulos* **

* Centre for Population, Poverty and Public Policy Studies, Luxembourg

** Department of Politics, UWE-Bristol, UK

Background

- ▶ MetroNet (2010–2012)
- ▶ Spatializing social networks
- ▶ Analyse an actor's position in geographic space simultaneously with his position in social networks

Research questions

- ▶ **Role of spatial proximity**

The closer the actors, the stronger the ties between them?

- ▶ **Border effects on network ties**

Borders as barriers or bridges?

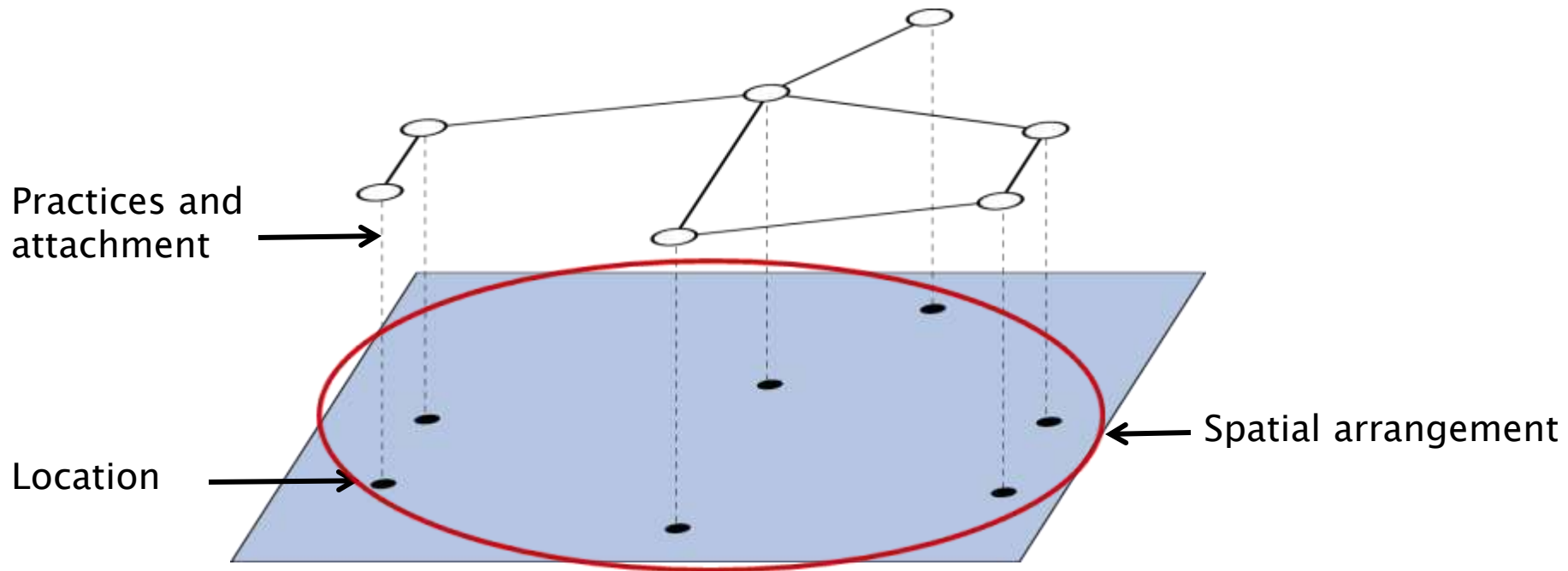
Space and social networks

- ▶ Until recently, social networks analysts and geographers were following different paths
- ▶ However, the spatial dimension of social networks is now increasingly under scrutiny
 - Social movement networks (Bosco 2001)
 - Terrorist networks after 9/11 (Ettlinger, Bosco 2004)
 - Firms and knowledge flows (Ter Wal, Boschma 2008, Morrison 2008, Rozenblat 2008)
 - Social networks and GIS (Faust et al. 1999)
 - Intra-organisational networks (Sailer 2009)
 - Urban gangs (Radil, Flint, Tita 2010)
 - Urban governance networks (John 1998)

