

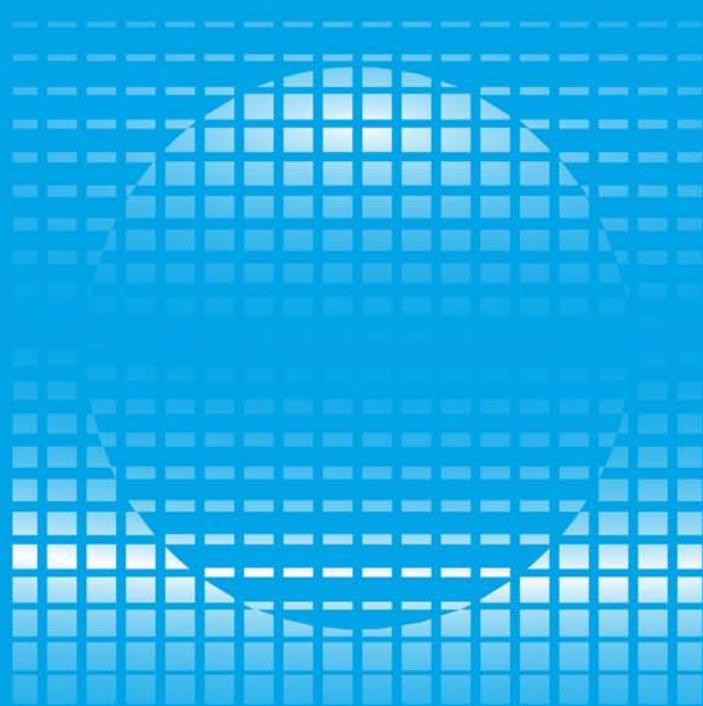
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Taeke M. de Jong

DIVERSIFYING ENVIRONMENTS THROUGH DESIGN

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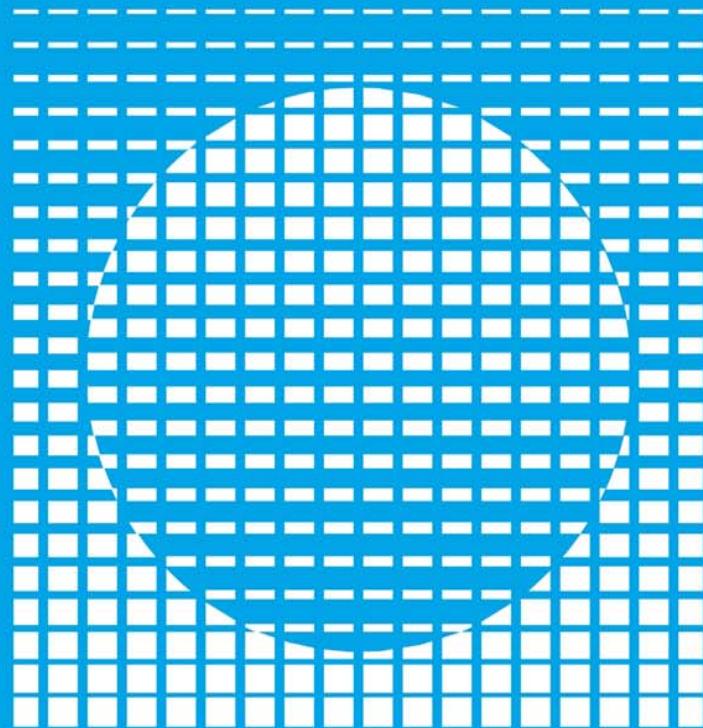
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Language games	Being able	Reflecting	Choosing
<i>Futures</i>	possible	probable	desirable
<i>Sectors</i>	technique	science	management
<i>Activities</i>	design	research	policy
<i>Modes</i>	conditional	causal	normative
Reductions as to <i>character</i> <i>location or time</i>	legend tolerances	variables relations	agenda appointments

Fig. 1 Three language games to be covered in any project p. 16

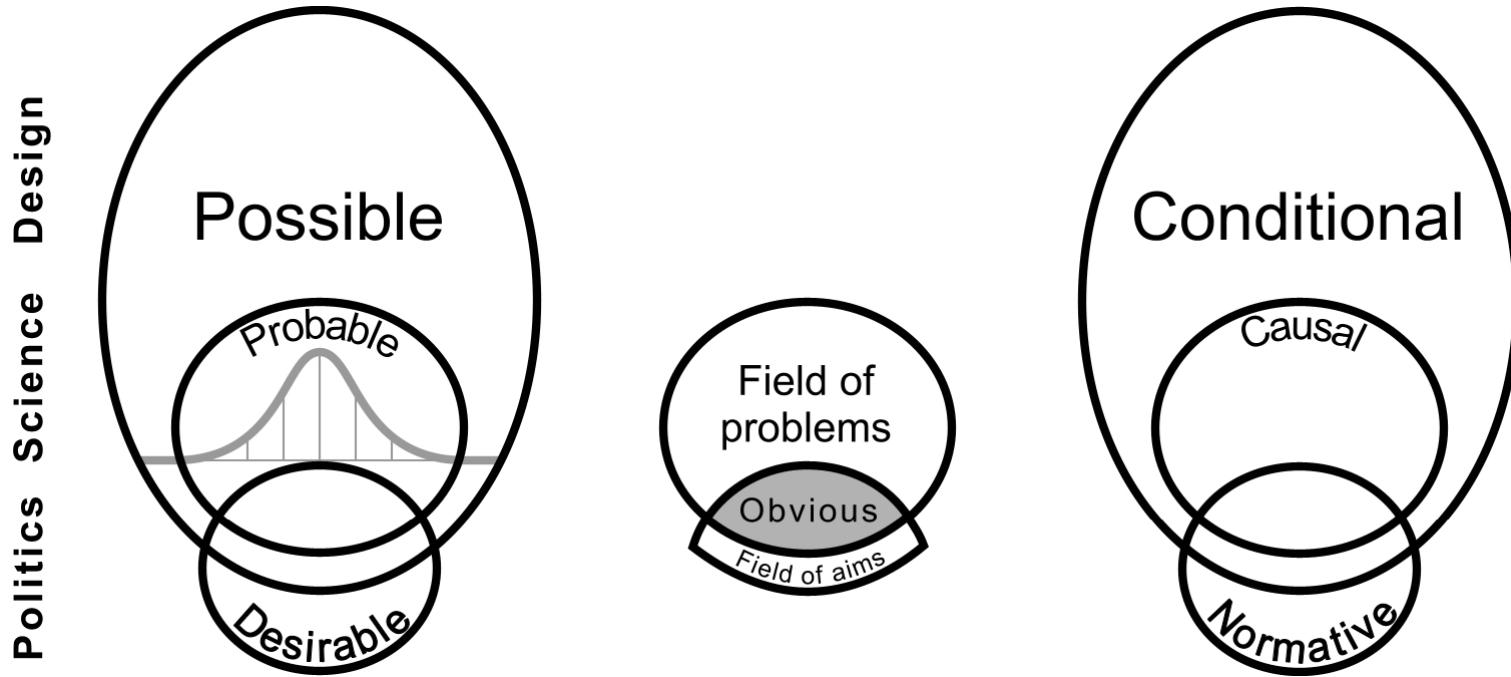


Fig. 2 Possible, probable, and desirable futures Fig. 3 Modes of reason p.17

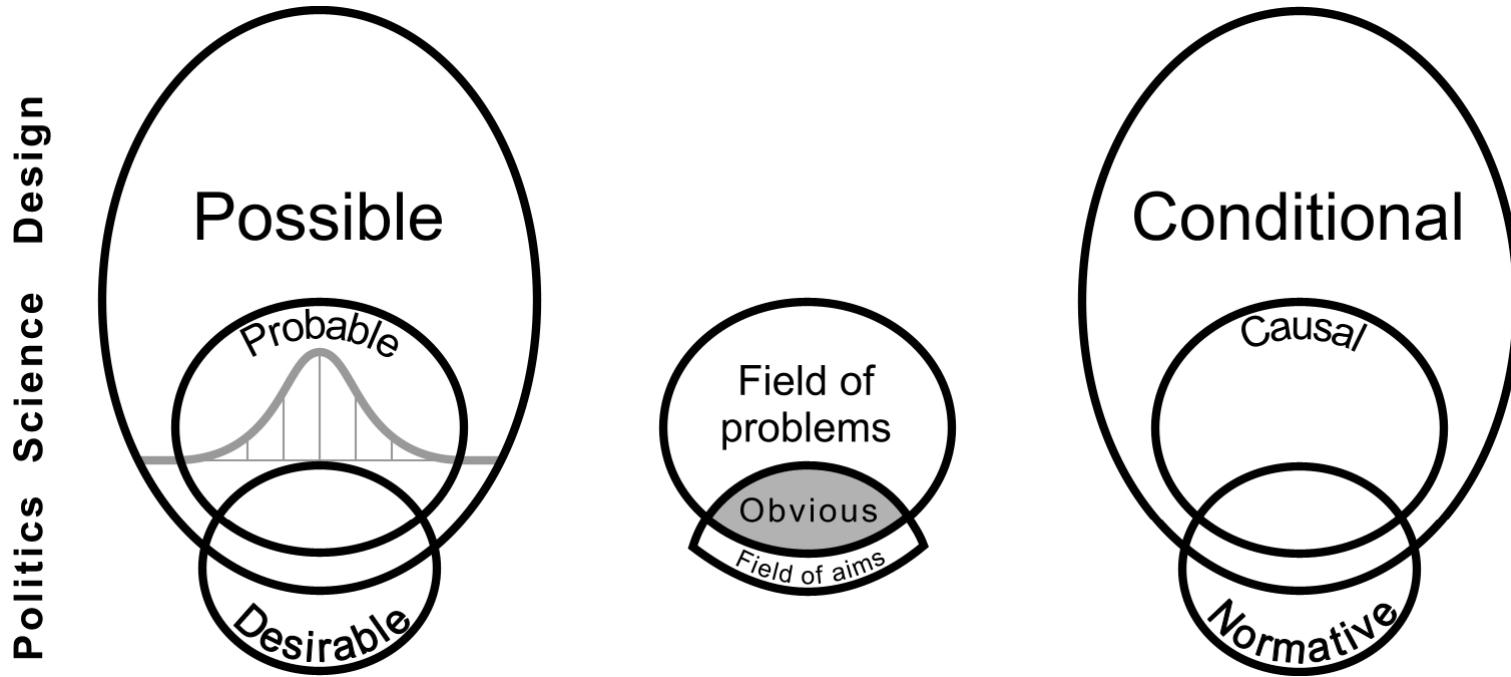


Fig. 2 Possible, probable, and desirable futures Fig. 3 Modes of reason p.17

Content

Form

Structure

Function

Intention

Fig. 4 Intention ↴ function ↴ structure ↴ form ↴ content p.18

Constitution

Formation

Operation

Performance

Execution

Fig. 5 Dynamic equivalents p.18

Image quality

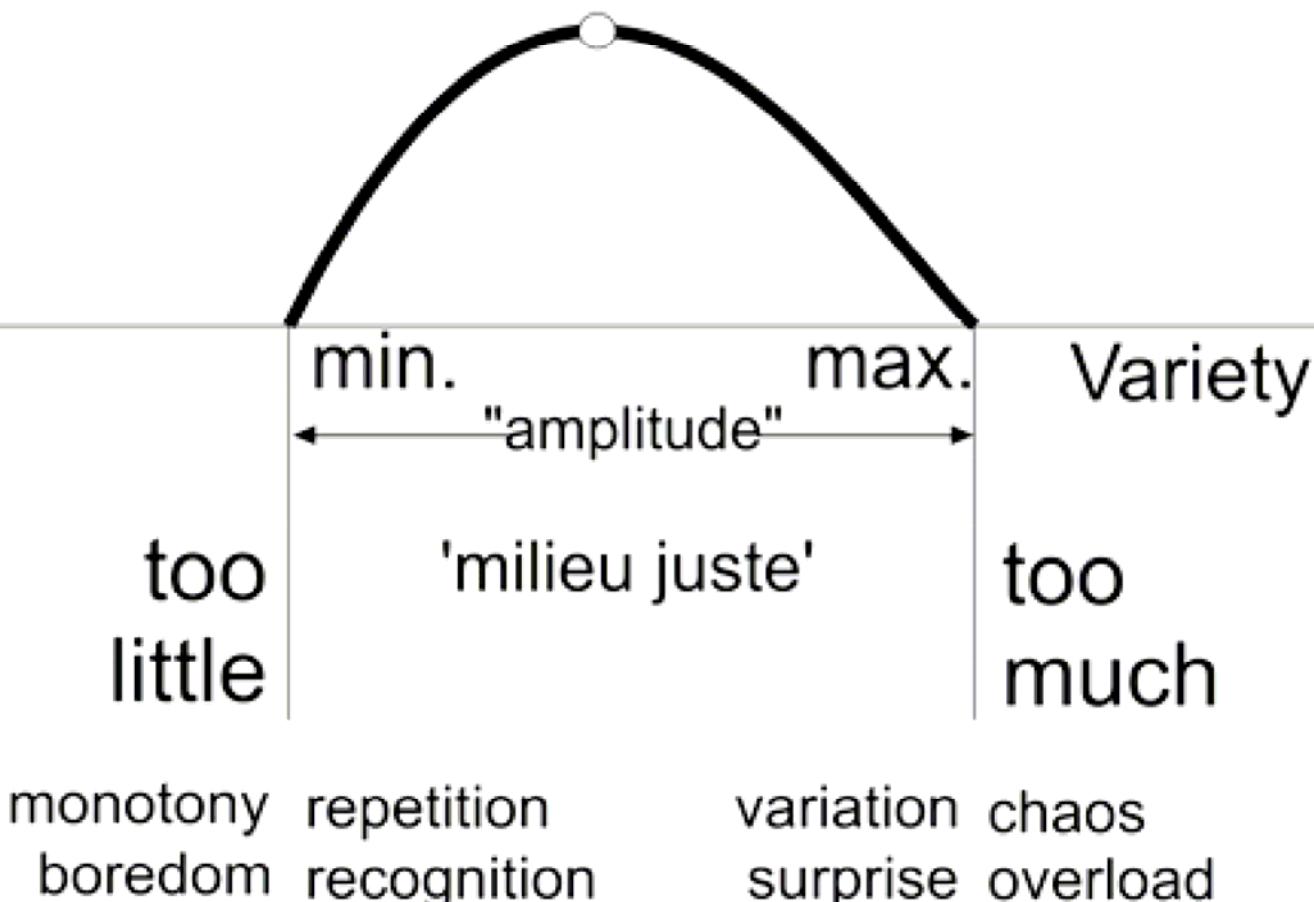


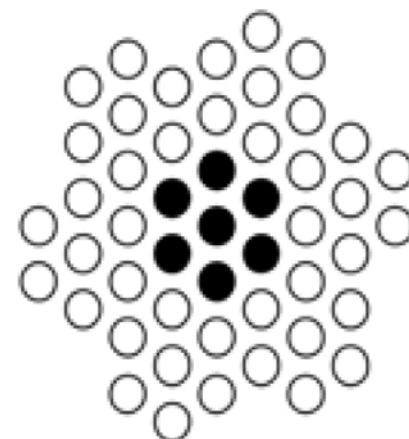
Fig. 6 Visual quality related to diversity p.21

unit: black

accumulation

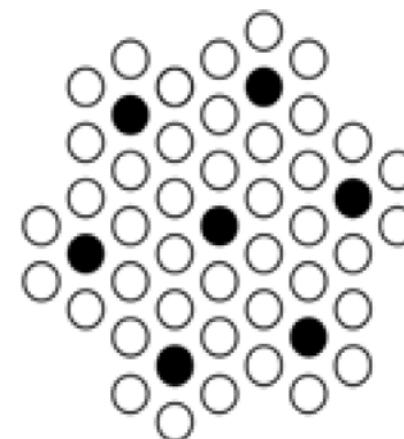
dispersion

grain



homogeneous
equality

heterogeneous
difference



heterogeneous
difference

homogeneous
equality

Fig. 7 Scale-paradox p.21



Fig. 8 Elementary selectors in space p.29



Fig. 9 Conditional selectors p.29

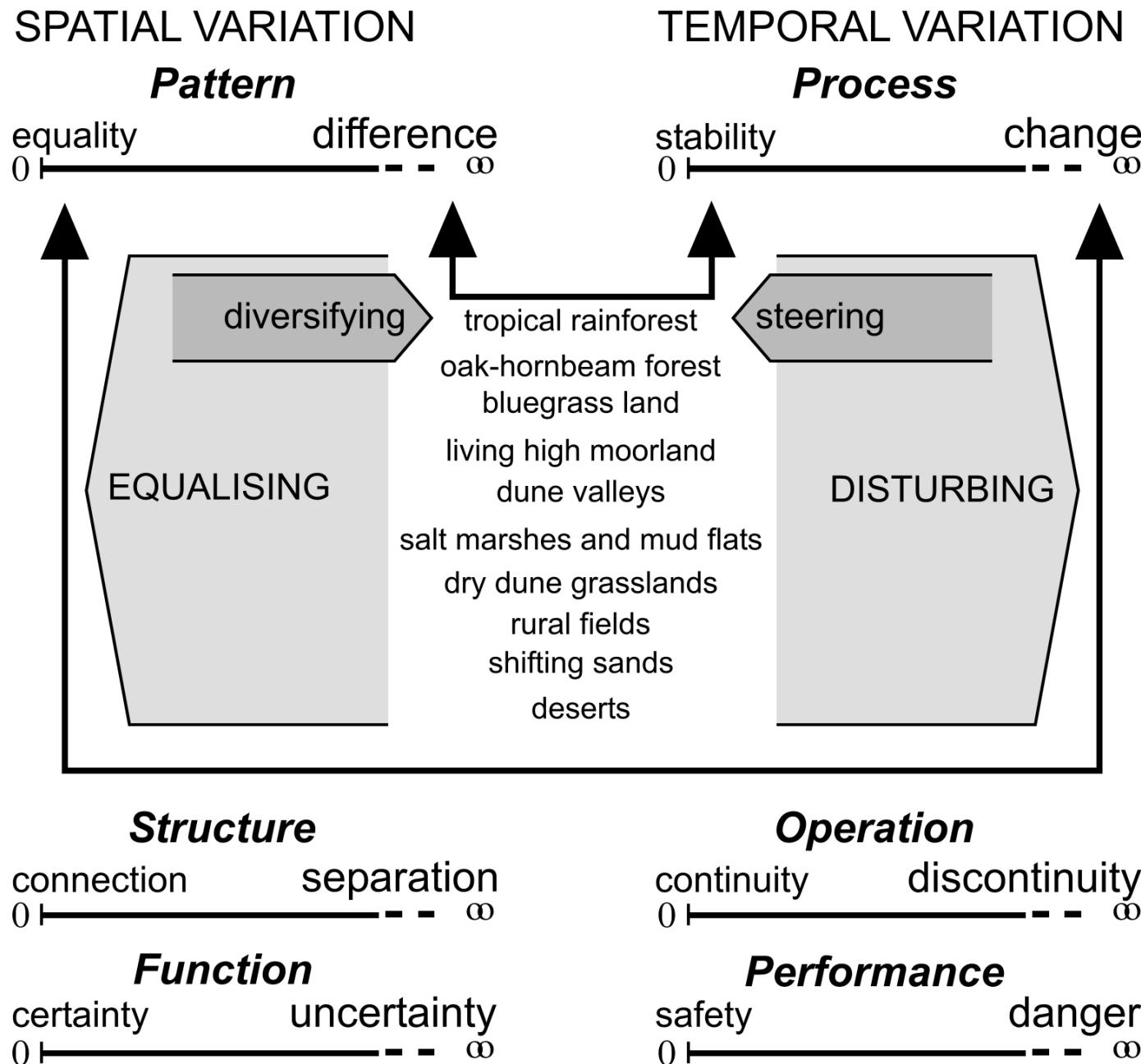


Fig. 10 Van Leeuwen's regulation theory p.36

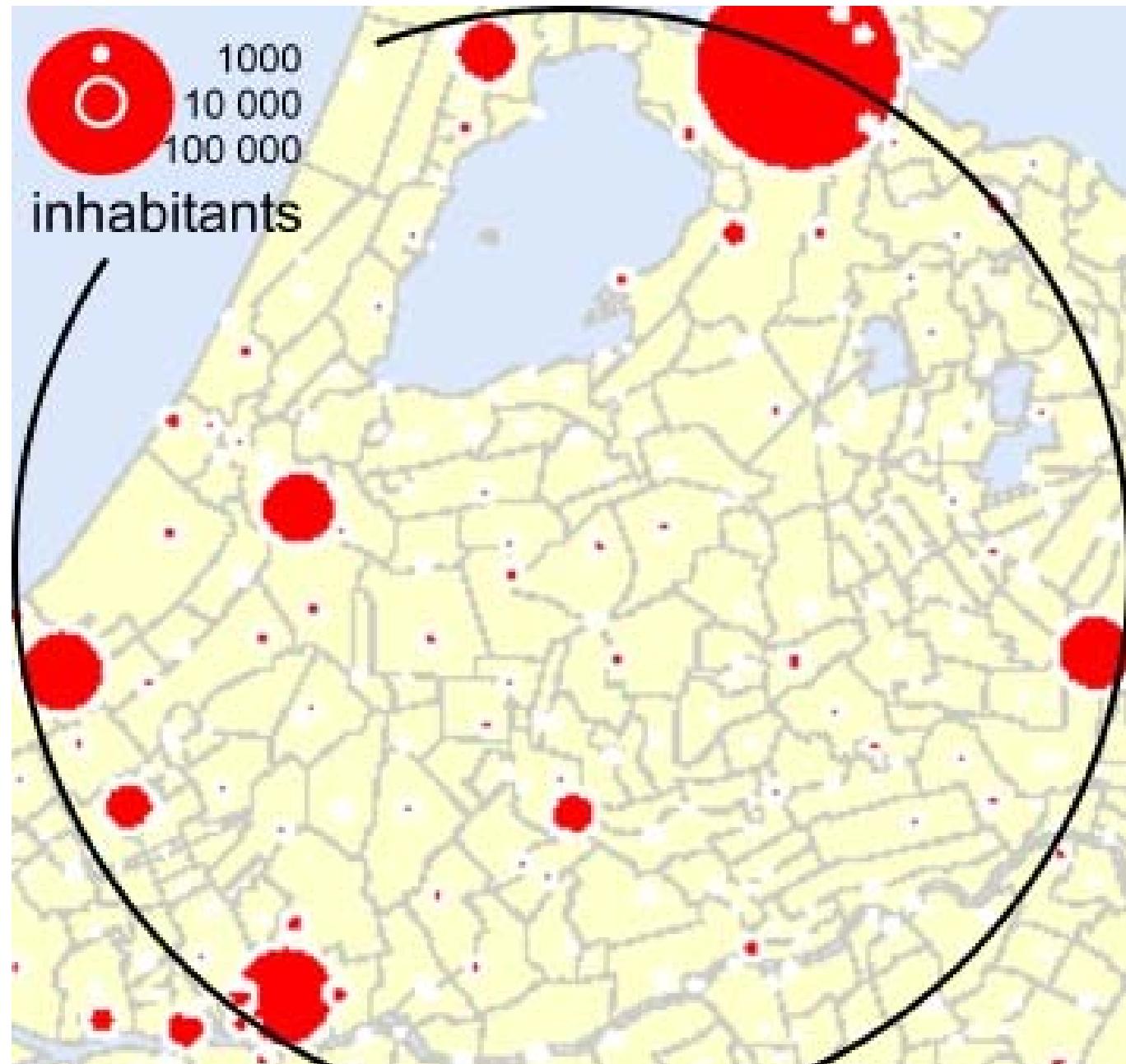


Fig. 11 $R=30\text{km}$ A.D. 1800 p.45

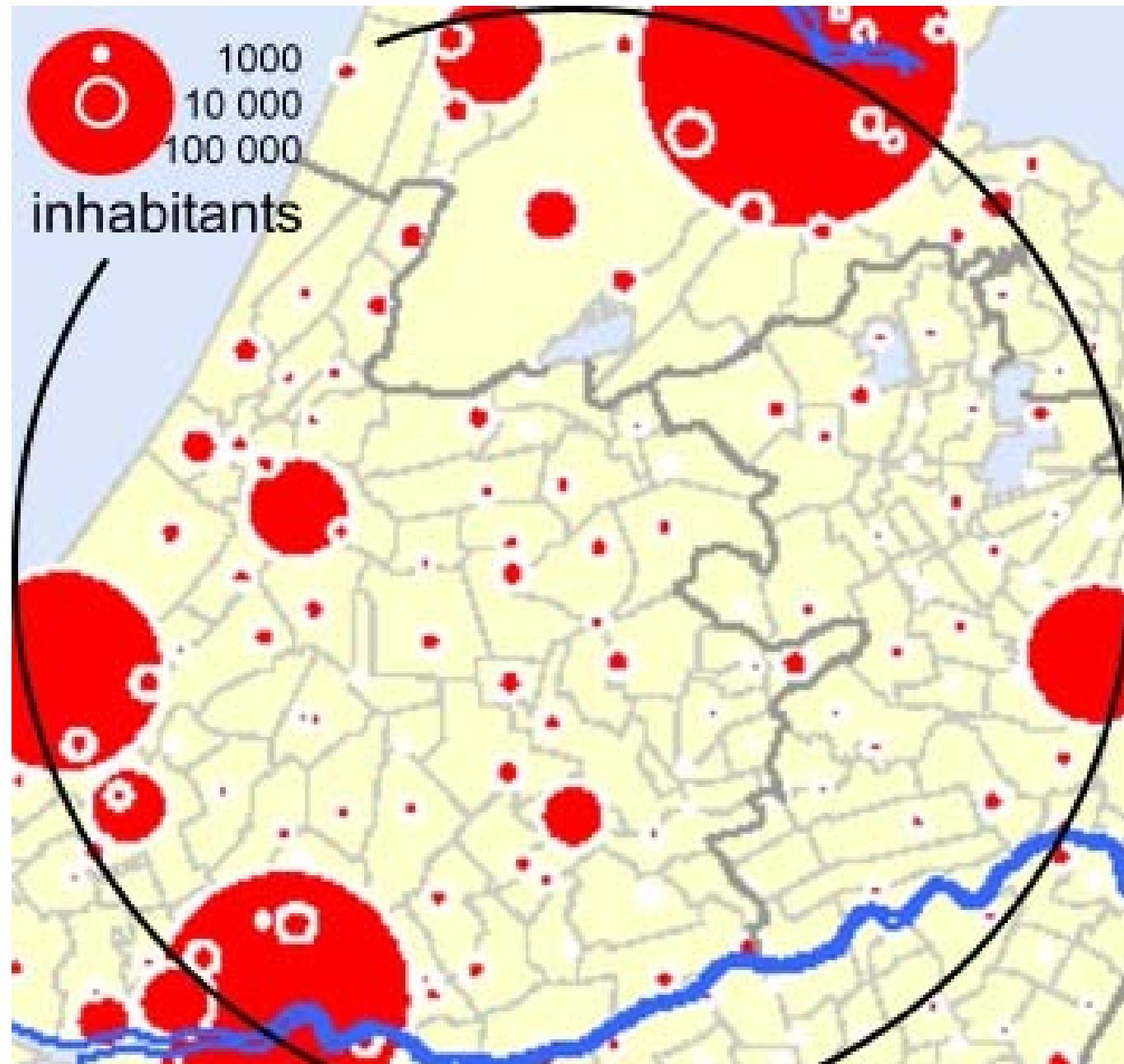


Fig. 12 $R=30\text{km}$ A.D. 1900 p.45

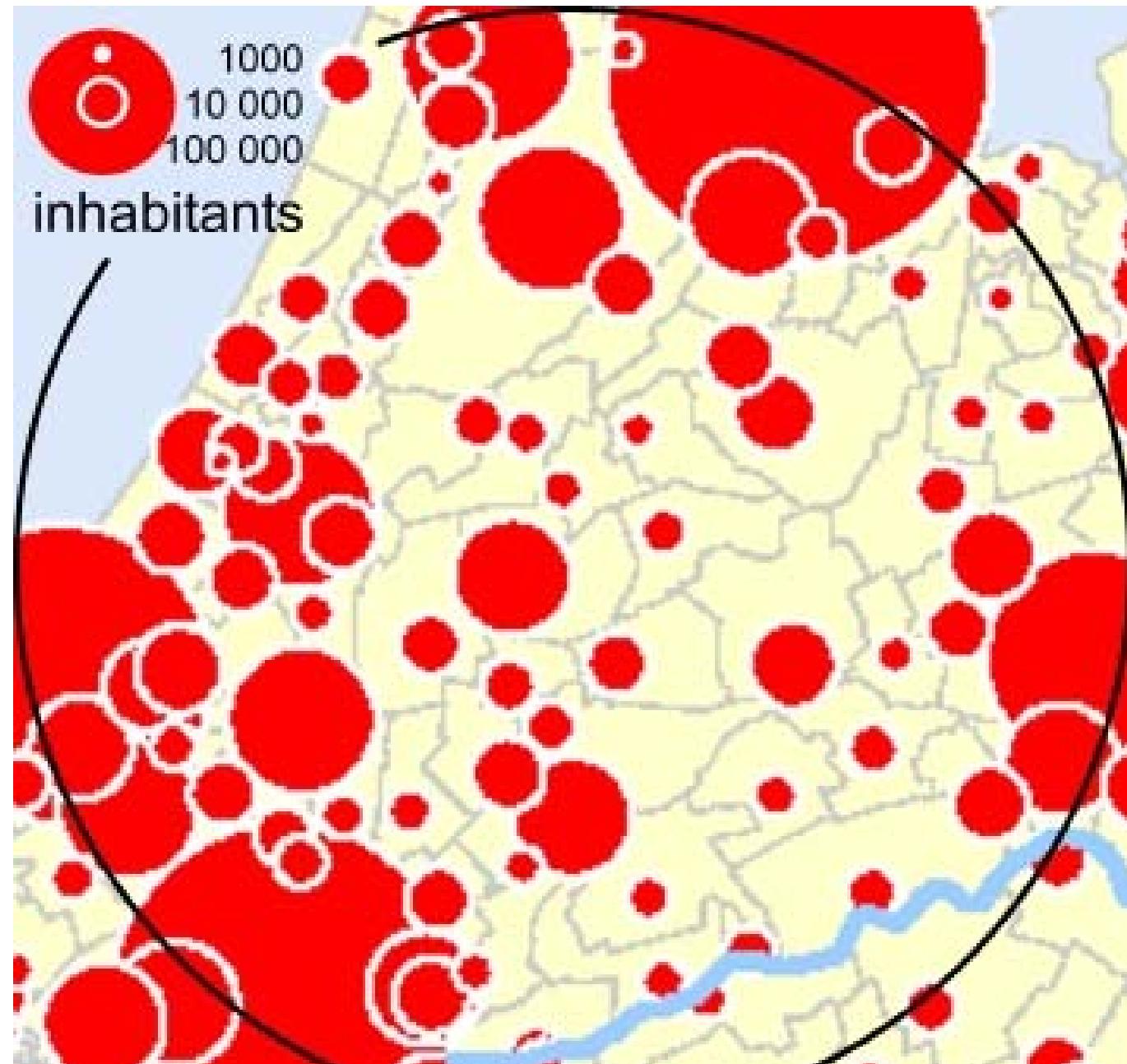


Fig. 13 $R=30\text{km}$ A.D.2000 p.45

- [Yellow square] type A
- [Orange square] type B
- [Red square] type C
- [Dark red square] type D

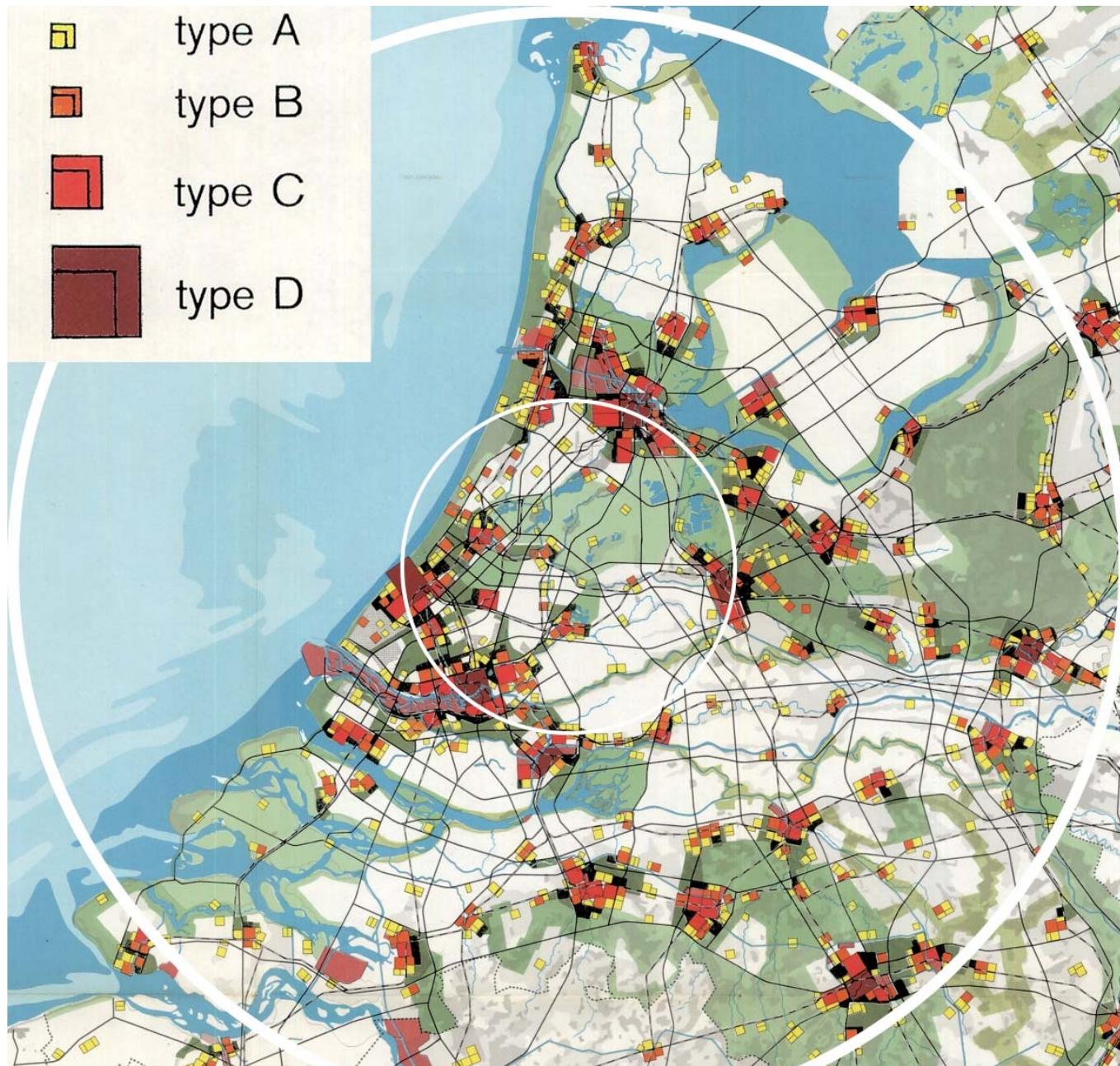


Fig. 14 Blocks map 1966 for 2000c $R=\{100, 30\text{km}\}$ p.46

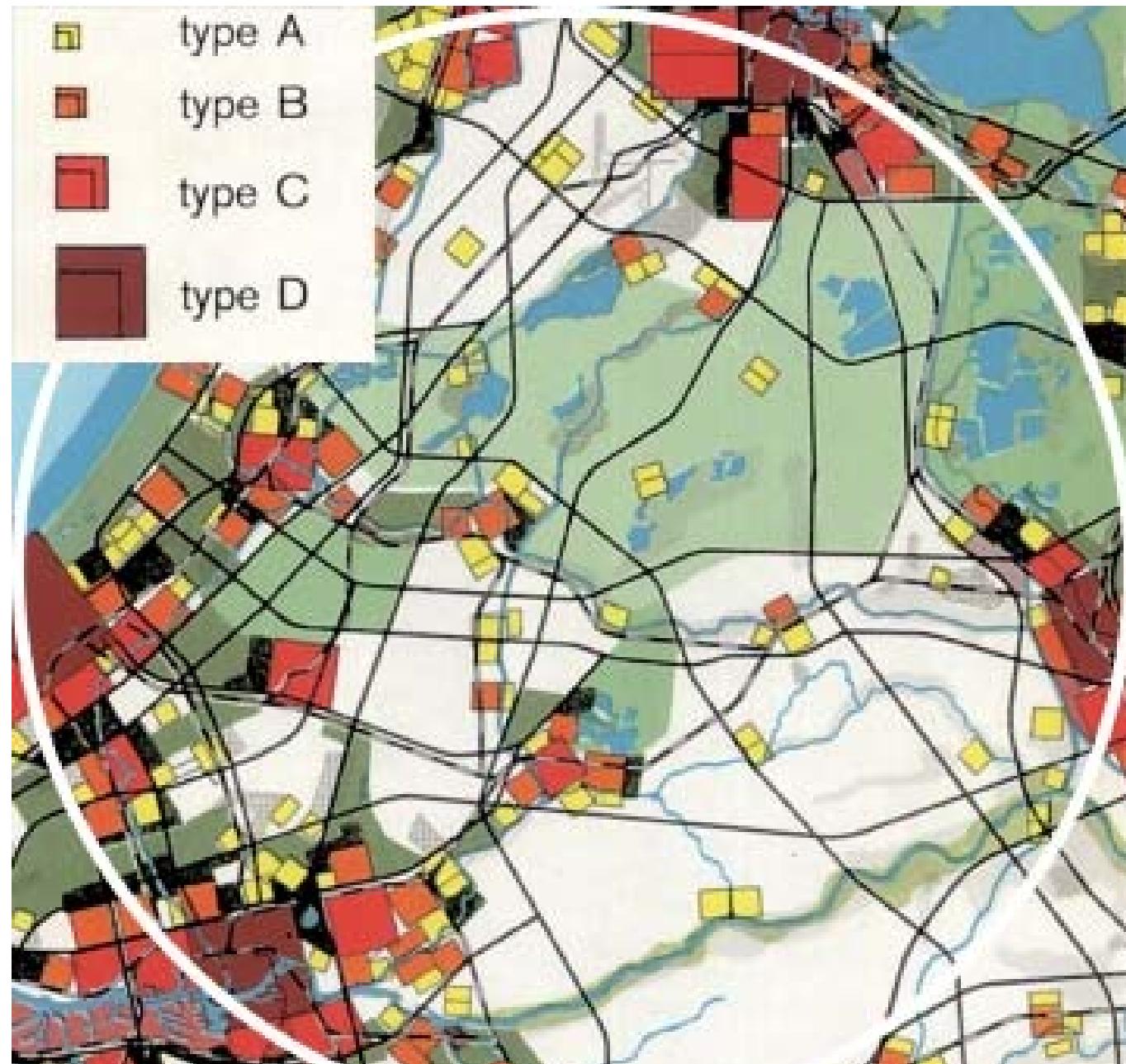


Fig. 15 Detail Fig. 14 radius R=30km p.46

		Time (spans of period)					Layers	
Periods of Nominal radius		days	weeks	months	years	centuries	managerial cultural economic technological ecological mass/space/time	
$\geq 30\text{km}$							regional design	
3km							urbanism	
300m							urban design	
30m							architecture	
3m							interior design	
$\leq 0.3\text{m}$							building technology	
		conception	communication analysis/synthesis, evaluation 	building process materialisation construction 	planning 	history		

Fig. 16 Disciplines bounded in time and space p.52

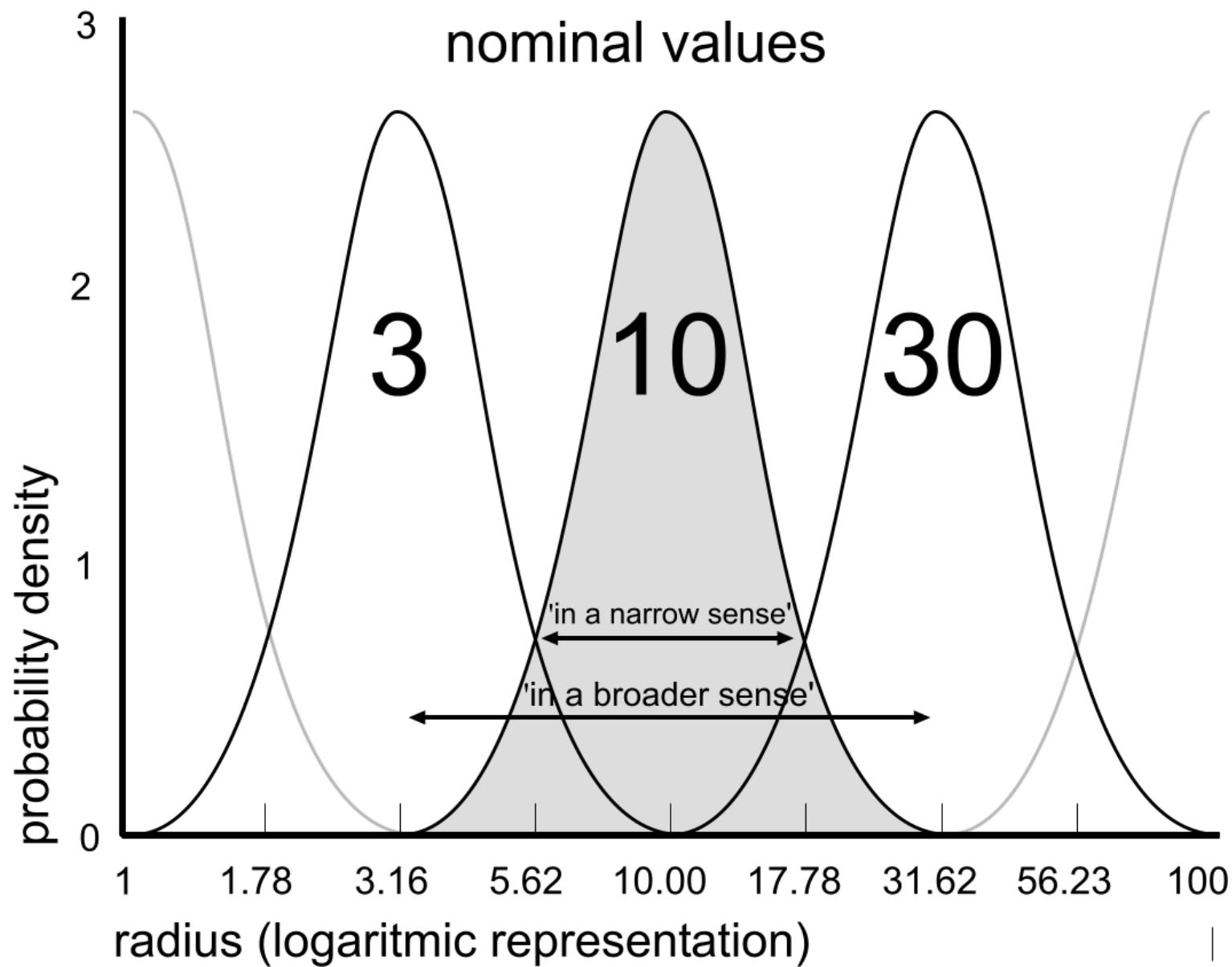


Fig. 17 Defining Nominal radius R p.52

Scale	Nominal radius R	Nominal surface	10x10 cm Scale 1:	G-scale Hagget	Urban types (1966)	Potential urban form	Potential urban function
Micro	1m	3m ²	20	14	a	spot	grip space
	3	30	60	13	b	place	room
	10	300	200	12	c	parcel	building
	30	3 000	600	11	d	block	building group
	100	30 000	2 000	10	e	allotment	ensemble
	300	300 000	6 000	9	A		neighbourhood
Macro	1km	3km ²	20 000	8	B		district
	3	30	60 000	7	C	built-up	town
	10	300	200 000	6	D		conurbation
	30	3 000	600 000	5	E		urban region
	100	30 000	2 000 000	4	F		region
	300	300 000	6 000 000	3	G		land

Fig. 18 Twelve levels of scale p.52

	years old	0	1	3	5	7	9	11	13
m Radius of frame	1	3	10	30	100	300	1000	3000	
Differences									
to experience:									
hard soft		x							
movable non-movable		x							
colour		x							
windows doors			x						
light dark			x						
shelter corners			x						
function time			x						
visibility			x						
accessibility				x					
control				x					
noise				x					
learning:									
danger									
operational abilities									
recognition									
orientation									
imagination									
to escape movements									
every time its own place									
hide-and-seek									
rules									
other people									
context									

