Räumliche Wahlmöglichkeiten in Szenarien der Siedlungs- und Verkehrsentwicklung - eine vergleichende Bewertung

Spatial options of choice in scenarios of developement of built-up areas and transportation - a comparative evaluation

Henning Krug, City of Heidelberg, Germany

mobil.TUM 2008, München

Structure

Relevant characteristics

5 guiding models

Evaluating accessibility: spatial options of choice

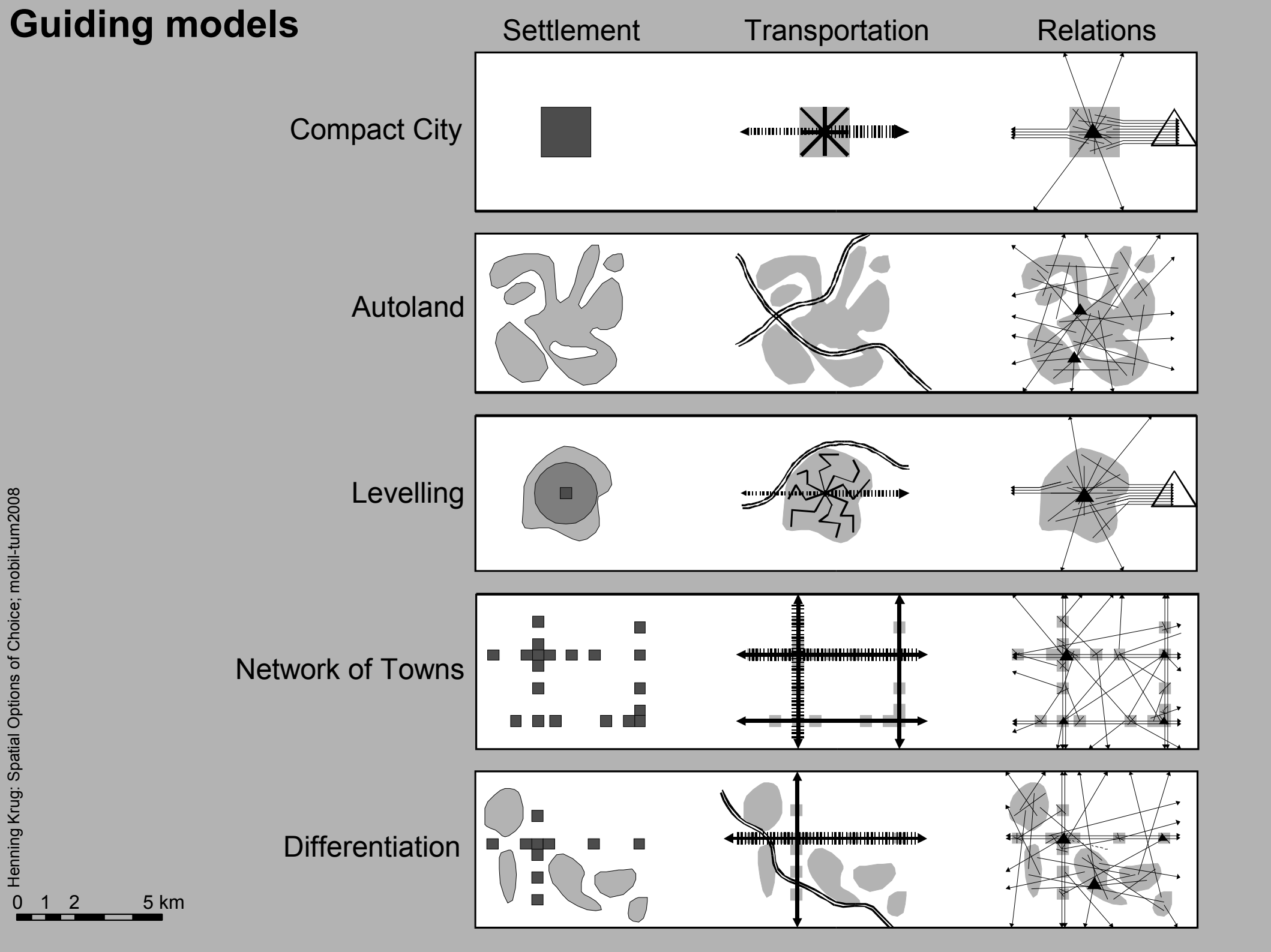
Case study: scenarios in Ostwestfalen-Lippe

Results: comparative evaluation

Relevant characteristics of built-up areas on different scales

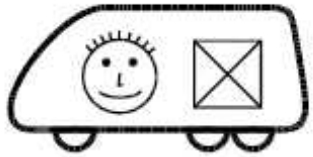
	Street 50m, 1ha, 1:500	**Quarter** 500m, 1km², 1:5.000	**Region** > 5km, 100km², 1:50.000
Walking (Cycling)	Orientation buildings –> street Mix of different activities for presence	Density of activities Mix of activities Concentration of retail etc Open and integrated street Network	Settlement units defined by walking distances Compact geometry (min. length of margins) Networks of open space
Public Transport	Orientation buildings -> street Mix of different activities for presence	Density of activities Mix of activities (for steady capacity utilization) Concentration of retail etc at stations	Settlement units defined by walking distance of stns. Settlement units along axes of public transport Densely laced networks Concentr. around nodes
Private Motorcar	Buildings turn away from the street Low density	Low density Separated networks	Dispersed settlement Uninhabited corridors for Expressways Concentrations of retail etc around junctions
	"Local Urbanity"		"Regional Geometry"

Guiding models

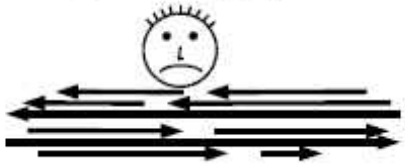


What is Mobility?

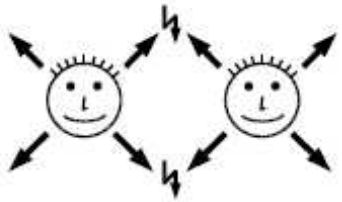
Transportation ?
Transport, Beförderung



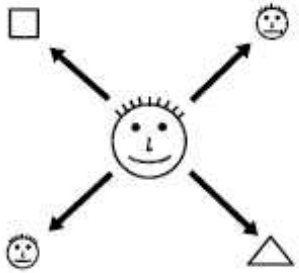
Traffic ?
Verkehr



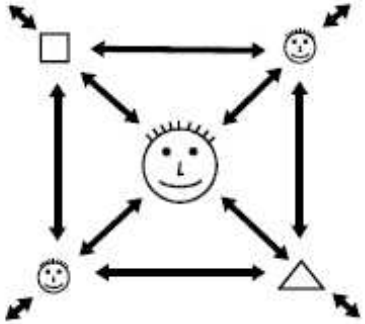
Mobility ?
Beweglichkeit

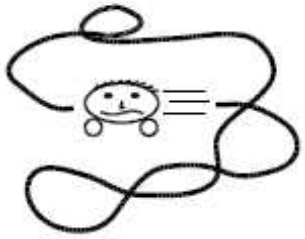


Access, Opportunities ?
Zugang, Gelegenheiten



Connections ?
Beziehungen, Verknüpfungen





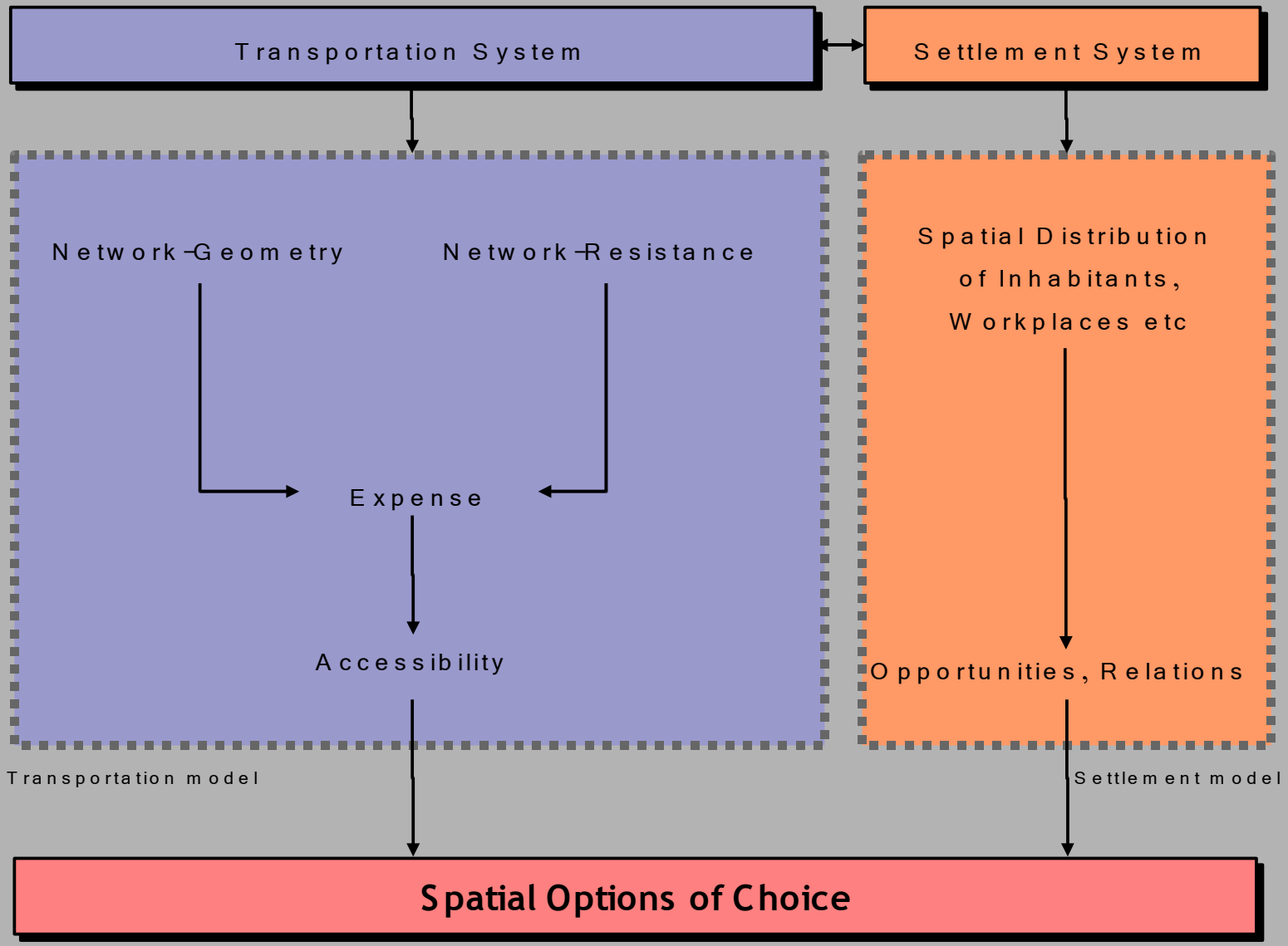
Or Freedom of Driving ?
freie Fahrt für ...