Space and social networks

1. What is the spatiality of the network?
 2. What concept of space do we mobilize?
 3. What spatial variables should be considered?
- ▶ The first question examines how the network is related to space
 - Distinguish different levels of spatiality
 - ▶ The two following questions determine the spatial effect to be tested
 - Combining the type of space and the type of spatial variables

Spatiality of networks



Types of spaces

Place, Area, Territory, Network (Lévy 2003)

For each concept, different meanings, different constructions

Place:

- Elementary spatial unit that can be localized (at different scales)
- Space within which distance is irrelevant

Area:

- Spatial arrangement of places separated by distance
- Close to the concept of region

Territory:

- Share of space delimited (over which a control is exerted)
- Space appropriated by a group of humans

Network:

- Set of interlinked places

Types of spatial variables

Three types of variables

Attribute, Structure, Process (Racine & Reymond 1973)

Attribute: characteristics of space

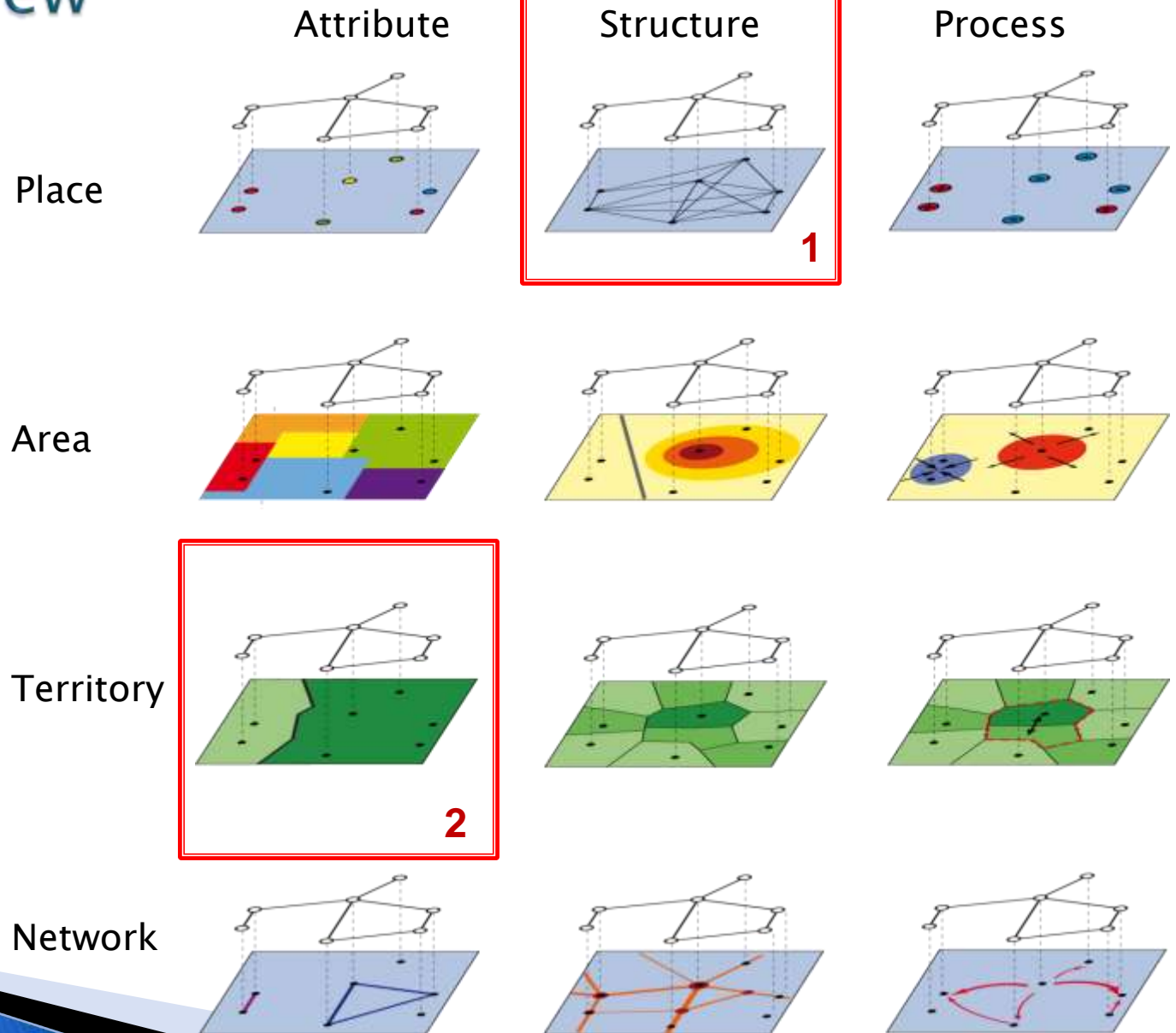
Structure: Arrangement of space

Process: Evolution of space

Types of spaces / types of variables: 12 configurations of spatial effects

		Spatial variables		
		Attribute	Structure	Process
Types of spaces	Place			
	Area			
	Territory			
	Network			

Overall view



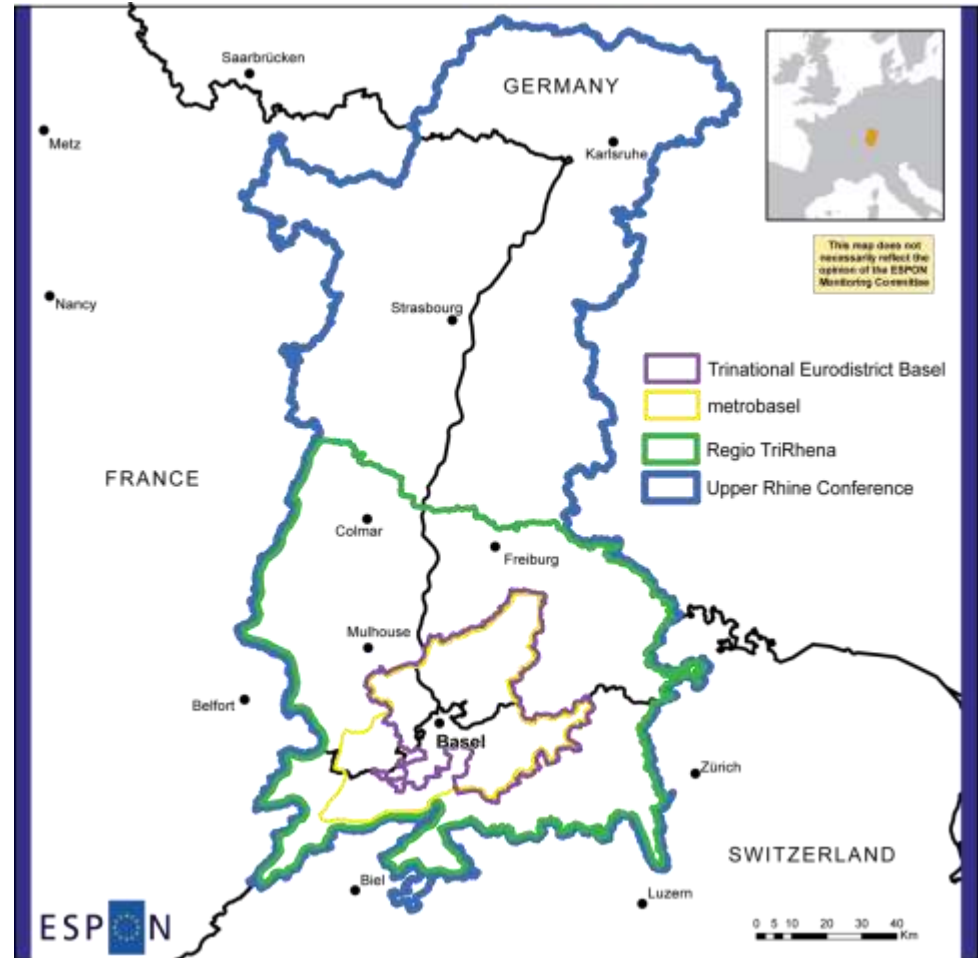
Empirical results

Example: The case of Basel

Complex institutional setting with three national borders (CH, FR, DE)