Fig. 19 Possible differences to experience at different ages and radiuses p.59

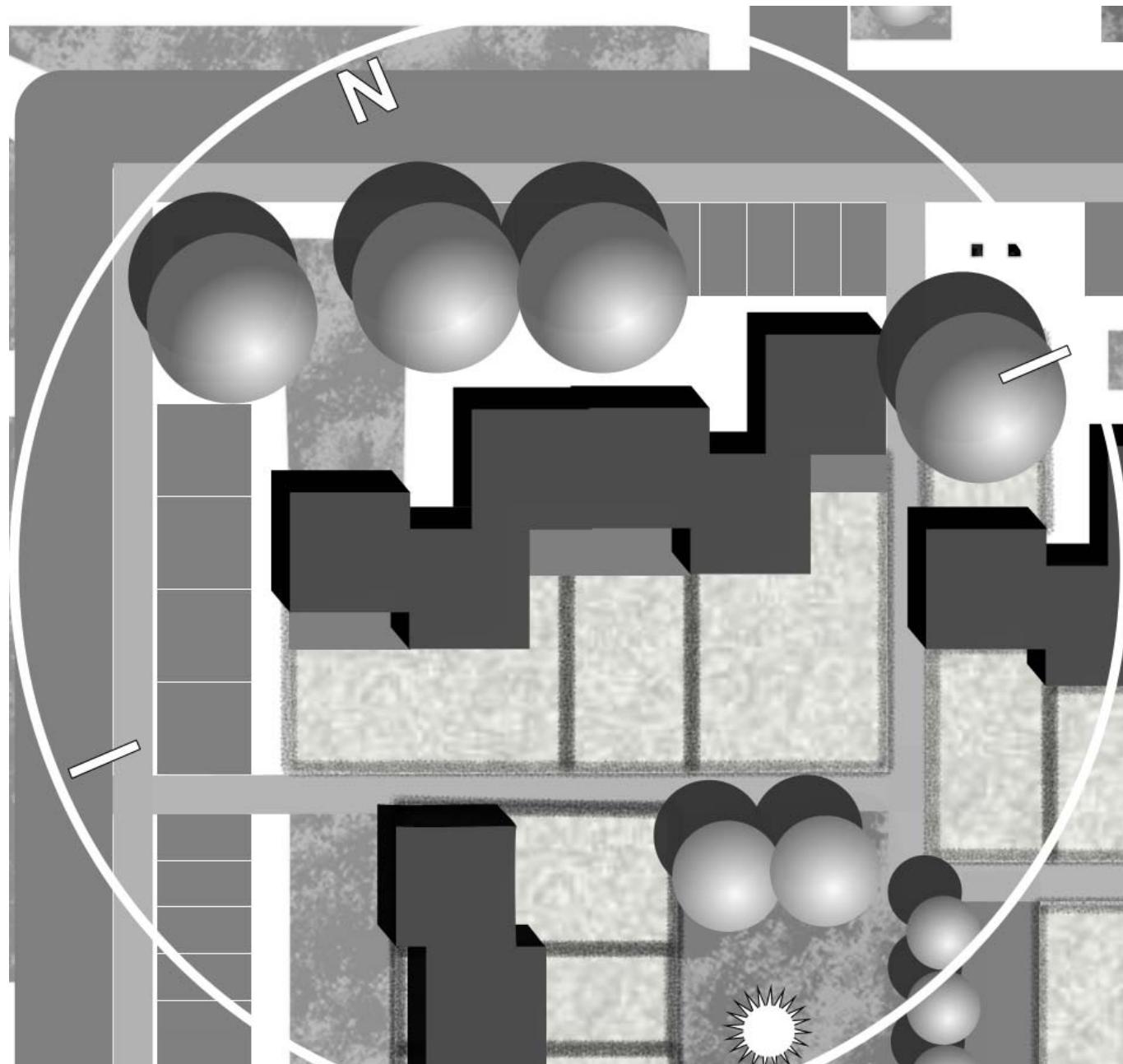


Fig. 20 Building group R=30m p.63



Fig. 21 Ensemble R=100m p.63



Fig. 22 Neighbourhood R=300m p.63



Fig. 23 R=300m with a District centre R=100m p.65



Fig. 24 R=300m with a Large building R=100m p.65

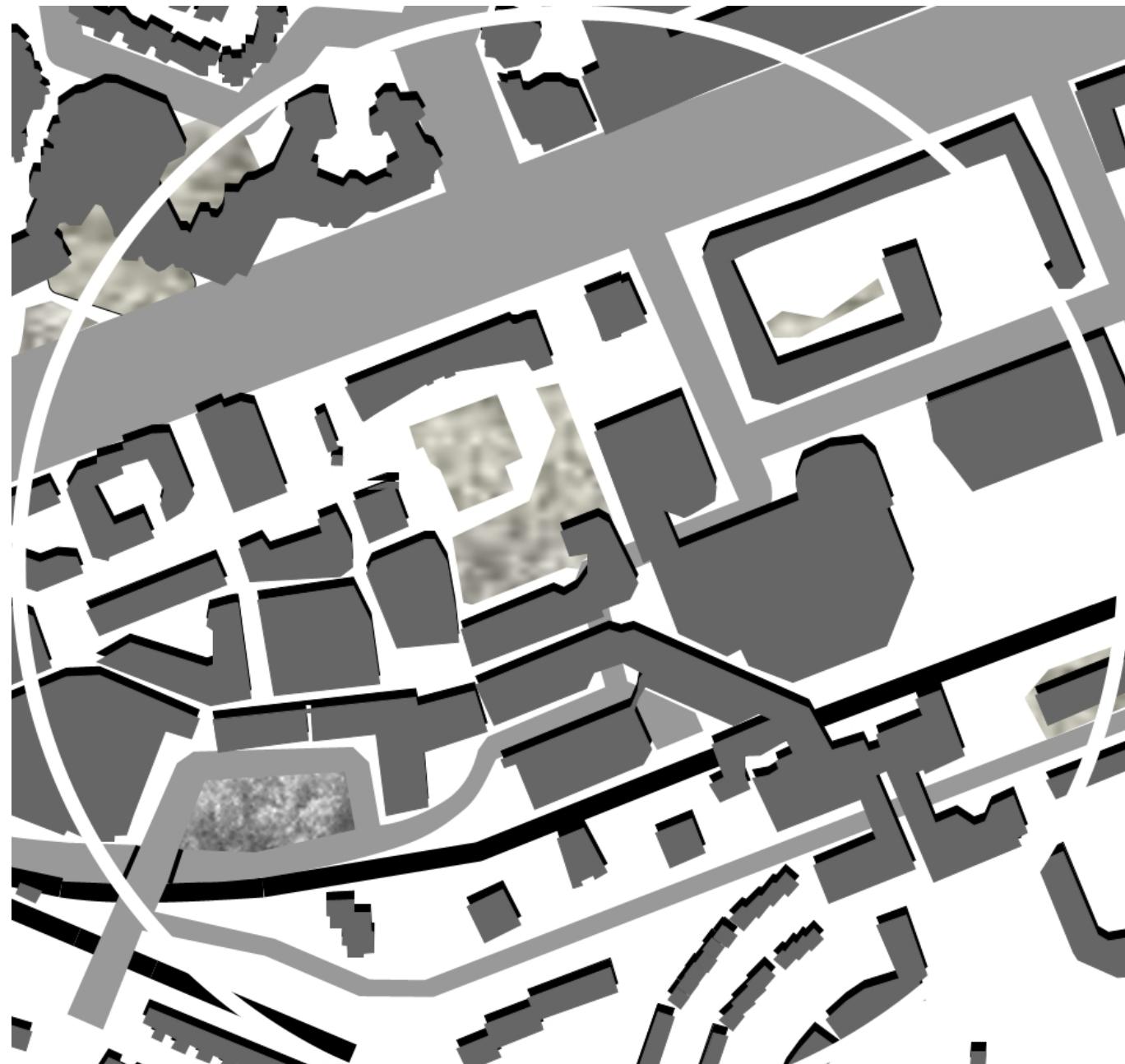


Fig. 25 R=300m Town centre p.65

Variables R=	varying within	1m					1km					100m					Page
		3	10	30	100	300	3	10	30	100	300	100	300	100	100		
altitude												1				183	
altitude				1			1	1								205-	
geology									1	1	1					221	
geomorphology										1	1	1				179	
water storage capacity									1	1	1					185	
lithology								1	1	1	1					186	
soil				1	1											189	
soil				1	1	1	1	1	1	1	1					188	
landscapes								1	1	1						201	
agricultural occupation types								1	1	1						222	
residential environment								1								226	
travel time into a centre									1	1						227	
land use 1900						1				1						230	
land use 2004						1				1						231	
allotment				1	1											234	
groundwater									1	1						244	
catchment basins											1	1				244	
hydrology										1						245	
subsidence							1	1	1							246	

Fig. 26 Several themes in maps in the 'Bosatlas van Nederland' 2007 p.67



Fig. 27 R=1km Zoetermeer Buytenwegrh p.69



Fig. 28 R=1km Zoetermeer Centre and Old Village p.69



Fig. 29 R=1km Amsterdam Centre p.69

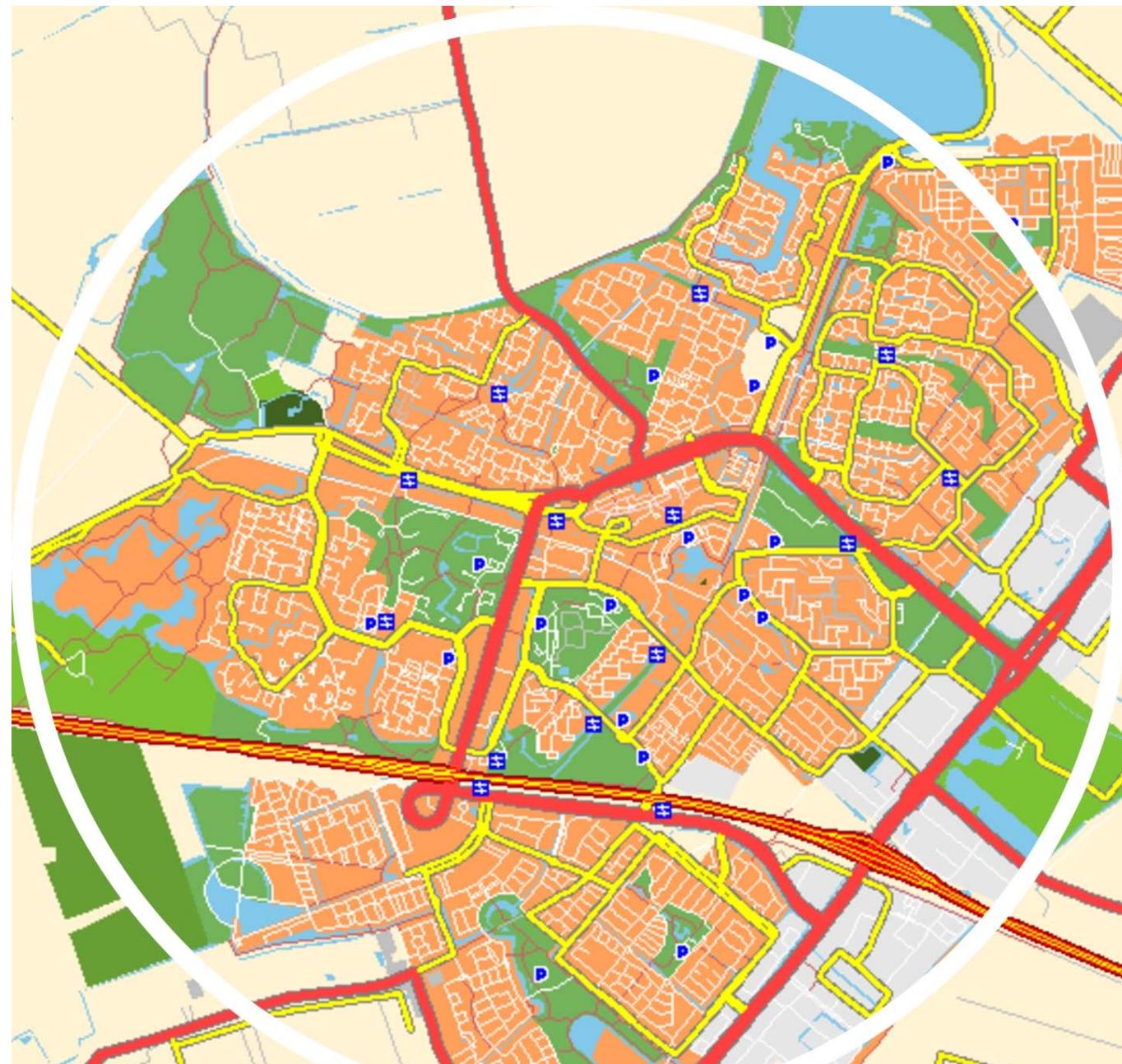


Fig. 30 $R=3\text{km}$ Zoetermeer p.70



Fig. 31 $R=3\text{km}$ Utrecht p.70



Fig. 32 R=3km Leiden p.70

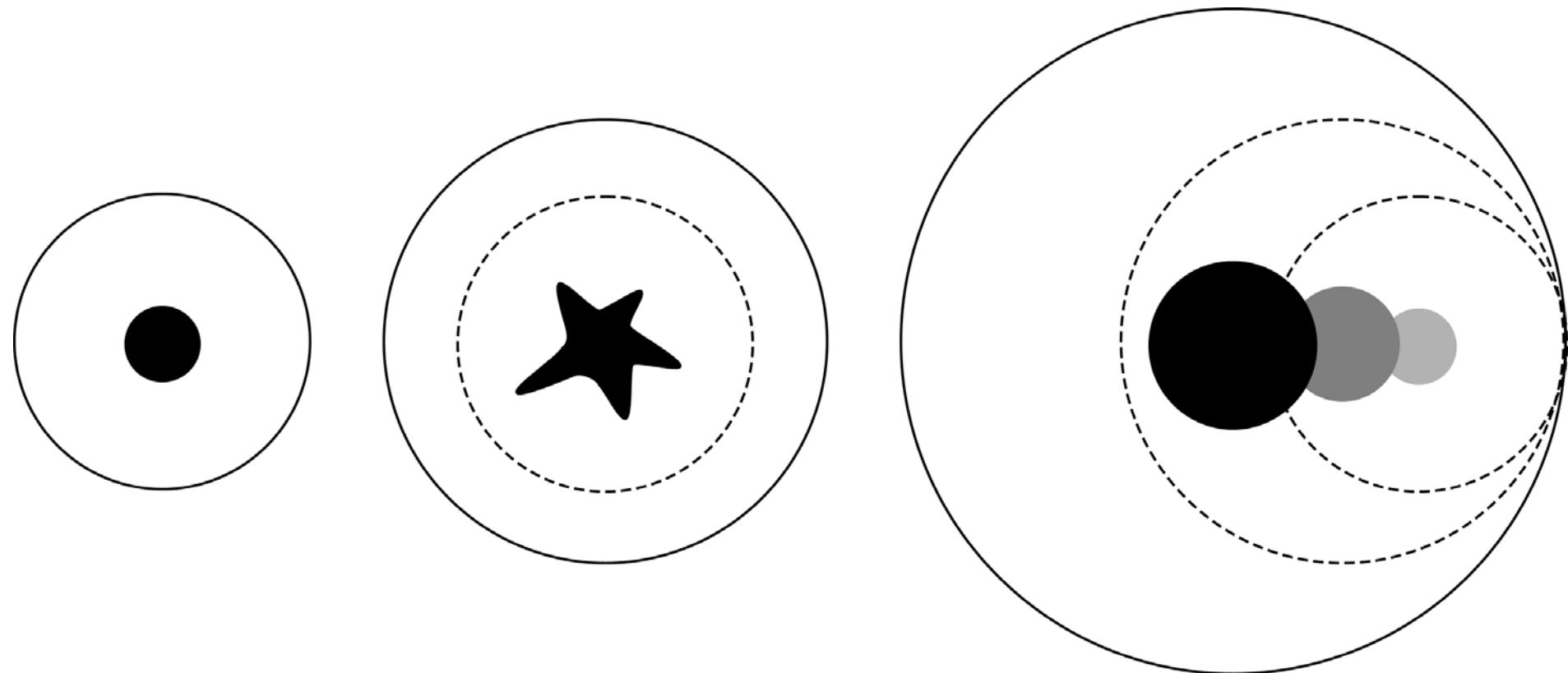


Fig. 33 Concentric and eccentric growth p.70

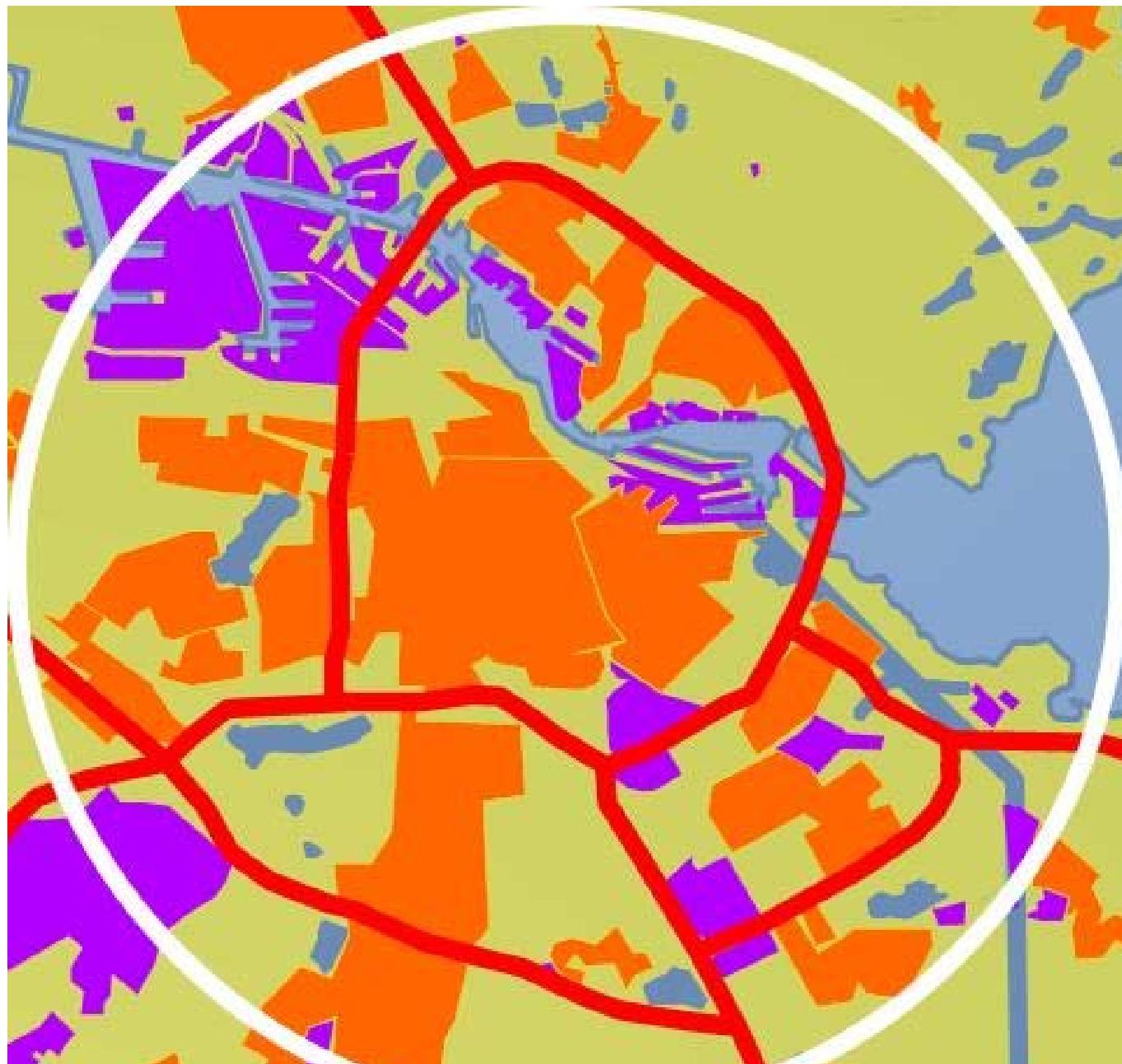


Fig. 34 R=10km Conurbation p.72

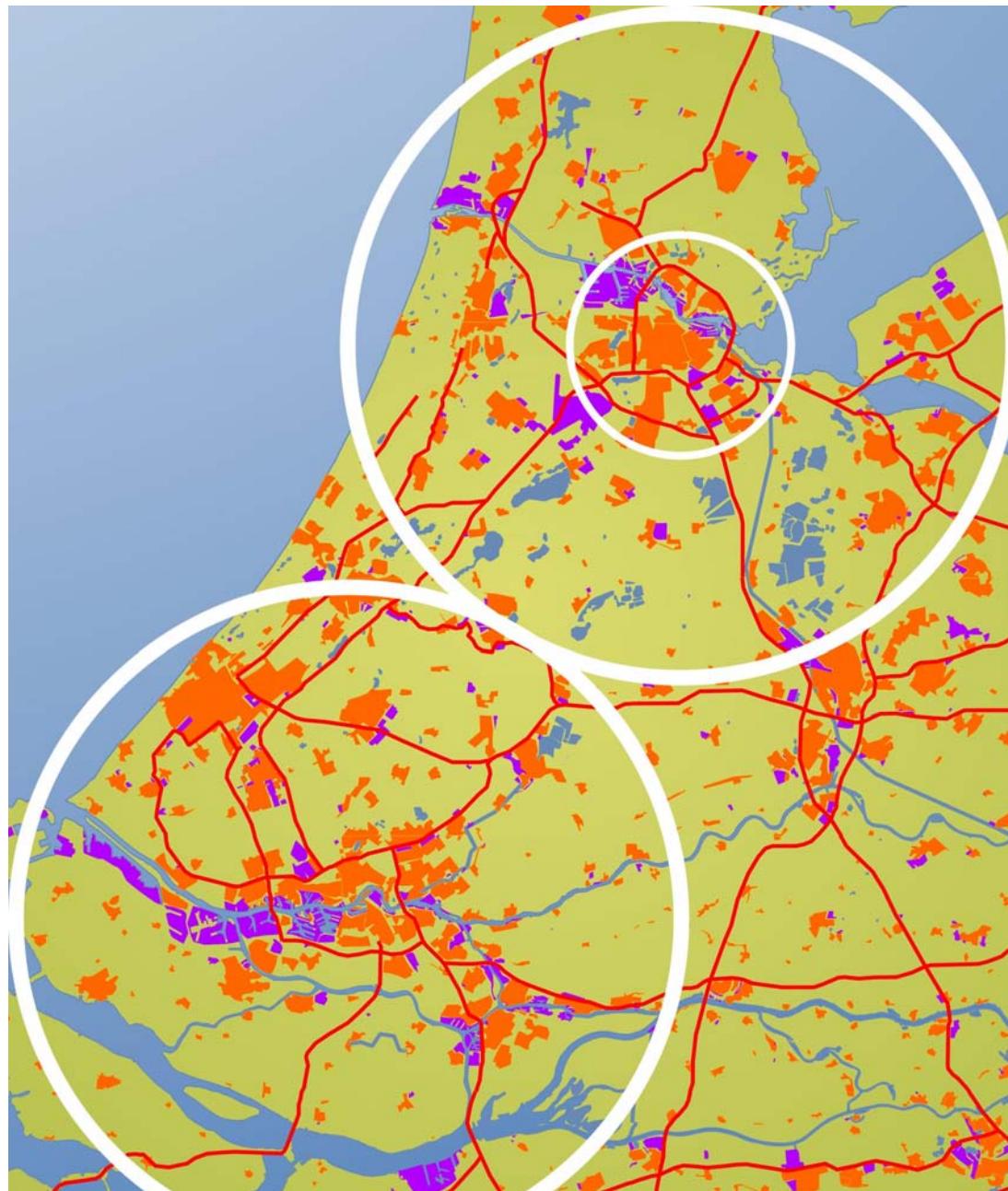


Fig. 35 $R=30\text{km}$ Urban regions with conurbations $R=10\text{km}$ p.72



Fig. 36 $R=100\text{km}$ Region, occupation A.D. 1000, urban regions $R=30\text{km}$ p.72

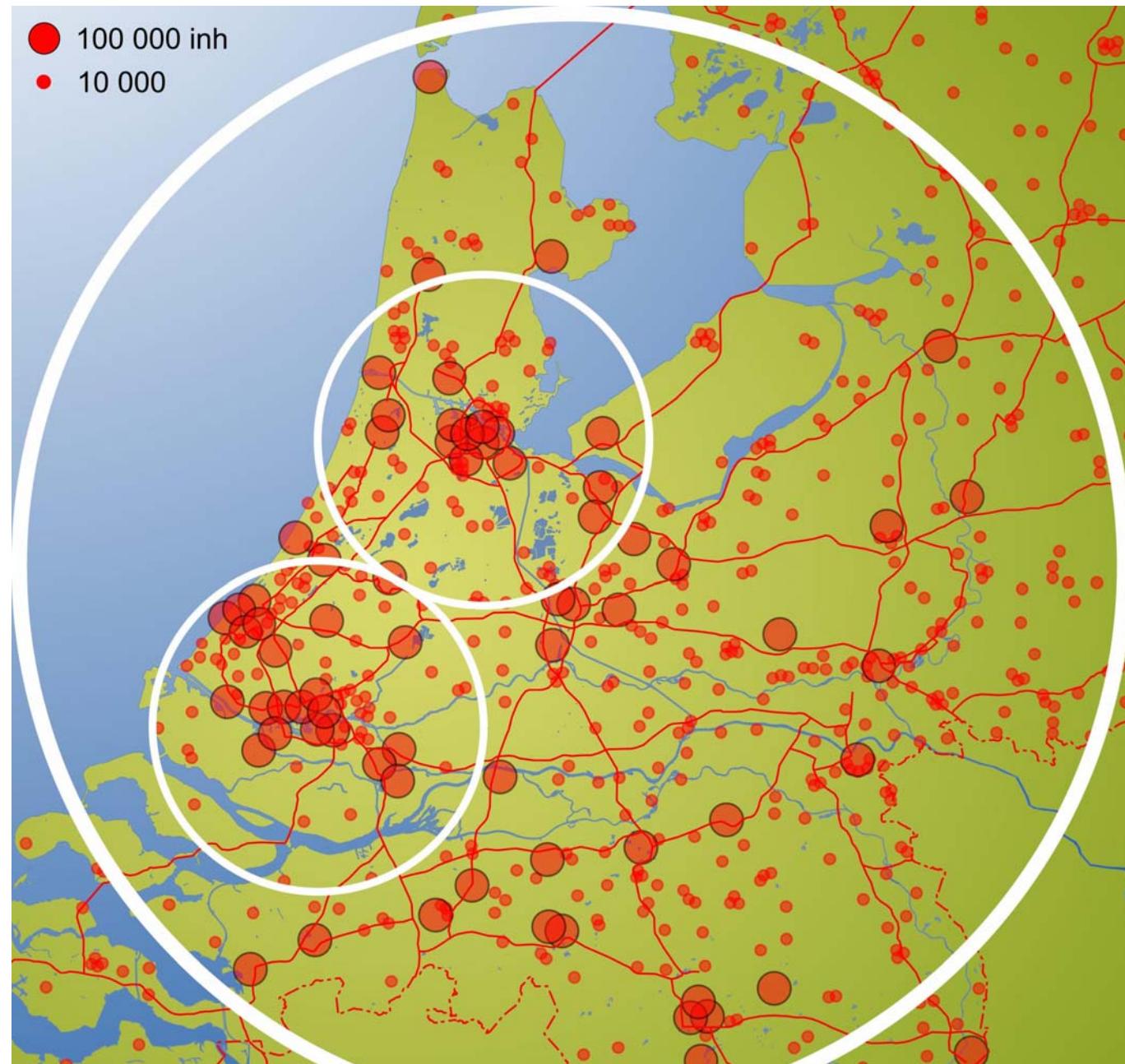


Fig. 37 $R=100\text{km}$ Region with $R=30\text{km}$ urban regions p.74



Fig. 38 $R=30\text{km}$ urban region with $R=10\text{km}$ Conurbation Amsterdam 1979 p.74



Fig. 39 $R=30\text{km}$ Urban Region Ruhrgebiet 1979a p.74

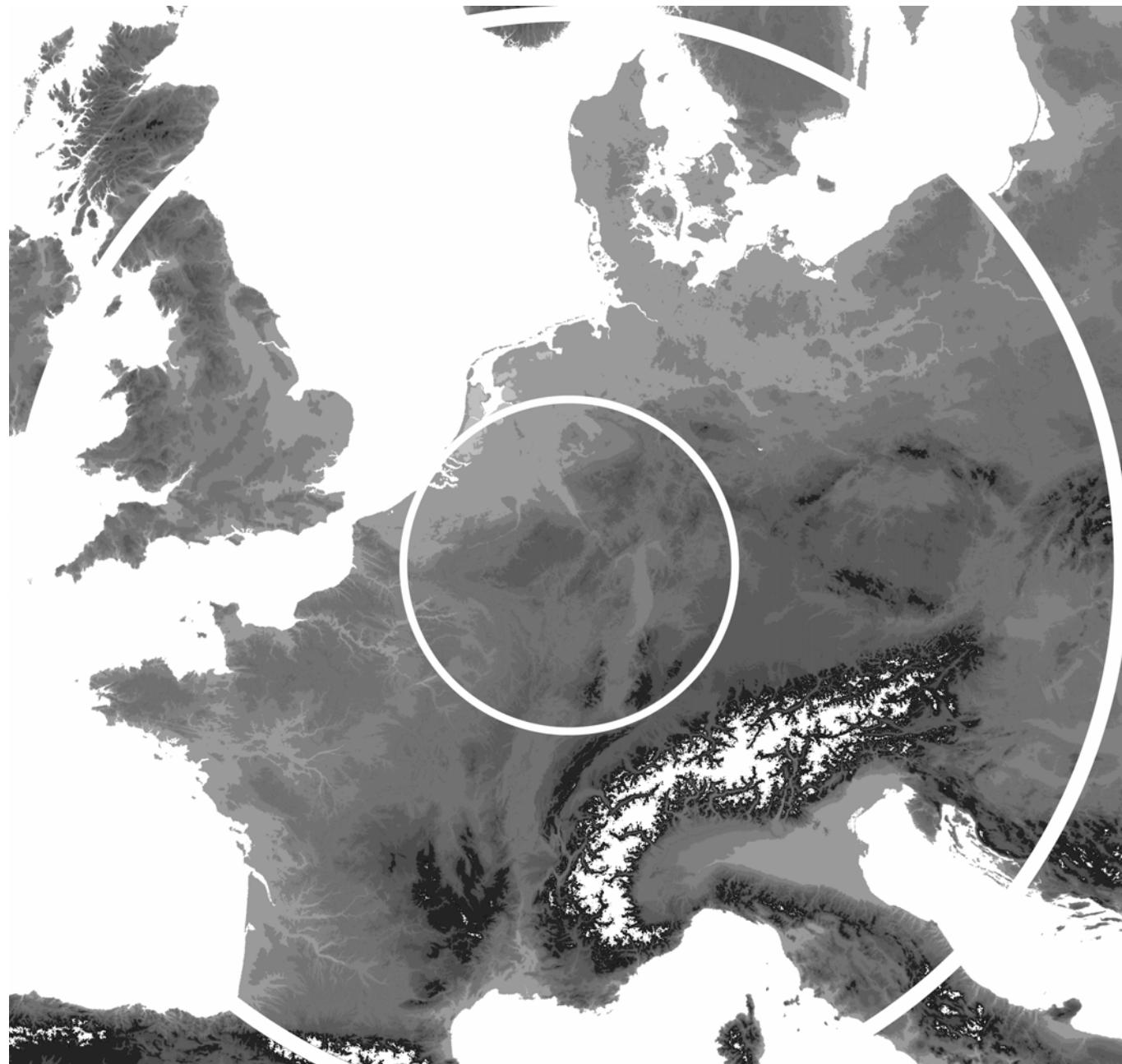


Fig. 40 $R=1000\text{km}$ Europe Altitude with $R=300\text{km}$ Rhine catchment p.75