v. Winning/Krug, Uni Kassel, 01/2004

Spatial options of choice =

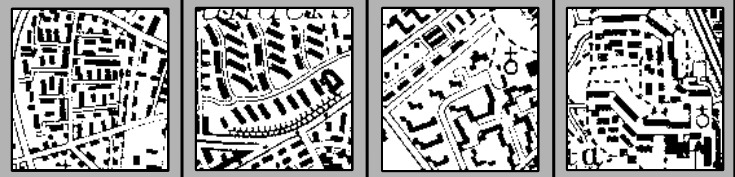
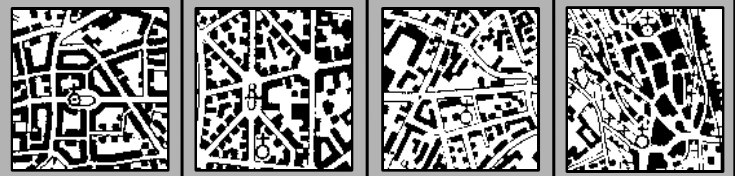
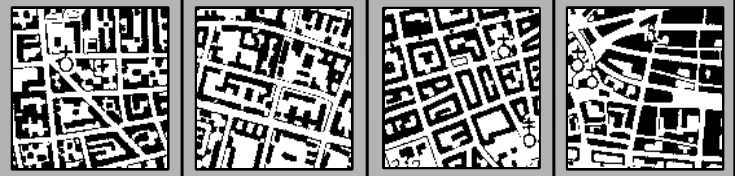
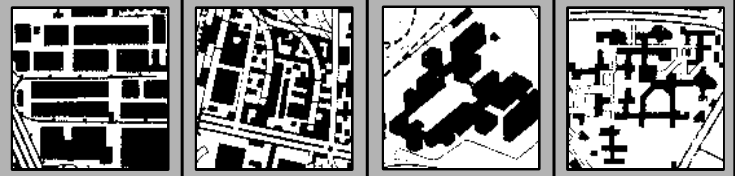
Degrees of freedom people have
to choose their spatial destinations and relations

Spatial options of choice as an integrative aproach



Patterns of built-up areas in the topographical map 1:50.000

500 x 500 m = 25 ha

Pattern	Characteristics	Examples drawn from the map
1 Detached Housing loose	a) kleinste Gebäudesignatur in sehr aufgelockerter Anordnung (max. 100 Gebäude) oder b) dörfliche Grundrisse (Mischung Einzelhaus – landwirtschaftl. Gebäude)	
2 Detached Housing	kleinste Gebäudesignatur (max. 10 größere Gebäude) sofern nicht Typ 1	
3 Detached Housing, Slabs	a) Mischung von Einzelhausbebauung und größeren Gebäuden (mind. 20 Kleinstgebäude) oder b) sehr kurze Zeilen bzw. Reihen (max. 10 Gebäude 50 m (1 mm) oder länger)	
4 Slabs	a) überwiegend längere Gebäudezeilen, meist in Gruppen parallel angeordnet oder b) besondere Geometrien bzw. Punkthäuser mit größerem Abstand	
5 Block	a) größere, überwiegend dem Straßenverlauf folgende Gebäude (max. 19 Kleinstgebäude, sofern nicht Typ 6 oder b) kleinstädtische Kerne	
6 Block dense	a) Blockränder weitgehend geschlossen und mind. vereinzelte Hofbebauung oder b) Blockränder zu mind. 50% geschlossen und intensive Hofbebauung	
7 Factory Buildings	Gewerbe- und Industriebebauung, max. 30-40% überbaut	
8 Factory B. dense + Campus	a) Großgebäude mit hohem Überbauungsgrad oder b) Gebäudekomplex besondere Geometrien bildend (Messe, Uni-Campus etc.)	

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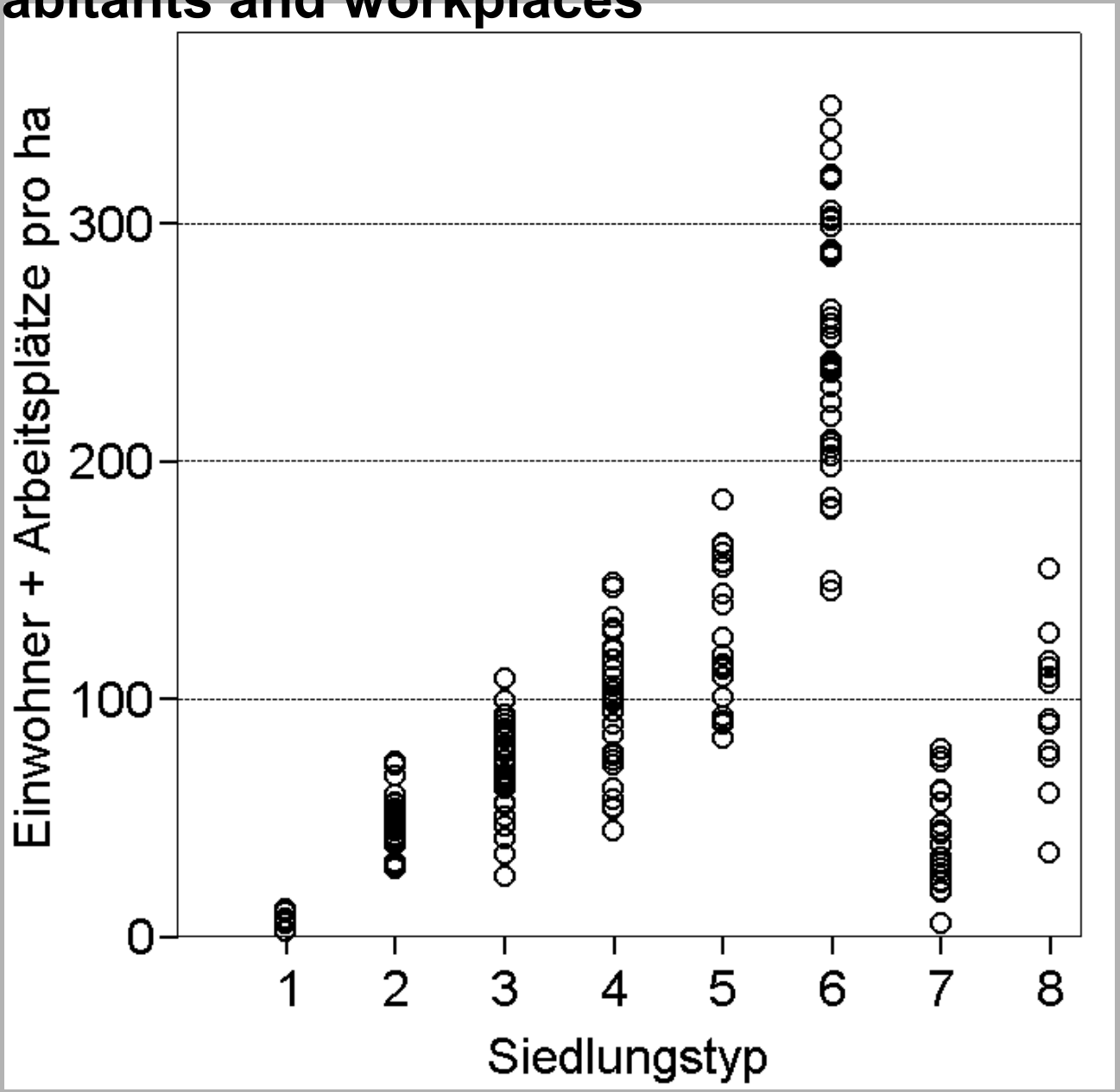
Correlation between patterns of built-up areas and the density of inhabitants and workplaces



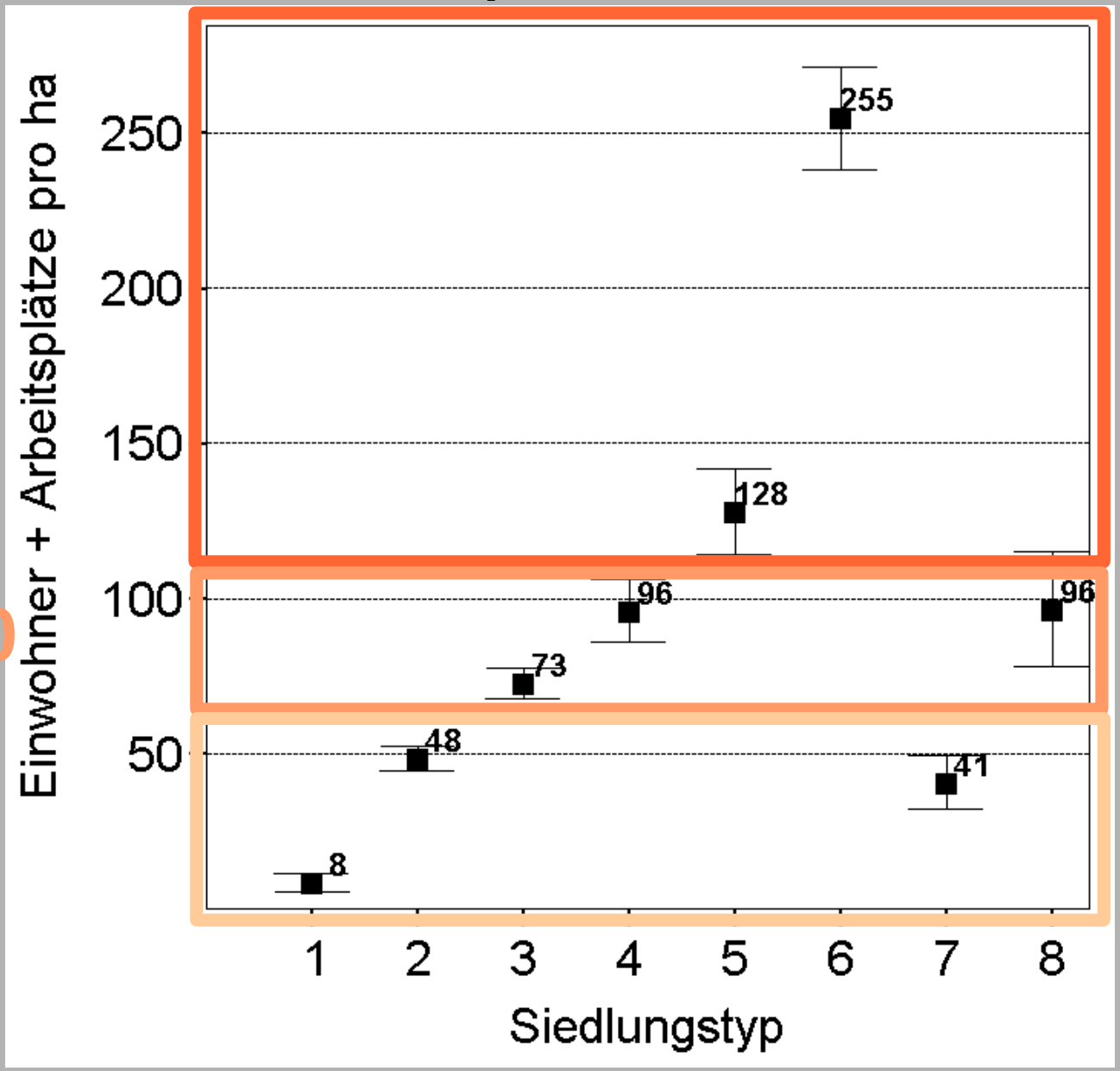
Correlation between patterns of built-up areas and the density of inhabitants and workplaces