CBC started in the 1960's

Several cross-border cooperation initiatives set up at different scales



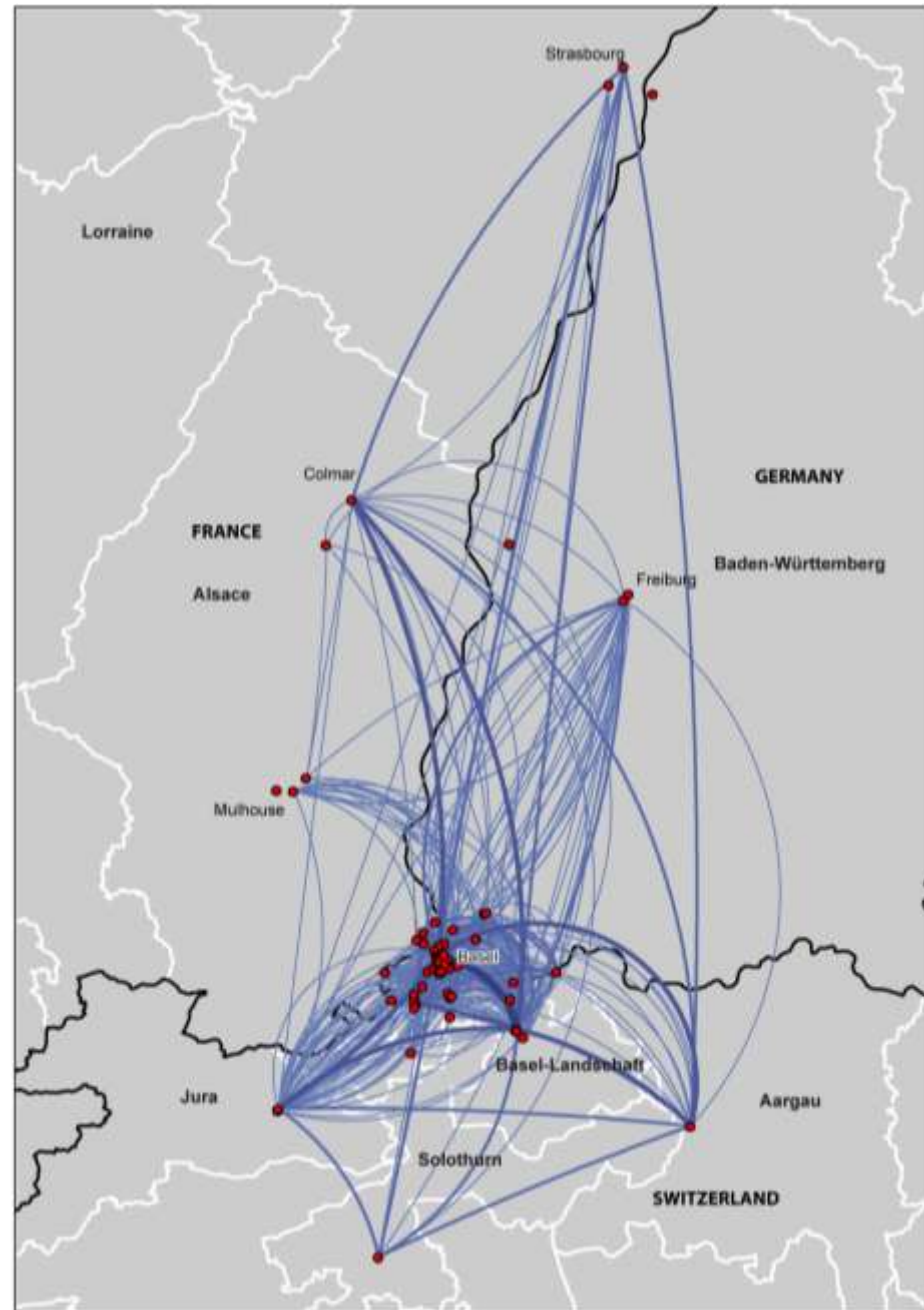
Spatial configuration of 2-mode networks