Fig. 41 $R=\{1000,300\text{km}\}$ GDP/inhabitant p.75

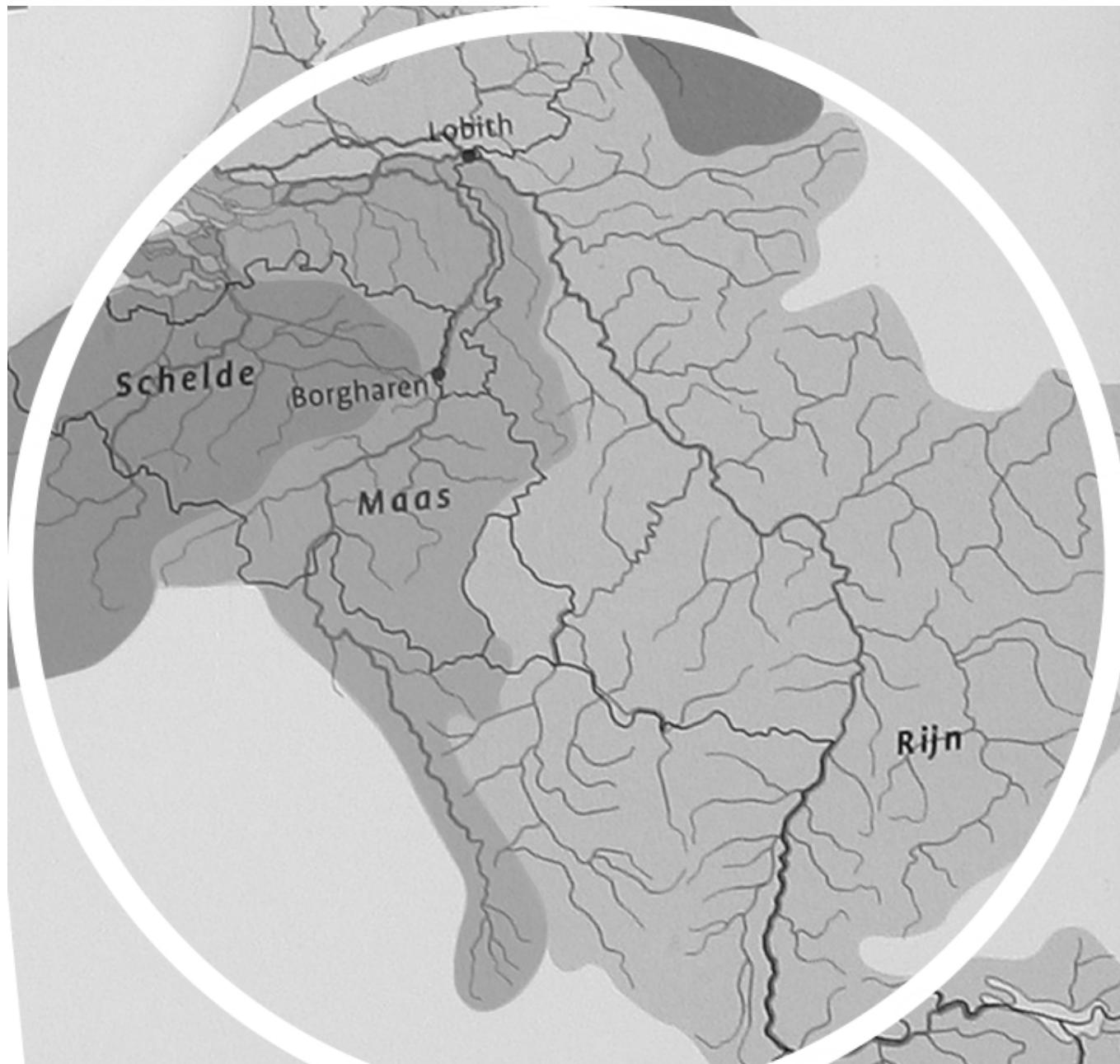


Fig. 42 R=300km Catchment areas p.76

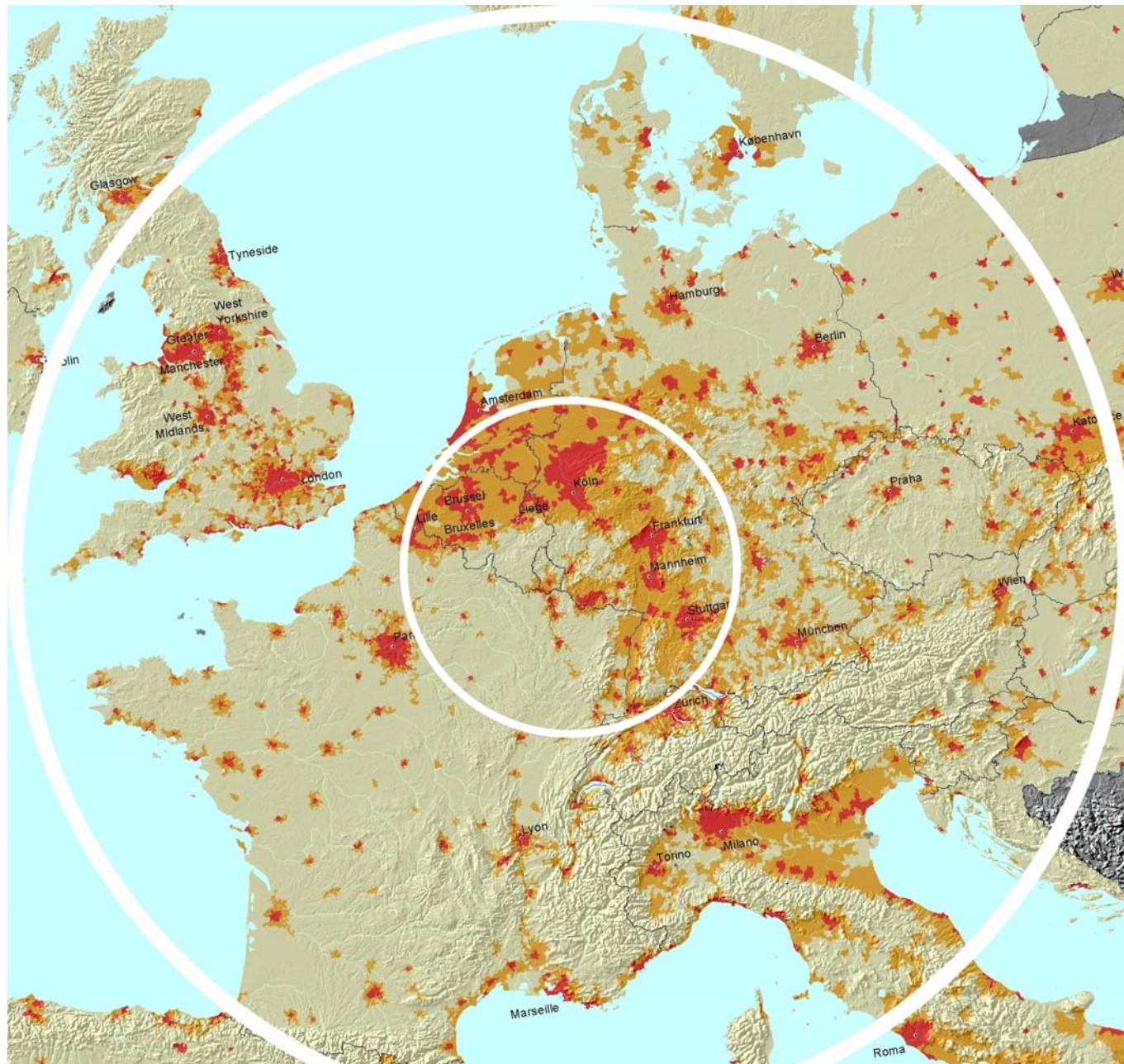


Fig. 43 $R=\{1000\text{km}, 300\text{km}\}$ Urban density p.76

**Physiological
needs**

Safety

Affection

Esteem

**Self-actua-
lisation**

Fig. 44 Maslow's sequence p.83

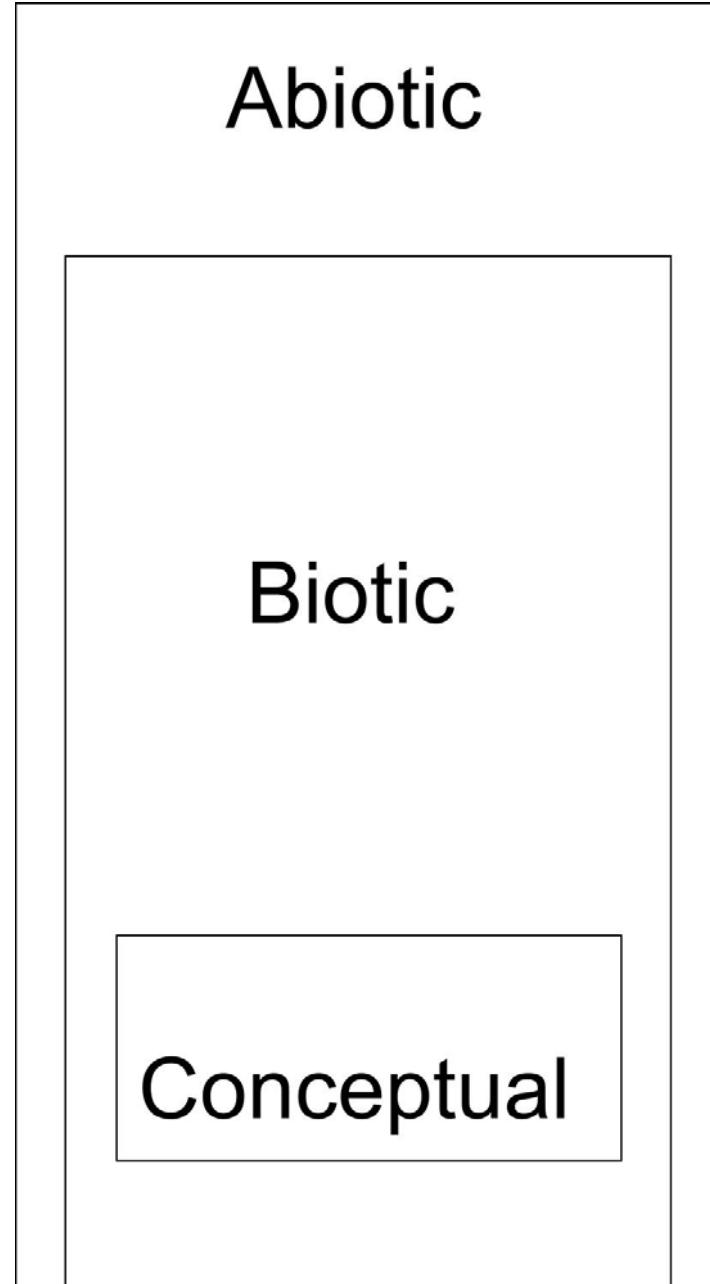


Fig. 45 ABC sequence p.83

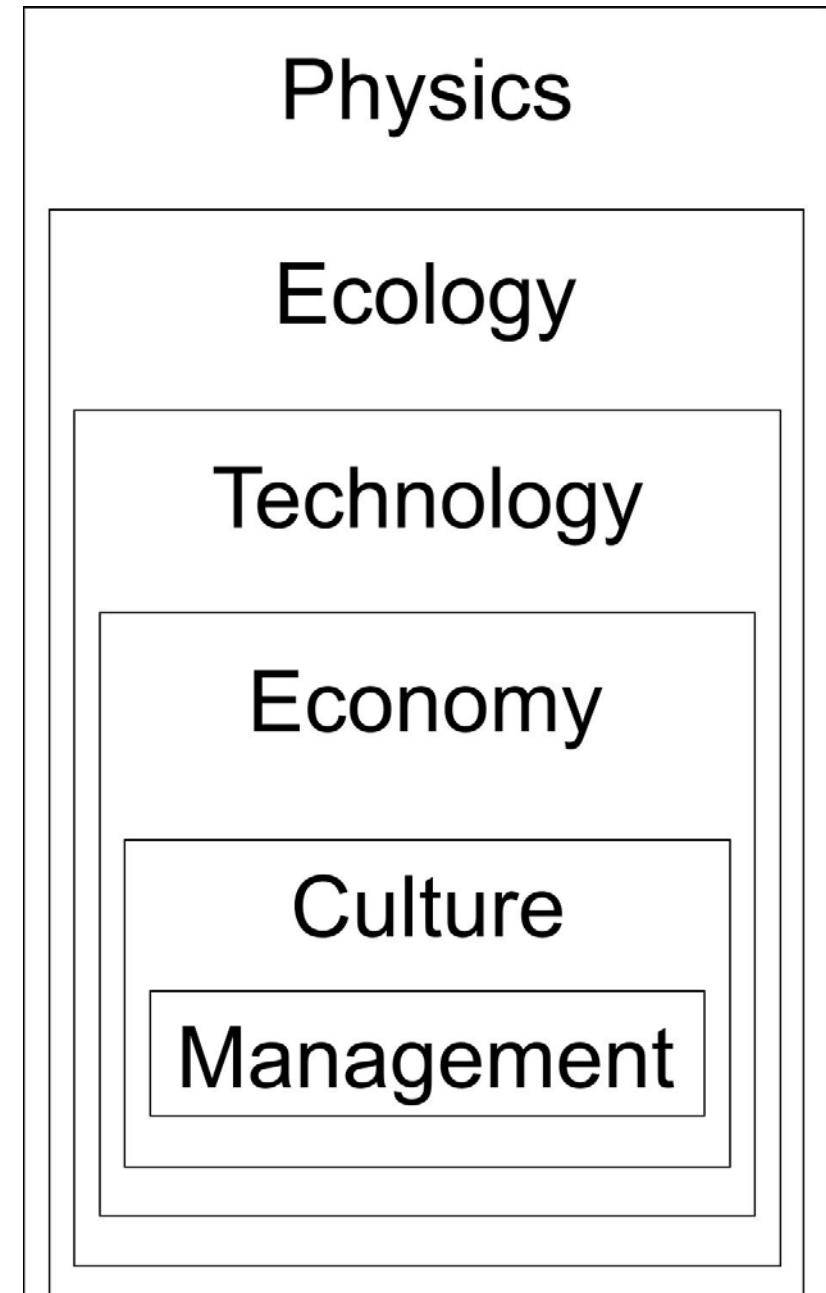


Fig. 46 Environmental layers p.83

order of size

layer

management
culture
economy
technique
ecology
mass|space-t

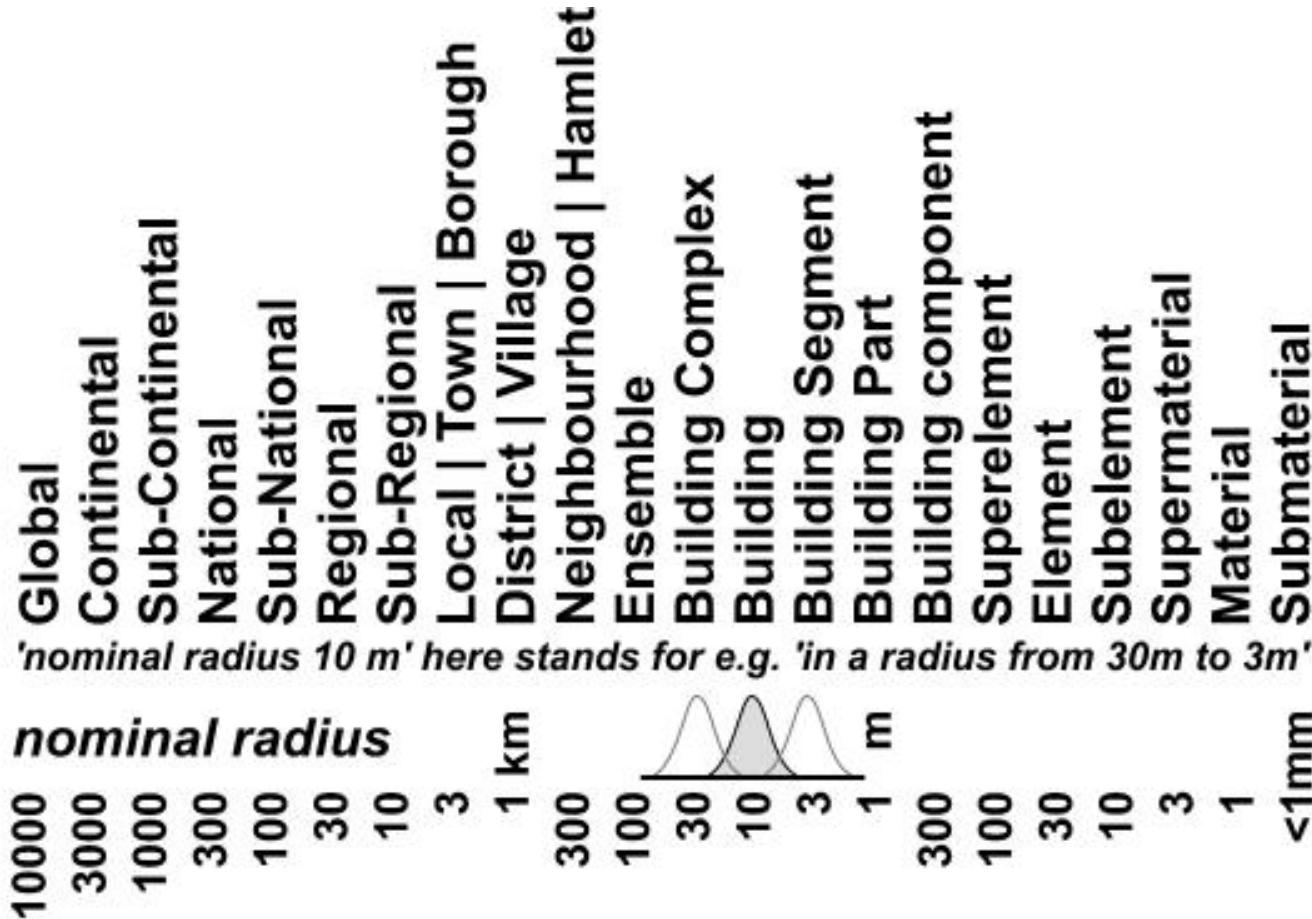


Fig. 47 A matrix of levels and layers of context p.91

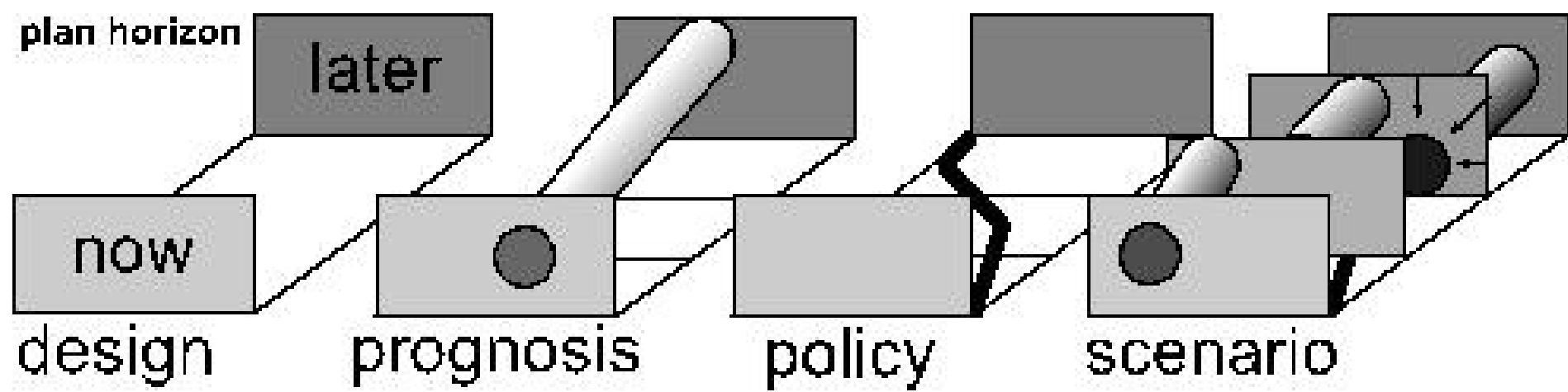


Fig. 48 Possible, probable and desirable futures in a scenario p.93

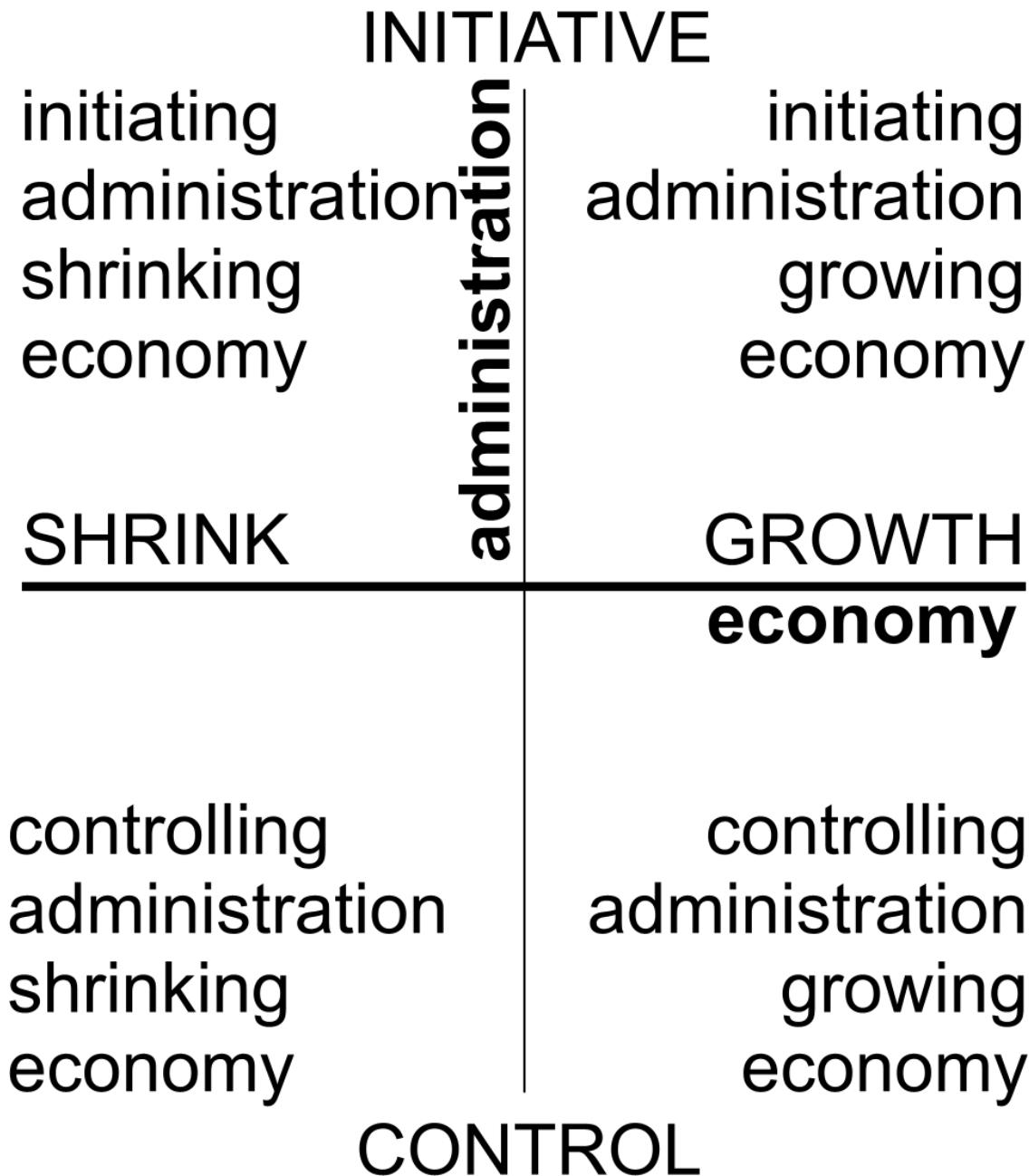


Fig. 49 Four scenarios on 2 x 2 alternatives p.93

		OBJECT	
		<i>Determined</i>	<i>Variable</i>
CONTEXT	<i>Determined</i>	Design research	Design study
	<i>Variable</i>	Typological research	Study by design

Fig. 50 Context sensitivity of design-related studies p.93

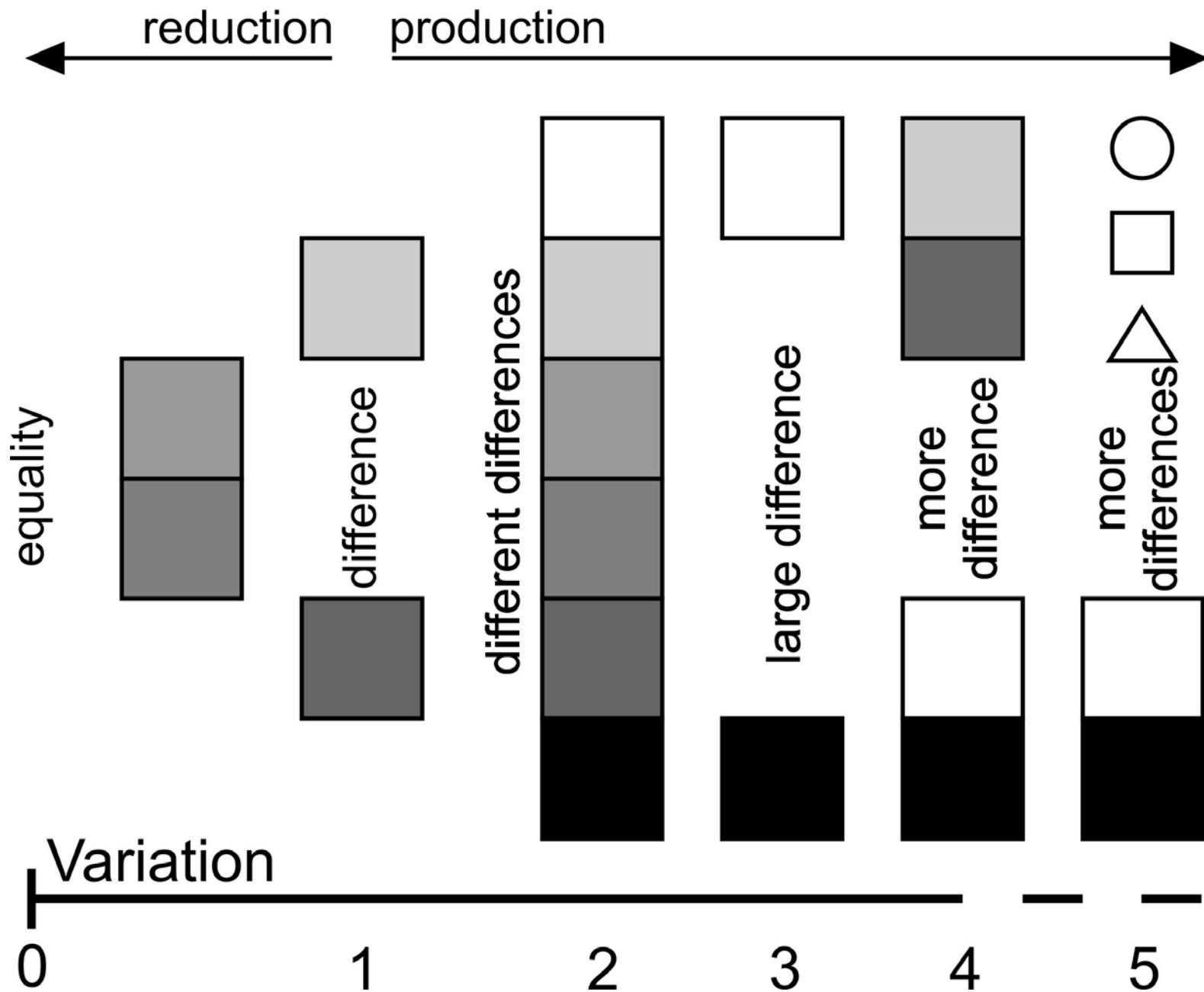


Fig. 51 Searching for differences p.98

radius in m	built-up green	built-up water	built-up pavement	green pavement	water pavement	green water			
30 000	national sprawl	building at the coast	mainports dream of the estate agent	green lay-out of highways noise nuisance opening-up	Afsluitdijk Tjeukemeer harbours boulevards quays	Waterland			
10 000	green heart	Casco-concept							
3 000	bufferzones	3 networks concept							
1 000	urban green	bank recreation							
300	district green								
100	neighbourhood green								
30	ensemble green					drainage			
10	court or garden	slope							
3	fragmented green	Venice	building line	roadside maintenance	quays	campsheeting			
1									

Fig. 52 ..., their possible borders and design problems p.98

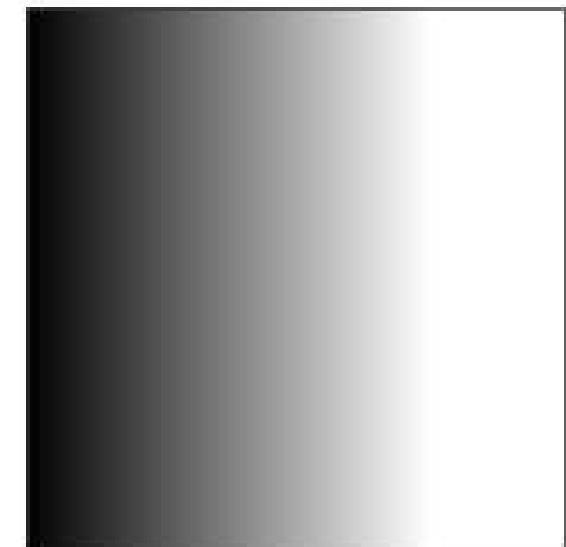
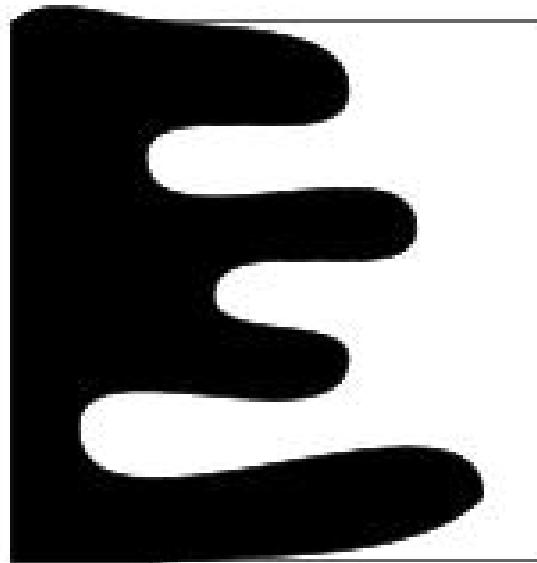
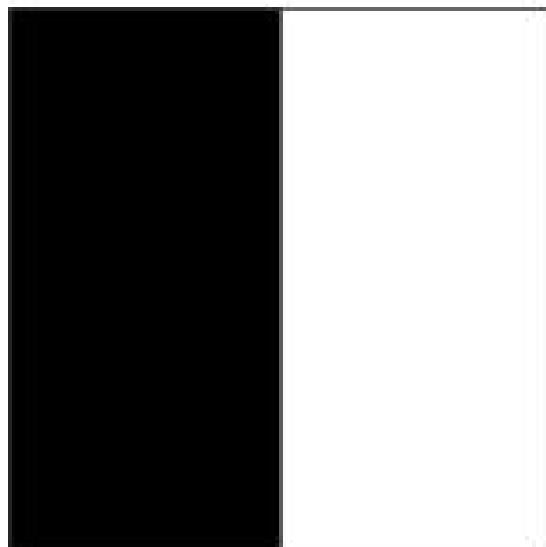
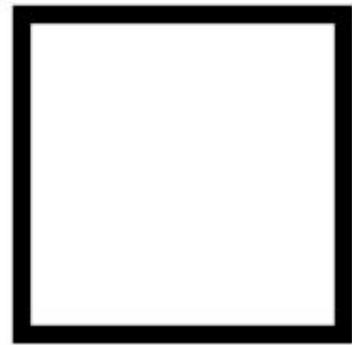


Fig. 53 Straight, curved, gradient p.99

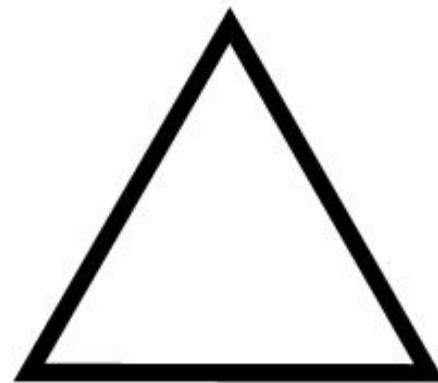
parallelogram

(2 directions)



triangle

(3 directions)



circle

(all directions)

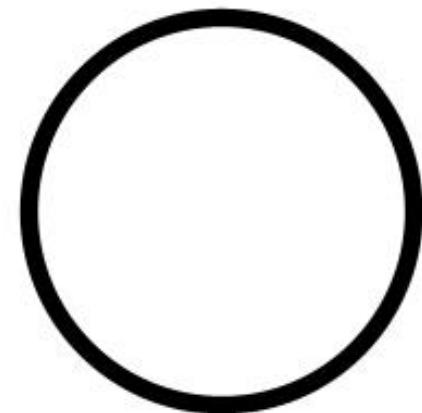


Fig. 54 Paralellogram, triangle, circle p.99



Fig. 55 $R=\{100, 30\text{km}\}$ The Netherlands 10^5 and 10^4 inhabitants/dot p. 100

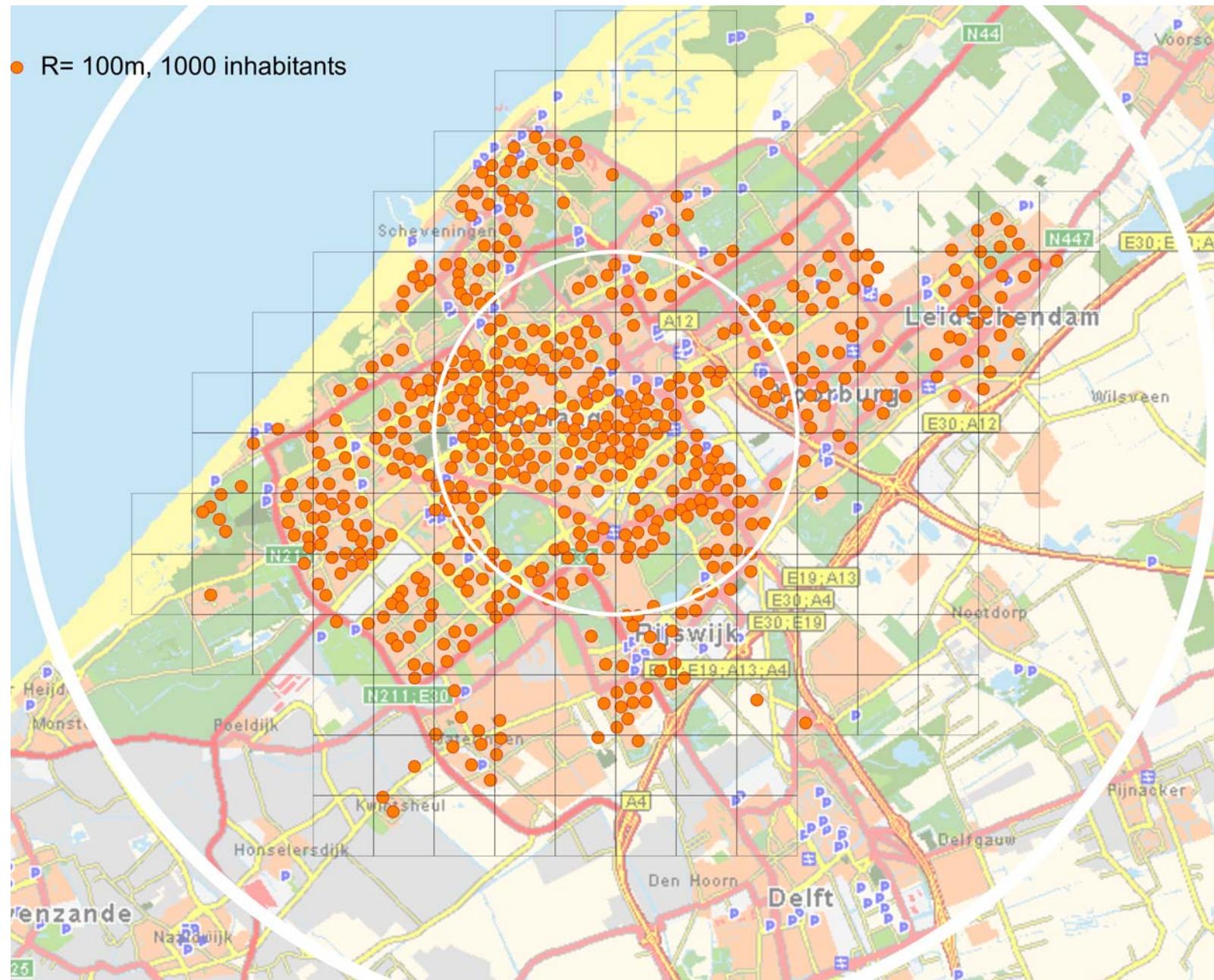


Fig. 56 R={10km, 3km} The Hague p.100



Fig. 57 Different size, same distance p.100

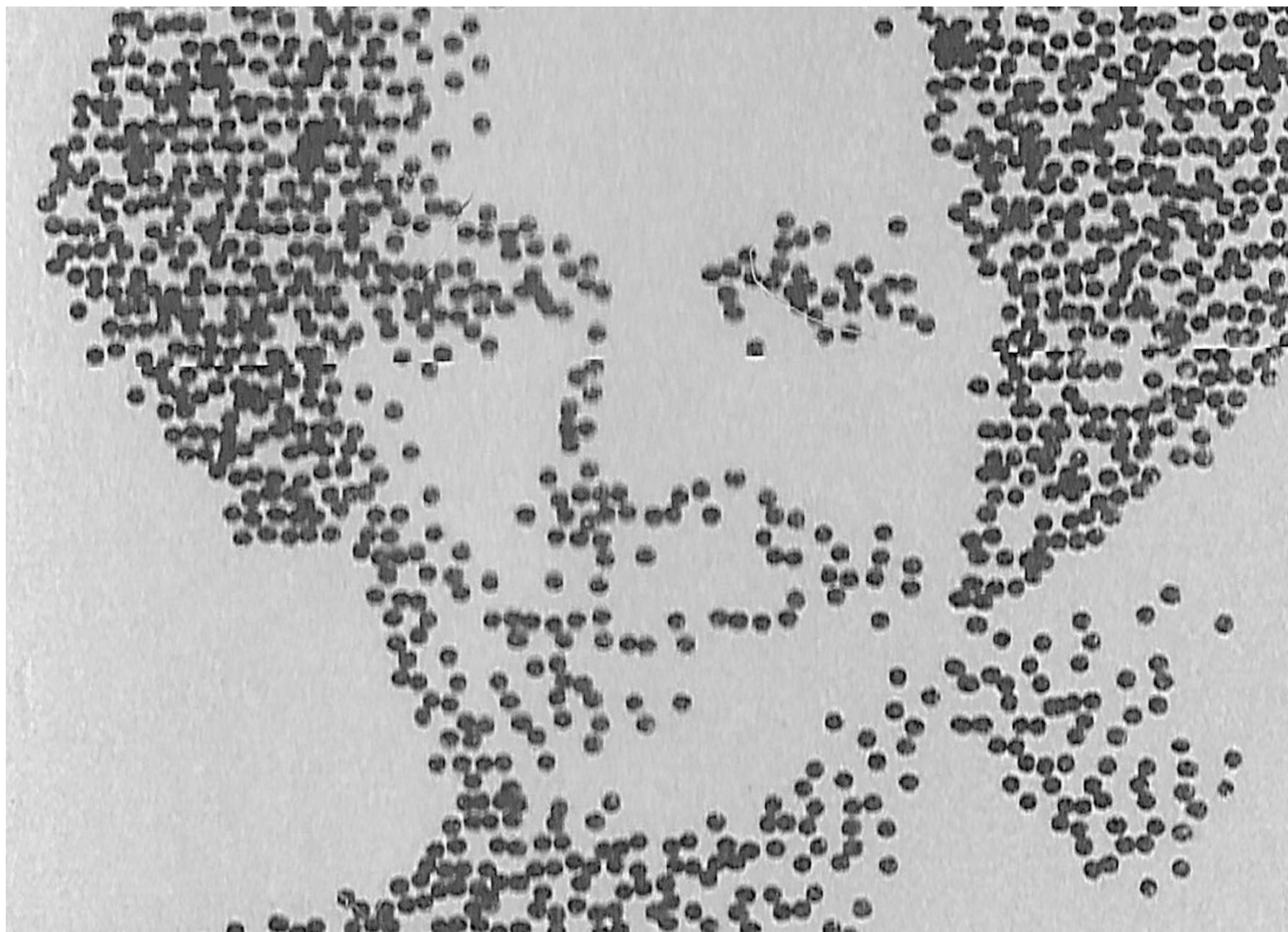


Fig. 58 Same size, different distance p. 100

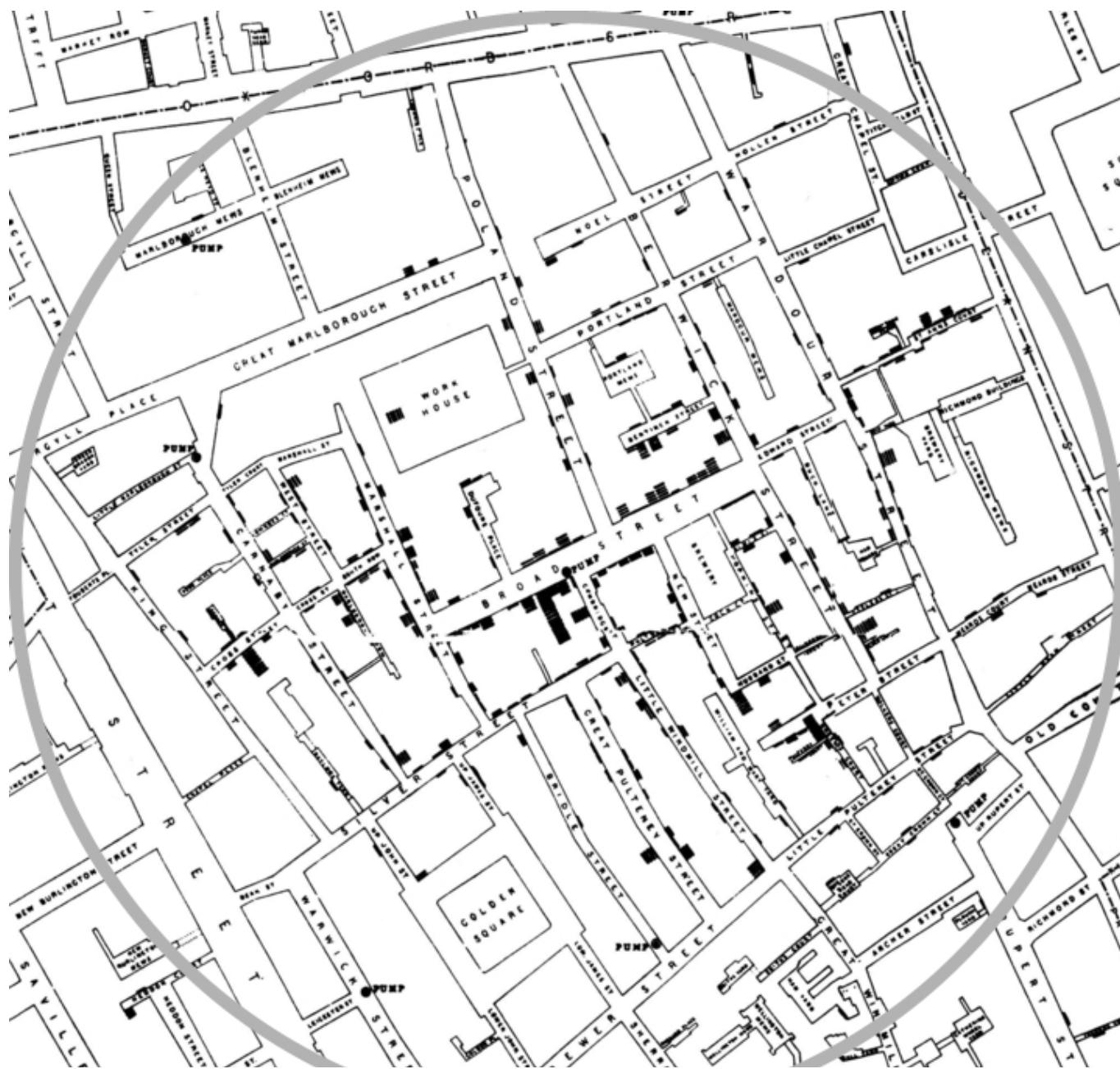


Fig. 59 Snow's map R=300m p. 101

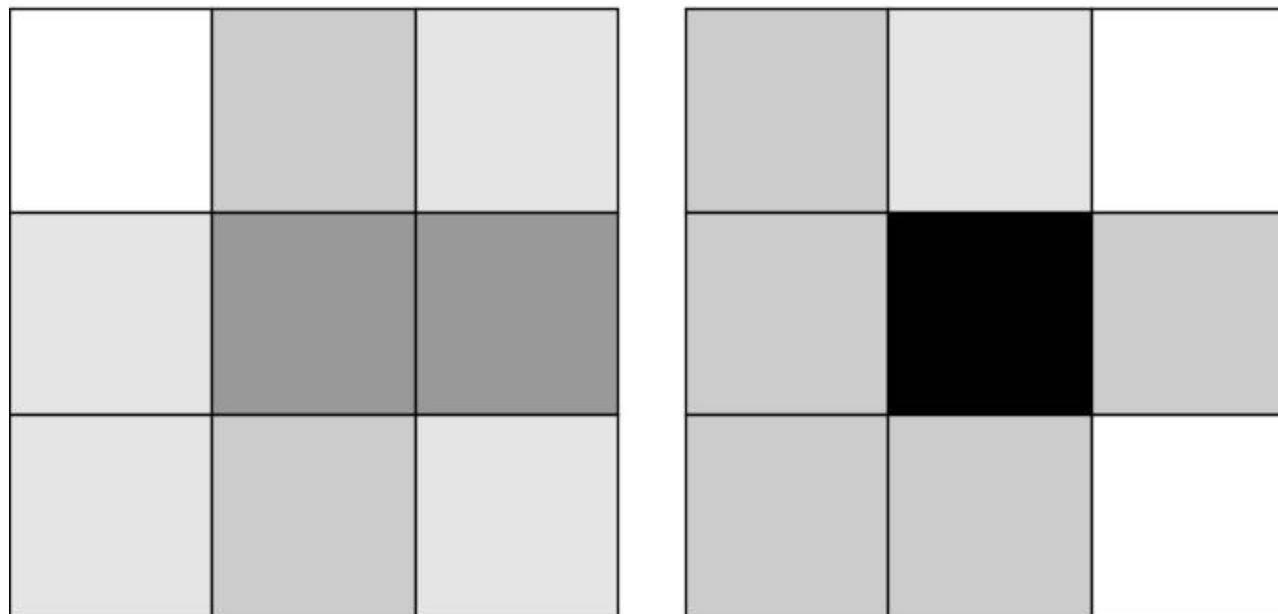
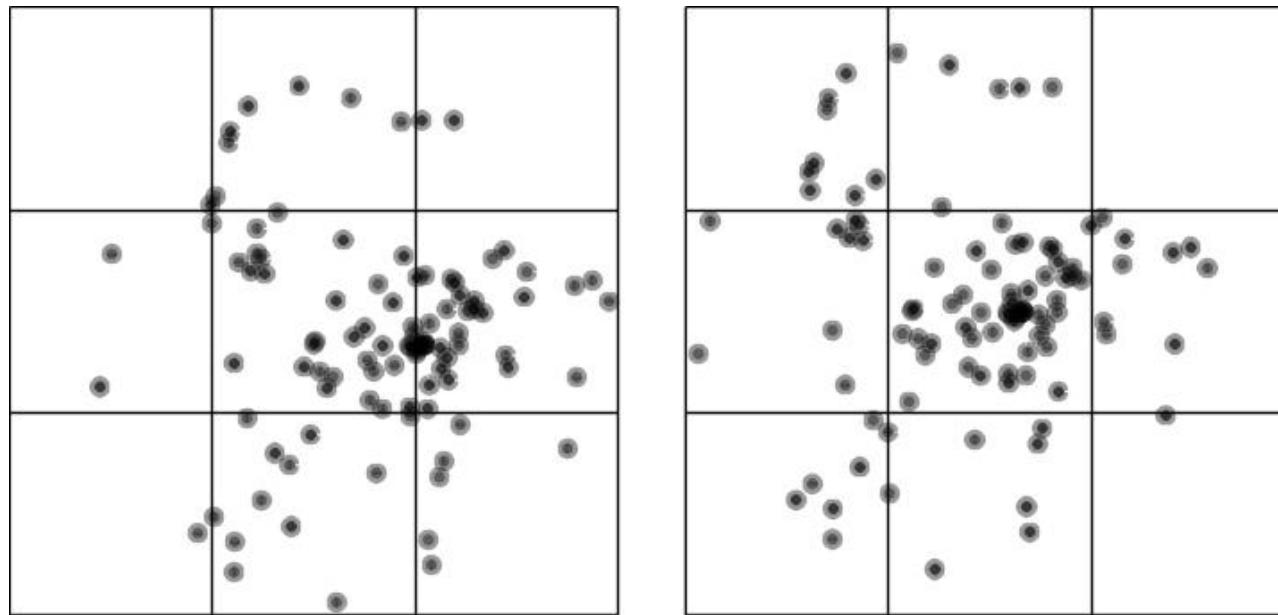


Fig. 60 Reductions in GIS p.101

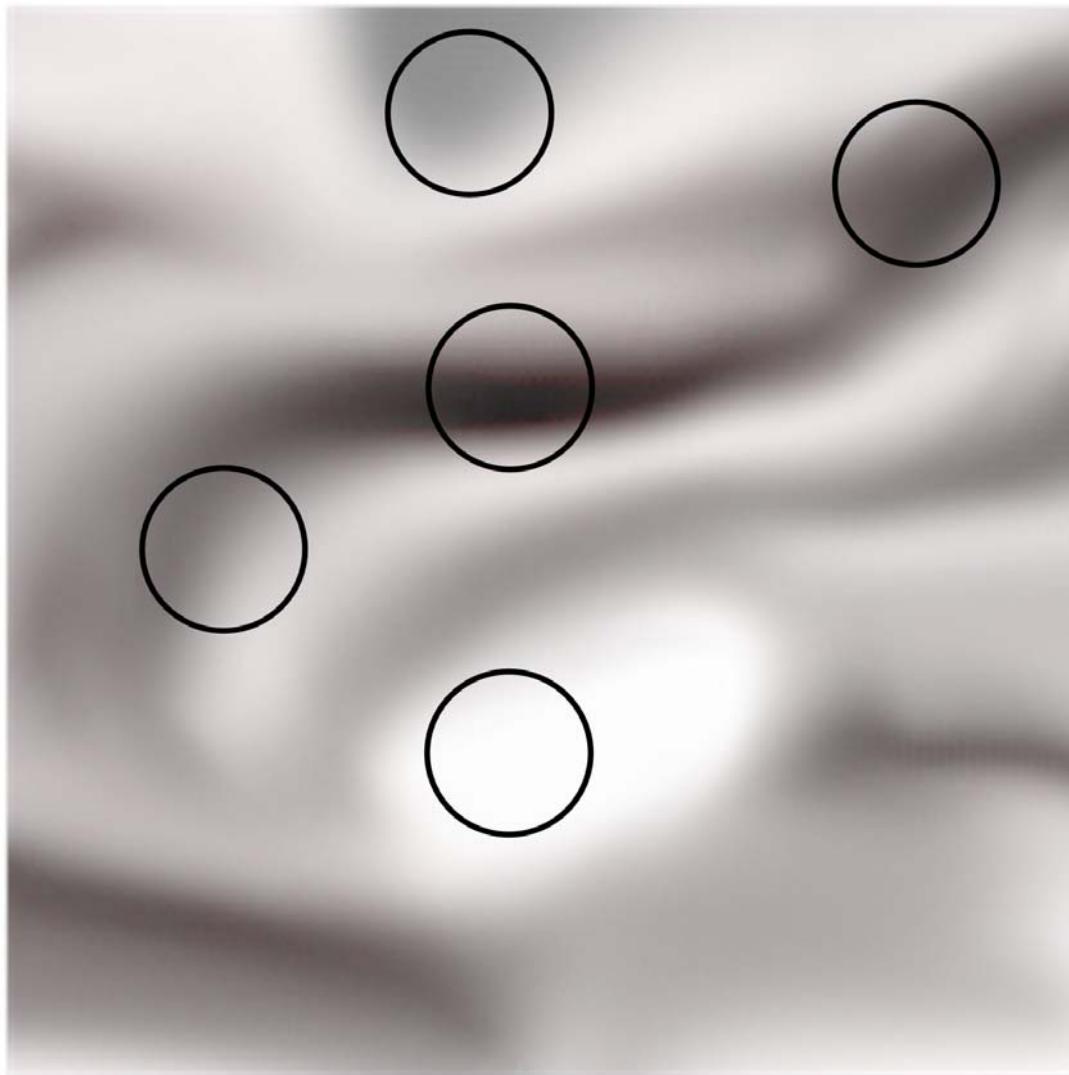


Fig. 61 Reducing gradients p. 101

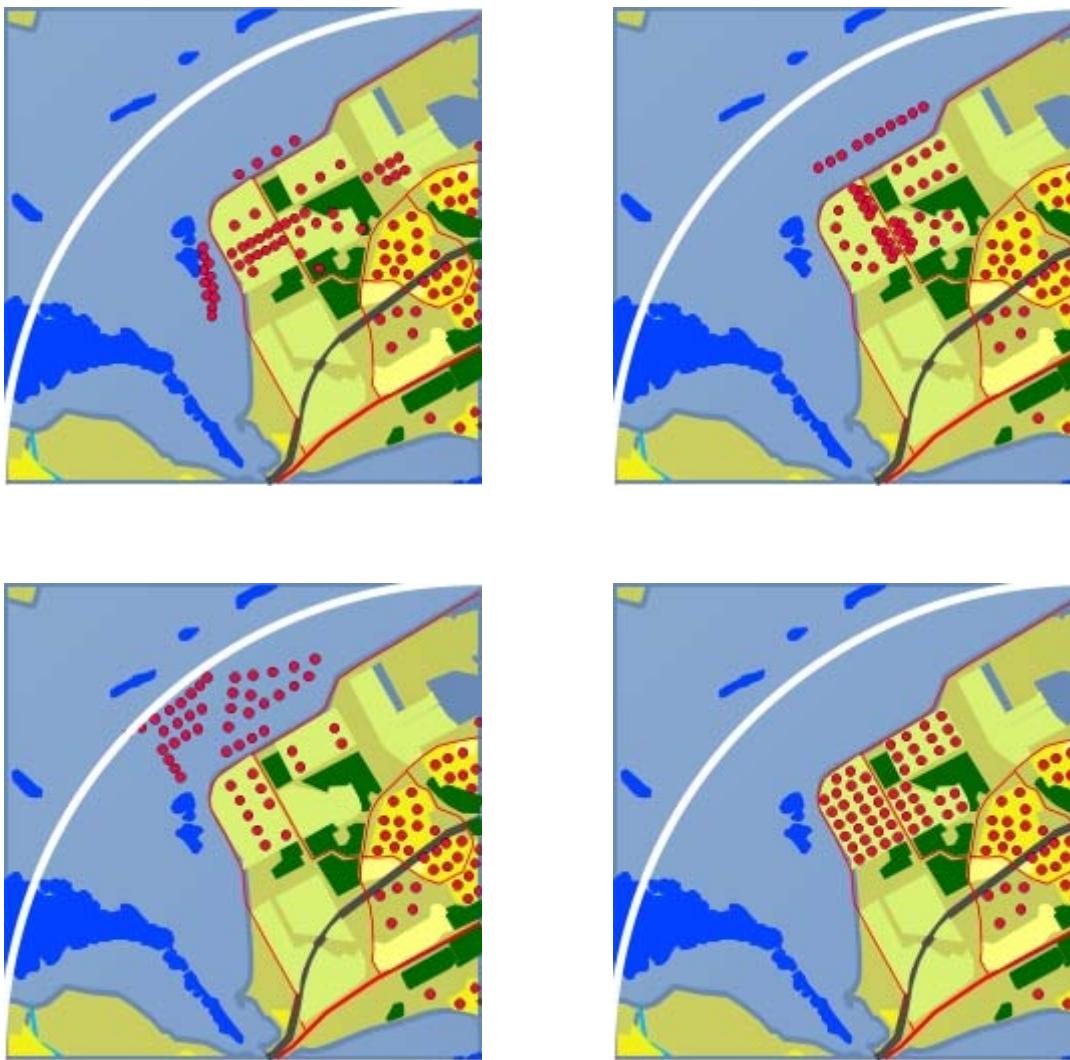
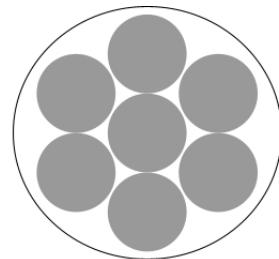
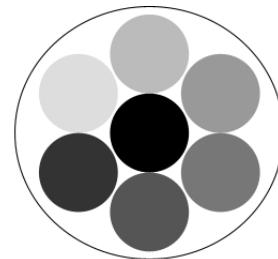


Fig. 62 $R=3\text{km}$ Alternatives for 50 000 inhabitants in Almere, 10^3 inhabitants/dot
n 101