Estimated intervals, means

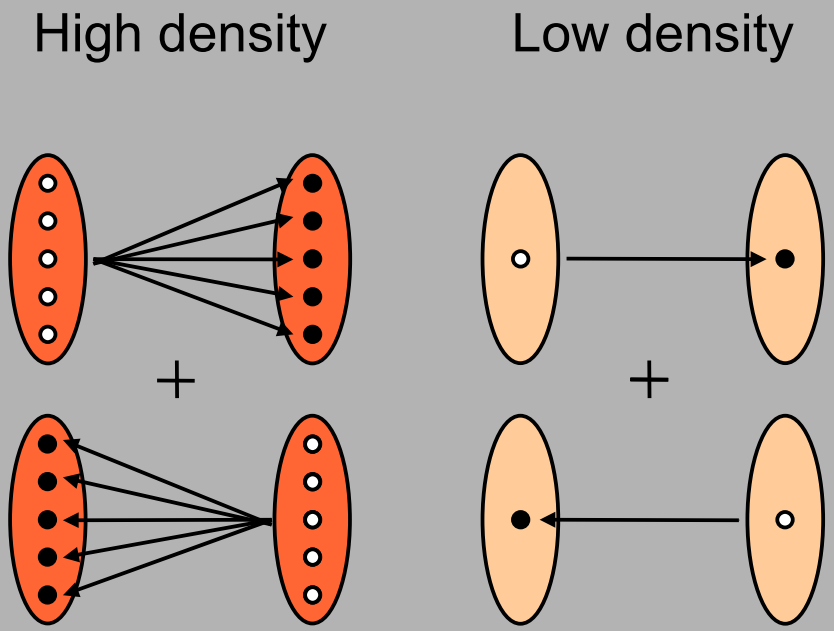
urban = 140

semiurban = 80

suburban = 40



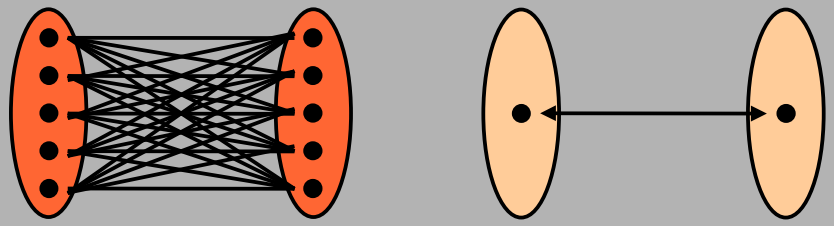
Spatial options of choice = the ease to communicate face-to-face



$C = \sum ij\ Oj \times Aij$

Opportunity indicator

10 : 2



$C = \sum ij\ Oi \times Oj \times Aij$

Communication indicator

25 : 1

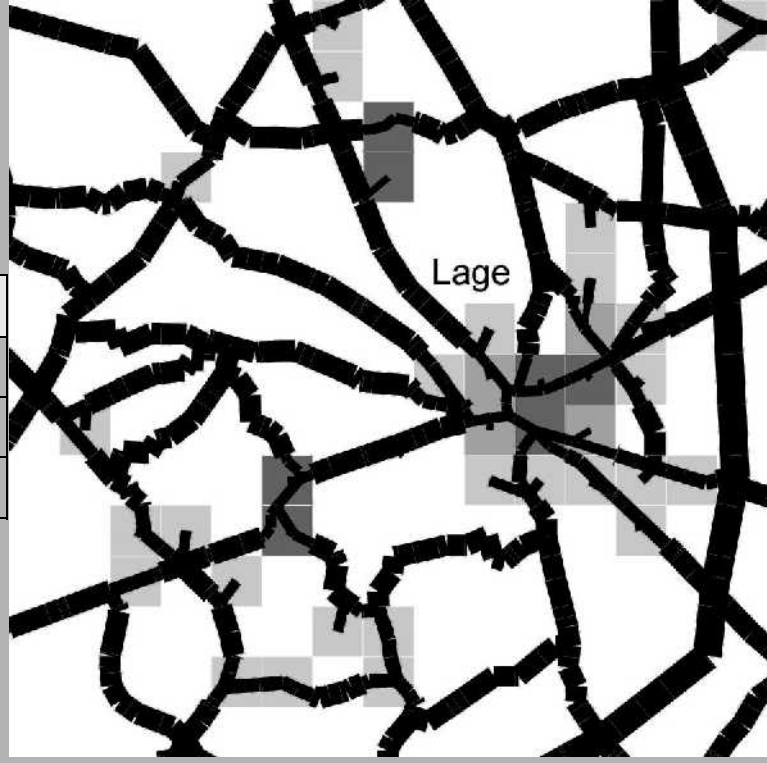
Settlement modell: spatial distribution of opportunities

Activities					Distribution of opportunities
Living	Working	Services	Leisure	Other	
35 %	10 %	3-10 %	9-12 %	3 %	**60 – 70 % as inhabitants and workplaces**
		10-3 %	7-4 %	3 %	**10 – 20 % clustering at nodes**
		7 %	9 %	4 %	**20 % otherwise**
35 %	10 %	20 %	25 %	10 %	= 100 %

Car transport model

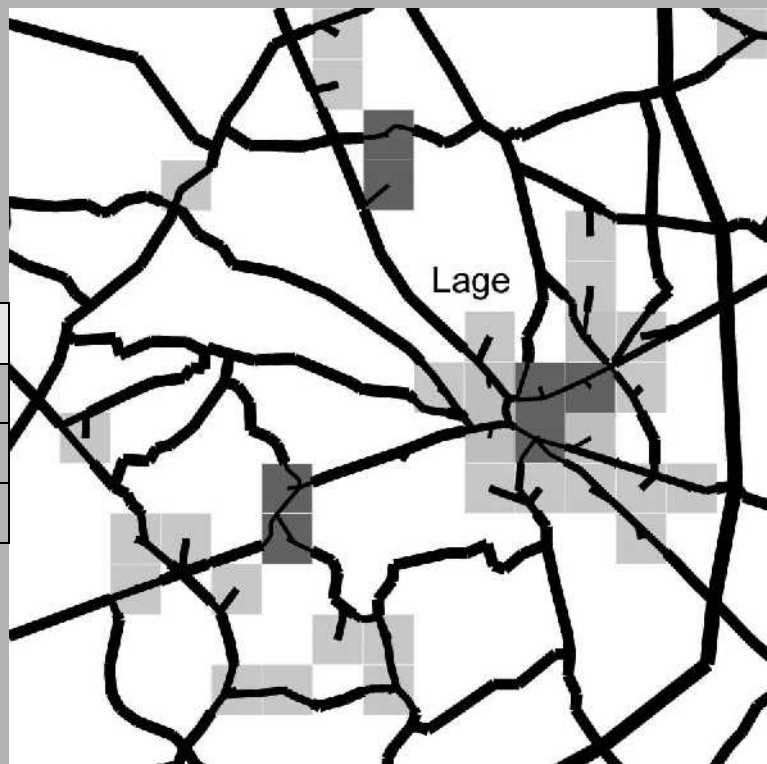
Fahrgeschwindigkeit

	urban	semiurban	suburban	außerorts
Nebenstraßen	17	20	25	50
Hauptstraßen	25	30	35	55
Schnellstraßen	/	/	60	80



Geschwindigkeitsäquivalente

	urban	semiurban	suburban	außerorts
Nebenstraßen	11	14	17	28
Hauptstraßen	14	18	21	29
Schnellstraßen	/	/	29	35



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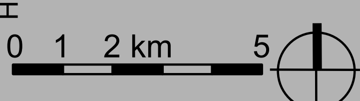
Research area