No relational data yet (survey planned at fall 2010) but 2-mode analysis that shows the co-membership of actors among six cross-border cooperation structures

334 actors in total

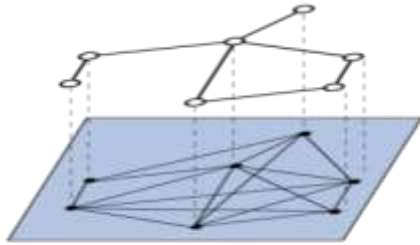
68 actors are in at least 2 structures

Analysis done with 68 actors + 6 structures = 74



1. Effects of geographical distance (1)

Comparing network structure and spatial structure (actors' location)



Correlation between affiliation matrix and distance matrix

QAP results (25000 permutations)

	Obs value	Signification
Pearson correlation	-0,435	0,000

1. Effects of geographical distance (2)

Correlation between network centrality and geographic centrality
(distance to the central actor: Basel City)

		Degree Centrality	Closeness Centrality	Betweenness Centrality	Eigenvector Centrality
Distance to Central Feature	Pearson Correlation	-,058	-,371**	-,058	-,442**

** Correlation is significant at the .01 level (2-tailed)

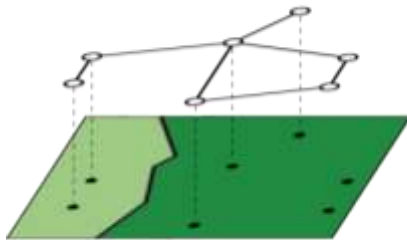
→ Spatial proximity is related to some network centrality!

2. Border effects (1)

Borders as barrier to contacts

→ National borders

→ Regional borders (Swiss cantons, French *Départements*...)



State (and regional) borders reduce the number of ties

State border	Regional border	Absence of ties	Presence of ties	Percentage
No	No	41	649	94,1
No	Yes	96	827	89,6
Yes	Yes	460	628	57,7

2. Border effects (2)

Logit model

State (and regional) borders significantly reduce the existence of ties

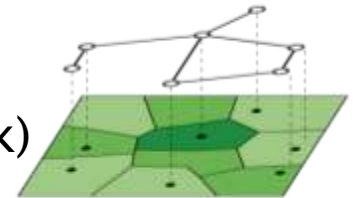
	B	S.E.	Wald	Sig.
State_border	-1,842	,124	220,469	,000
Region_border	-,608	,194	9,856	,002
Constant	2,762	,161	294,160	,000

Next steps

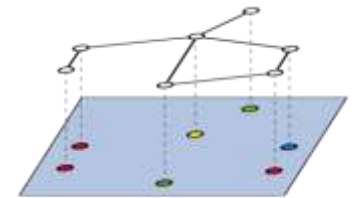
Analyse the influence of space to survey data collected in four cross-border metropolitan regions across Europe

Examine the effects of different spatial/territorial variables

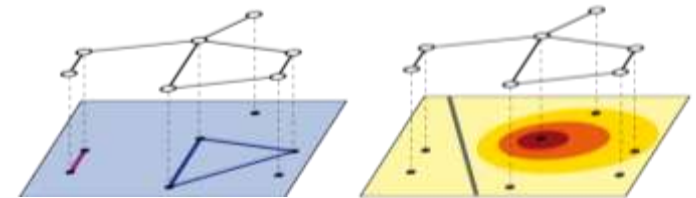
→ Territorial hierarchy (territorial network vs social network)



→ Spatial attributes of actors (e.g. located in the main city)



→ Combinaison of different spatial effects



Related publications

- ▶ Christopoulos DC. 2006. Relational attributes of political entrepreneurs: A network perspective. *Journal of European Public Policy* 13(5): 757–778.
- ▶ Sohn C (ed.) 2010. *Luxembourg. An emerging cross-border metropolitan region*, Brussels: Peter Lang (forthcoming).
- ▶ Sohn C, Reitel B, Walther O. 2009. Cross-border metropolitan integration in Europe: the case of Luxembourg, Basel and Geneva. *Environment and Planning C* 27: 922–939.
- ▶ For more information: <http://metrolux.ceps.lu>