Content

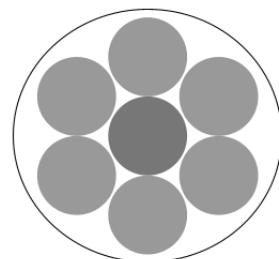


homogeneous

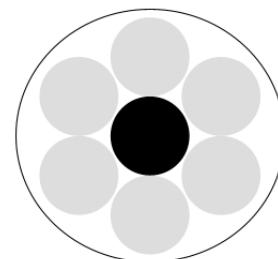


heterogeneous

Contrast

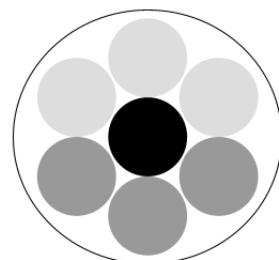


weak

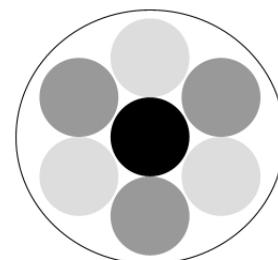


strong

Mixture

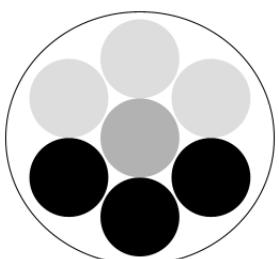


segregated

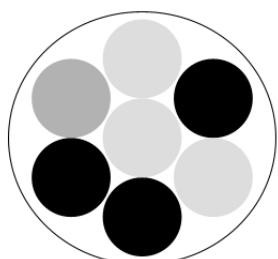


mixed

Proportion



balanced



unbalanced

Fig. 63 Variables of composition p. 102

Composition quality

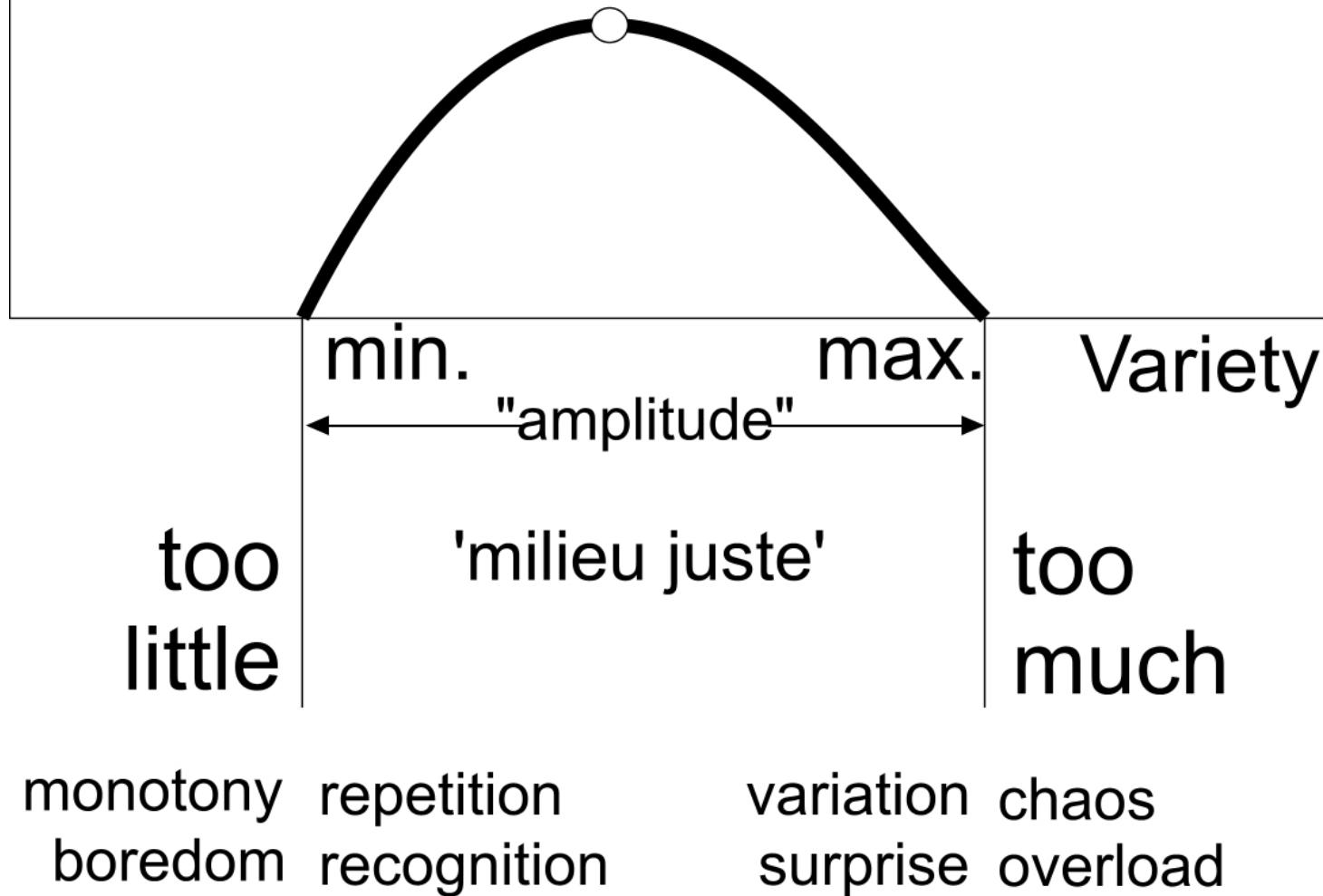
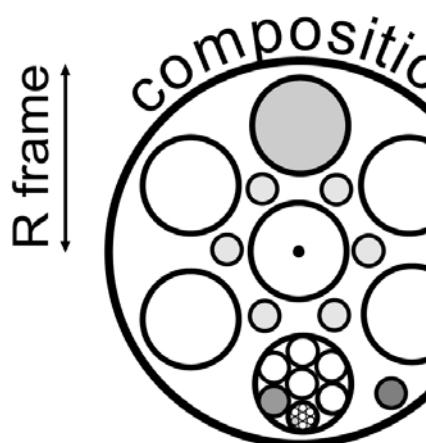


Fig. 64 Quality between recognition and surprise p. 102

image



component

details

- characteristic details
- connecting details
- striking details
- crucial details

Fig. 65 Composition, components, details p.102

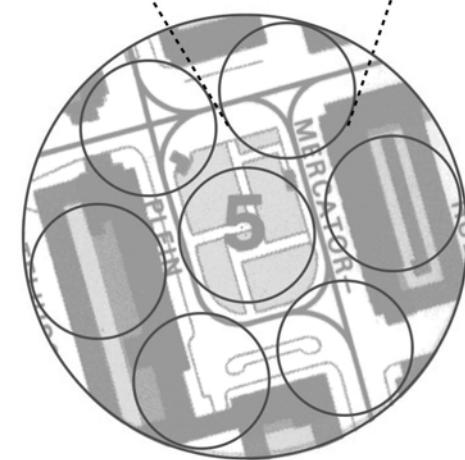
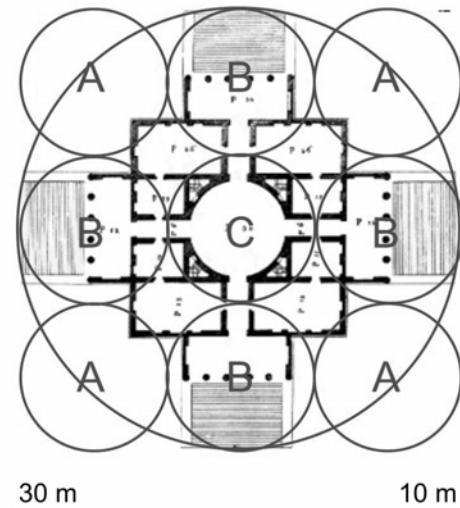
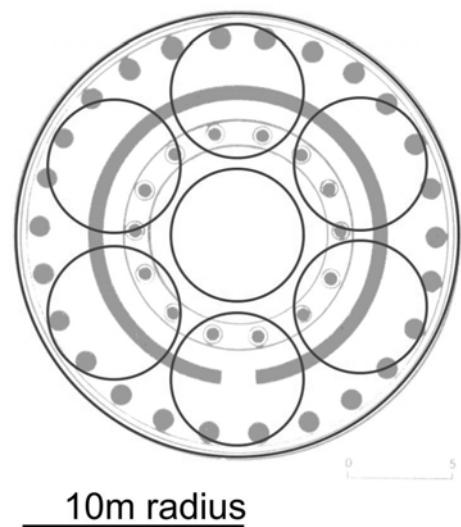
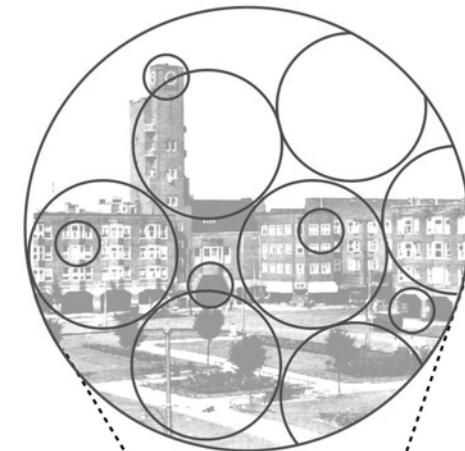
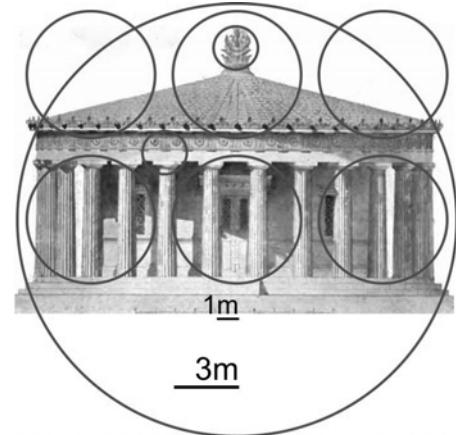


Fig. 66; 67; 68 $R=\{10, 20, 100m\}$ composition p.102

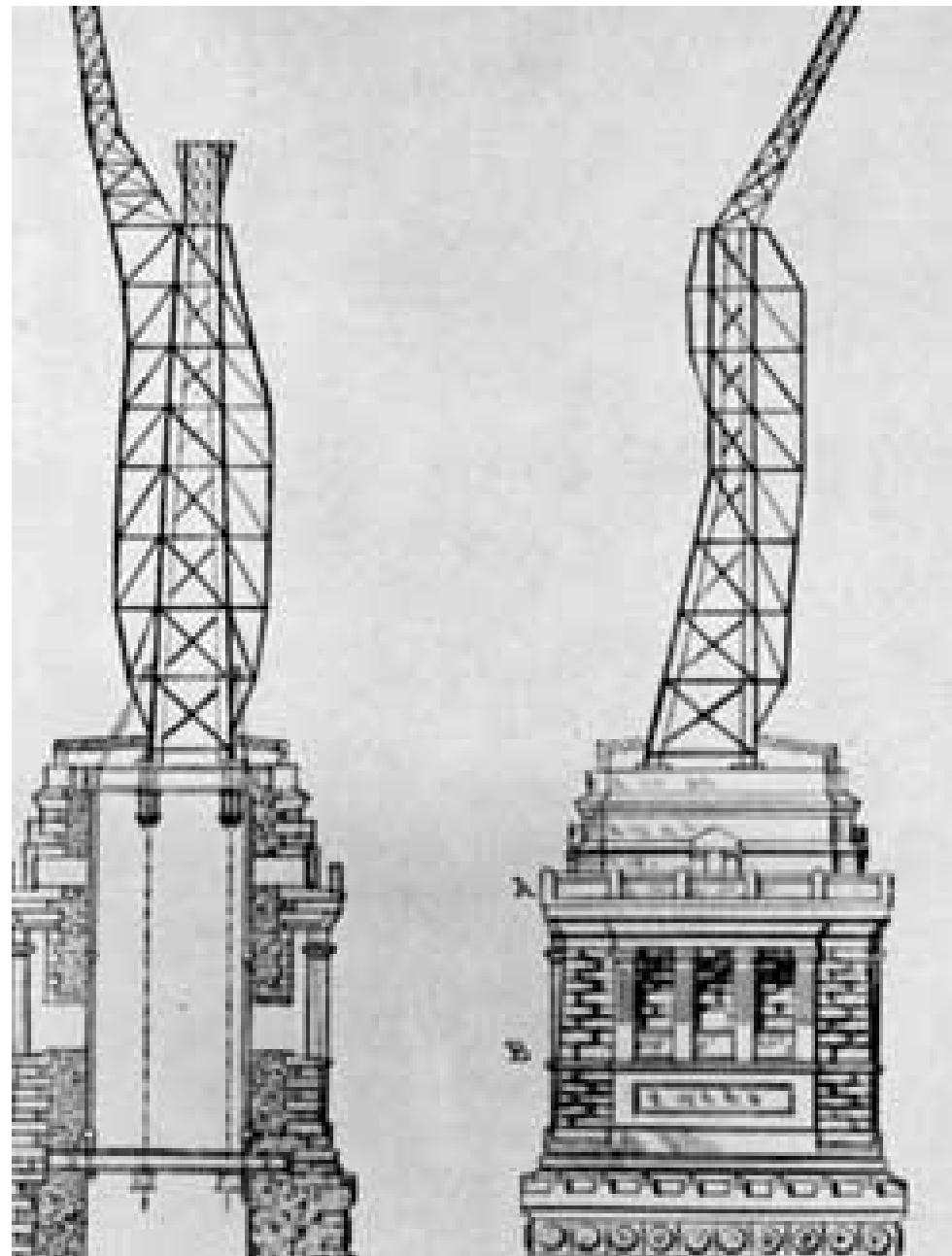


Fig. 69 The New York Statue of Liberty constructed in Paris 1884 p. 104

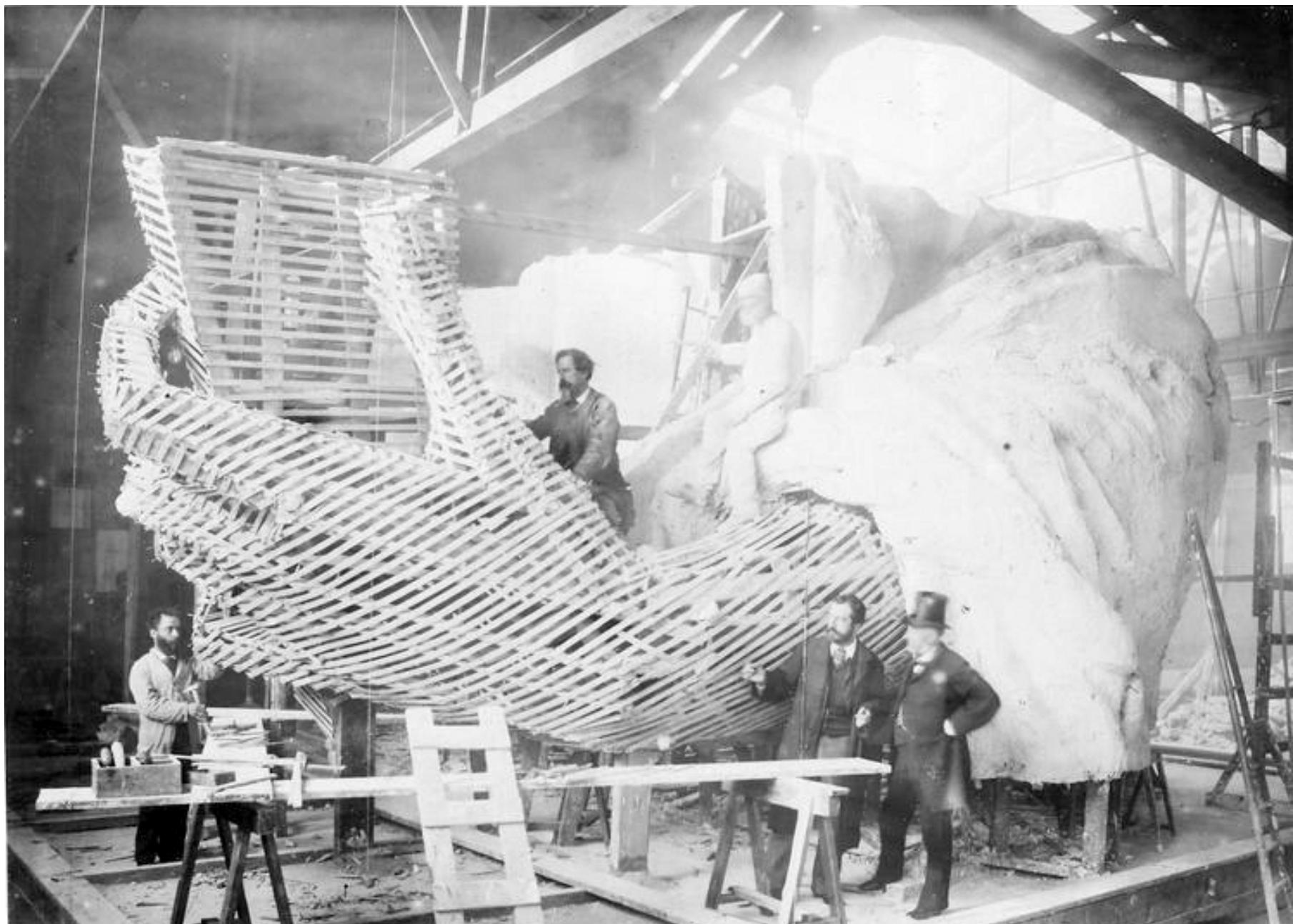


Fig. 69 The New York Statue of Liberty constructed in Paris 1884 p.104



Fig. 69 The New York Statue of Liberty constructed in Paris 1884 p.104

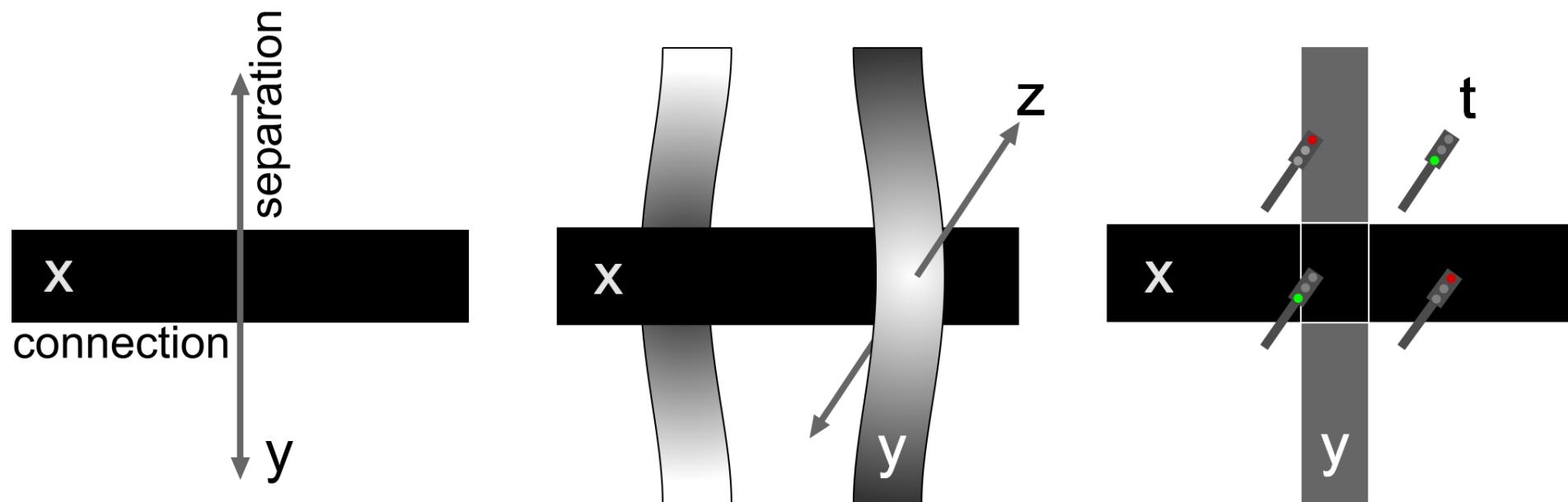
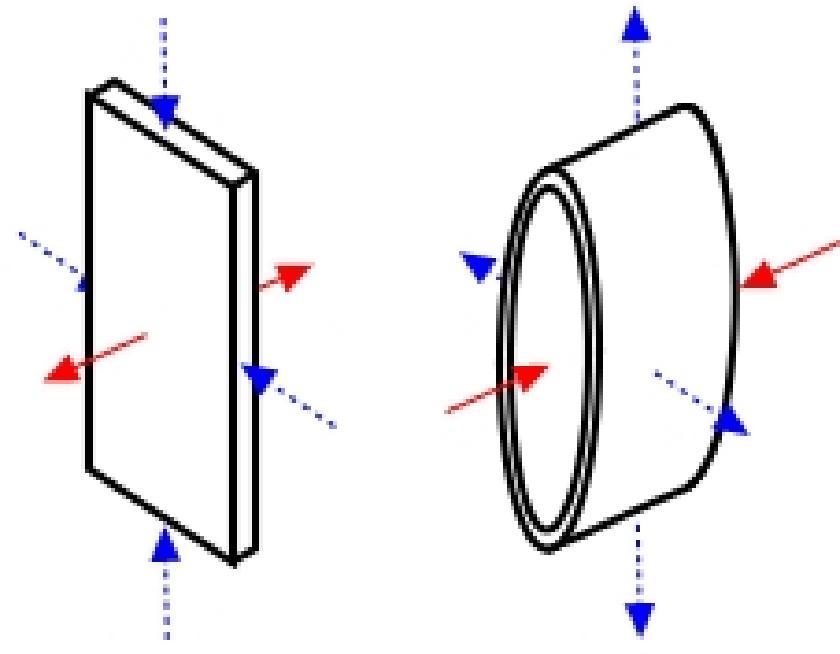


Fig. 70 Separation $y \perp x$? Then separate in z or t ! p. 105

dynamic



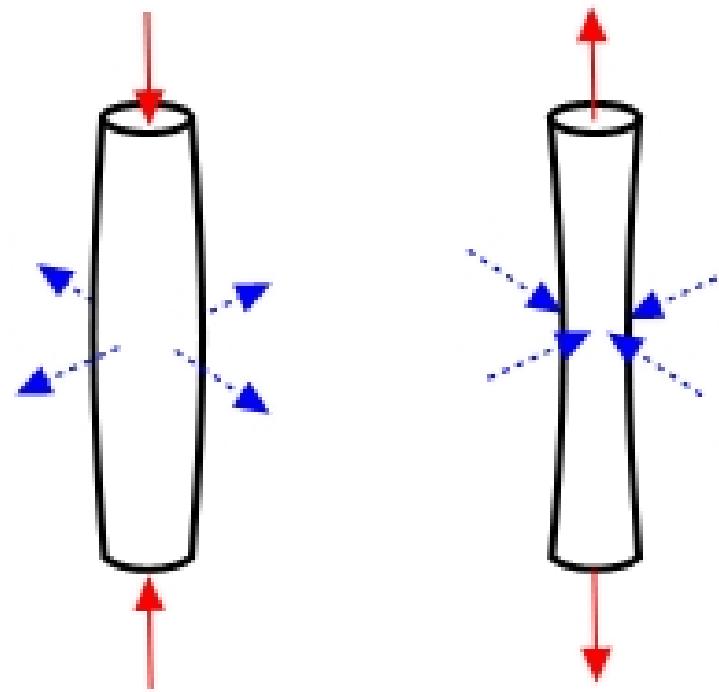
wall

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to dynamic
<separation>

tube

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static



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to static press
>separation<

stave

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to static tension
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Fig. 71 Direction paradox in construction p. 105

Content

Form

Structure

Function

Intention

Fig. 72 Orders p.107

POSSIBILITIES

PROBABILITIES

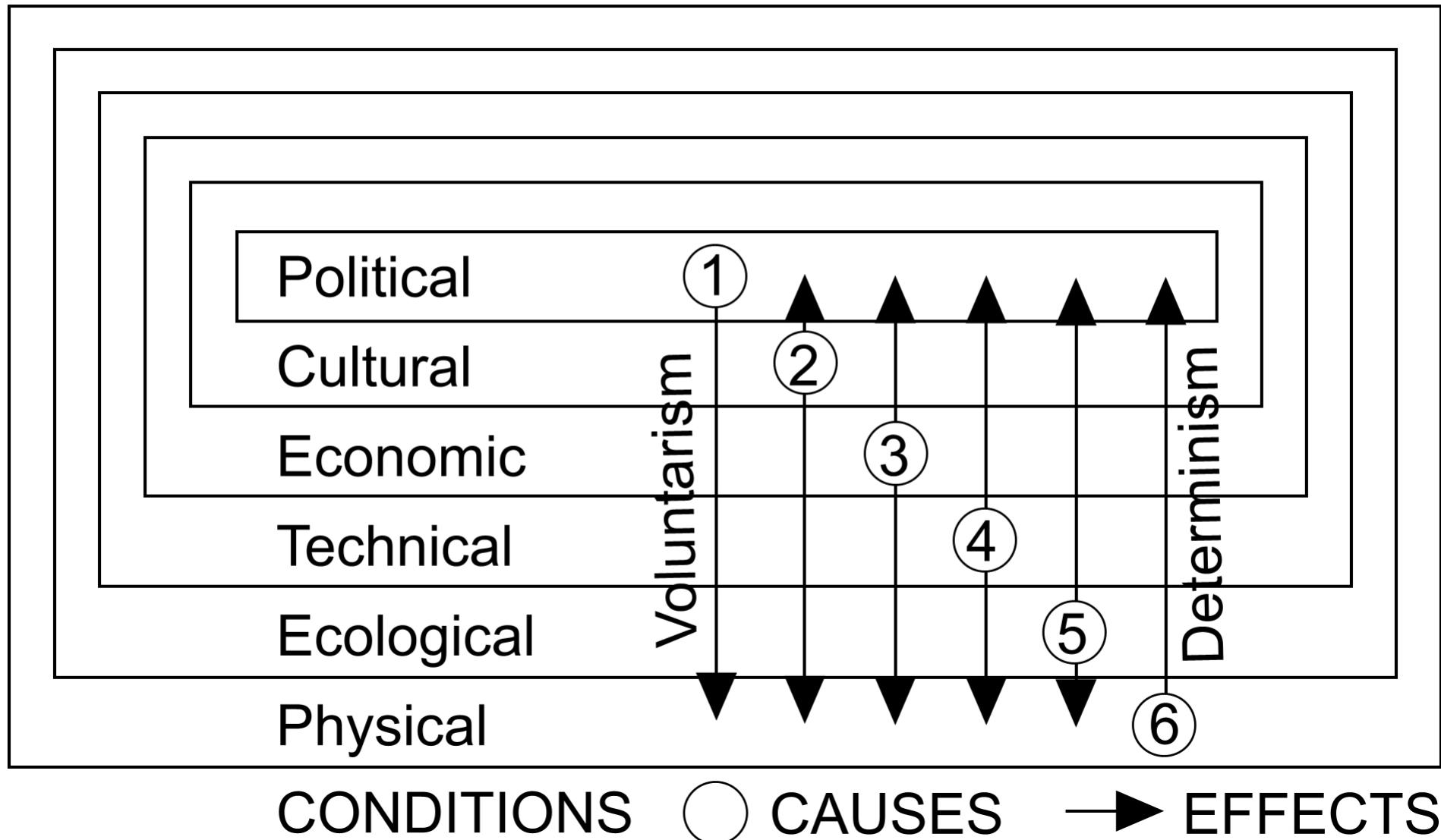


Fig. 73 Layers p.107

Examples 'E' elaborated on page	115	120	123	127	129	132	134	138	142	144	147	149	Examples of	0 -----
Nominal radius	1m	3m	10m	30m	100m	300m	1km	3km	10km	30km	100km	300km	Variables	Values
General name														
Access	E x x E	x x x x x x x x E	x x x x x x x x E	x x x x x x x x x x x x E	Access _{3m} Access _{10m} Access _{300m} Agriculture _{3km} Allotment _{100m} Altitude _{30m} Altitude _{10km} Altitude _{100km} Articulation _{30m} Beauty _{1m} Backing _{3m} B. Richness _{10m} Building Shape _{30m} Building Size _{300m} Cables And Pipes ₃₀₀ Catchment Area ₃₀₀ Centrality _{300m} Change _{1m} Character _{1m} Climate _{10m} Climate _{300km} Colour _{1m}	wall public pedestrians cars fields detached low rise centimetres kilometres lowland horizontal chaotic boring corner sharp accumulated small matter mountainous centre seconds introvert stable cold black	door private cars settlements attached high rise kilometres highland vertical recognition surprise centre vague dispersed large information delta periphery millennia extrovert variable warm white							
Beauty	x x x x	x x												
Backing	E x x													
Boundary Richness	x E x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x						
Building Shape		x x												
Building Size			E											
Cables And Pipes	x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x						
Catchment Area						E								
Centrality			E x x	x x x	x x x	x x x	x x x	x x x						
Change	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x						
Character	x x x x	x x x x	x x x x	x x x x										
Climate	E x					x x	Climate _{10m}							
Colour	E x x x					E	Climate _{300km}							