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Local urbanity 1960 - 2000

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0 1 2 5 km

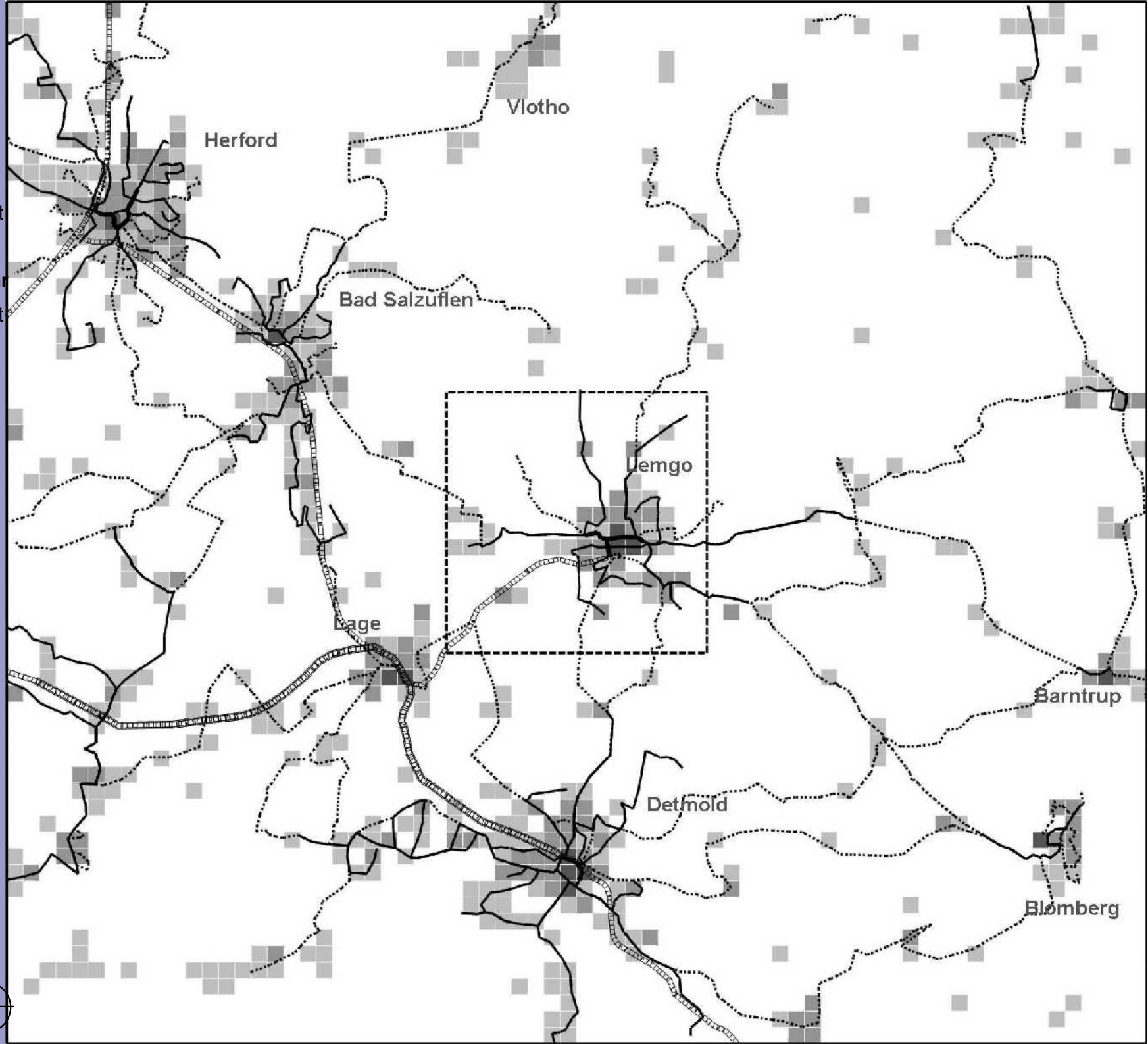
Existing conditions

ÖV Nahverkehr

- 7,5-Minuten-Takt
- 15-/ 30-Minuten-Takt
- 60-Minuten-Takt

ÖV Regionalverkehr

- 15-/ 30-Minuten-Takt
- 60-Minuten-Takt



0 1 2 5 km

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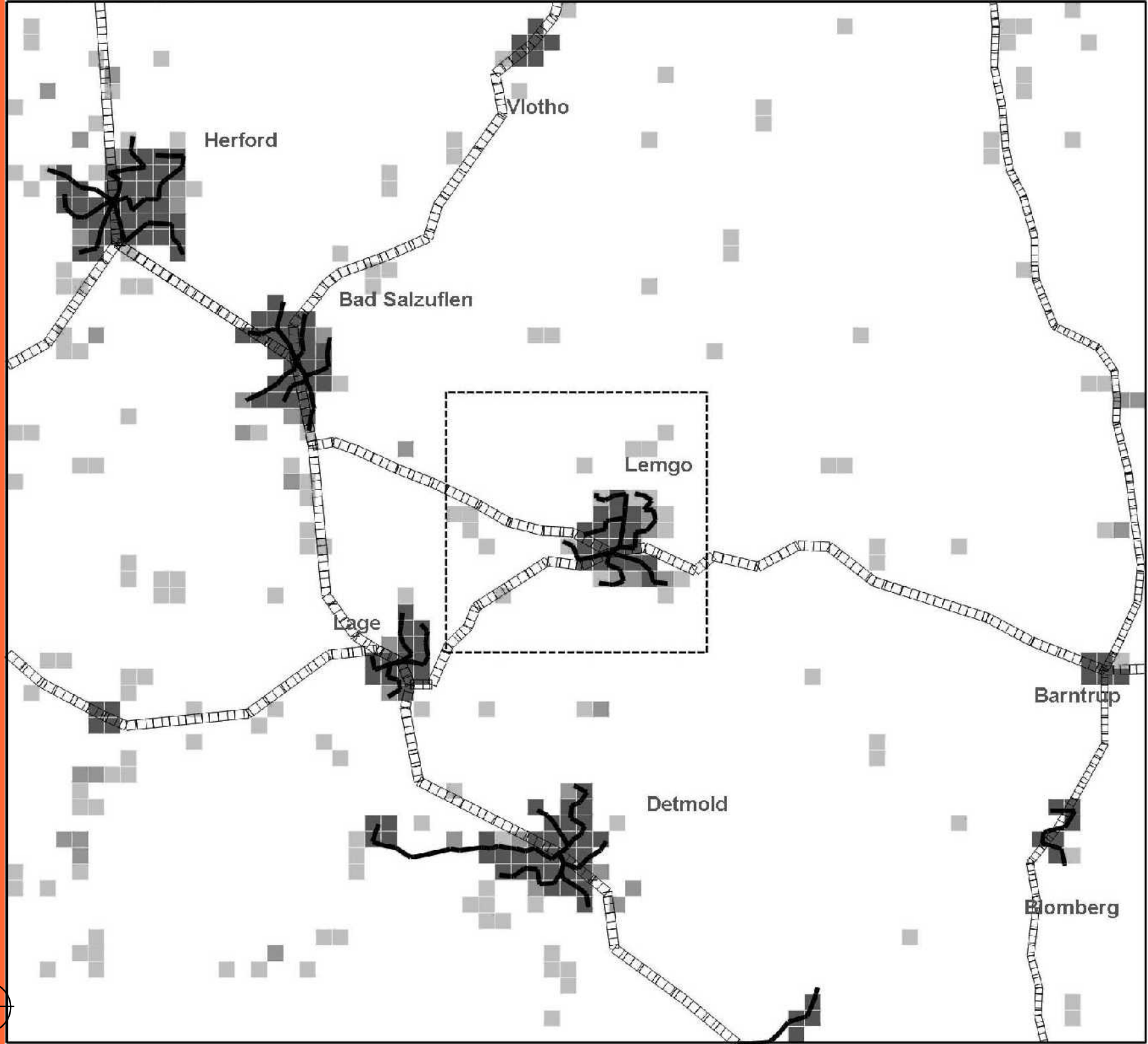
Compact City



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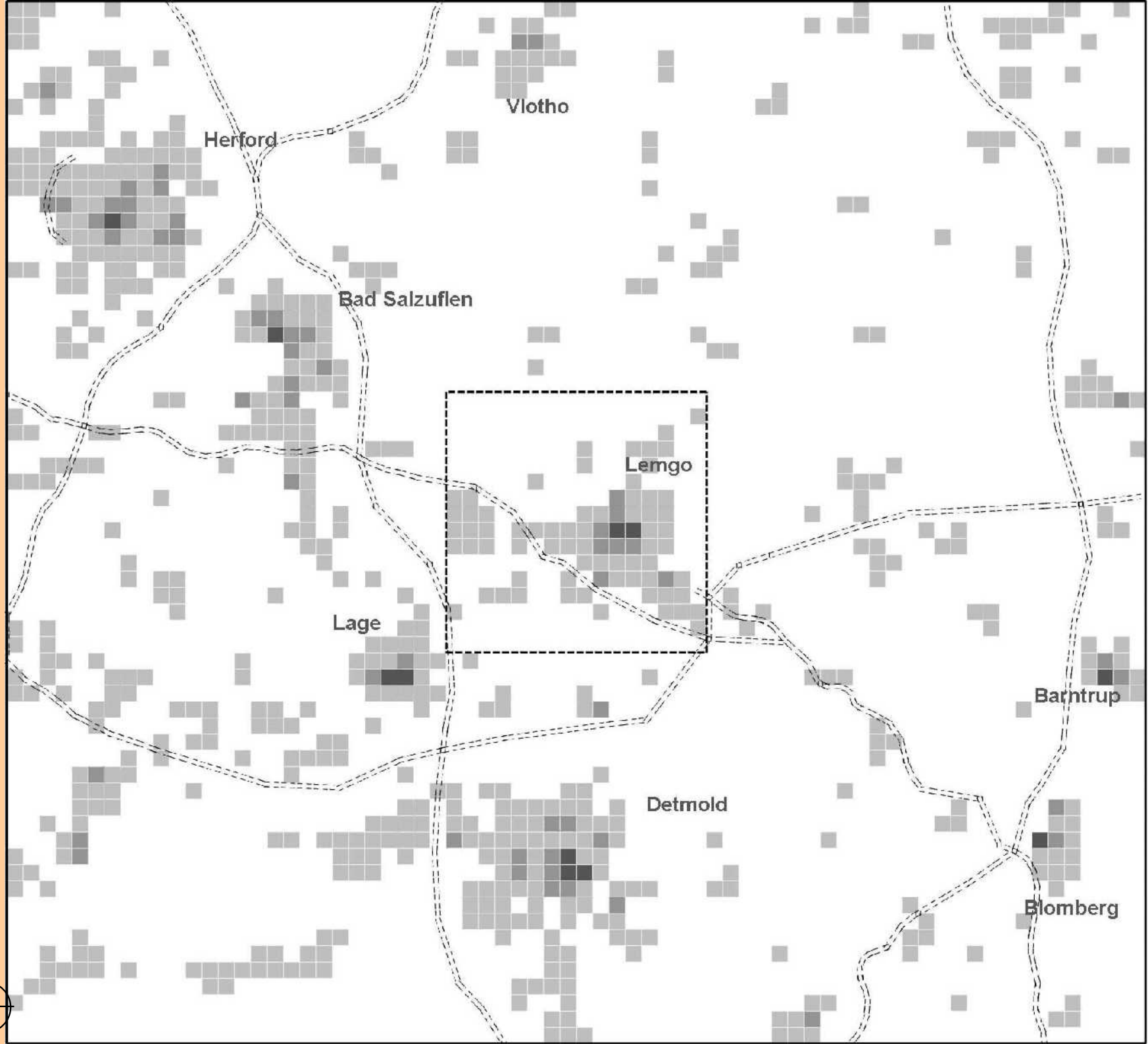
0 1 2 5 km