Fig. 74 Variables relevant for design p.114



Fig. 75 Example 2x2m p.115



Fig. 76 Example 6x6m p. 120



Fig. 77 Example 20x20m p. 123

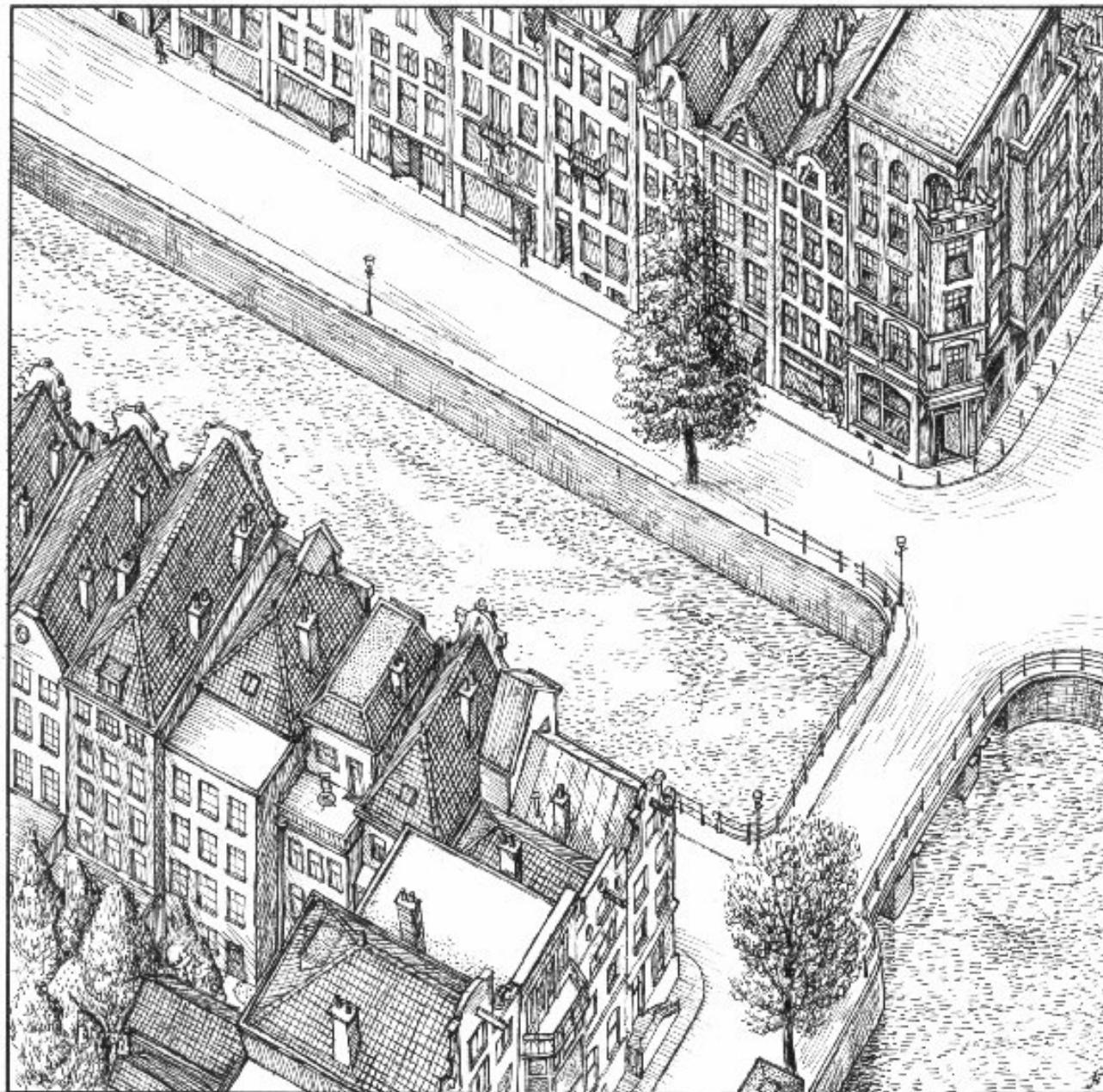


Fig. 78 Example 60x60m p.127

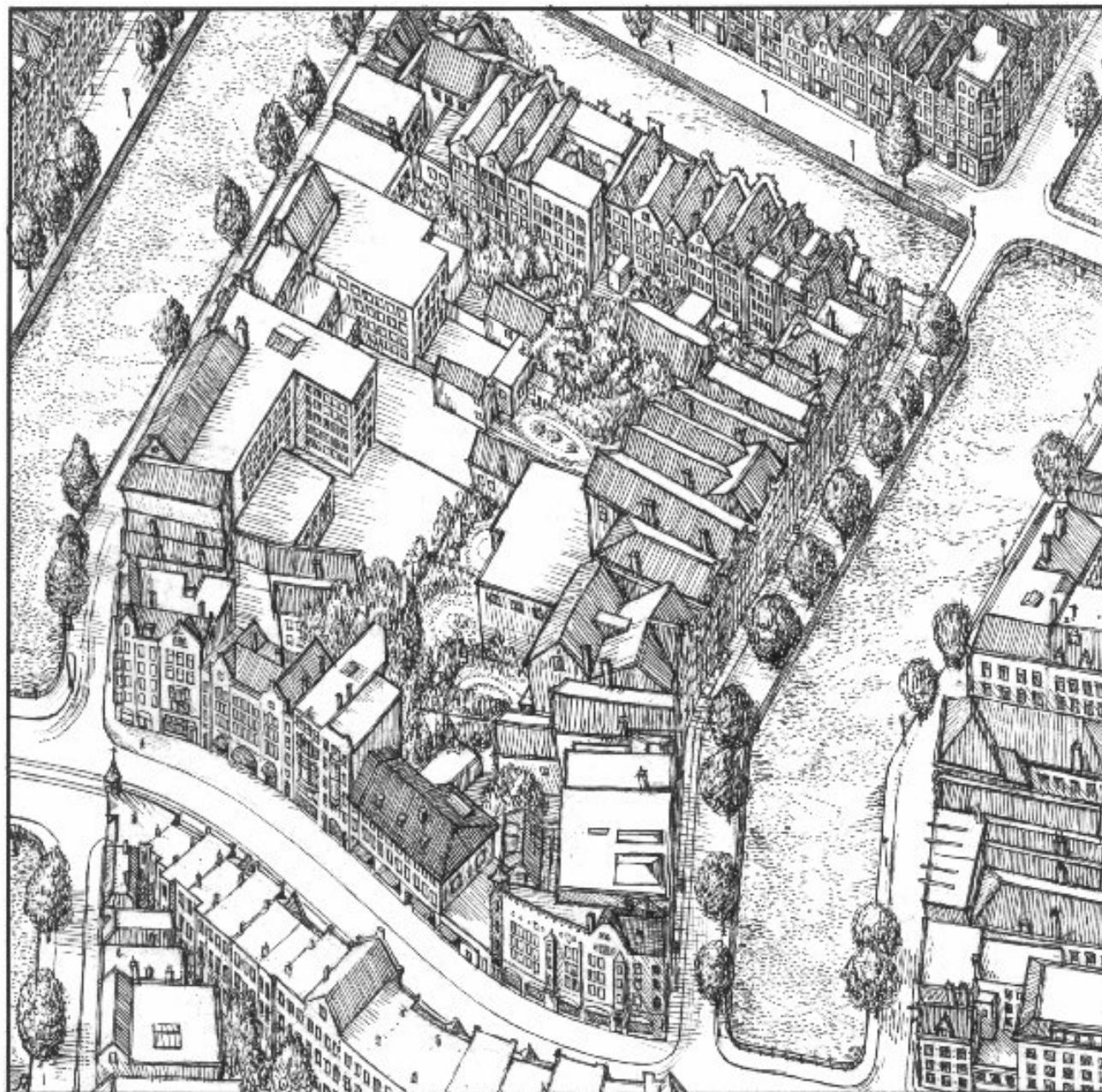


Fig. 79 Example 200x200m p.129



Fig. 80 Example 600x600m p.132



Fig. 81 Example 2x2km p.134

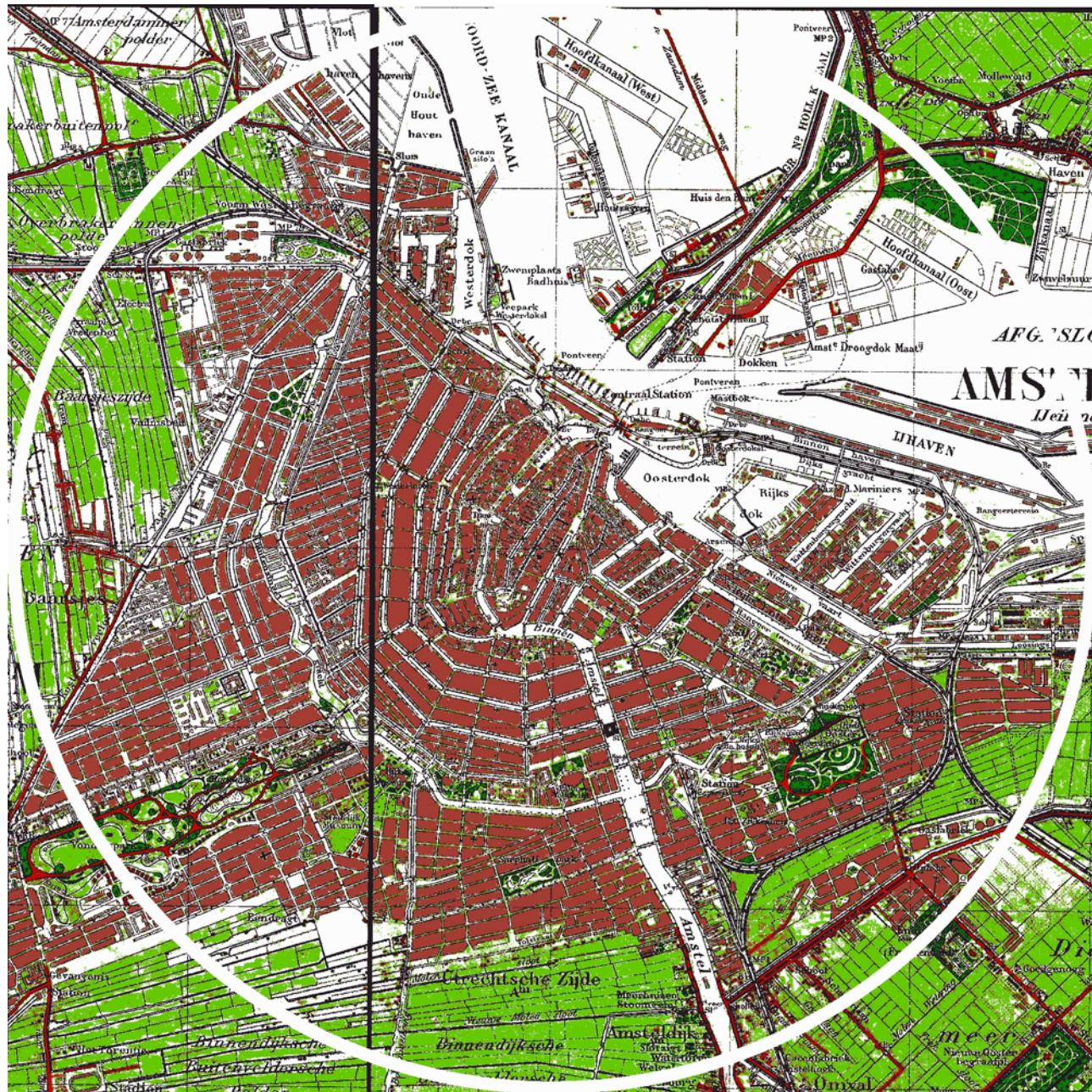


Fig. 82 Example 6x6km 1930 p.138



Fig. 83 Example 20x20km p.142

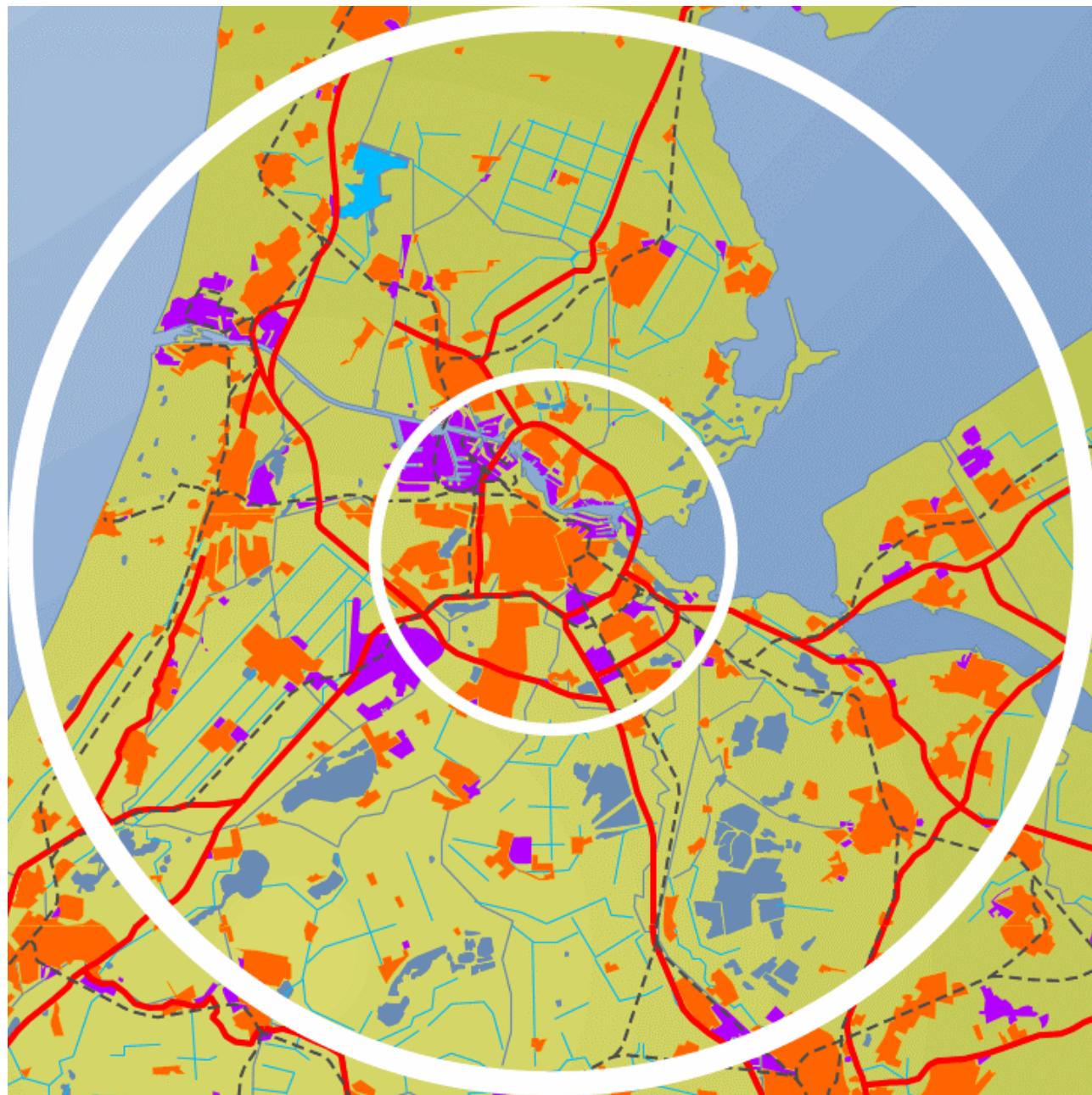


Fig. 84 Example 60x60km p.144

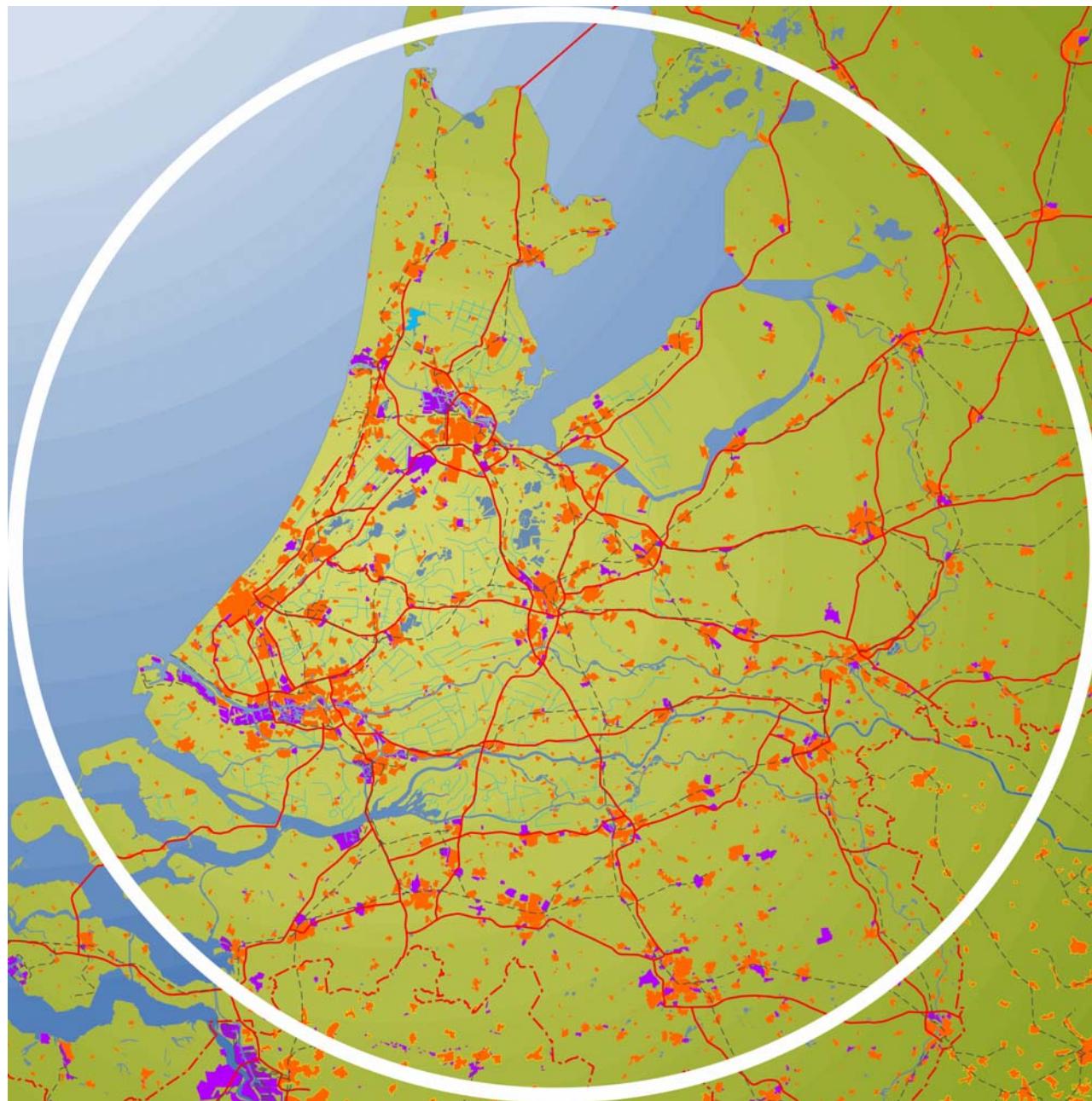


Fig. 85 Example 200x200km p.147

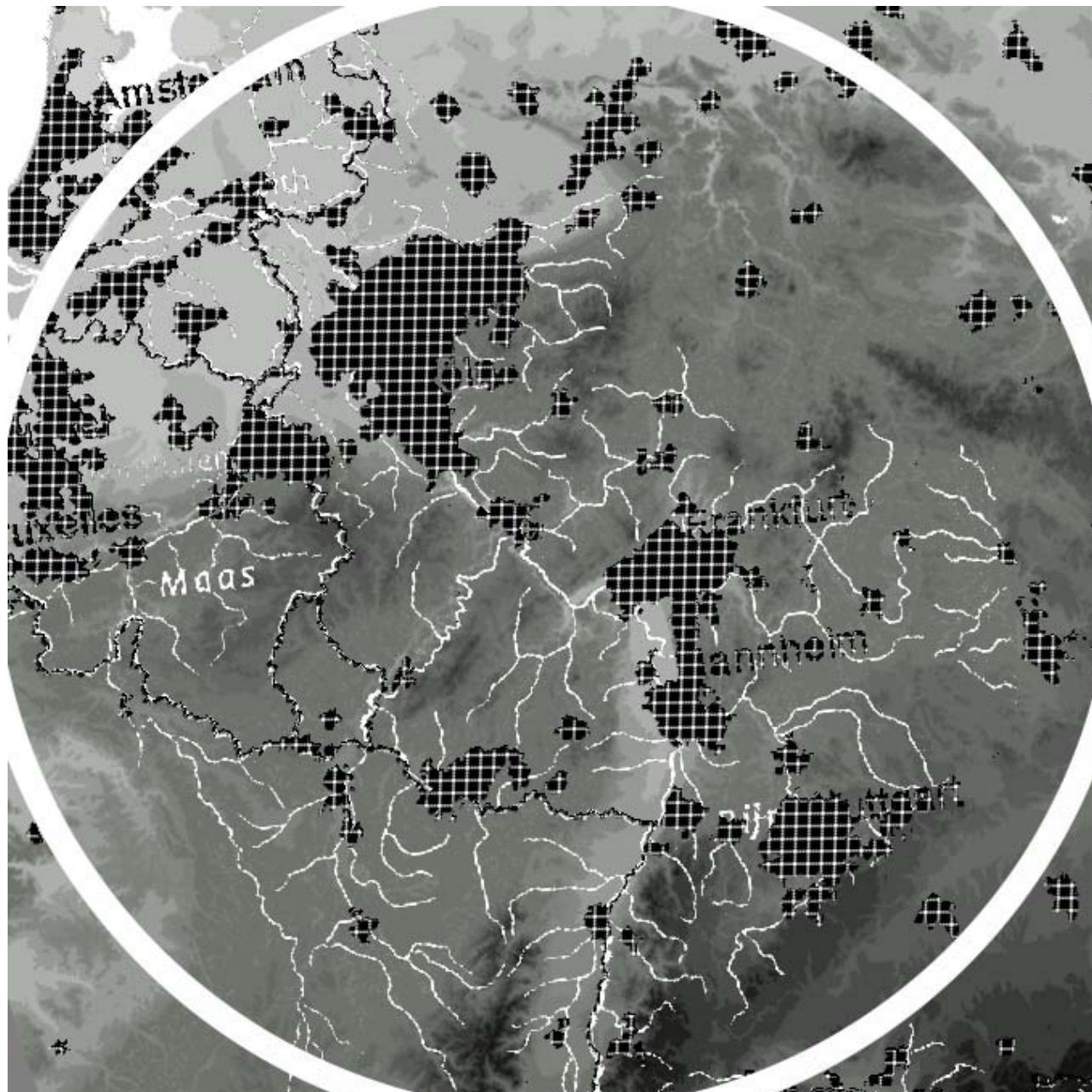


Fig. 86 Example 600x600m p. 149

$C^L = \text{Categories}^{\text{Locations}}$

$$2^2 \frac{2!}{0!2!} + \frac{2!}{1!1!} + \frac{2!}{2!0!} = 4$$

$$2^3 \frac{3!}{0!3!} + \frac{3!}{1!2!} + \frac{3!}{2!1!} + \frac{3!}{3!0!} = 8$$

$$2^4 \frac{4!}{0!4!} + \frac{4!}{1!3!} + \frac{4!}{2!2!} + \frac{4!}{3!1!} + \frac{4!}{4!0!} = 16$$

$$3^2 \frac{2!}{0!0!2!} + \frac{2!}{0!1!1!} + \frac{2!}{0!2!0!} + \frac{2!}{1!0!1!} + \frac{2!}{1!1!0!} + \frac{2!}{2!0!0!} = 9$$

$$3^3 \frac{3!}{0!0!3!} + \frac{3!}{0!1!2!} + \frac{3!}{0!2!1!} + \frac{3!}{0!3!0!} + \frac{3!}{1!2!0!} + \frac{3!}{2!1!0!} + \frac{3!}{3!0!0!} + \frac{3!}{2!0!1!} + \frac{3!}{1!1!0!} + \frac{3!}{0!1!0!} = 27$$

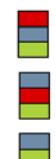


Fig. 87 Combinatoric explosion of possible forms with two or three legend units

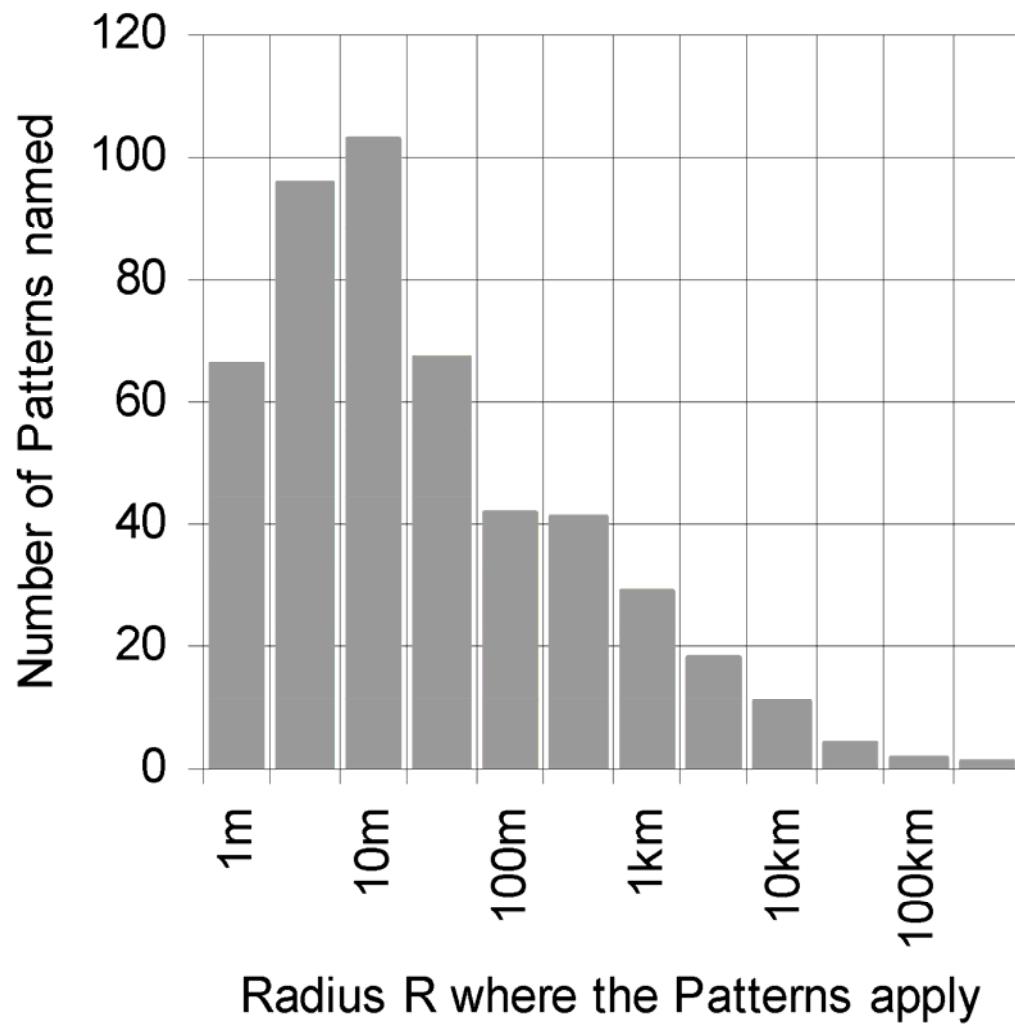


Fig. 88 The number of Alexander's Patterns per radius R p.152

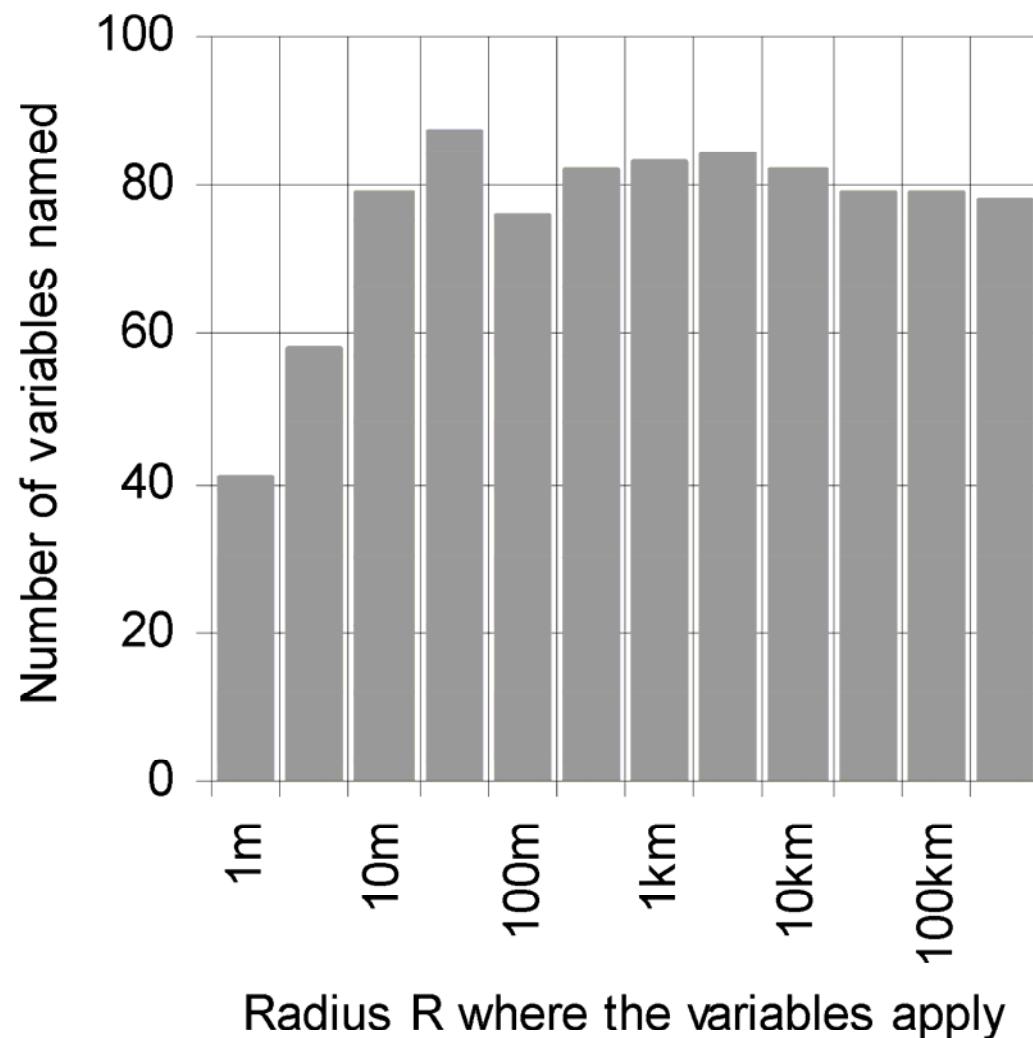


Fig. 89 The number of values per radius R p. 152

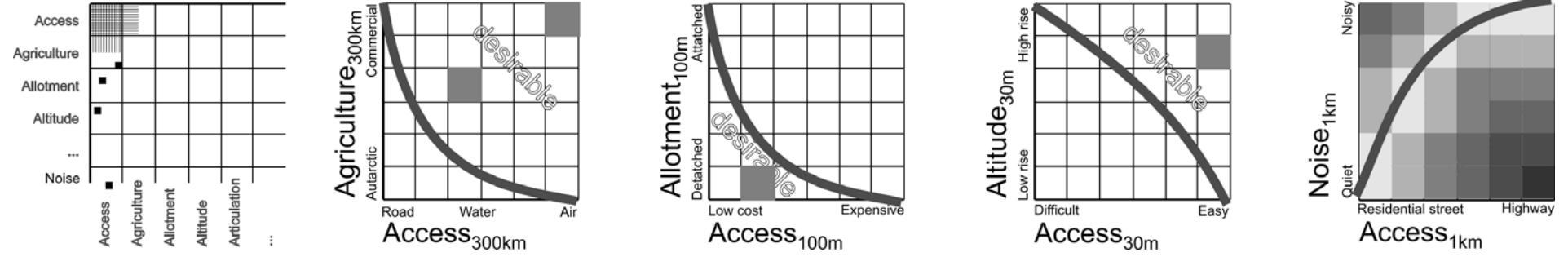
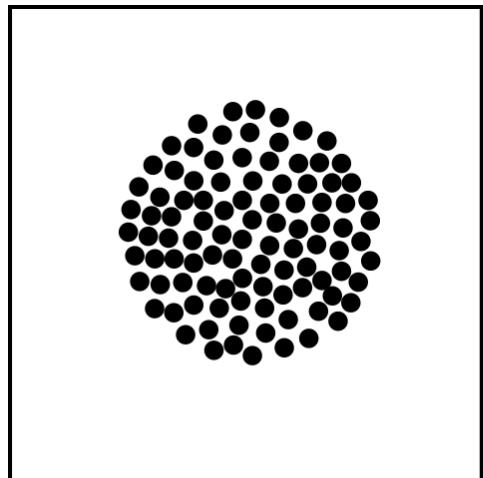
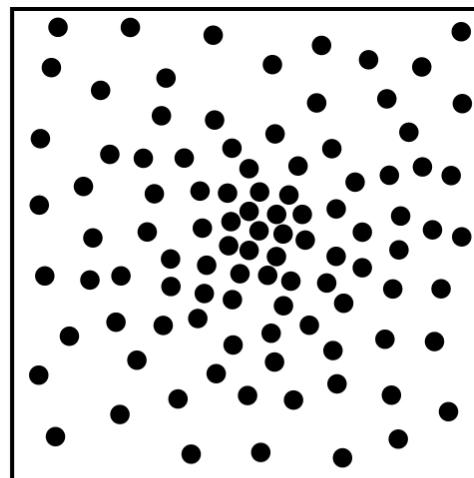


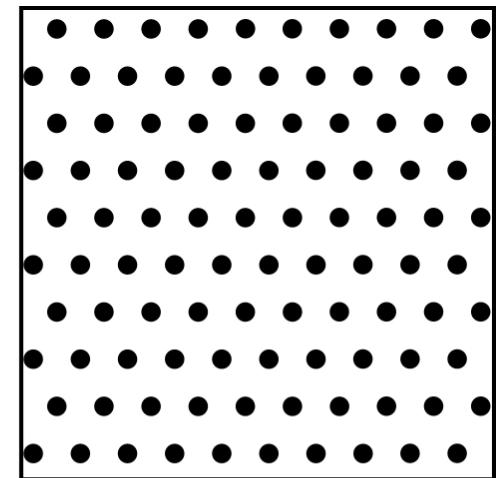
Fig. 90 Probable relations between variables in a field of possibilities p. 153



accumulation



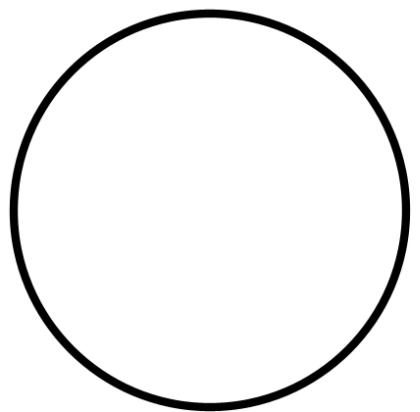
gradient



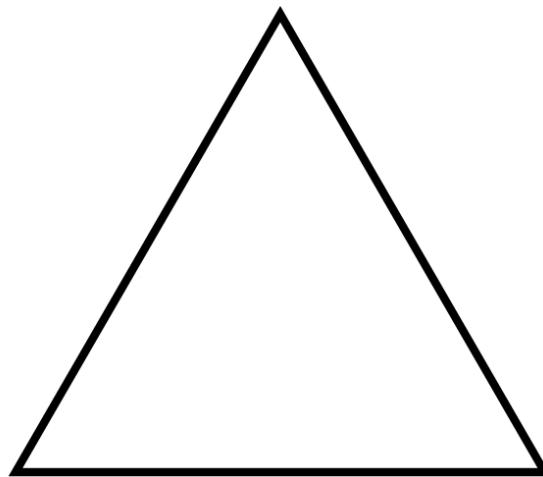
dispersion

← concentration (process) deconcentration →

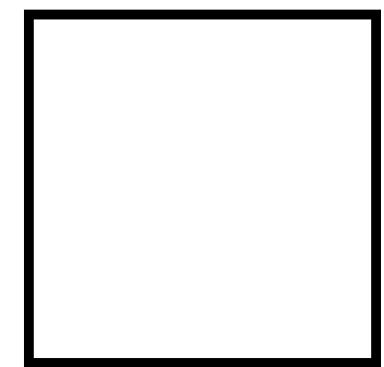
Fig. 91 Extreme states of distribution p. 158



any direction
one change of direction



3 directions
3 changes of direction



2 directions
4 changes of direction

Fig. 92 Contours circumscribing equal surfaces p. 158

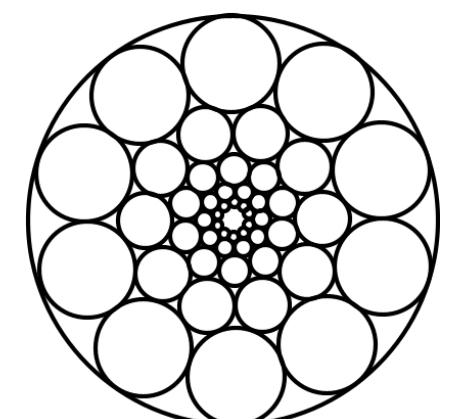
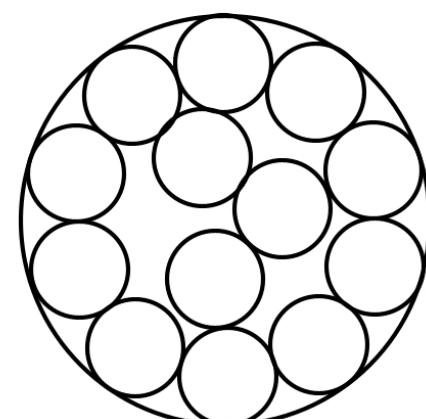
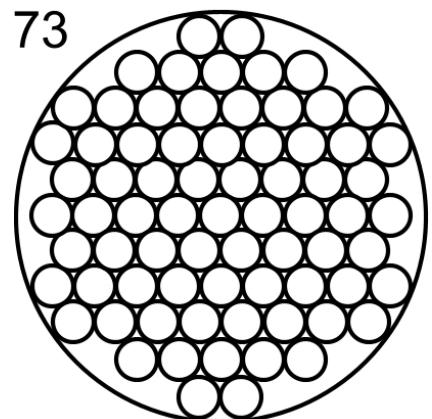
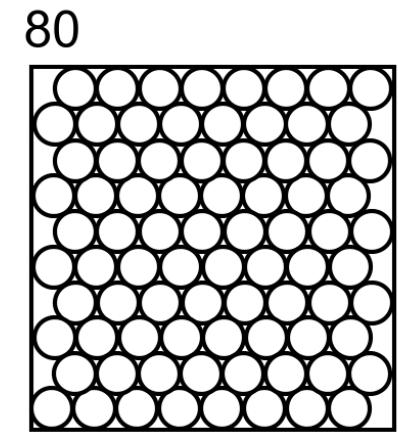
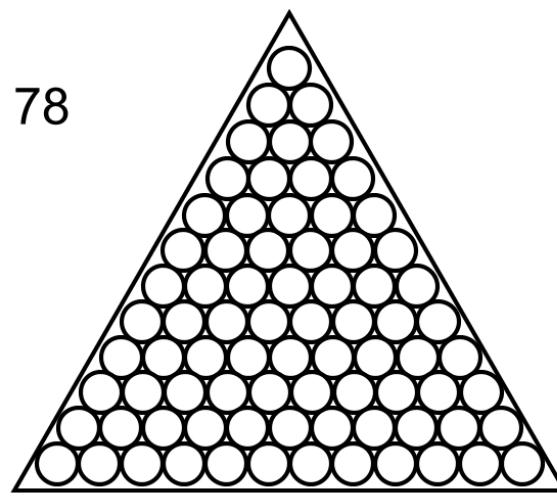
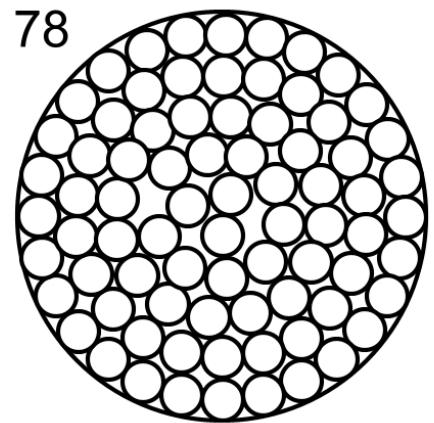


Fig. 93 Closest packing and maximum coverage within a contour p. 160

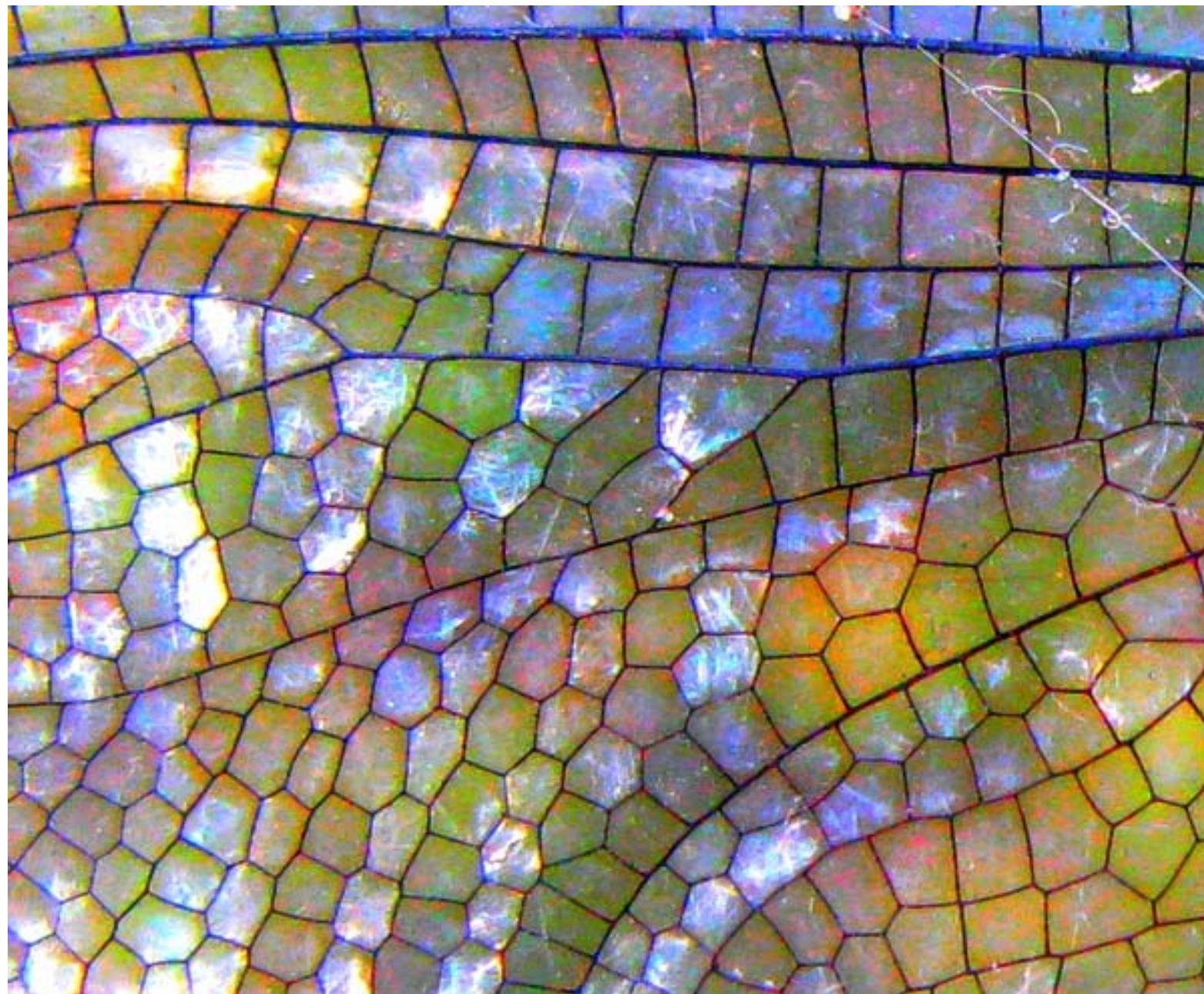


Fig. 94 The wing of a dragonfly p. 160

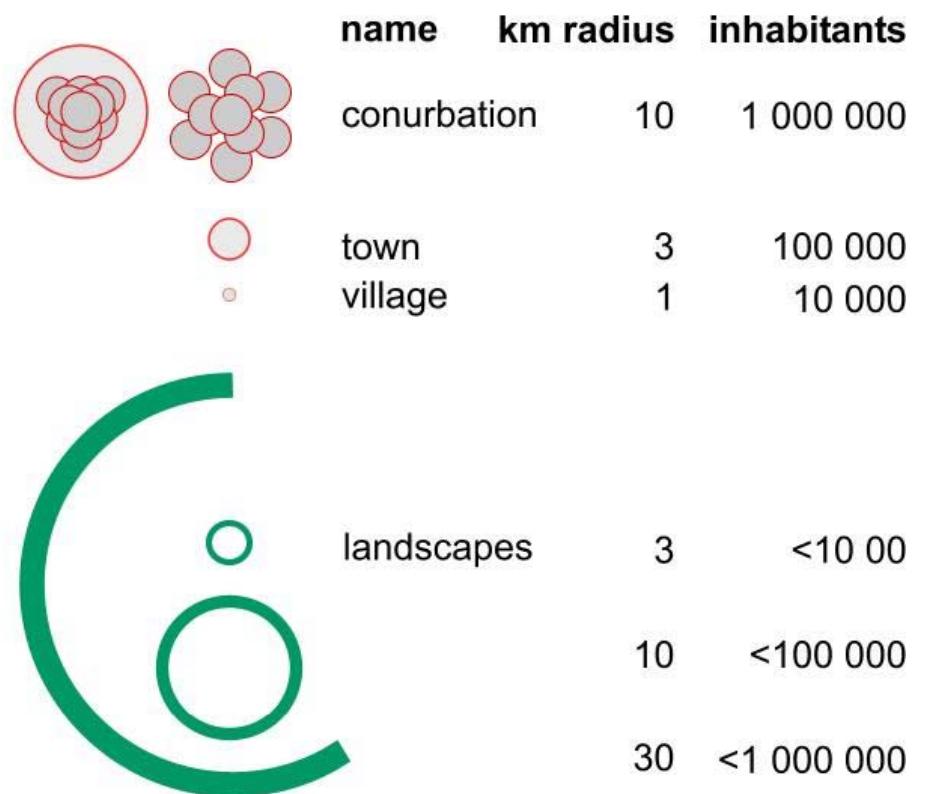
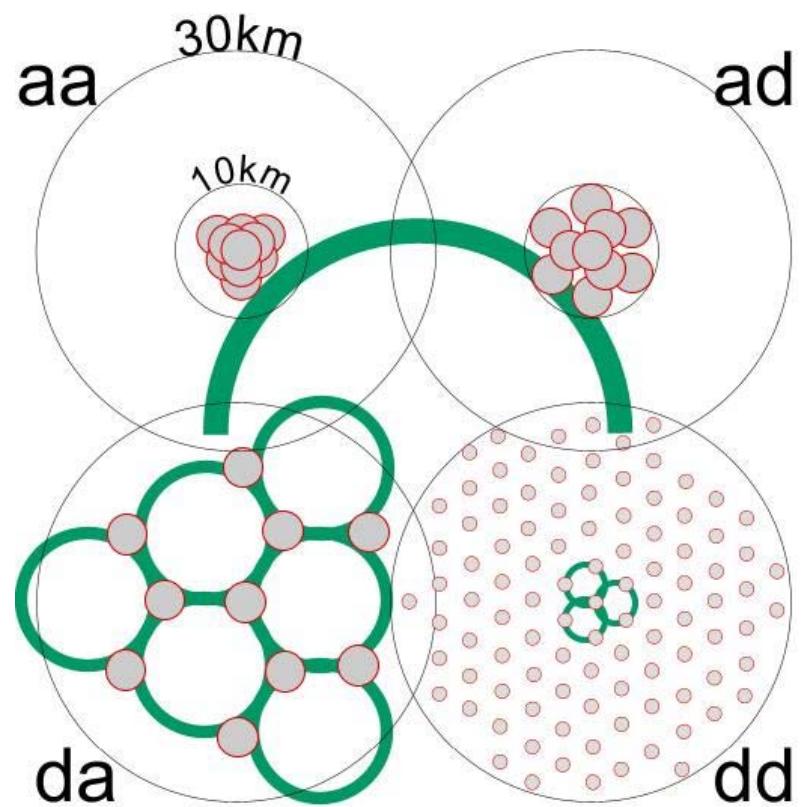


Fig. 95 Accumulation (a) and dispersion (d) at two levels of scale p. 161

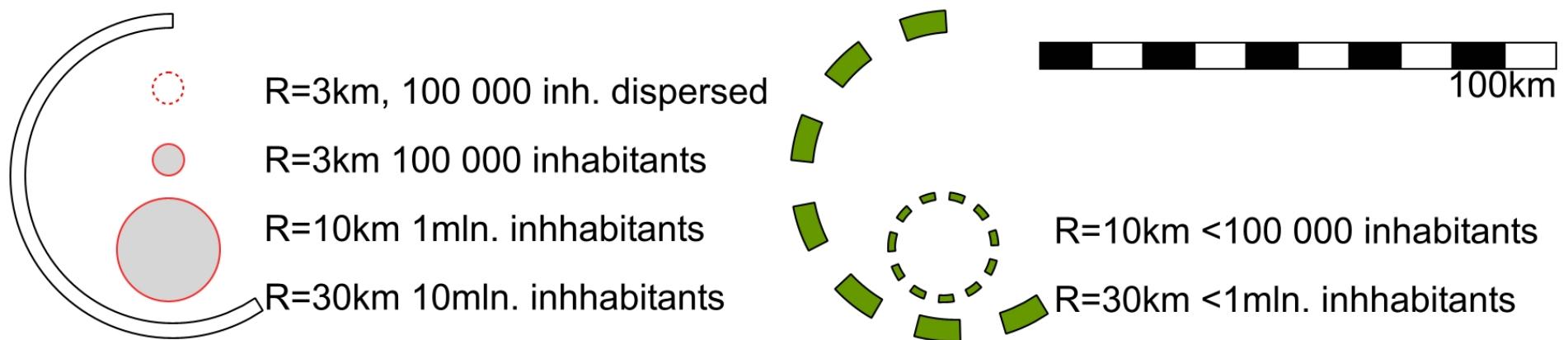
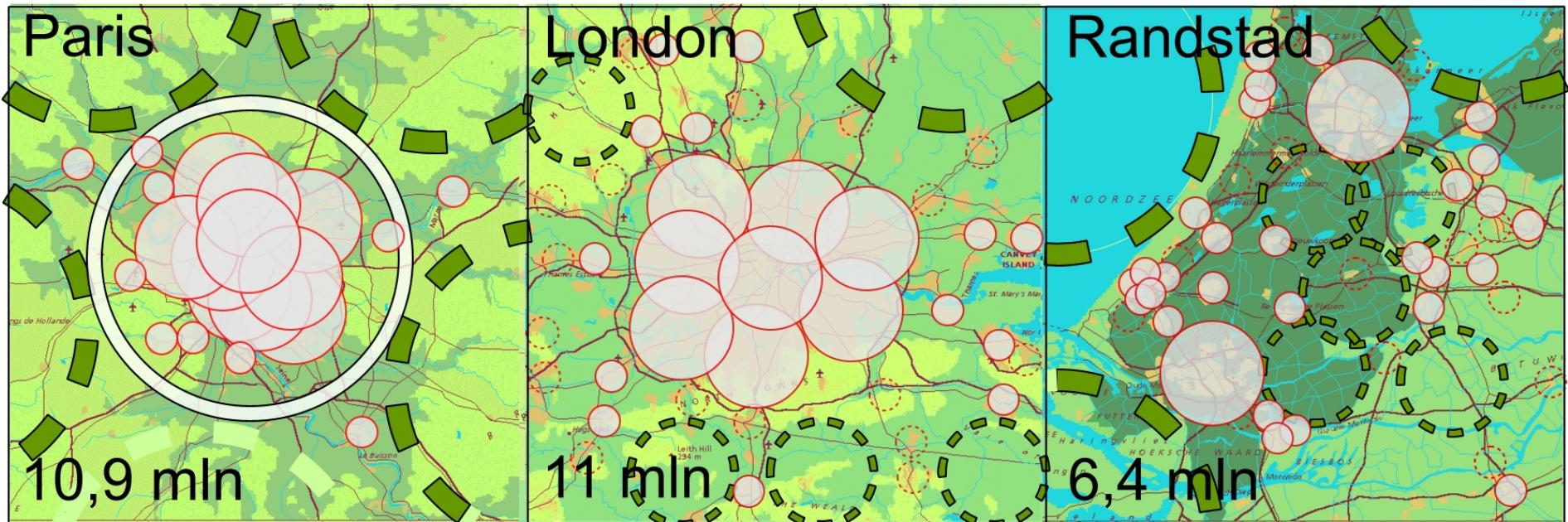


Fig. 96 Paris, London, Randstad 2000 in gross dots p. 162

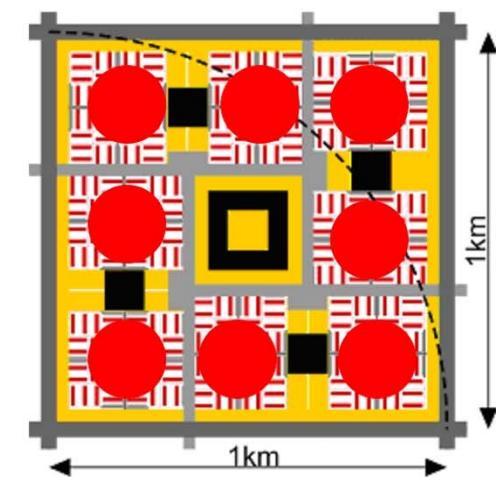
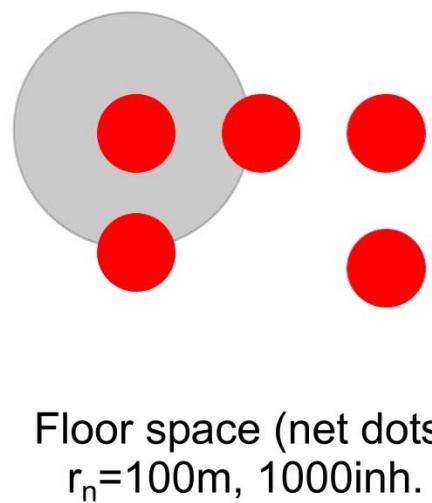
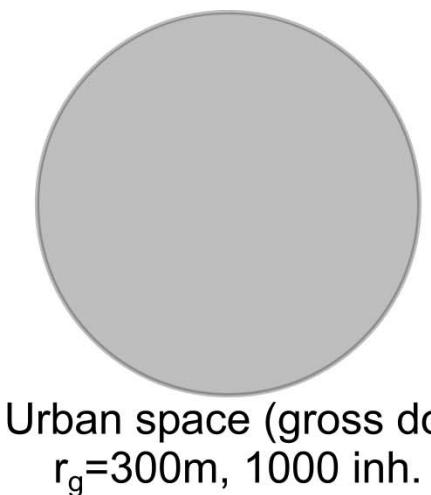


Fig. 97 Distribution of floor space reduced in net dots p. 162

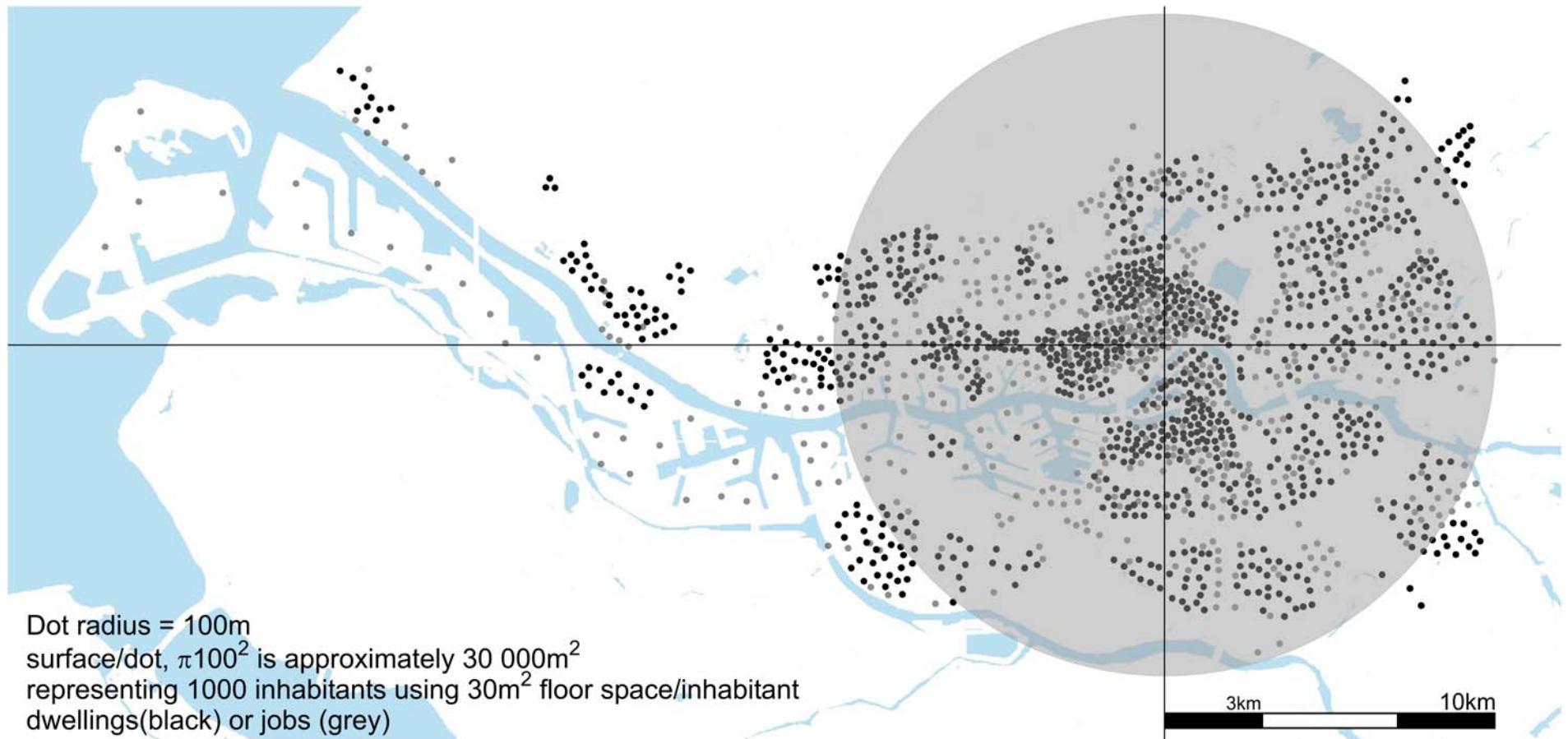


Fig. 98 The distribution of inhabitants of Rotterdam conurbation 2010 showing its form p. 163

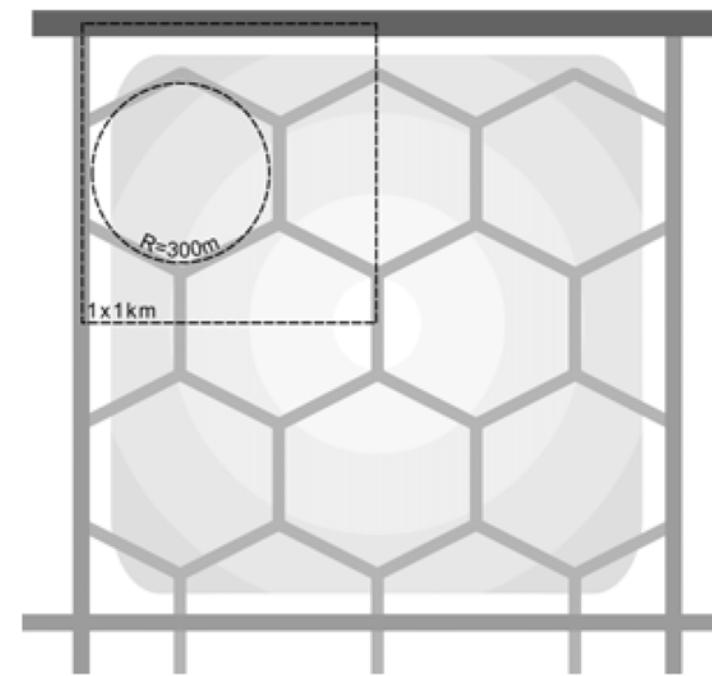
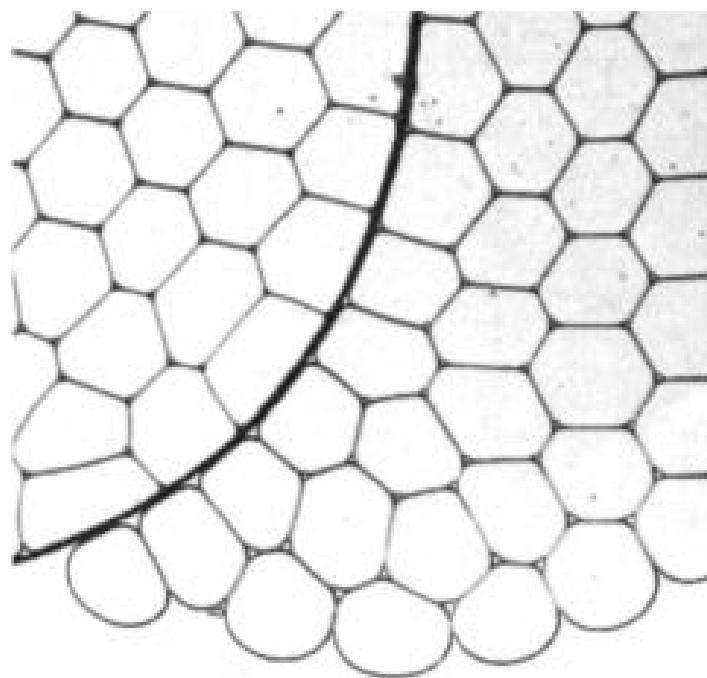


Fig. 99 Hexagonal network p. 164

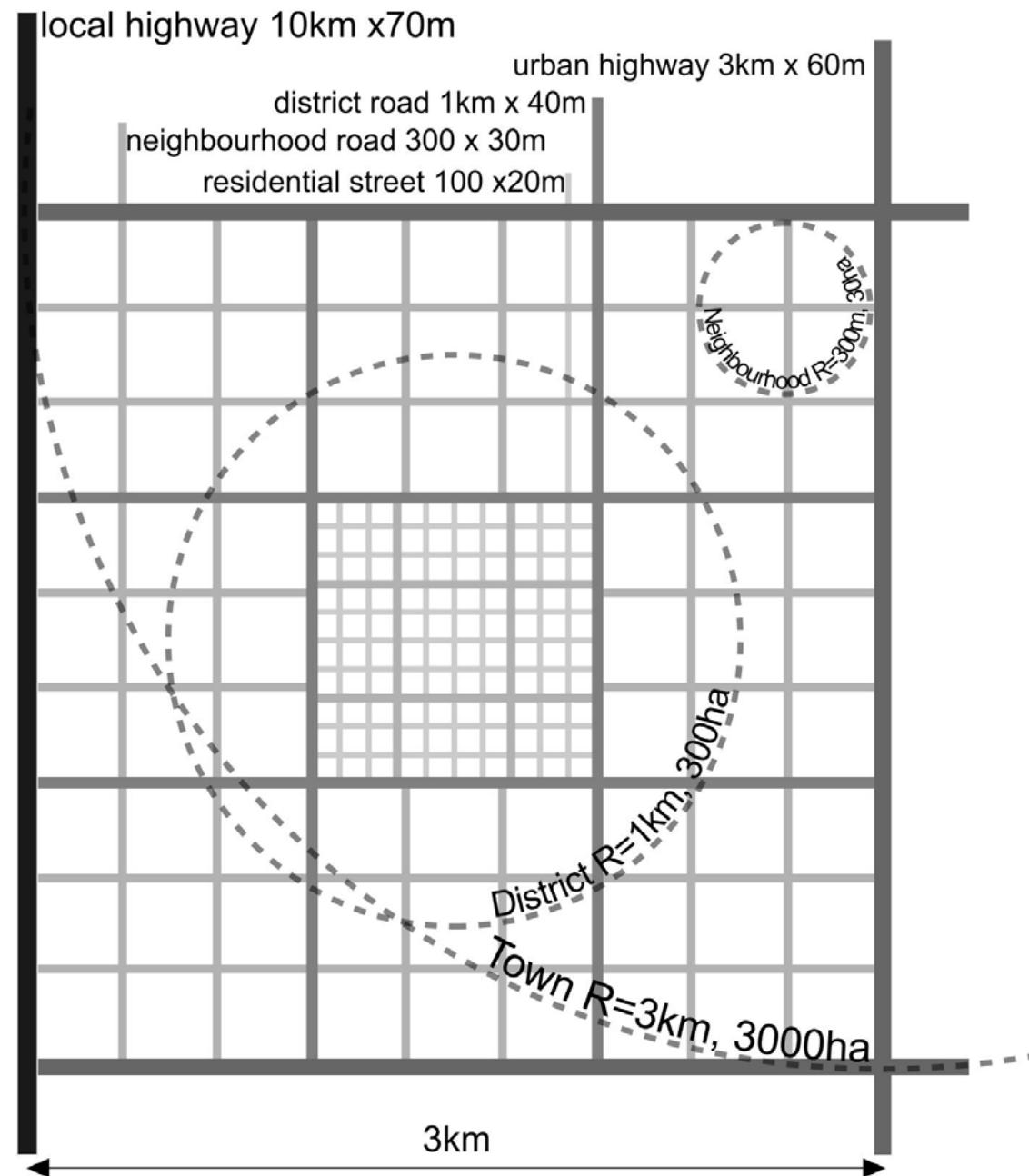
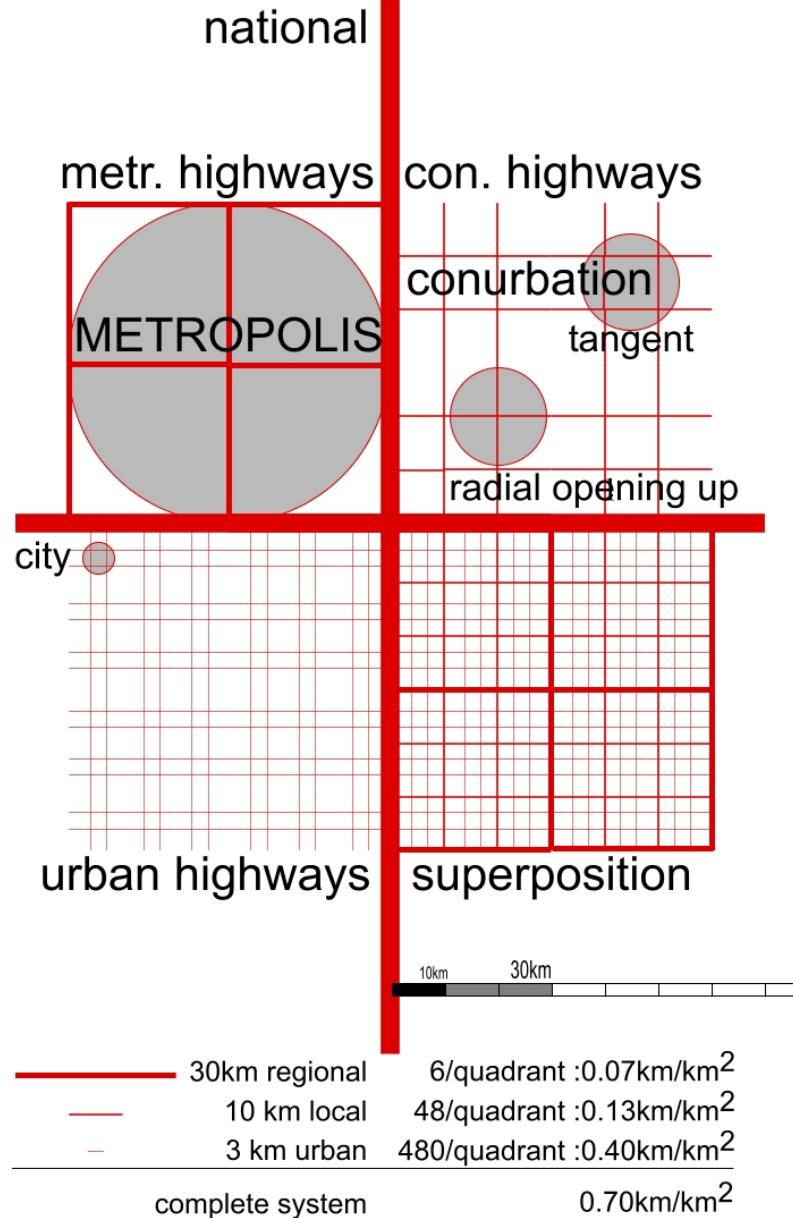


Fig. 100 Orthogonal network p.164

DRY CONNECTIONS



WET CONNECTIONS

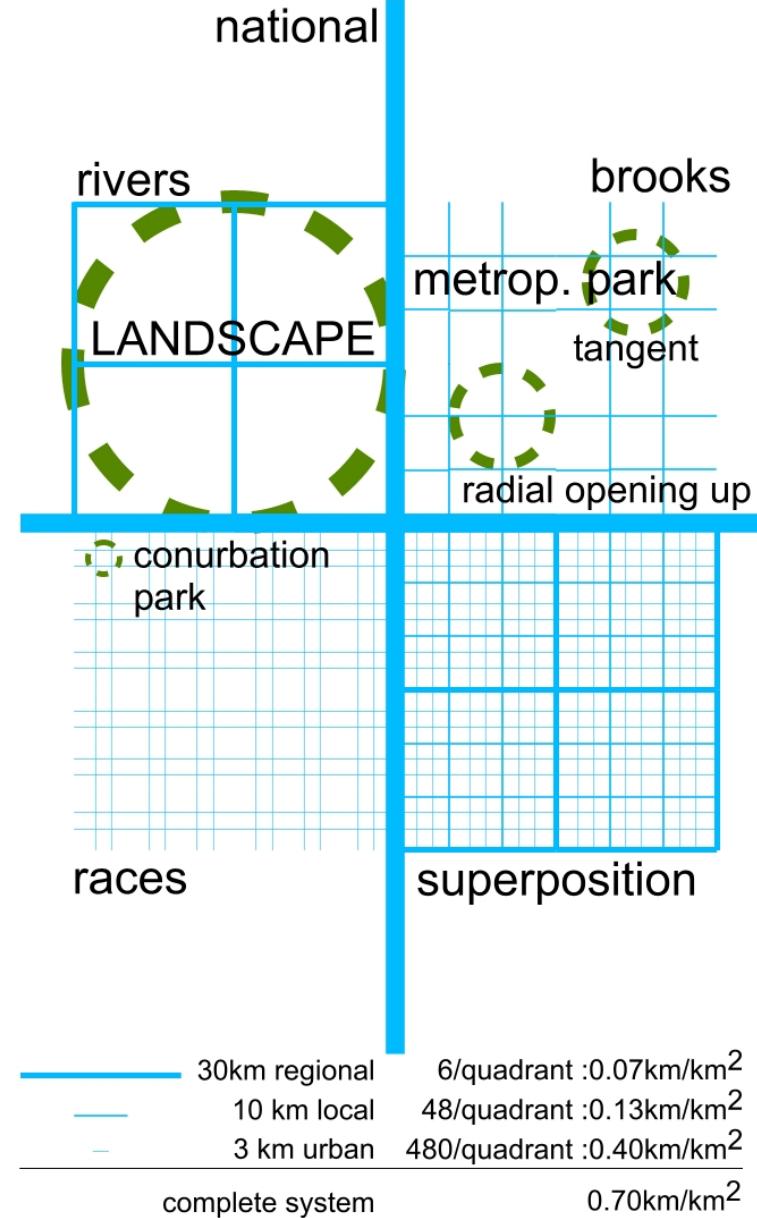


Fig. 101 Dry and wet connections p.165

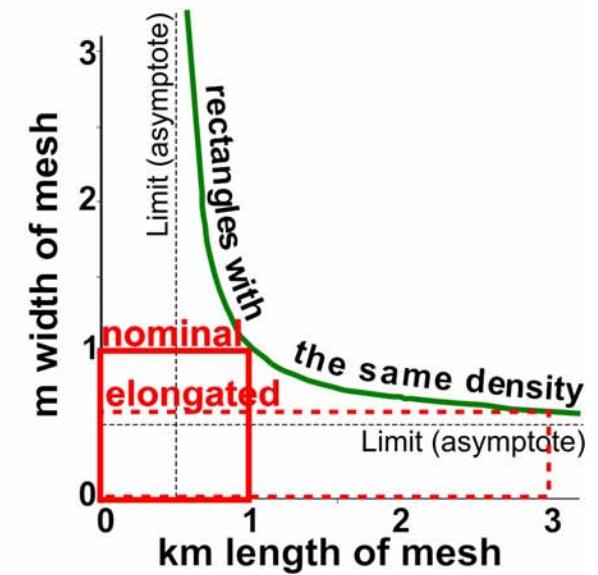
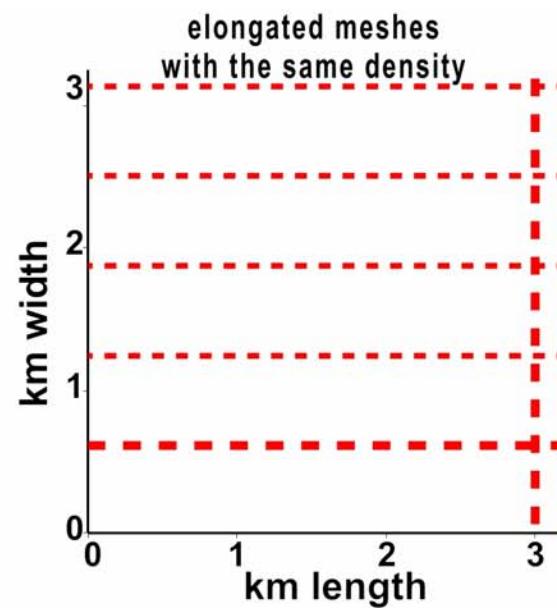
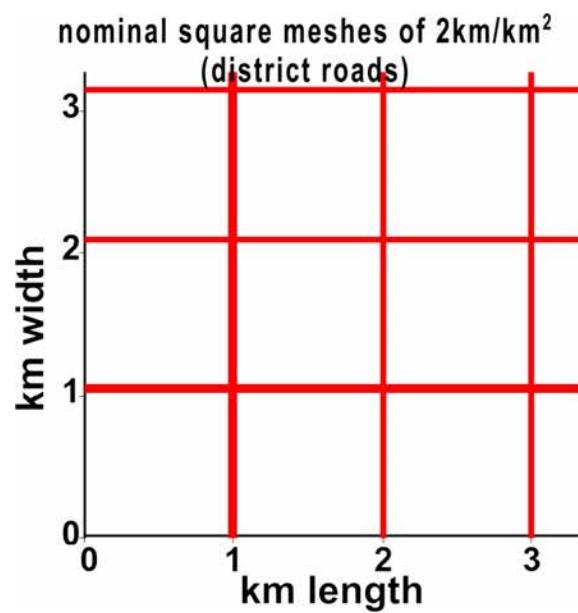


Fig. 102 Equal network densities Fig. 103 Equal density elongations p. 166

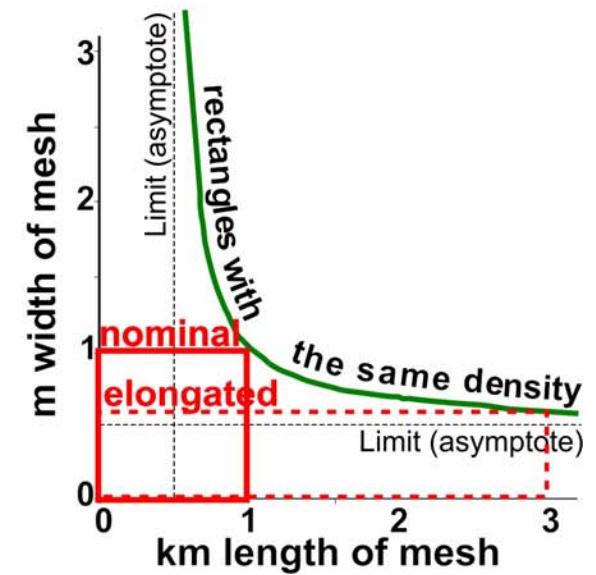
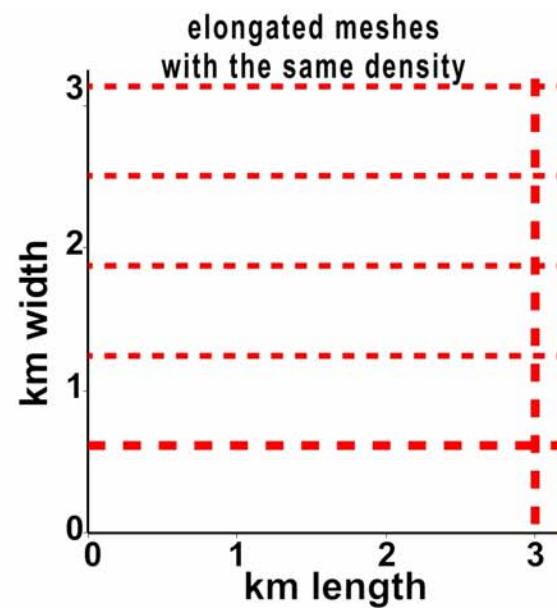
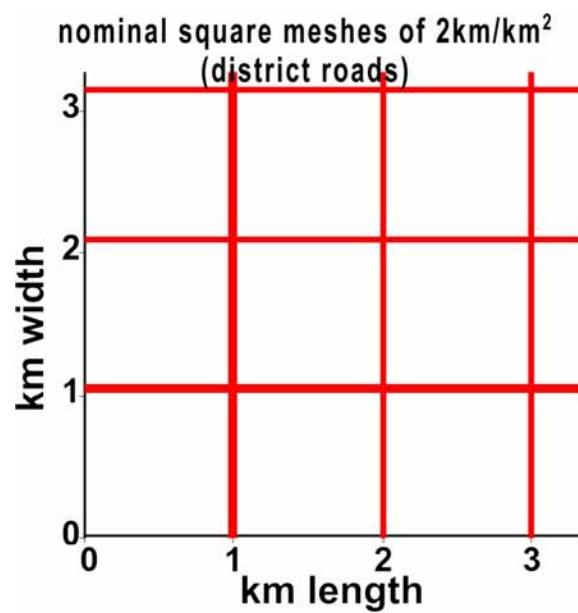


Fig. 102 Equal network densities Fig. 103 Equal density elongations p. 166

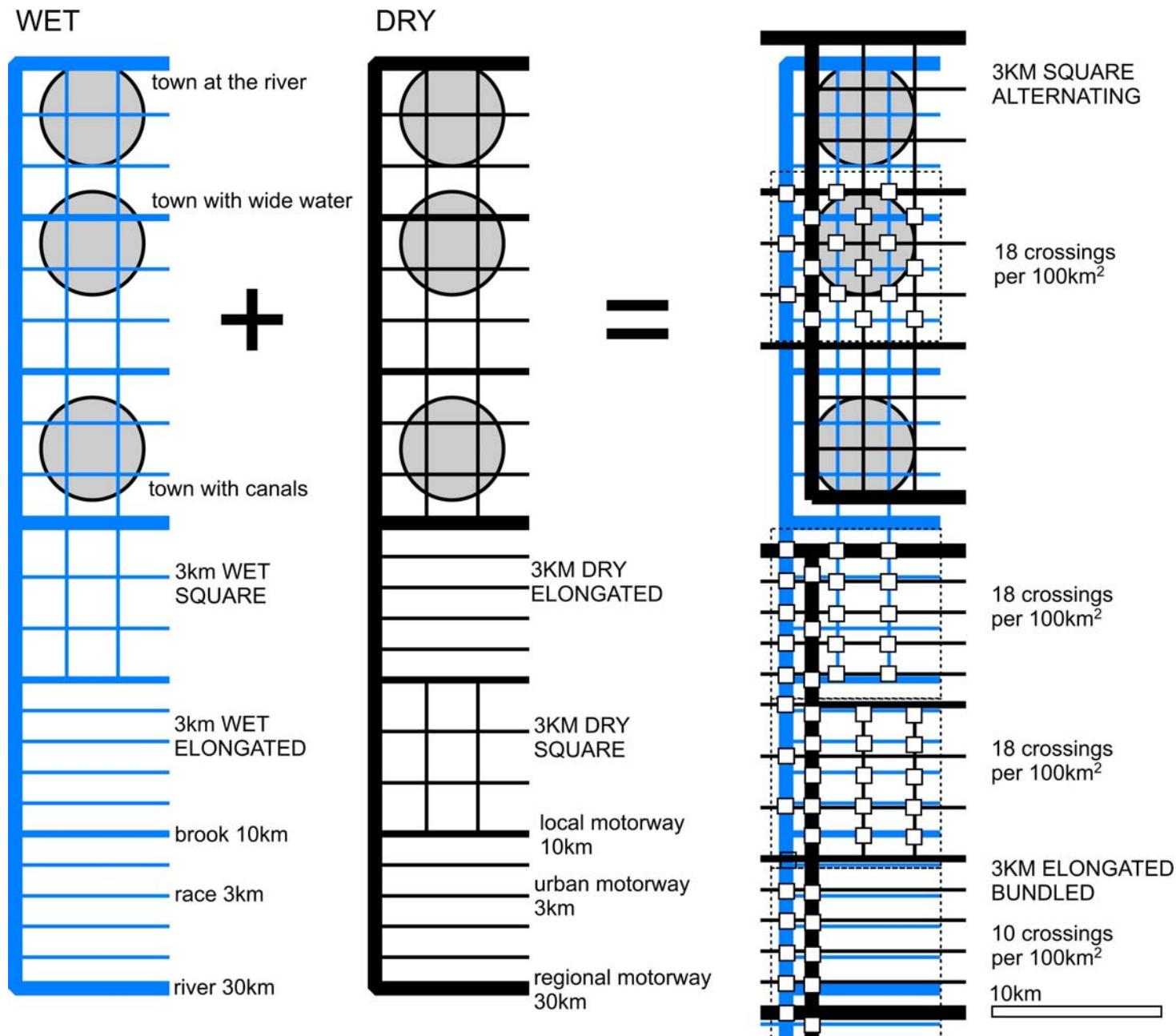
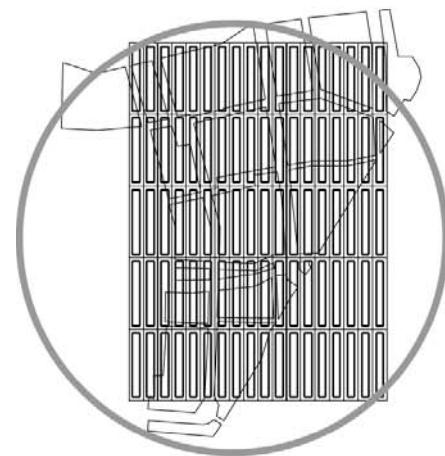
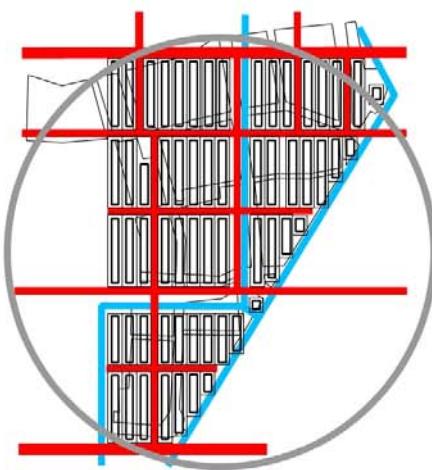


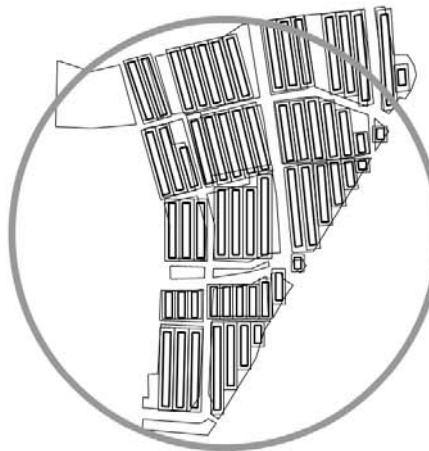
Fig. 104 Interference and reducing crossings p.166



Division



Segmentation



Tailoring



Detailing

Fig. 105 R=1km Division, segmentation, tailoring and detailing De Baarsjes, Amsterdam p.167

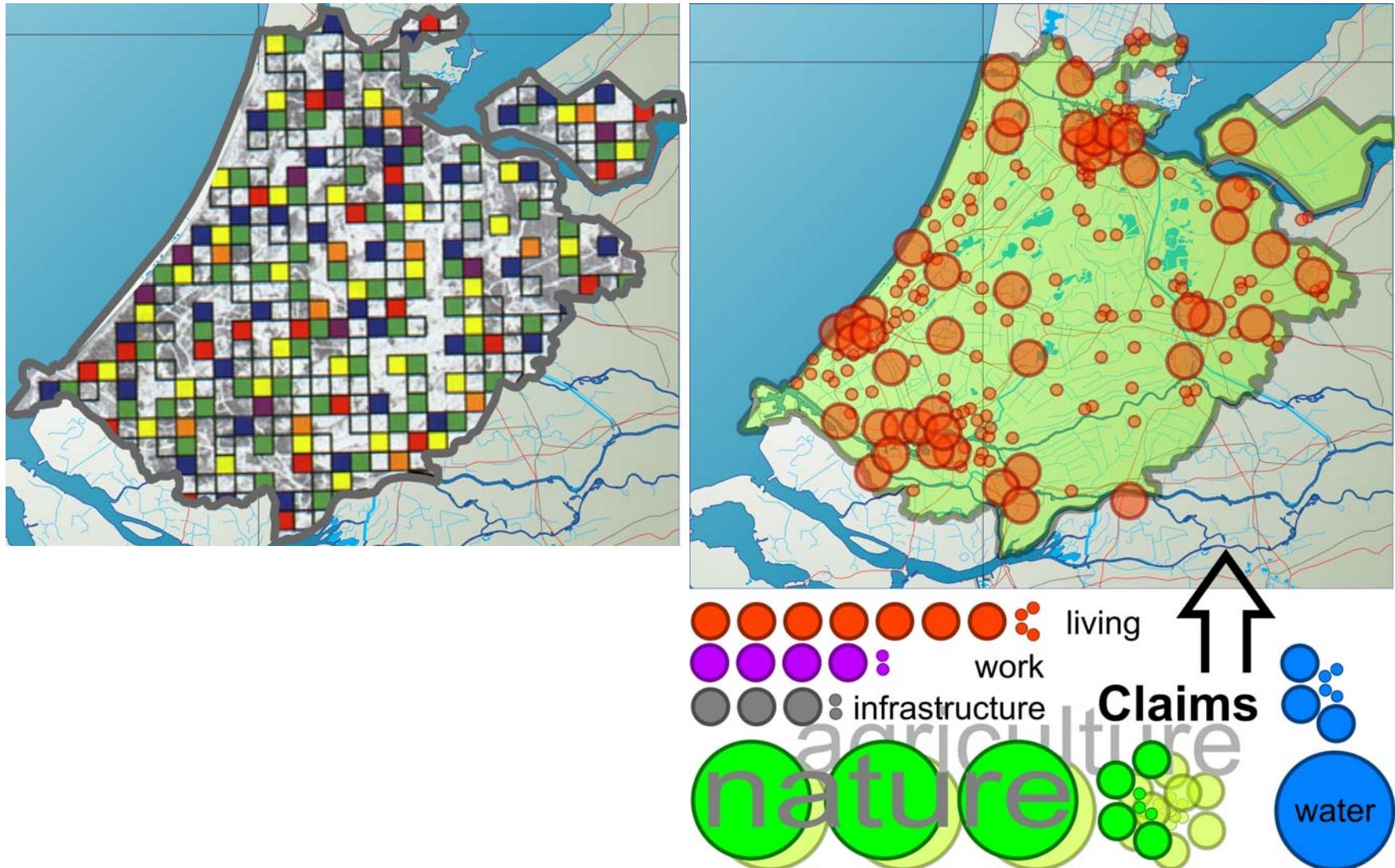


Fig. 106 Space demand suggested

Fig. 107 Claims to add in dots $r = \{1, 3, 10\text{km}\}$ p.168

landscape park

urban landscape

town park

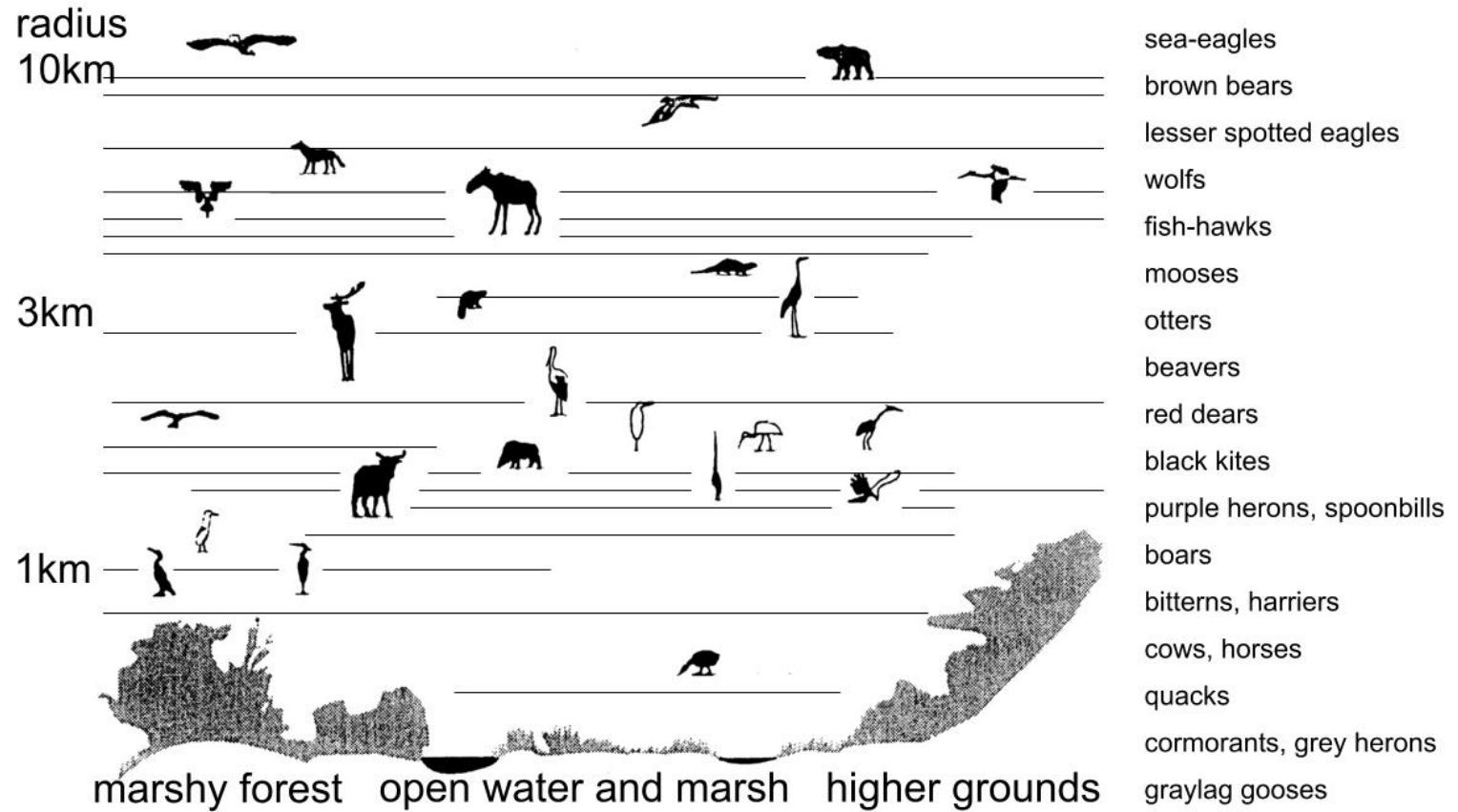


Fig. 108 Ecological advantages of cohesion(economies of scale) and ... p.169

landscape park

urban landscape

town park

district park

several
days
tours

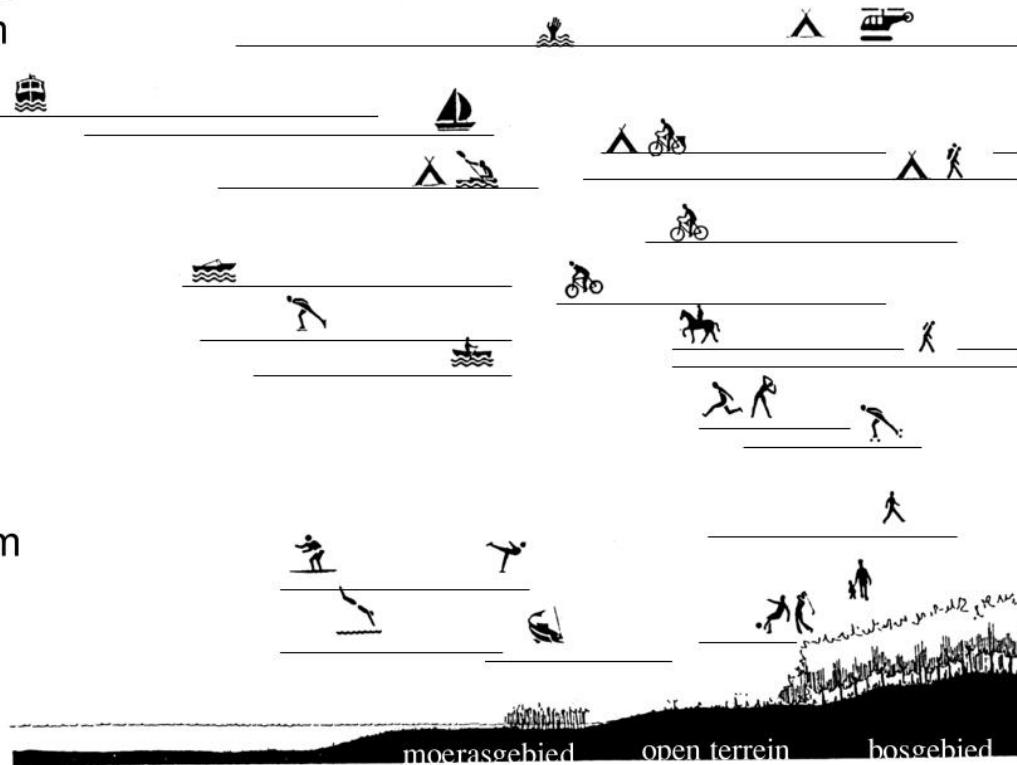
radius
10km

3km

1km

0.3km

day trips



- survival journey
- saloon yacht sailing voyage
- boat tour
- cycling tour
- walking tour
- rowing or canoeing tour
- cycling trip
- boat trip
- mountainbike cycling
- horse trip
- skating trip
- walking trip
- rowing or canoeing trip
- jogging
- rollerskating
- Sunday walk
- surfing, skating
- stroll
- sport and game
- swimming
- fishing, sunbathing
- paddling

... recreational opportunities differ per landscape and increase per radius p. 170

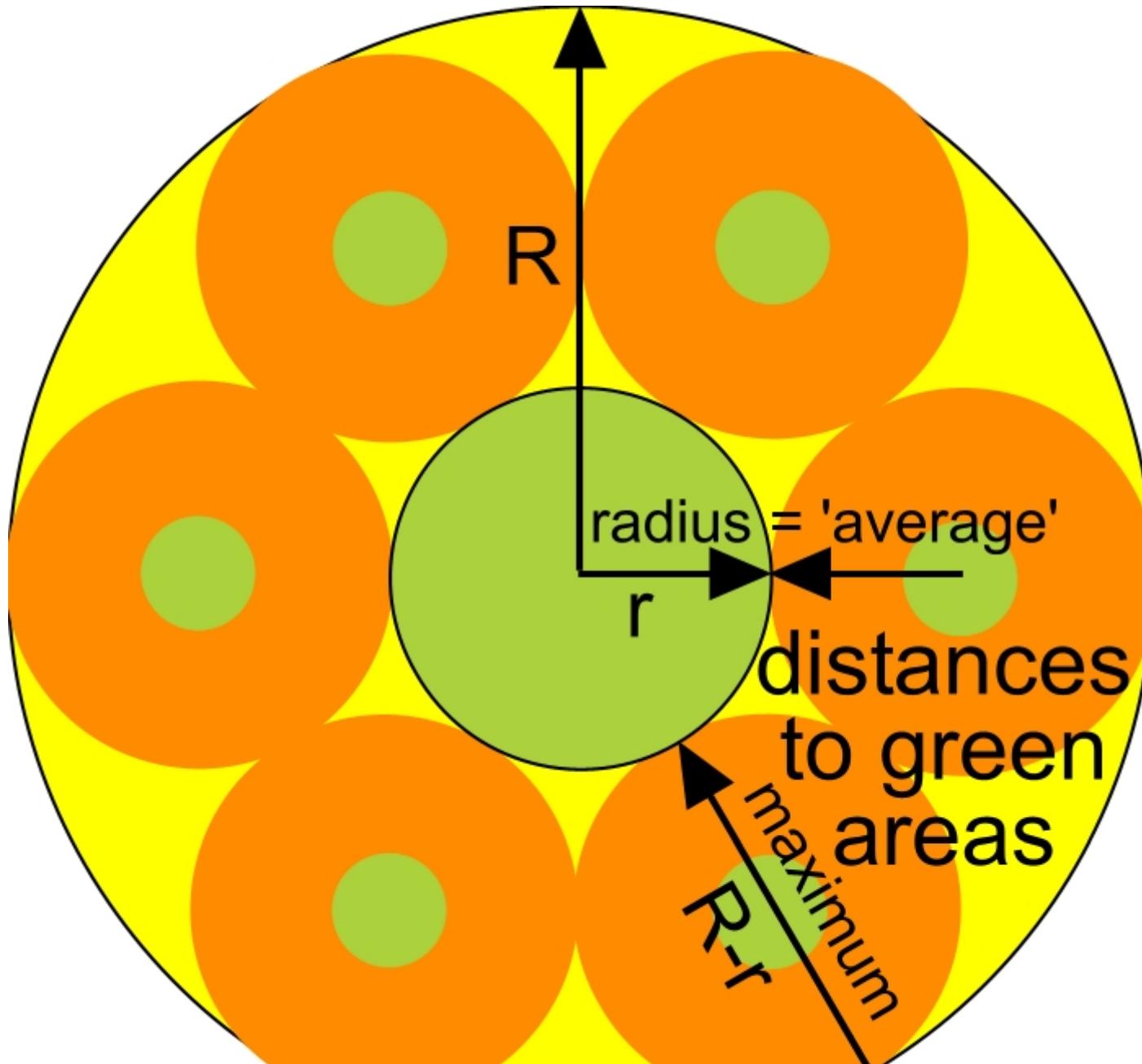


Fig. 109 Standard Green Structure p.170

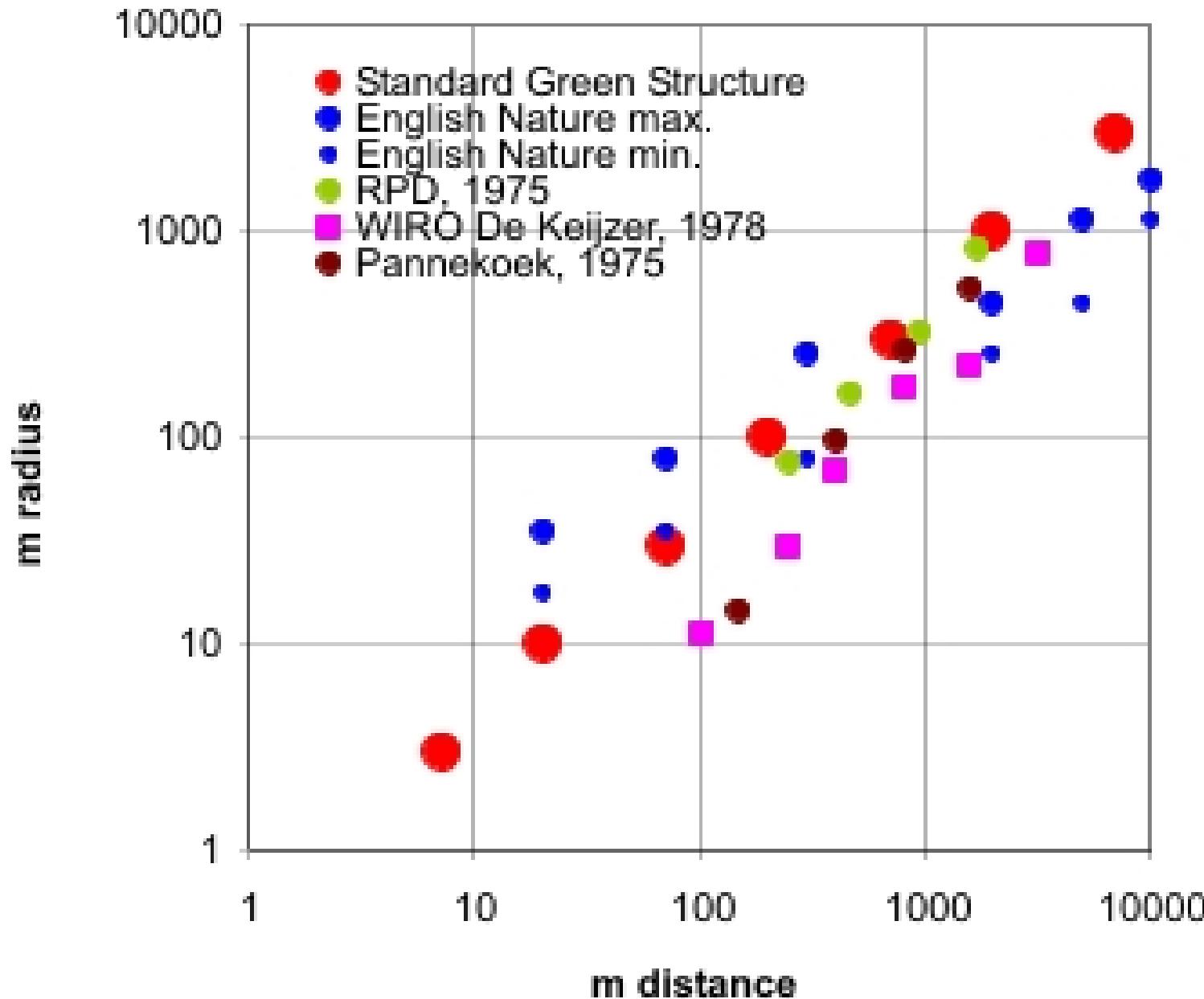


Fig. 110 Some standards for green area p.170

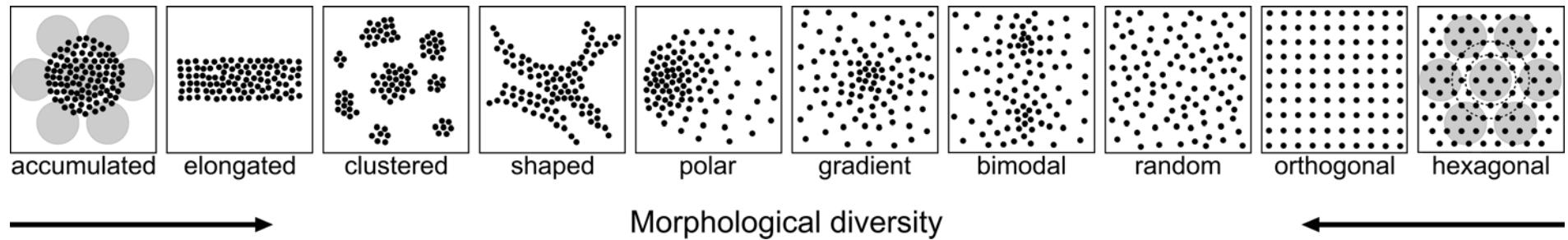


Fig. 111 Increasing and decreasing morphological diversity tentatively related to distribution p. 173