Autoland



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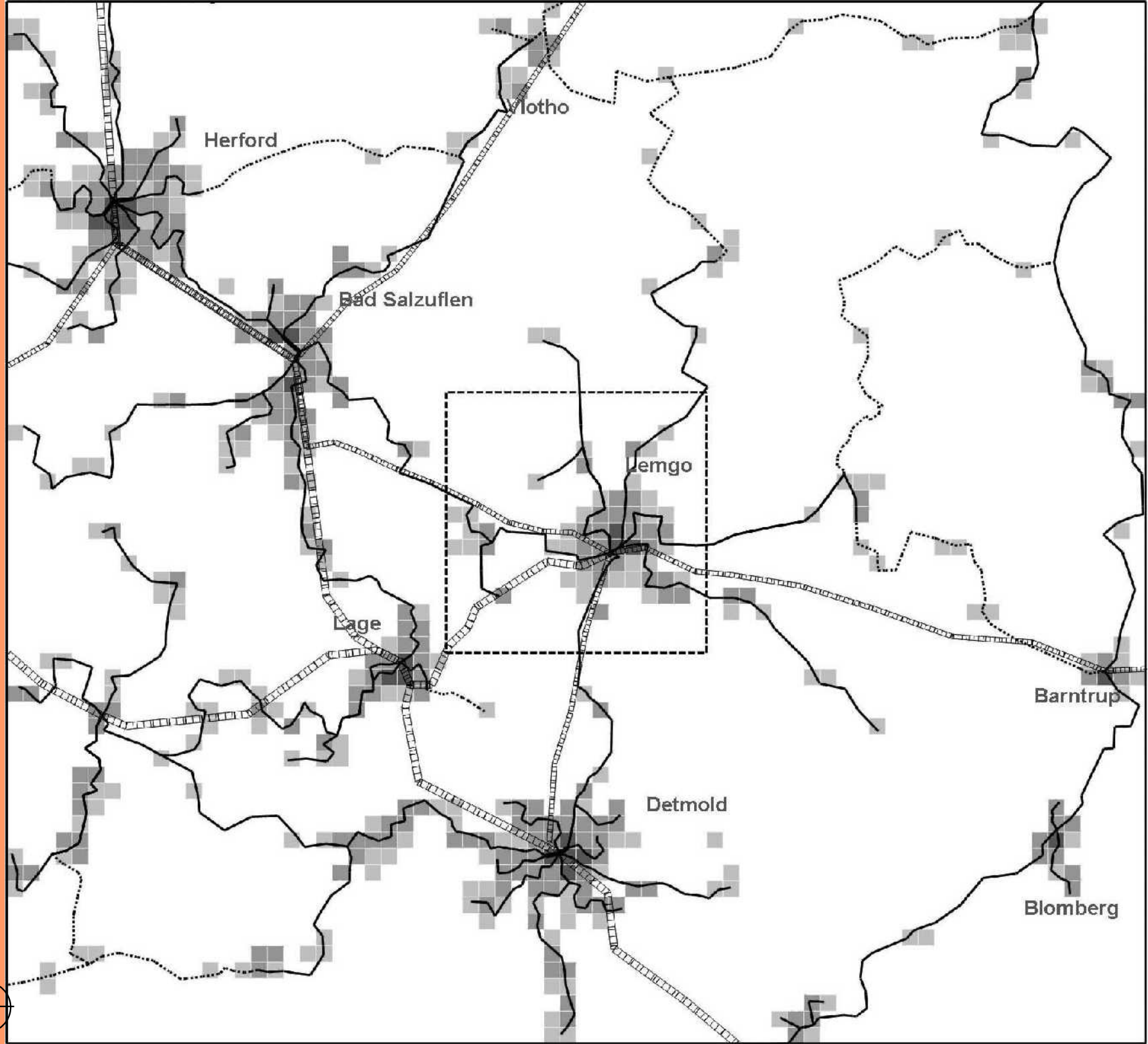
0 1 2 5 km

Levelling



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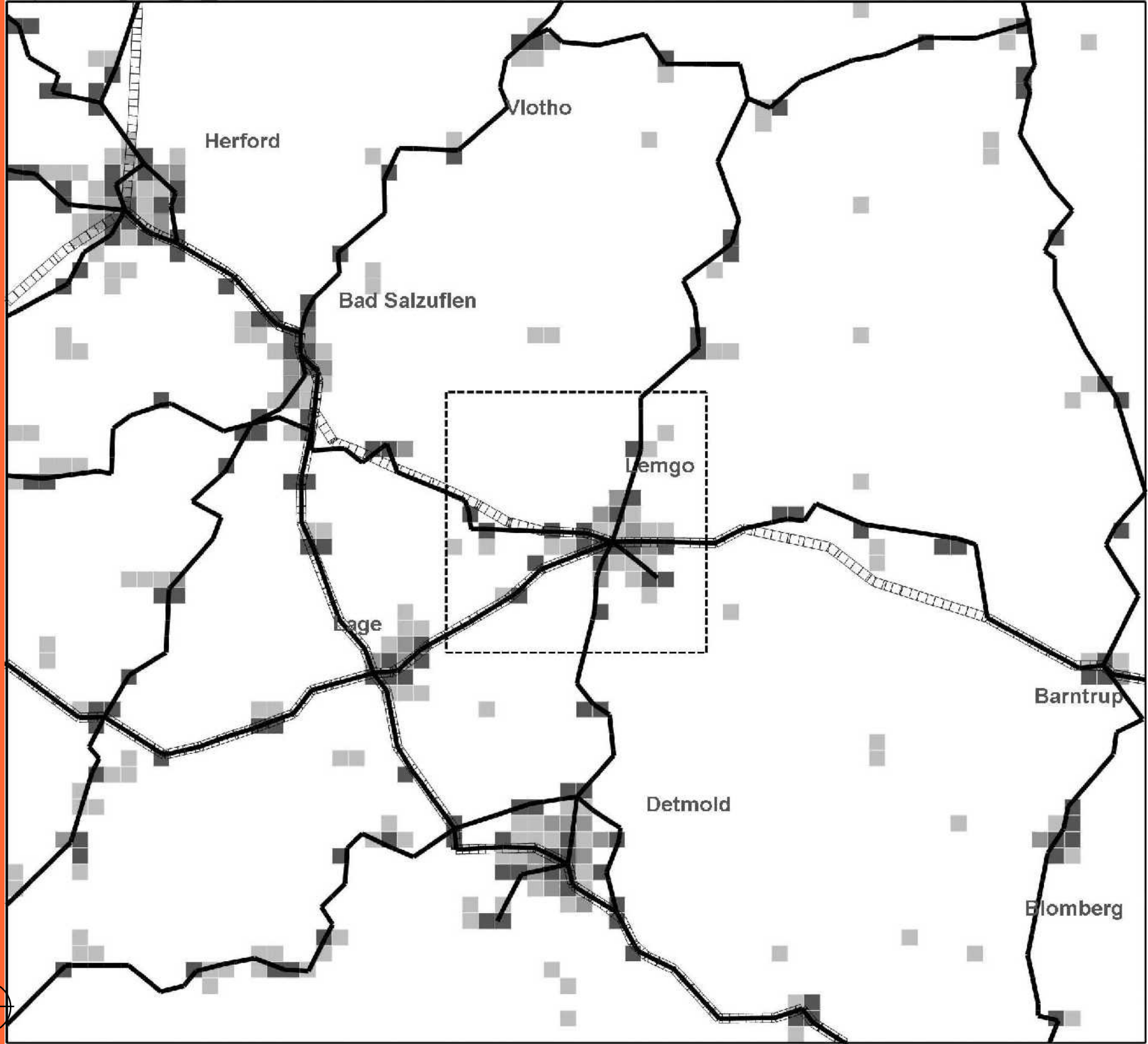
0 1 2 5 km

Network of Towns



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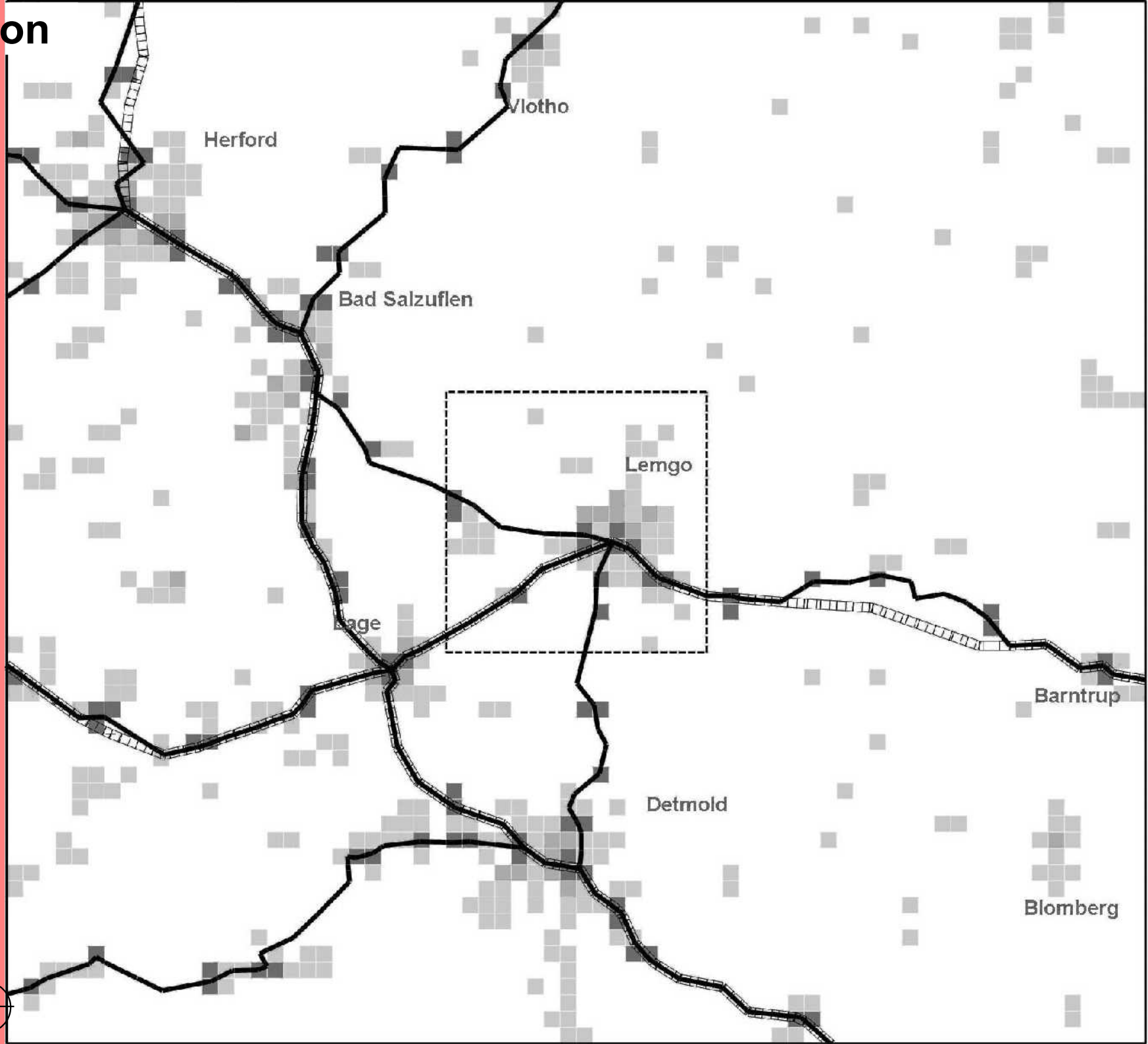
0 1 2 5 km