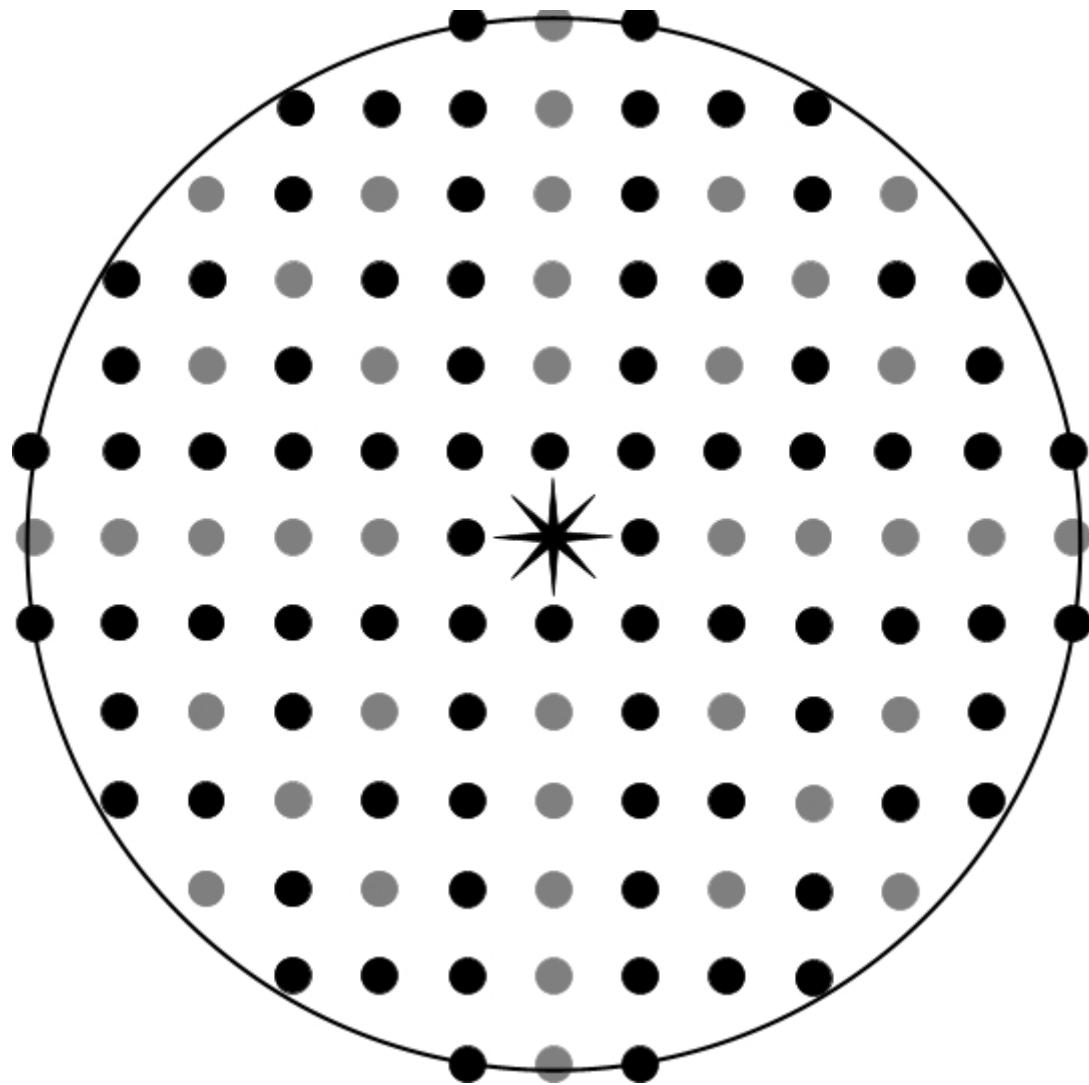


Fig. 112 Orthogonal: 120 dots, 80 (black) dots visible from the centre p. 173

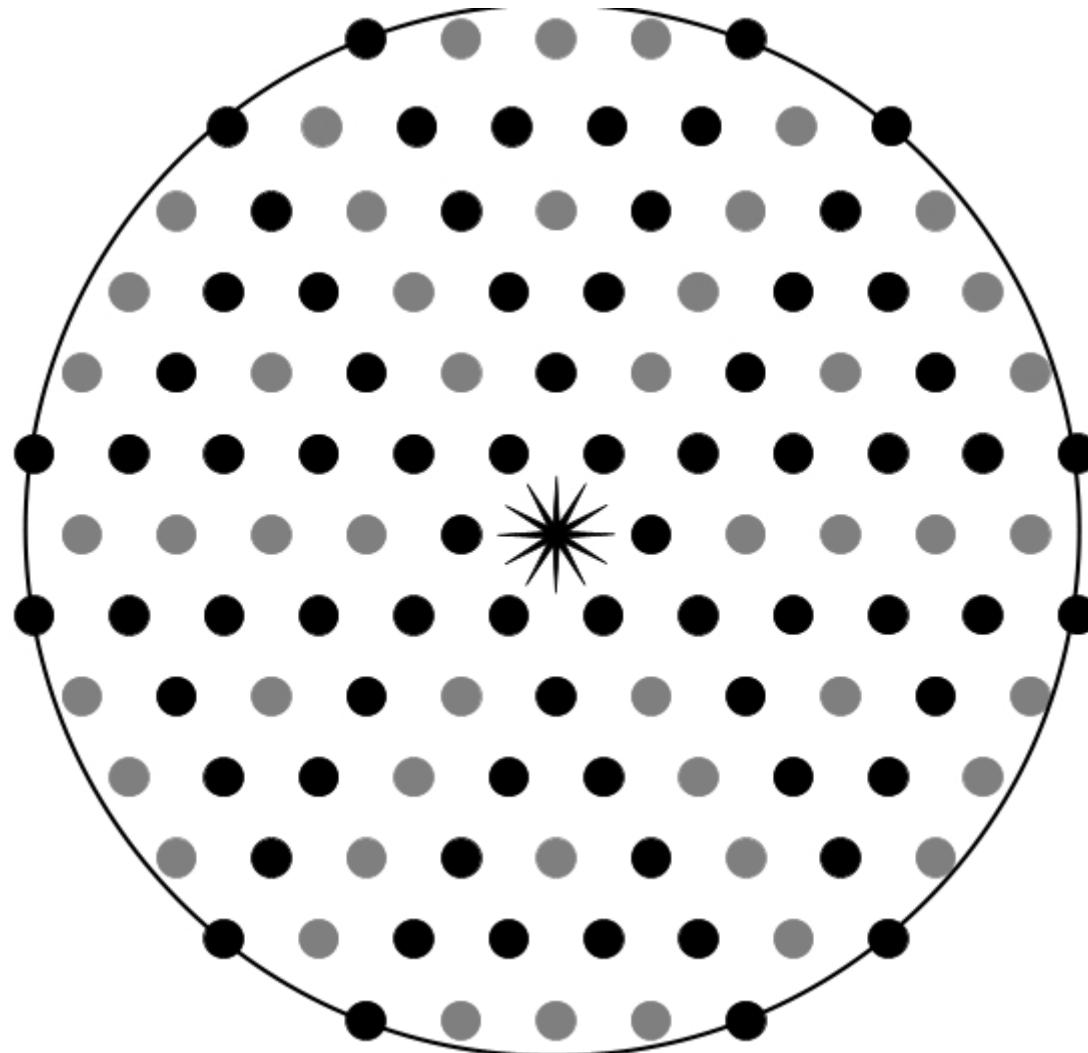


Fig. 113 Hexagonal: 120 dots, 72 (black) dots visible from the centre p. 173

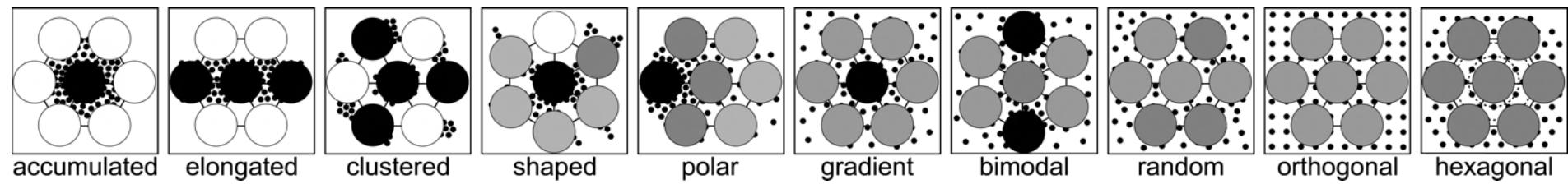


Fig. 114 Roughly quantifying form diversity, reduction into 6 components p.175

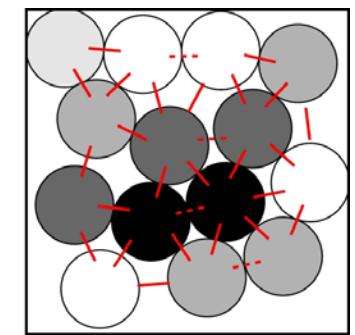
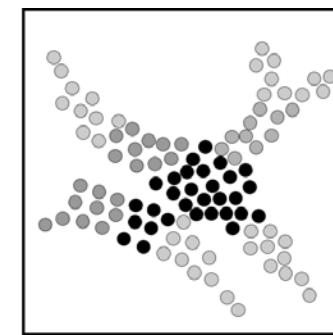
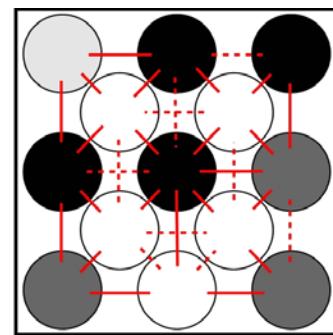
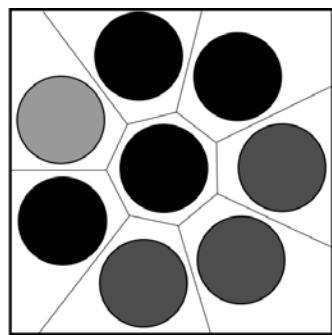
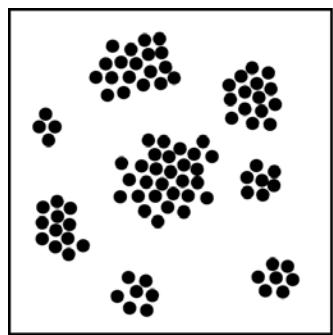


Fig. 115 More components 'clustered' and Fig. 116 'shaped' p.175

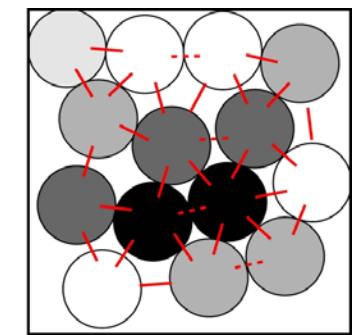
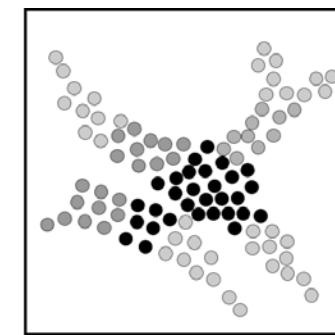
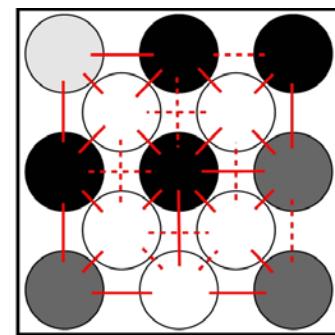
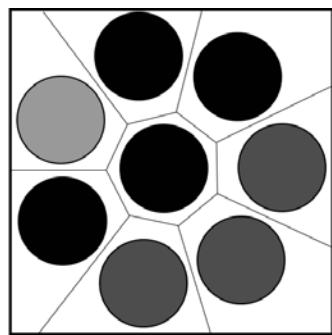
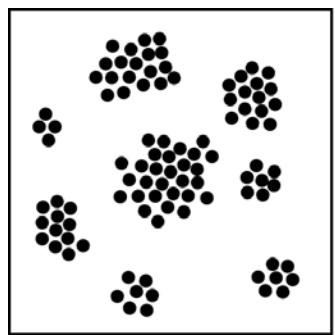


Fig. 115 More components 'clustered' and Fig. 116 'shaped' p.175

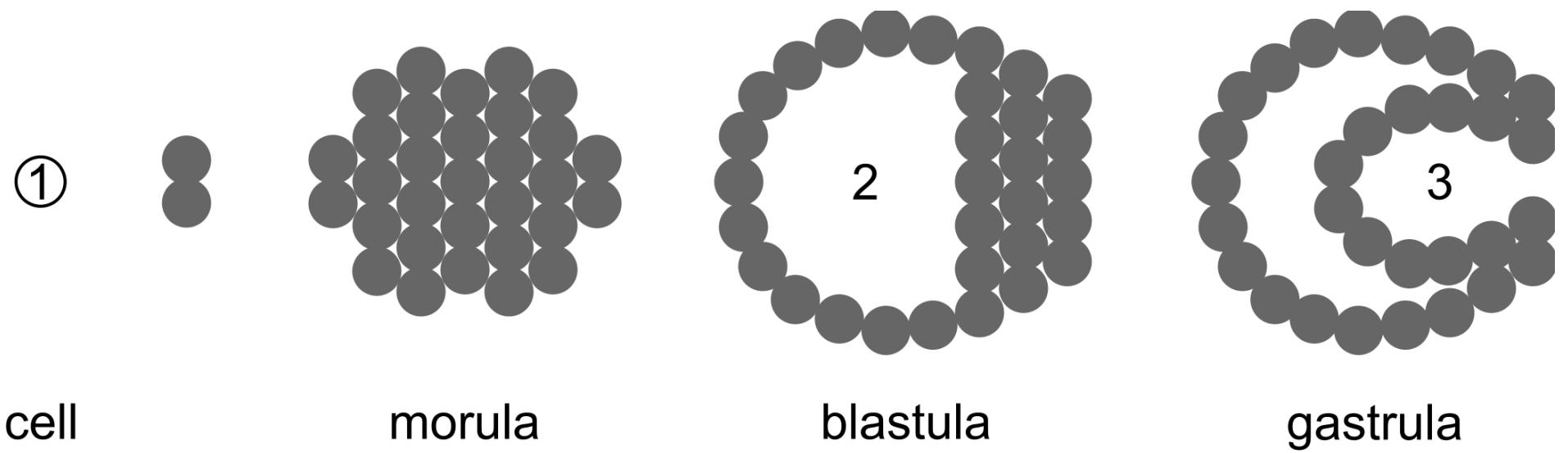


Fig. 117 $R=10\text{-}30\mu\text{m}$ Gastrulation producing 2nd and 3rd order interiors p.177



Fig. 118 R=100m Muiderslot p.177

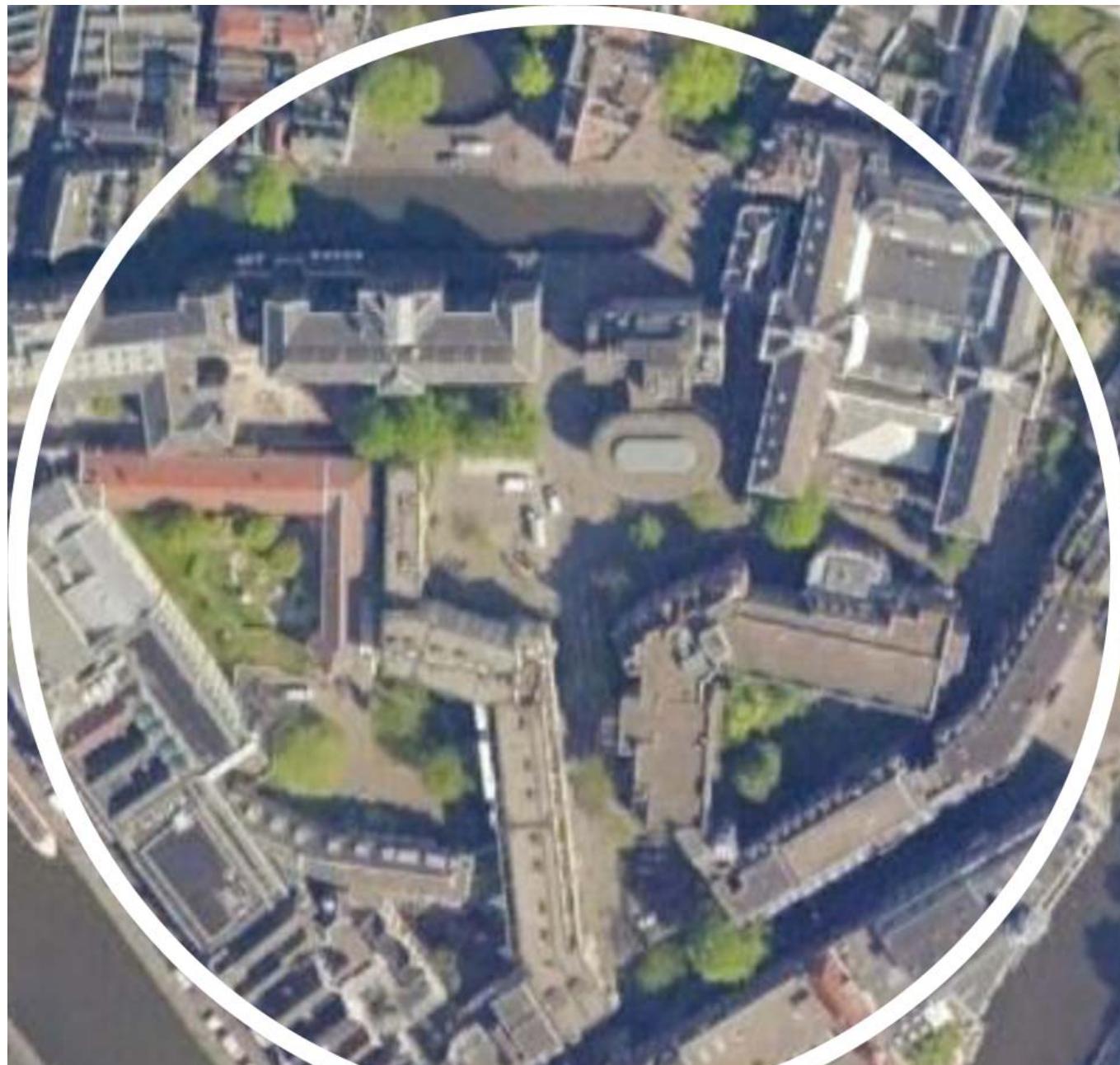


Fig. 119 R=100m Oudemanhuispoort, Amsterdam p.177

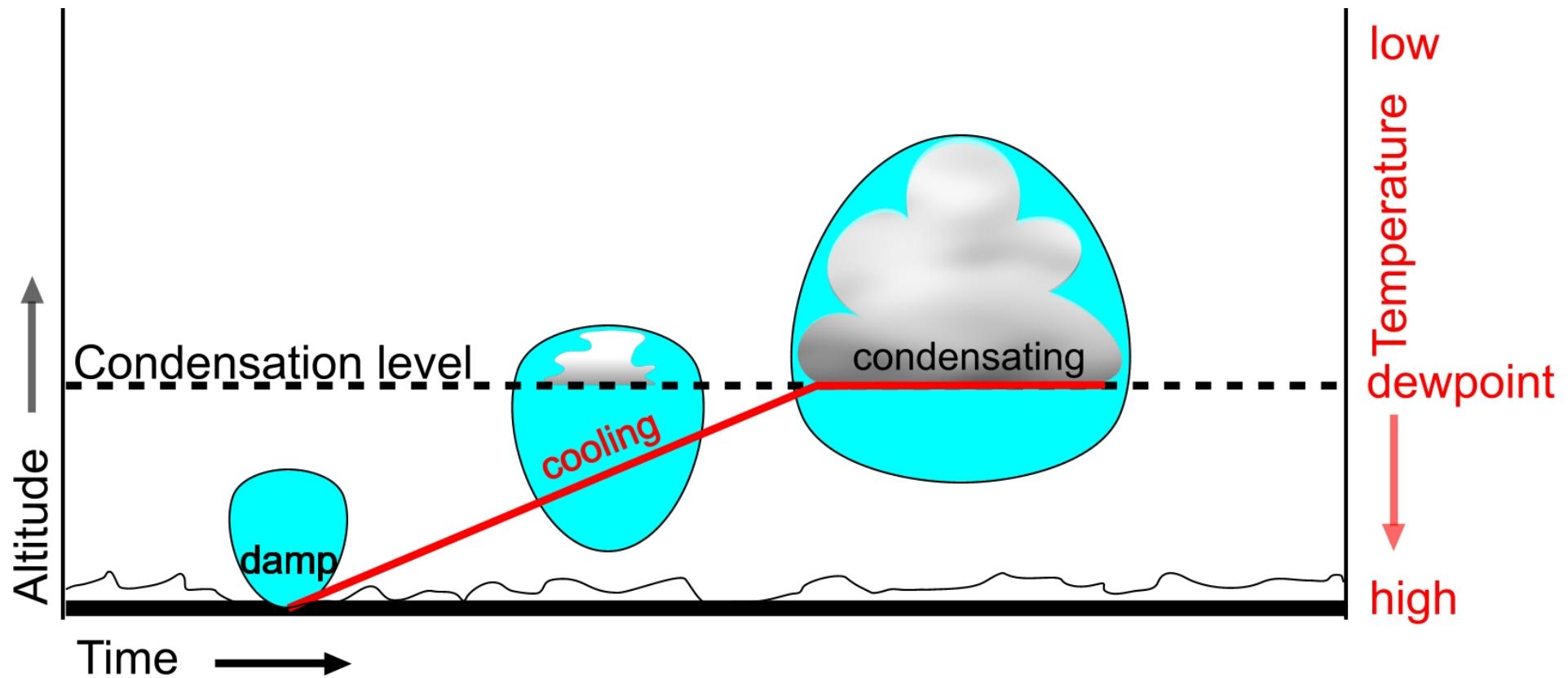


Fig. 120 The origin of a cloud p. 178

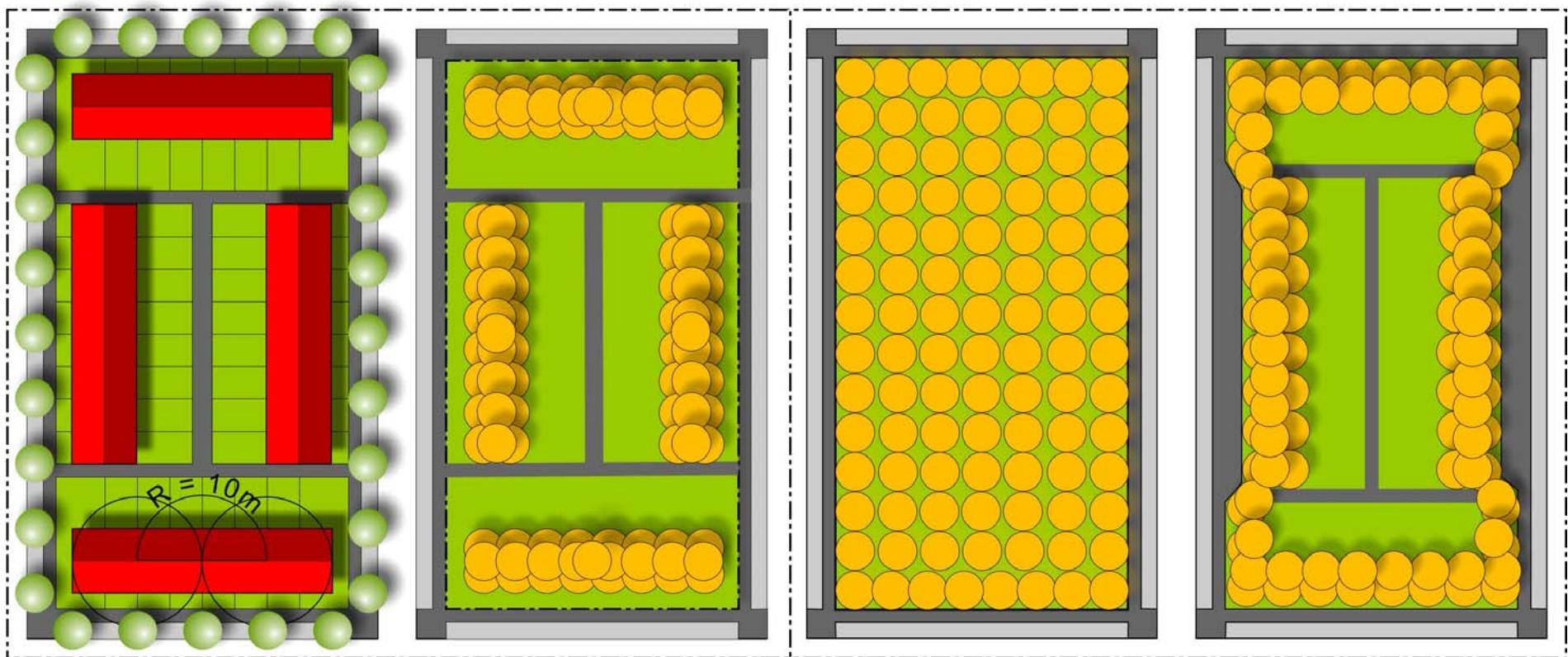


Fig. 121 $R=30m$ Floor space for 100 inhabitants in $30m^2$ circles $r = 3m$ p. 180



Fig. 122 Redistributions for 200 inhabitants at equal density (red ~ more floors)
p.180

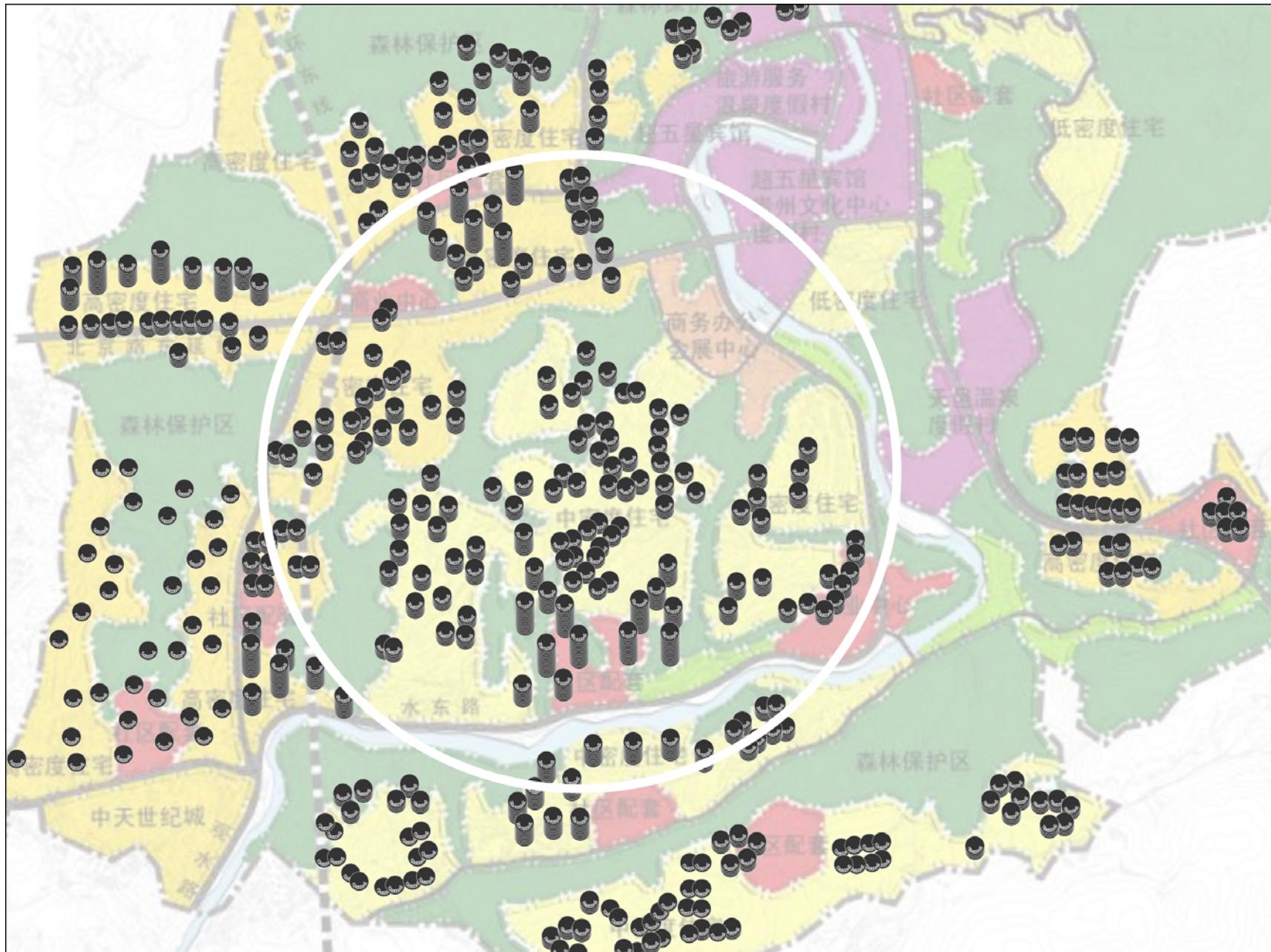


Fig. 123 R=1km Analysis of the Master-plan p. 181

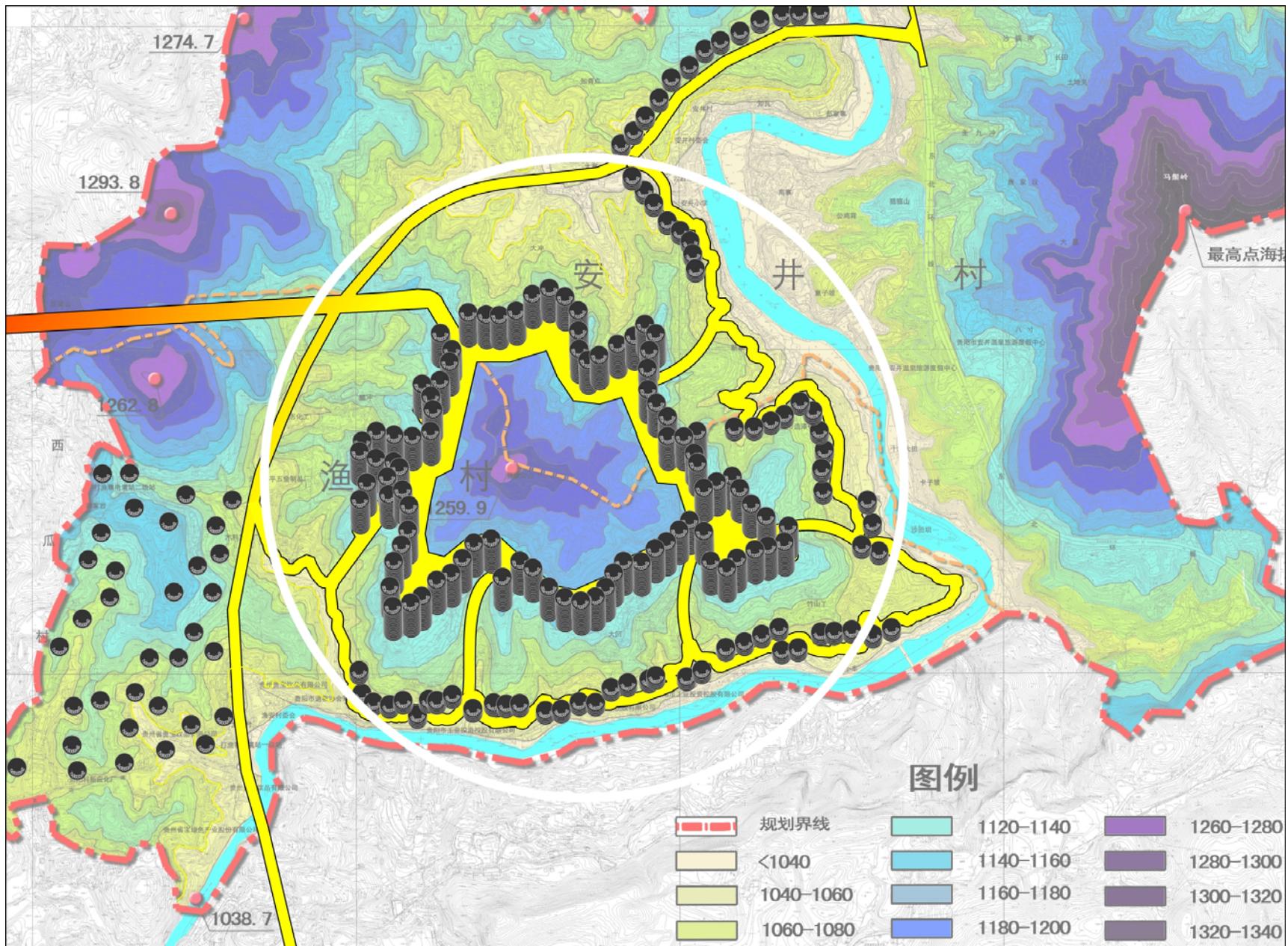


Fig. 124 $R=1\text{km}$ Redistribution around the central hill p.181

Trinomial locations = built + pavement + green

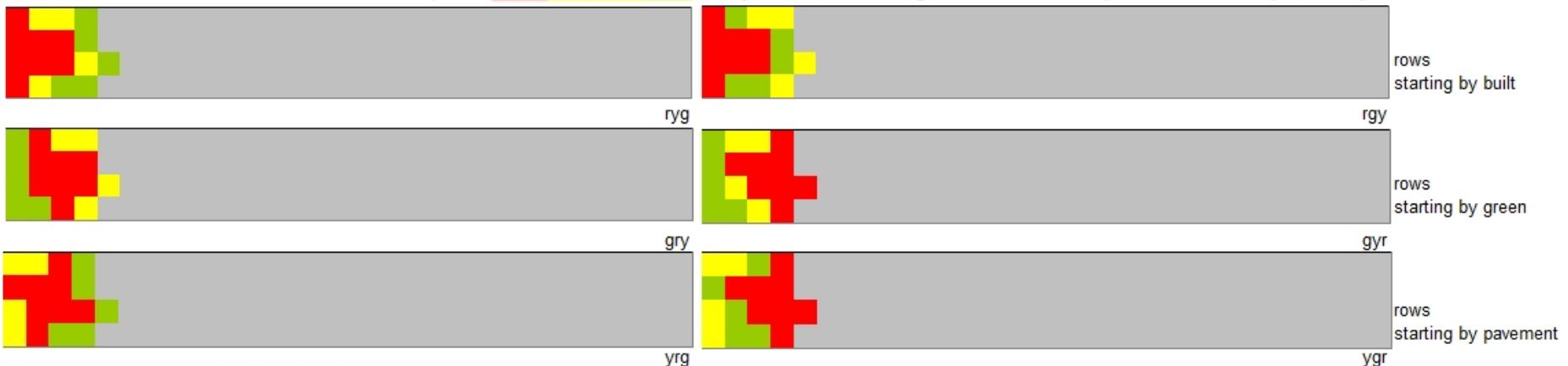
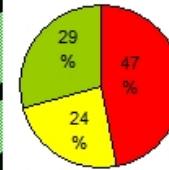
$$\text{possibilities} := \frac{\text{locations}!}{\text{built!} \cdot \text{pavement!} \cdot \text{green!}}$$

number of possibilities

$3063060 \approx 10^6$

Programme	built	pavement	green	locations
random division	1	2	1	4
over 4 rows	3	0	1	4
with adjacent colours	3	1	1	5
per row	1	1	2	4

Inspiration by accident



Adjacency reduces the number of possibilities.

The form changes also, but for any form the same number of possibilities applies.
So, the number of possibilities is again multiplied by the number of possible forms.

Fig. 125 Some examples of three quantified colours distributed of over 17 locationsa p.182

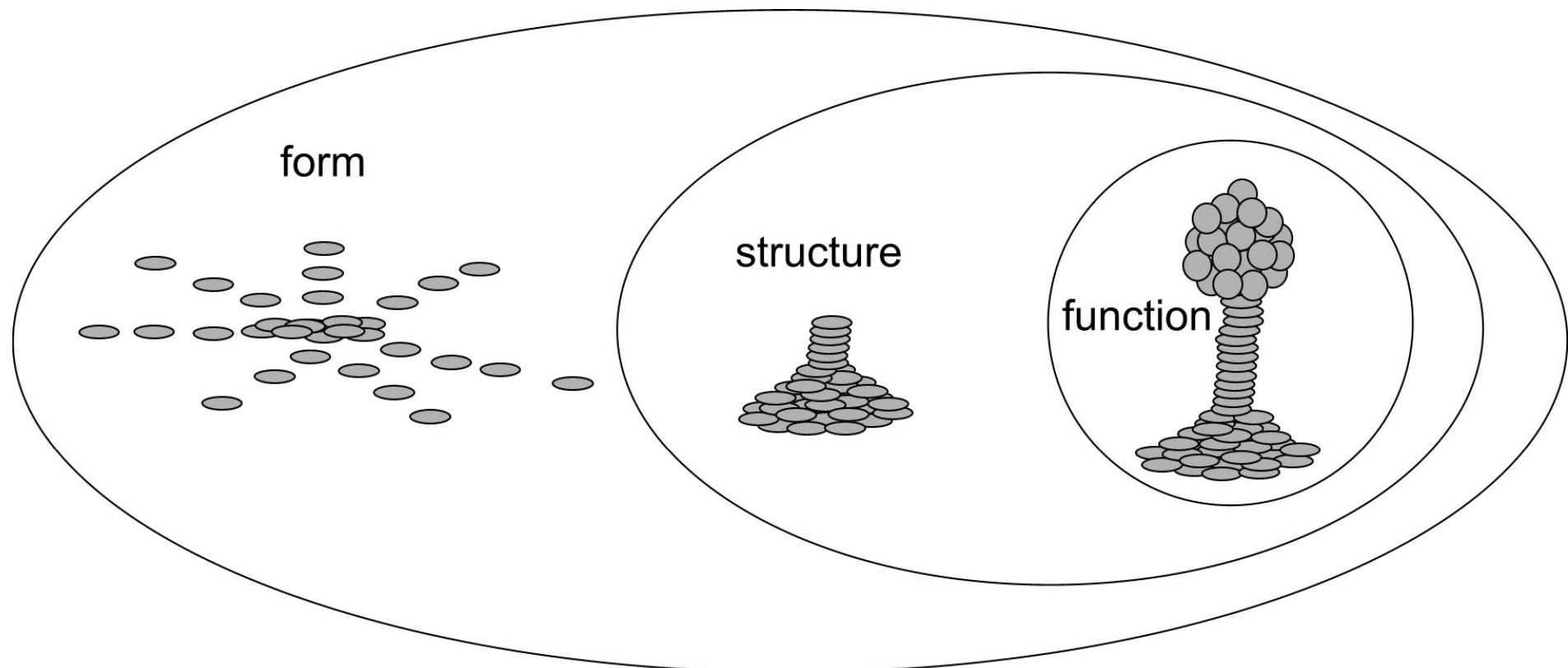


Fig. 126 The sequence of form, structure, function in the development of *Dictyostelium discoideum* $R = 100 \text{ mm}$ (the approximately 100 000 cells are depicted too large) p. 184

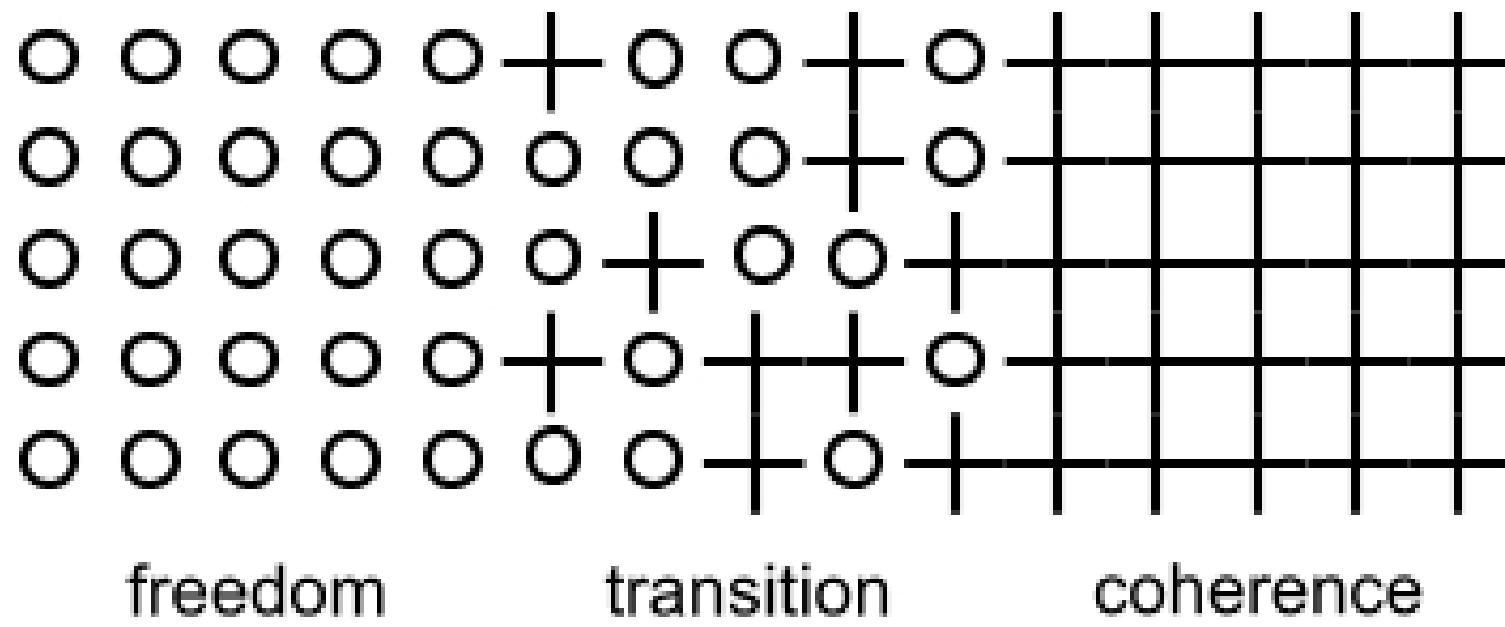
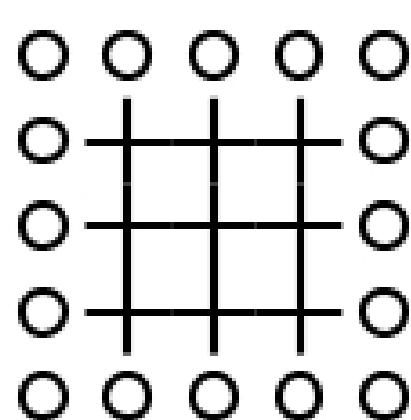


Fig. 127 Variable coherence p.184

isolation

body

cavity



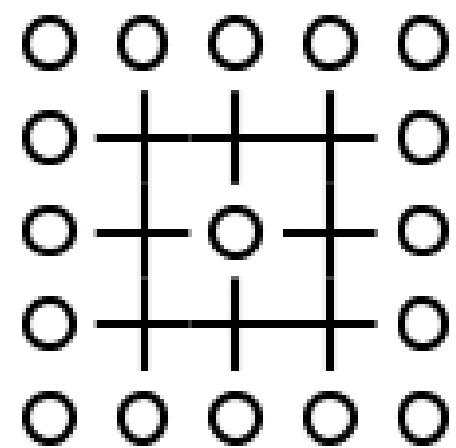
freedom

outside

inside

Fig. 128 Isolation p.184

enclosure



inclusion

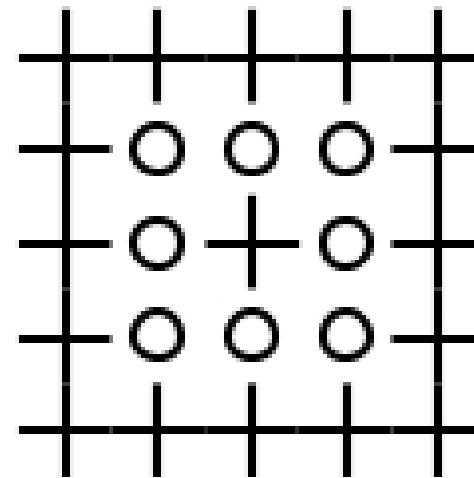
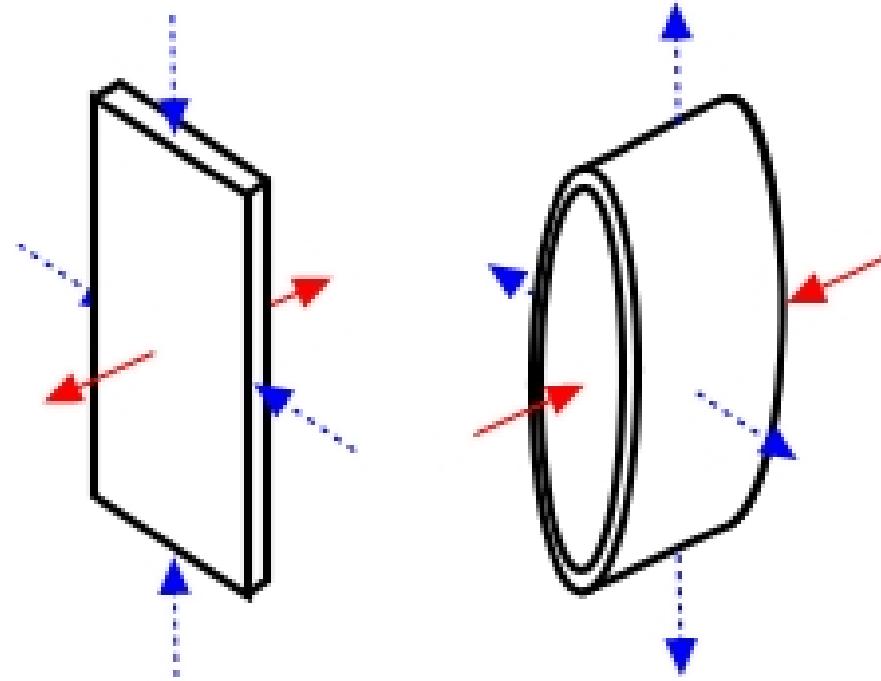