Differentiation



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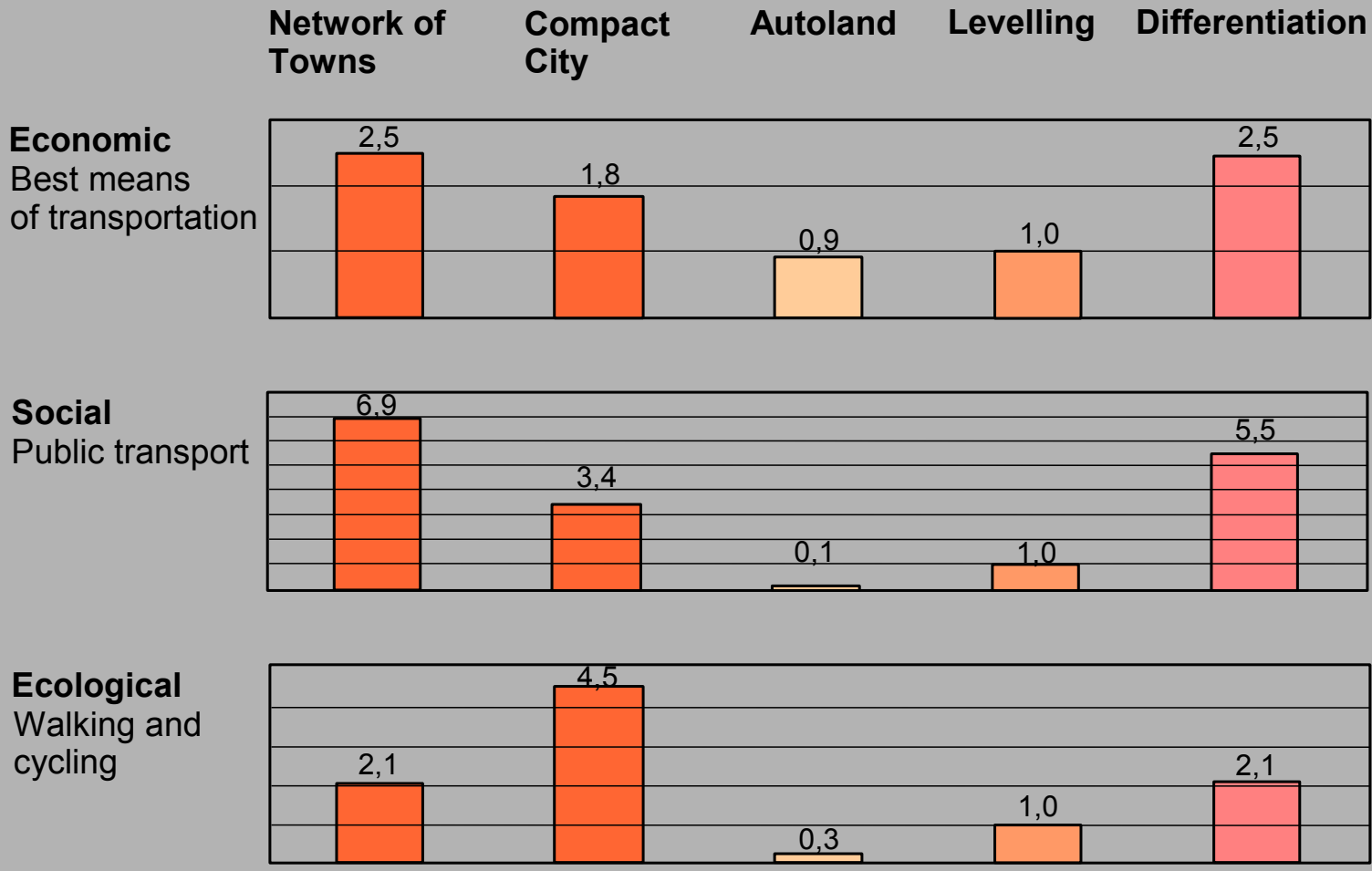
0 1 2 5 km

Results
Spatial options of choice

Potential connections in mio.

	Network of Towns	Compact City	Autoland	Levelling	Differentiation
		Comparison for hypothesis I			
Ped.	1,2	3,2	0,2	0,7	1,2
Bike	5,5	9,4	0,8	2,3	5,4
PT	28,3	13,9	0,5	4,1	22,4
Car	19,4	20,6	9,7	11,2	27,5
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)

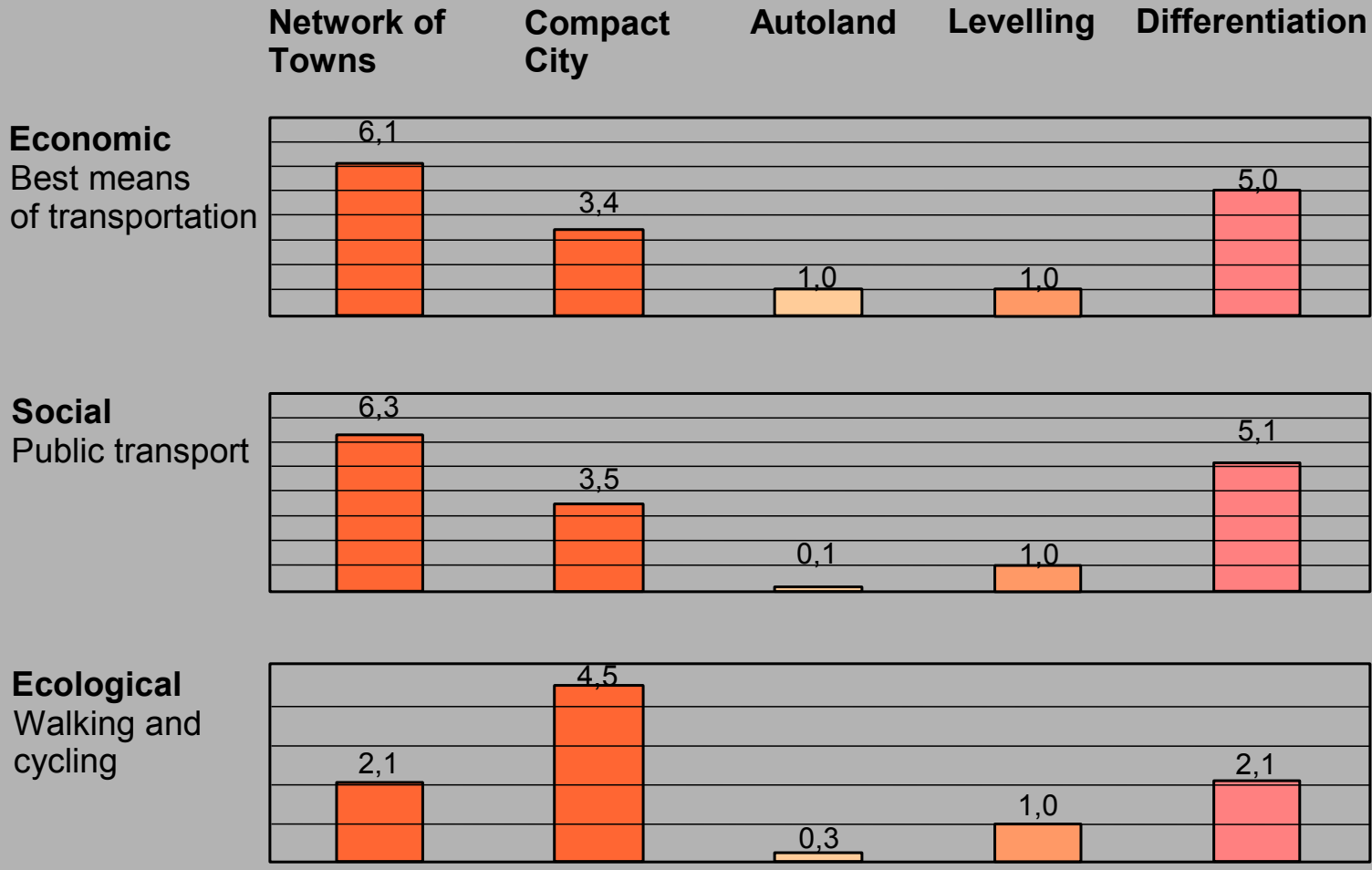


Sensitivity analysis
Assumption low income

Potential connections in mio.

	Network of Towns	Compact City	Autoland	Levelling	Differentiation
		Comparison for hypothesis I			
Ped.	1,2	3,2	0,2	0,7	1,2
Bike	5,5	9,4	0,8	2,3	5,4
PT	19,6	10,9	0,3	3,1	15,9
Car	4,1	4,9	3,1	3,2	6,3
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)

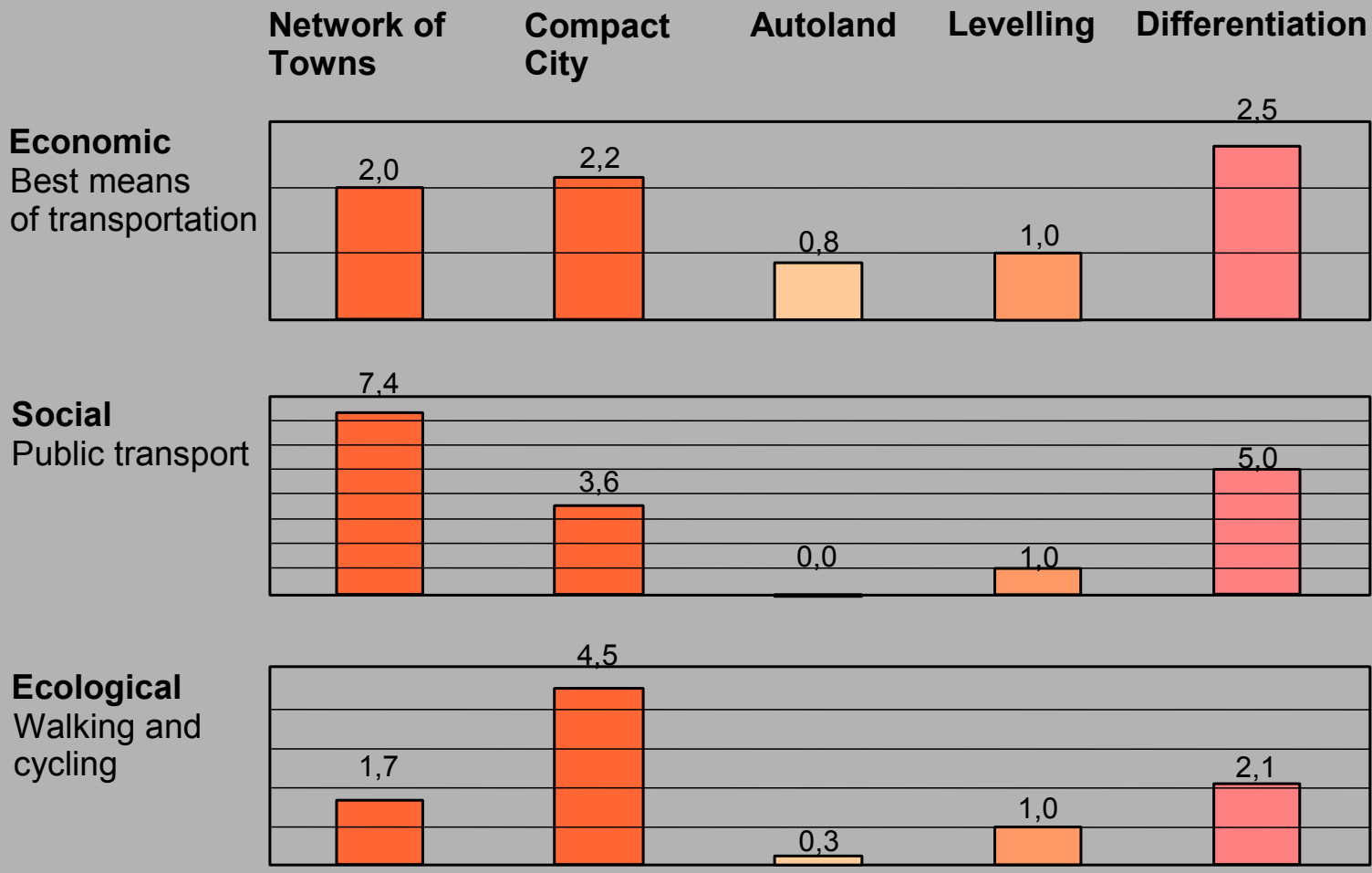


Sensitivity analysis
Assumption high income

Potential connections in mio.

	Network of Towns	Compact City	Autoland	Levelling	Differentiation
		Comparison for hypothesis I			
Ped.	1,2	3,2	0,2	0,7	1,2
Bike	4,4	9,4	0,8	2,3	5,4
PT	36,7	17,8	0,0	5,0	28,5
Car	58,9	62,9	22,9	29,1	78,2
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)



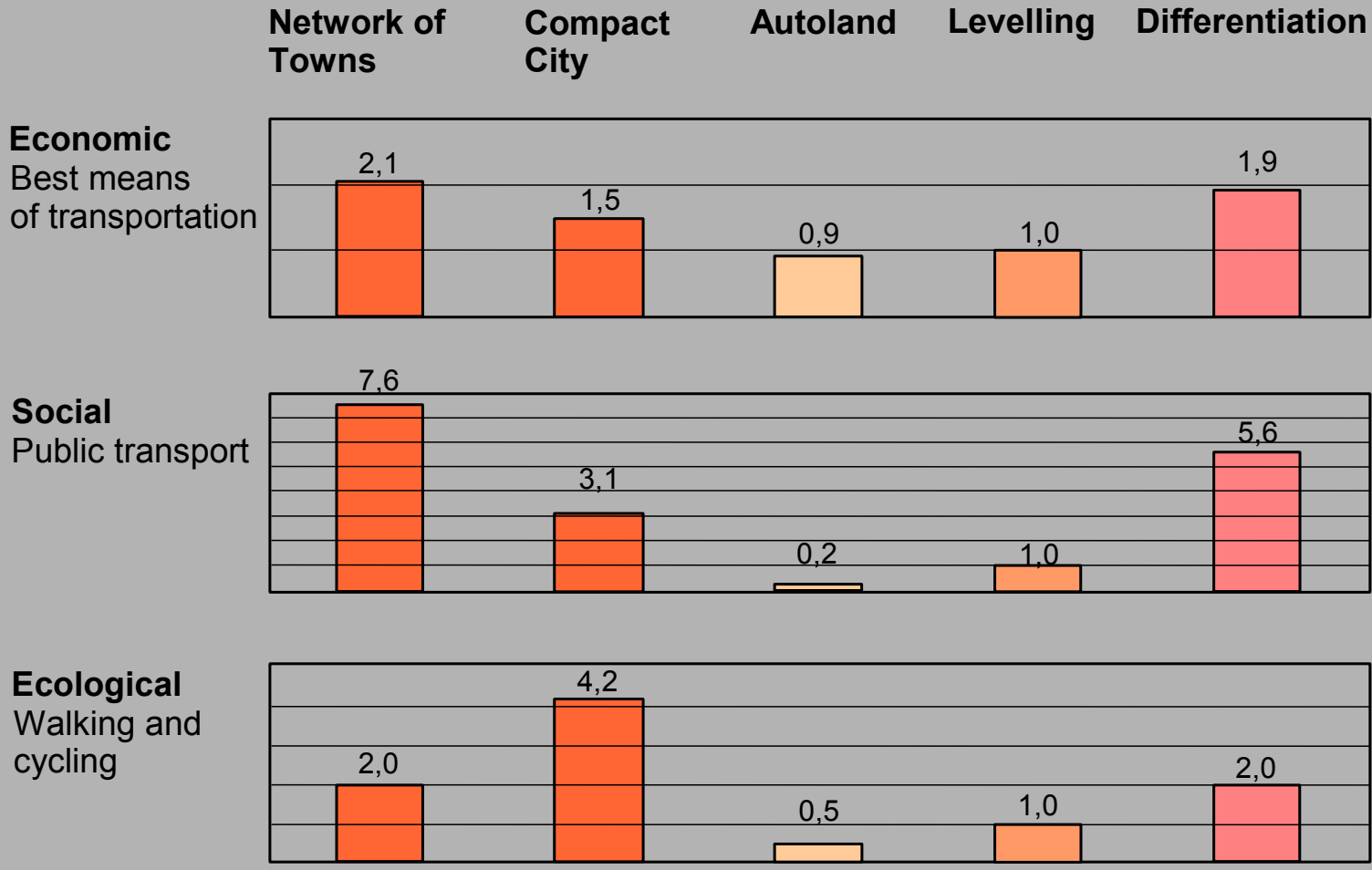
Sensitivity analysis

only inhabitants and workplaces

Potential connections in mio.

	Network of Towns	Compact City	Autoland	Levelling	Differentiation
		Comparison for hypothesis I			
Ped.	0.3	0,7	0,1	0,1	0,3
Bike	1,3	2,3	0,3	0,6	1,3
PT	7,9	3,2	0,2	1,0	5,8
Car	6,2	5,6	3,4	3,8	7,2
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)



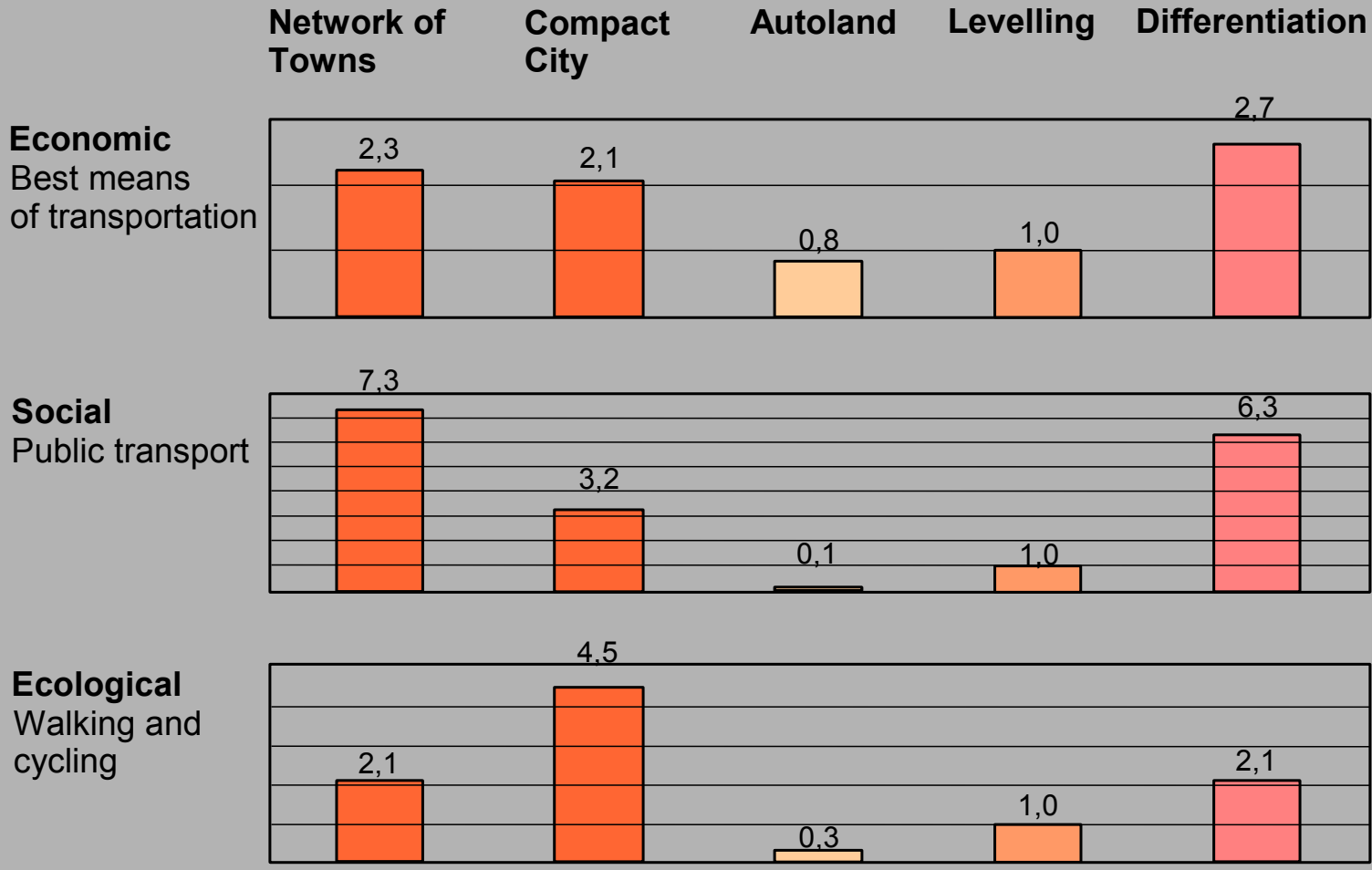
Sensitivity analysis

Car-sharing and bike & ride

Potential connections in mio.

	Network of Towns	Compact City	Autoland	Levelling	Differentiation
		Comparison for hypothesis I			
Ped.	1,2	3,2	0,2	0,7	1,2
Bike	5,5	9,4	0,8	2,3	5,4
PT	40,8	18,1	0,5	5,6	35,0
Car	35,6	37,4	13,4	17,7	47,5
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)



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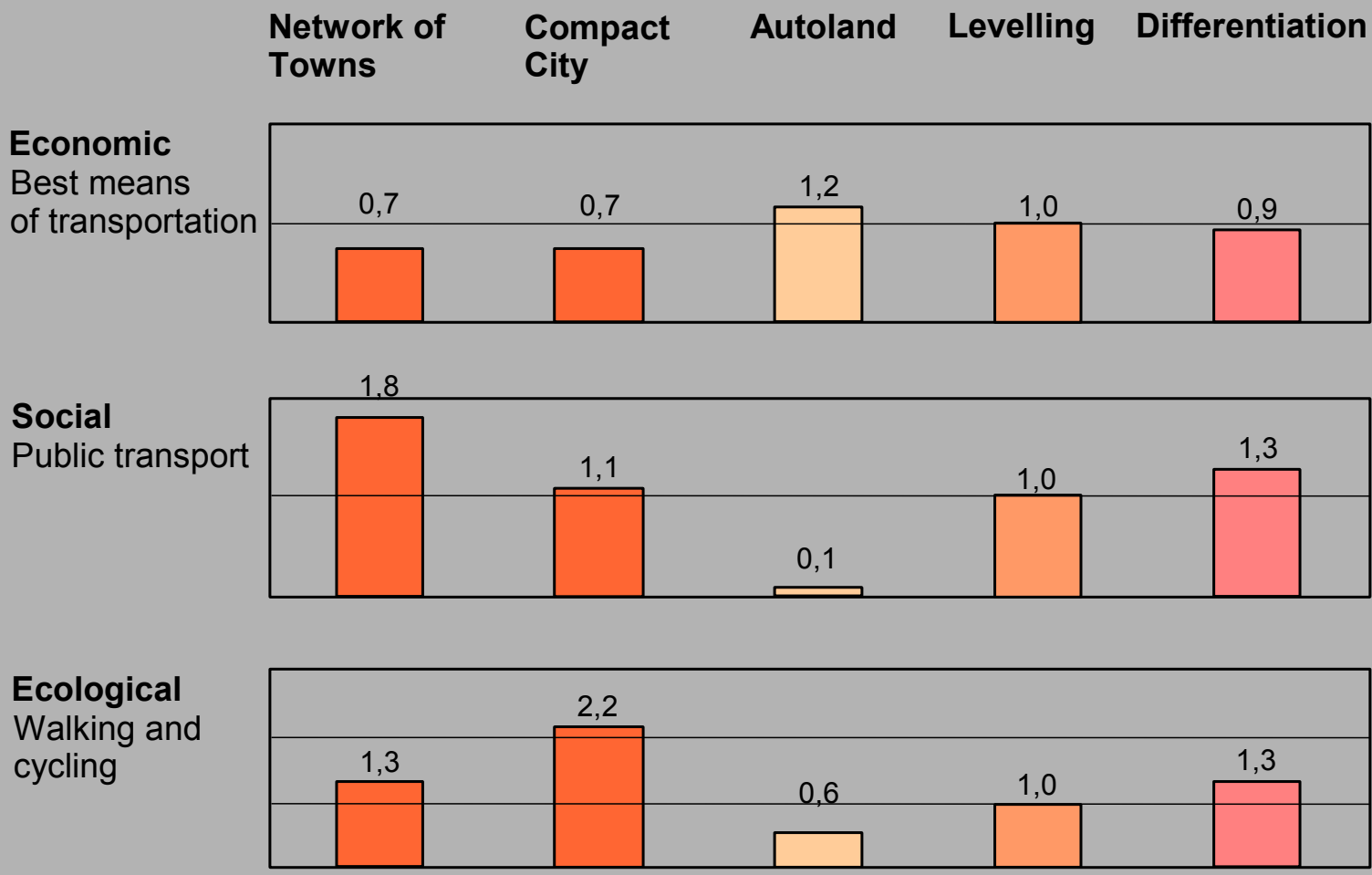
Sensitivity analysis from the user's point of view

Opportunity-indicator
and variable user costs only

Potential connections in mio.

	Network of Towns	Compact City	Autoland	Levelling	Differentiation
		Comparison for hypothesis I			
Ped.	10,1	18,3	3,9	7,0	10,1
Bike	28,2	46,6	15,8	25,1	28,3
PT	189,0	109,2	*10,0*	102,7	133,8
Car	185,5	187,0	301,8	252,9	235,2
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)



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Results

Potential connections in mio.

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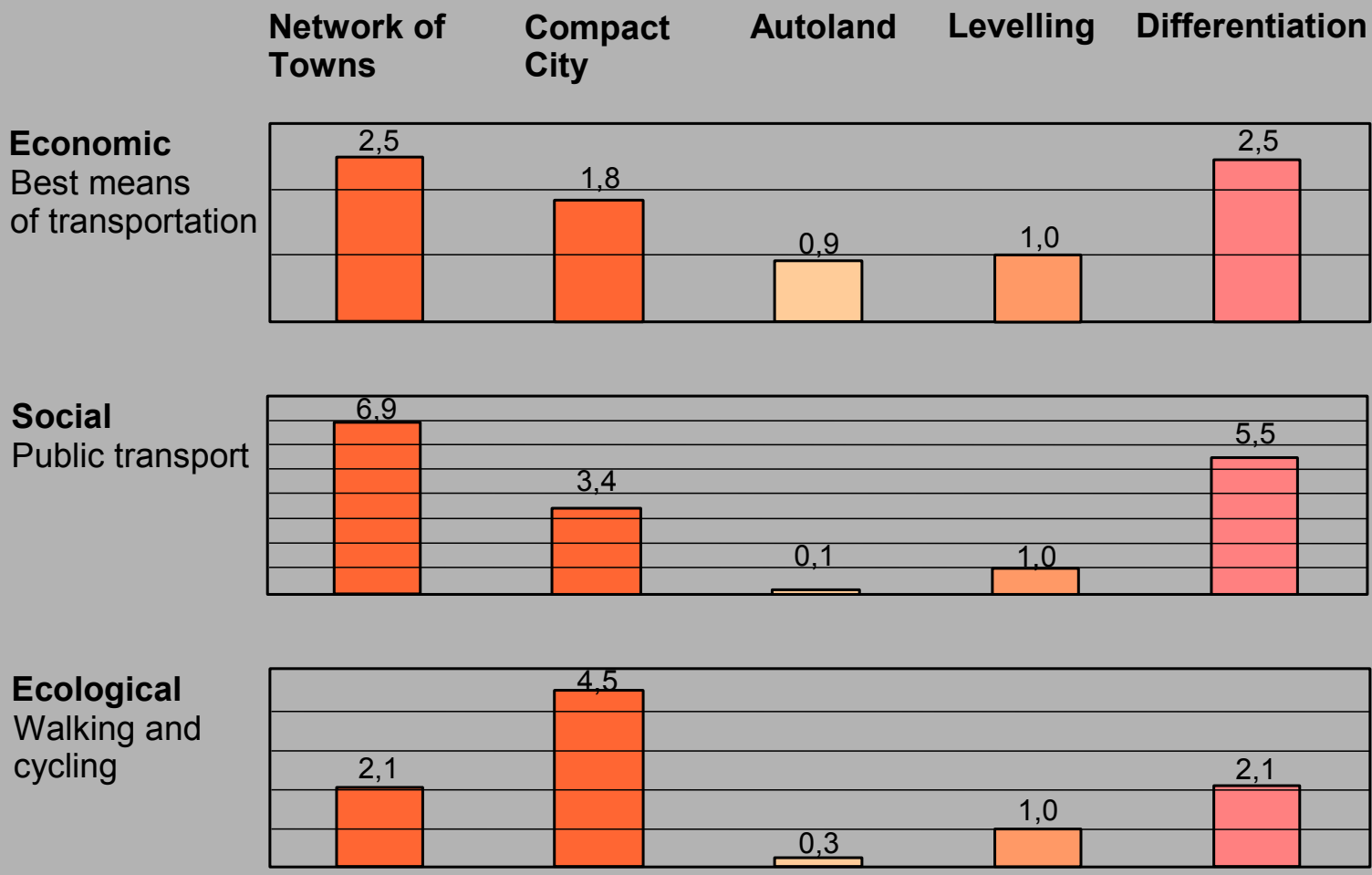
	Comparison for hypothesis II			Comparison for hypothesis III	

Comparative evaluation (Levelling = 1)



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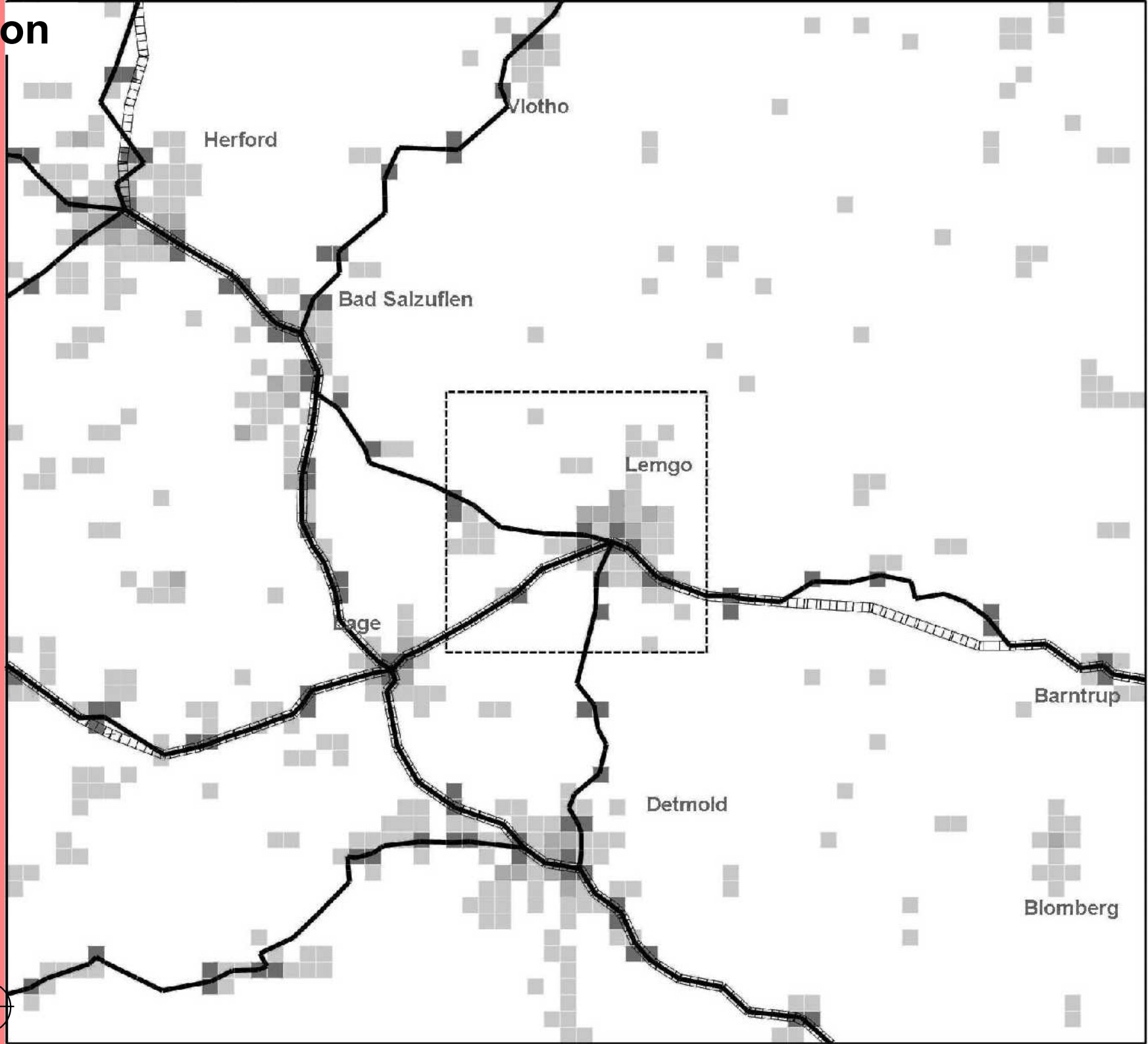
Differentiation



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0 1 2 5 km

Conclusions

Spatial options of choice instead of traffic behaviour: a new paradigma?

Quasi-endless settlement networks instead of central place theory

Local urbanity: polarisation instead of levelling

Political reforms instead of "planning against the market"