Fig. 129 Enclosure p.184

dynamic



wall

>coherence<

perpendicular

to dynamic

<separation>

tube

<separation>

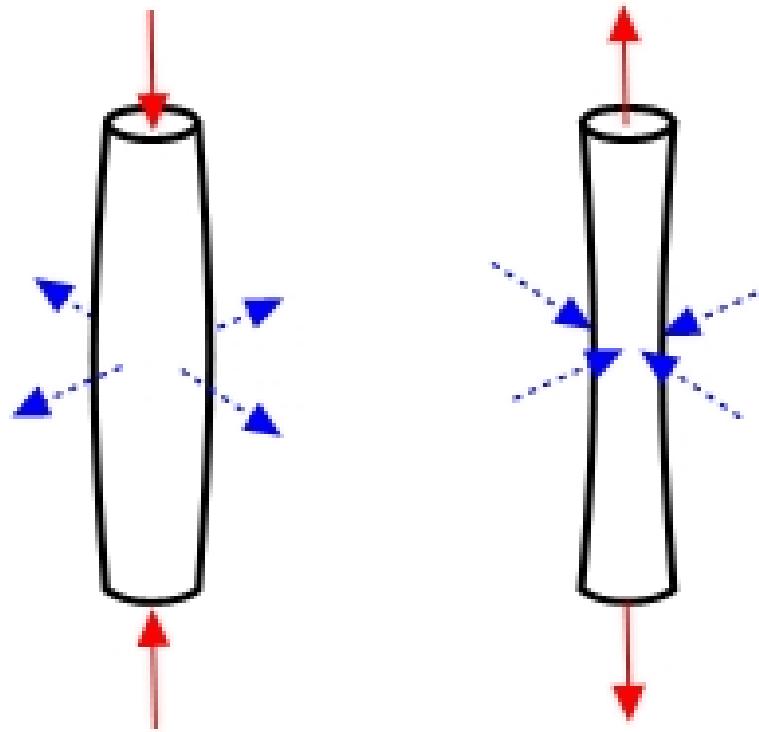
perpendicular

to dynamic

>connection<

Fig. 130 Dynamic connection and separation p.185

static



column

<strain>

perpendicular

to static press

>separation<

stave

>tightening<

perpendicular

to static tension

<connection>

Fig. 131 Static separation and connection p. 185

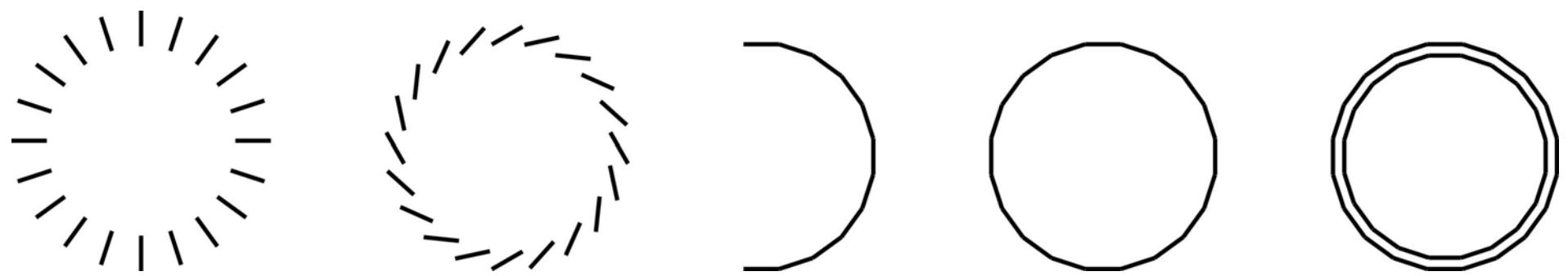


Fig. 132 Enclosure from open into more closed p. 186

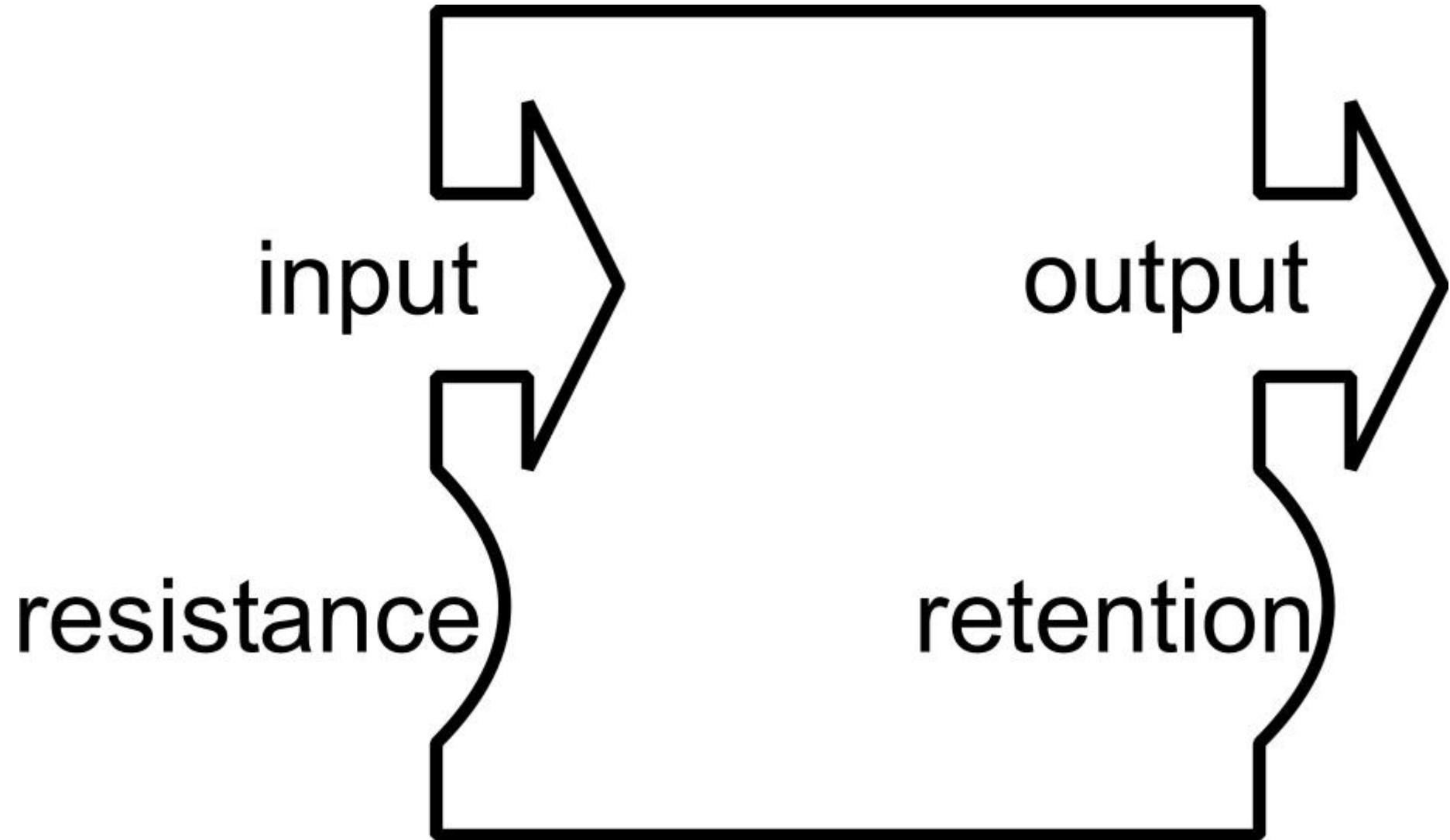


Fig. 133 Eco-device p. 186

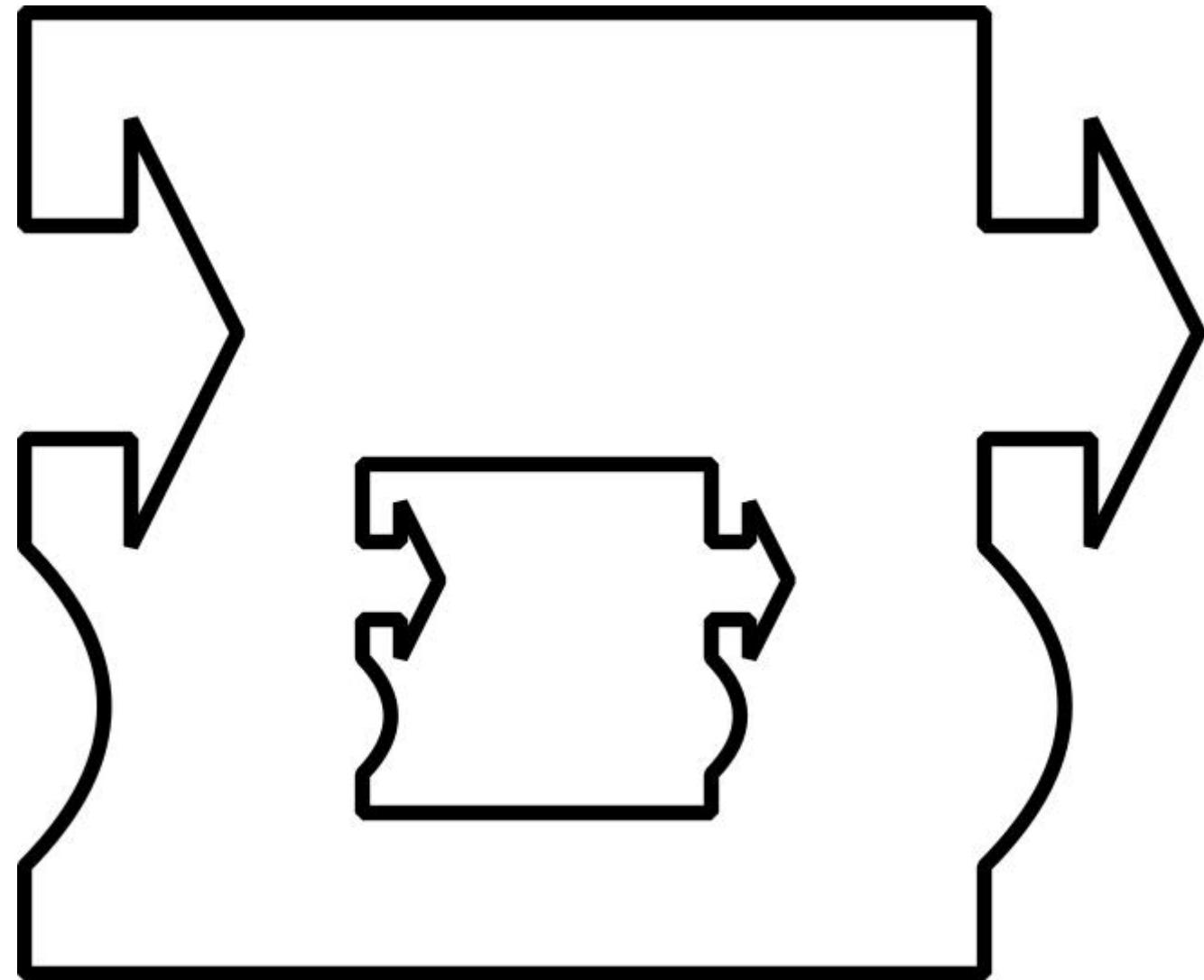
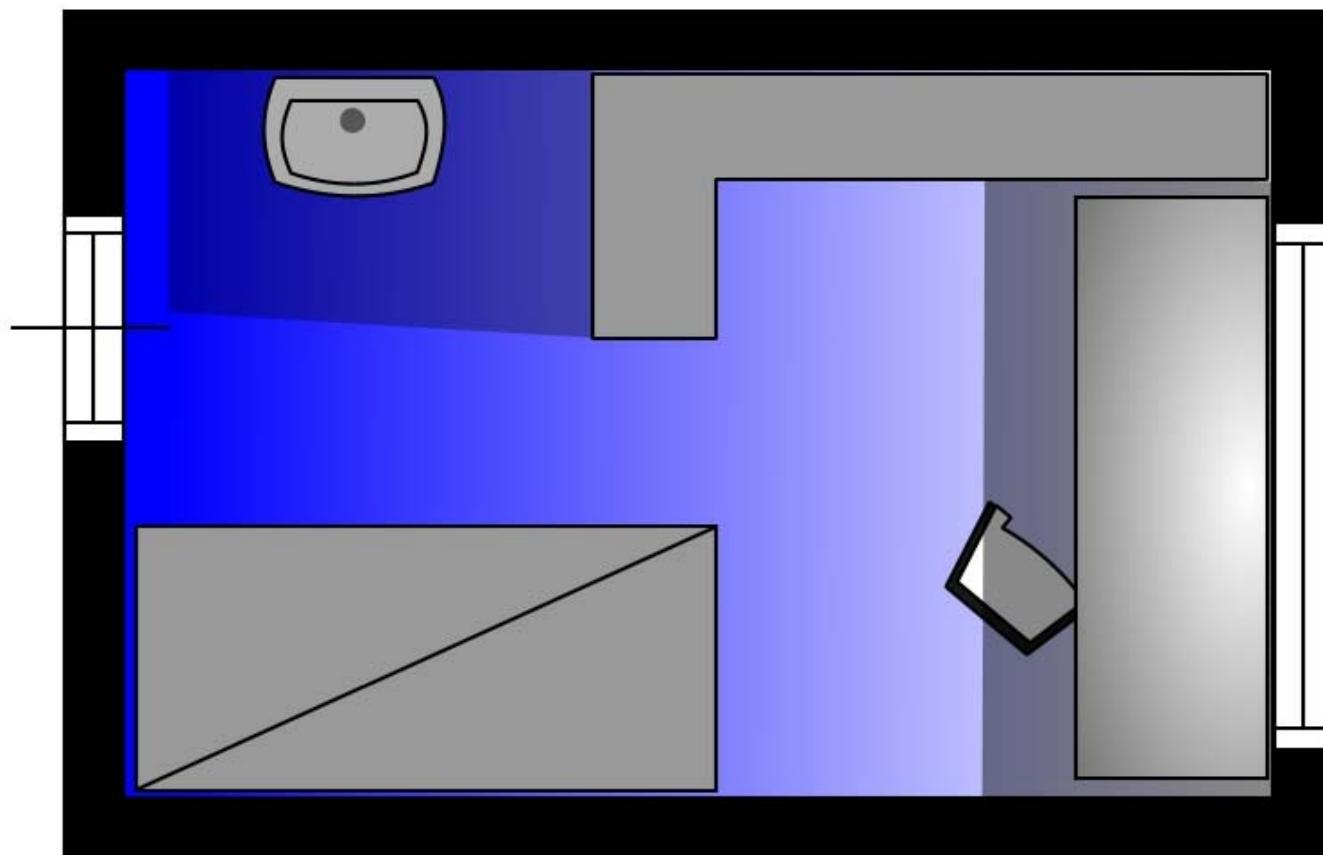


Fig. 134 Enclosing and enclosed eco-device p. 186



Fig. 135 P_{1m} p.188



3m sensoric →

Fig. 136 P_{3m} (sensoric) p. 188

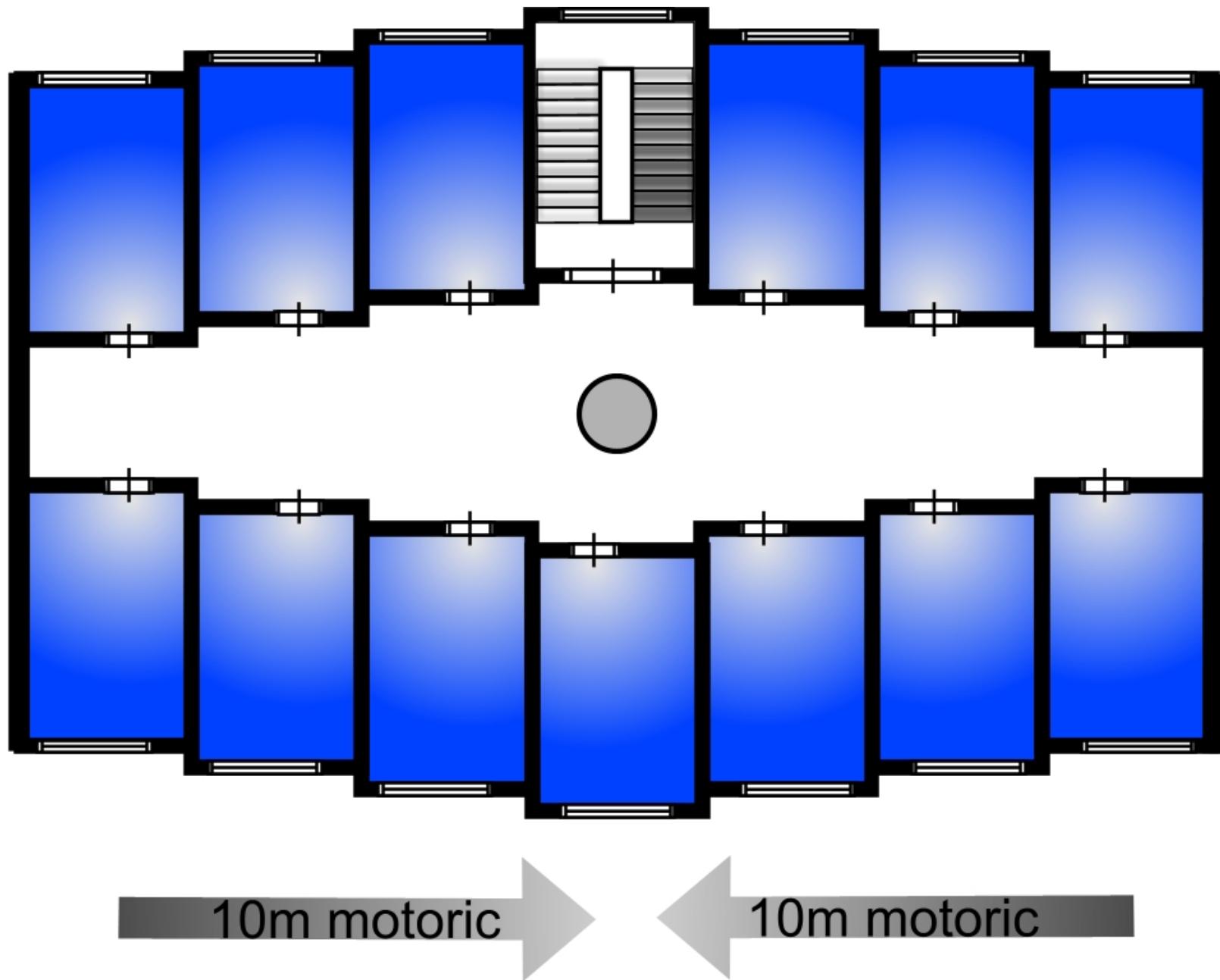


Fig. 137 P_{10m} (motoric) p. 188

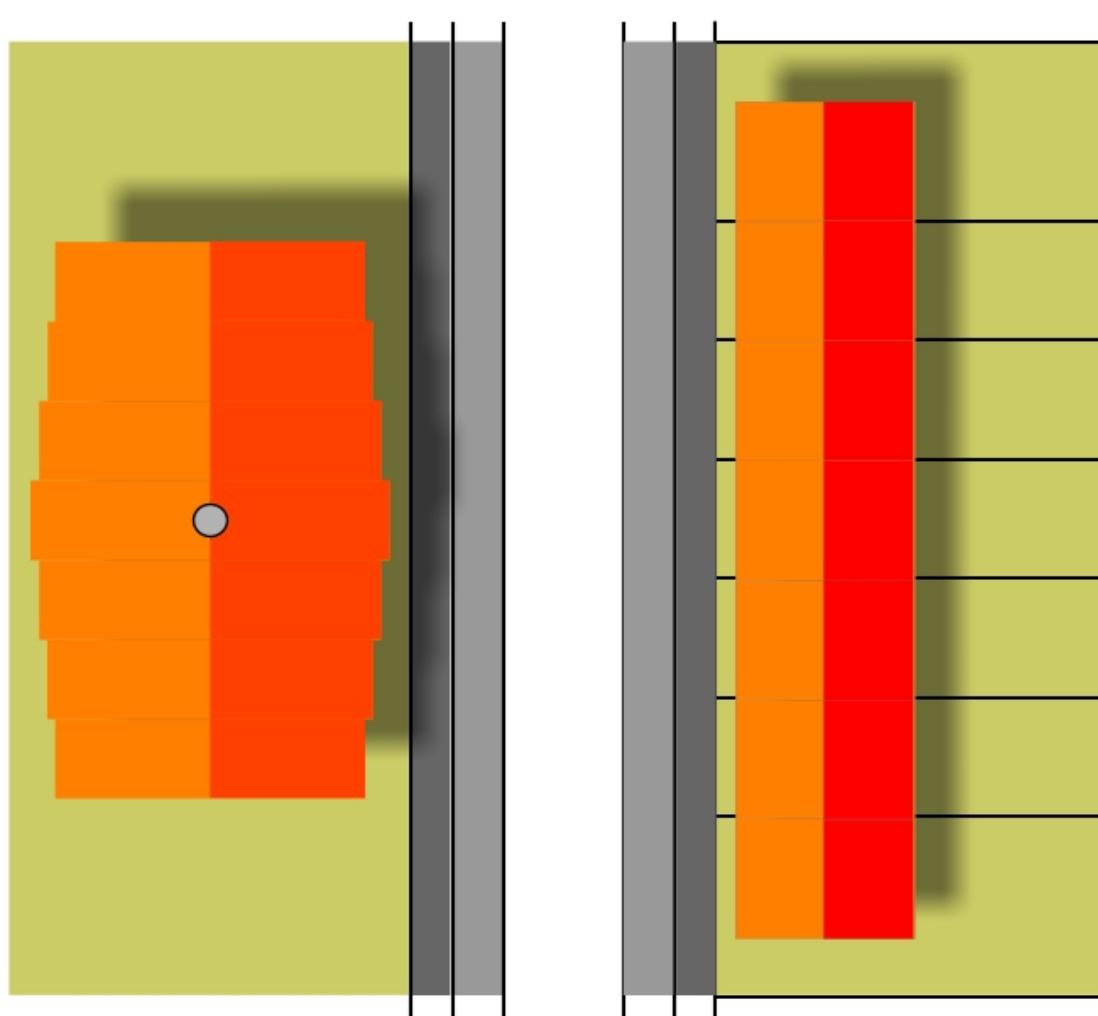


Fig. 138 P_{30m} (private-public) p. 188

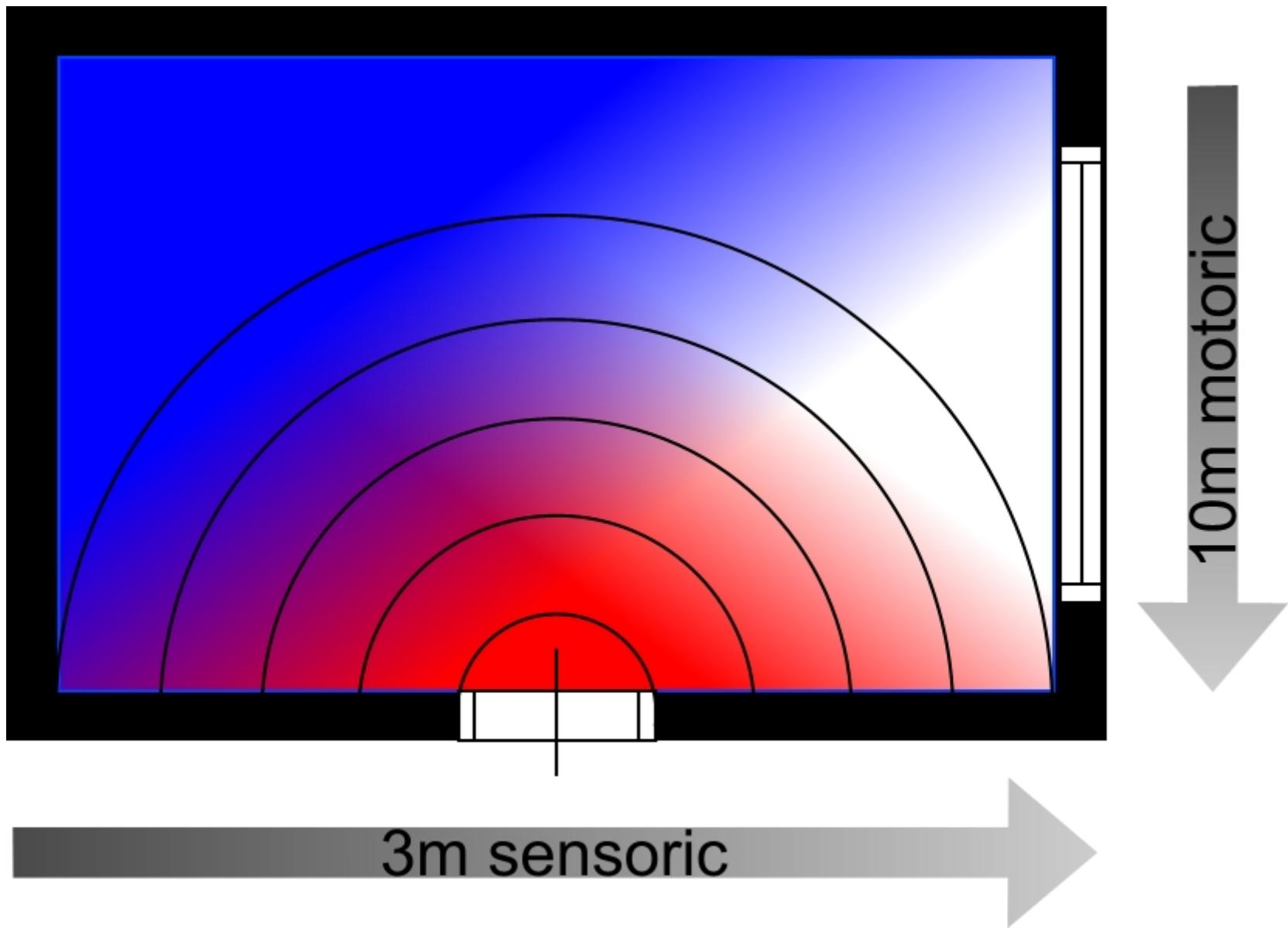


Fig. 139 Orthopolar $R = 3m$ p. 189

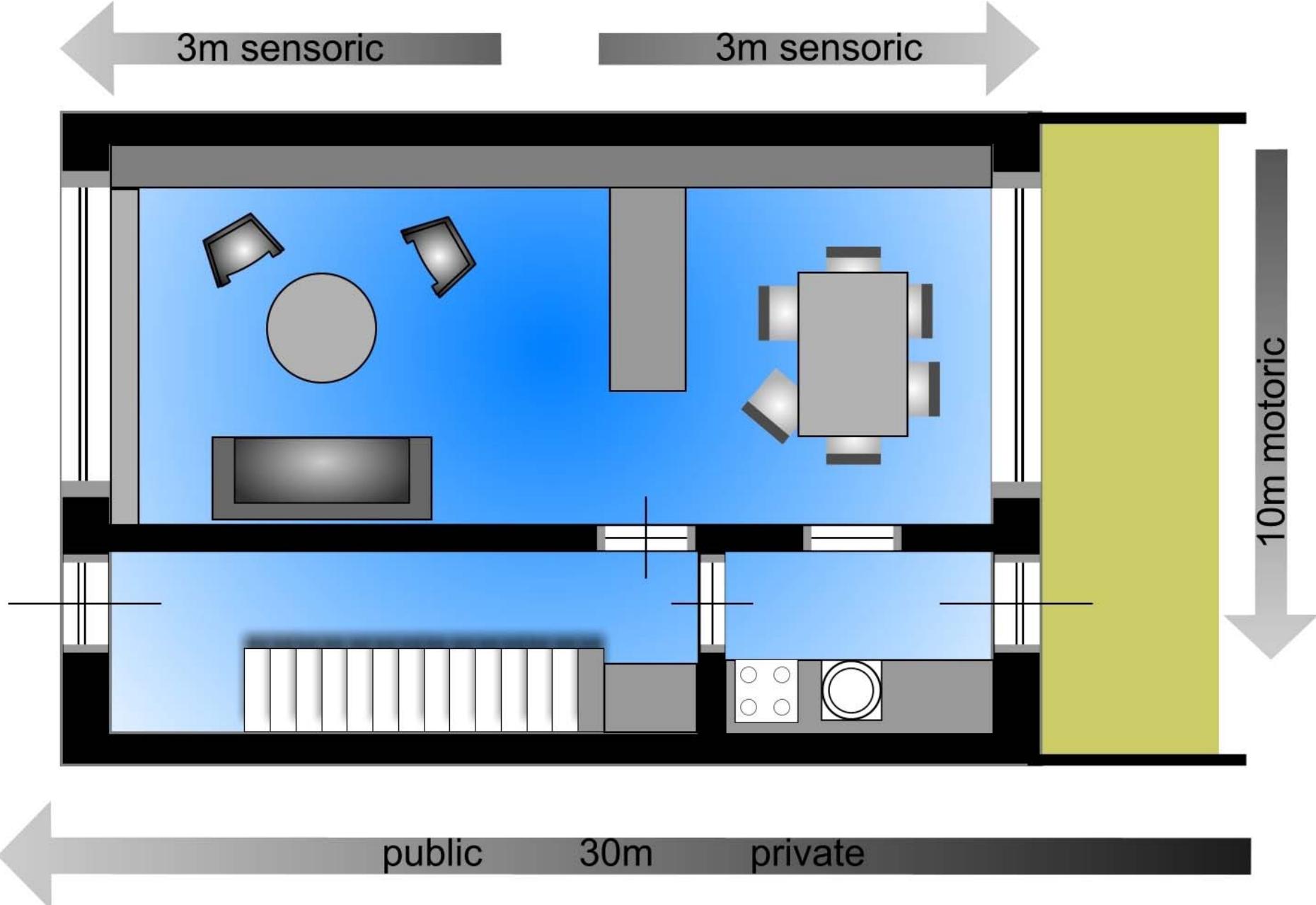


Fig. 140 Orthopolar $R = 10m$ p.189

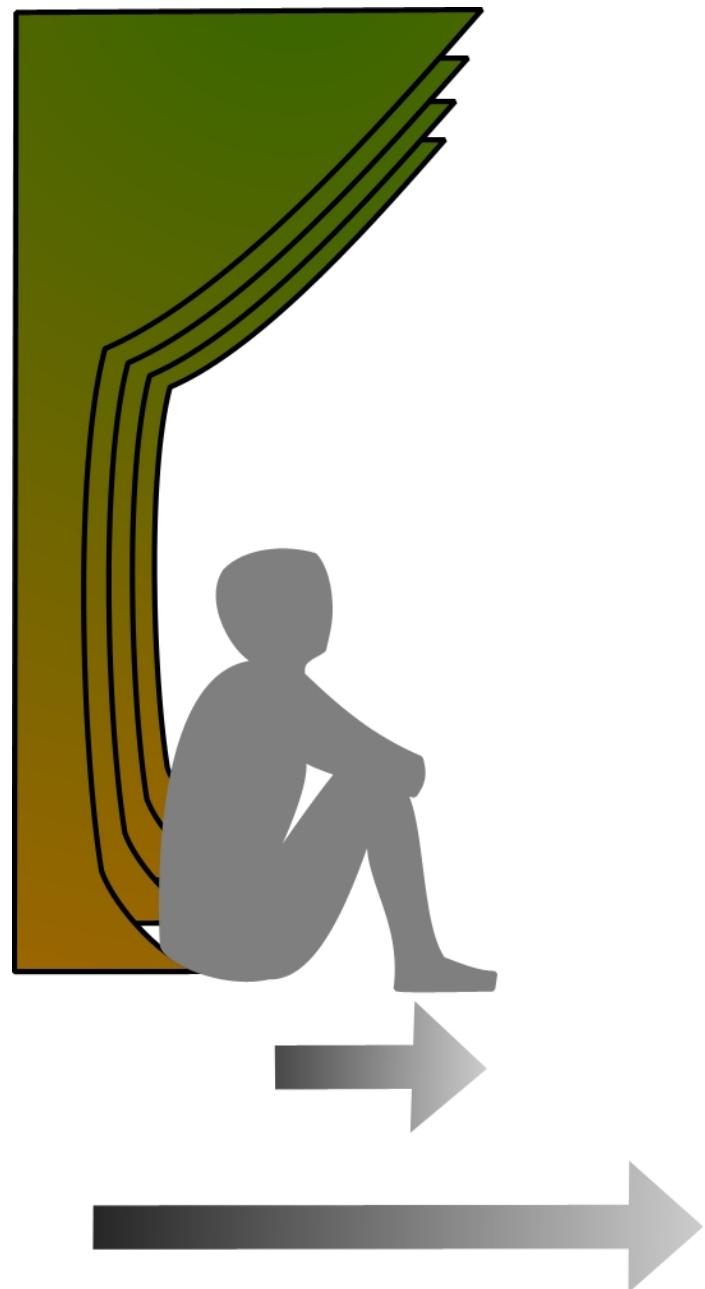


Fig. 141 Synpolar p.190



Fig. 142 Counterpolar p.190

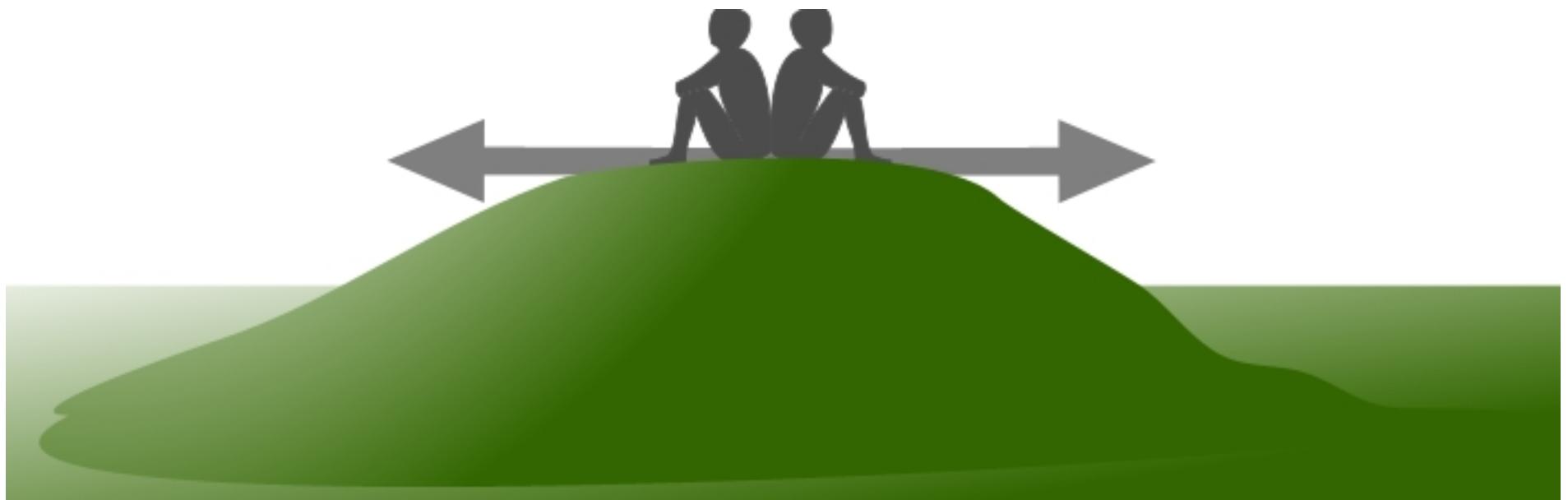


Fig. 143 Divergent p.190

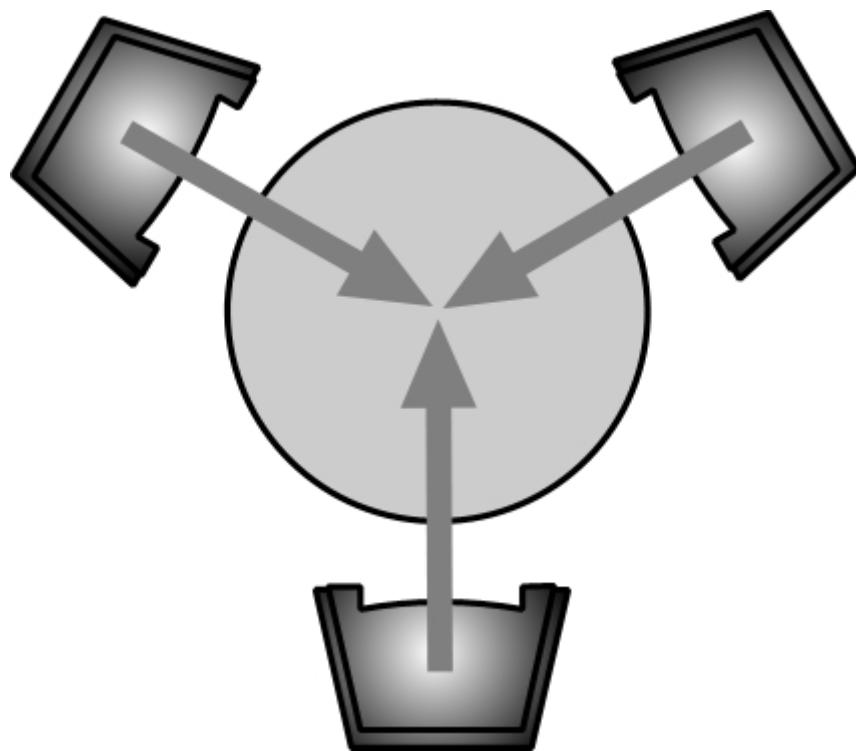


Fig. 144 Convergent p. 190

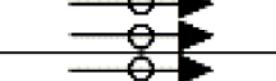
Polarities	Name	#radiuses	#locations	#directions
Combinations of polarities at one location				
	synpolar	> 2	> 1	> 1
	counterpolar	> 2	> 1	> 2
	orthopolar	≥ 2	≥ 1	≥ 2
	divergent	≥ 1	≥ 1	≥ 2
Arrangements of polarities at different locations				
	convergent	≥ 1	> 2	≥ 2
	consecutive	≥ 1	> 2	≥ 1
	parallel	≥ 1	≥ 2	≥ 1
	counterparallel	≥ 1	≥ 2	≥ 1

Fig. 145 Kinds of polarities p.190

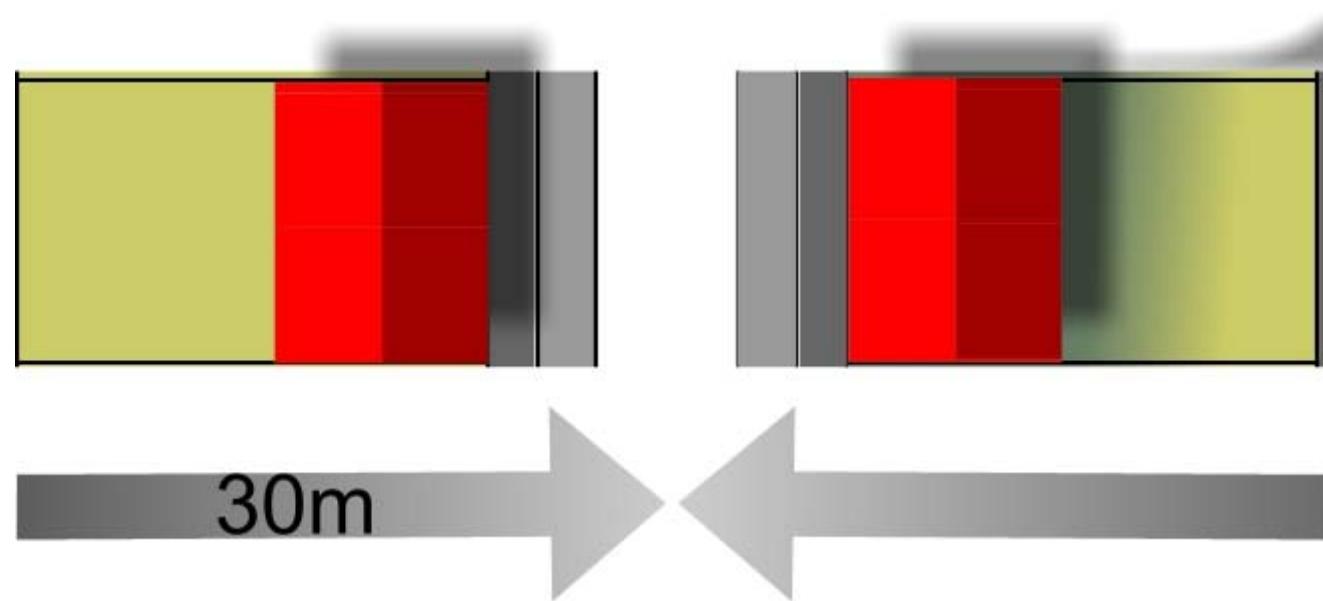


Fig. 146 Opposite convergent p.191

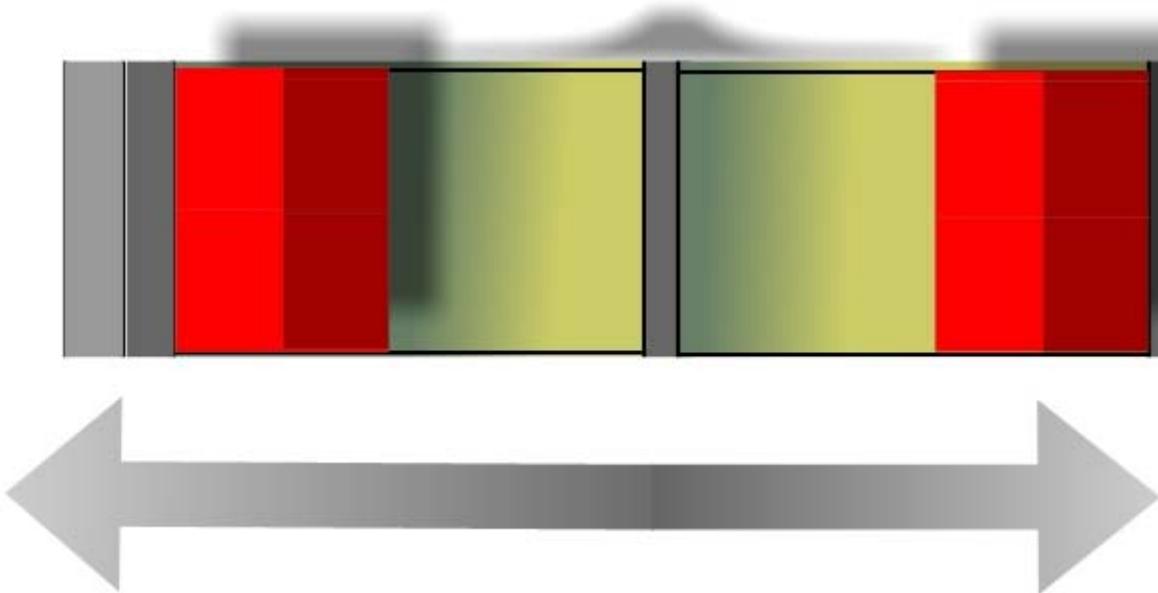
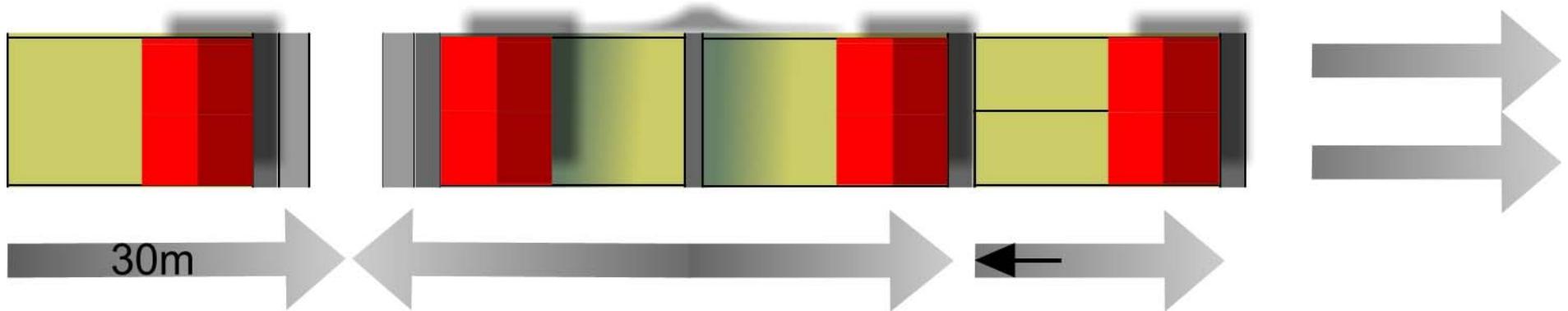


Fig. 146 Opposite divergent p.191



*Fig. 146 Opposite convergent, divergent Fig. 147 Consecutive Fig. 148 Parallel
p.191*

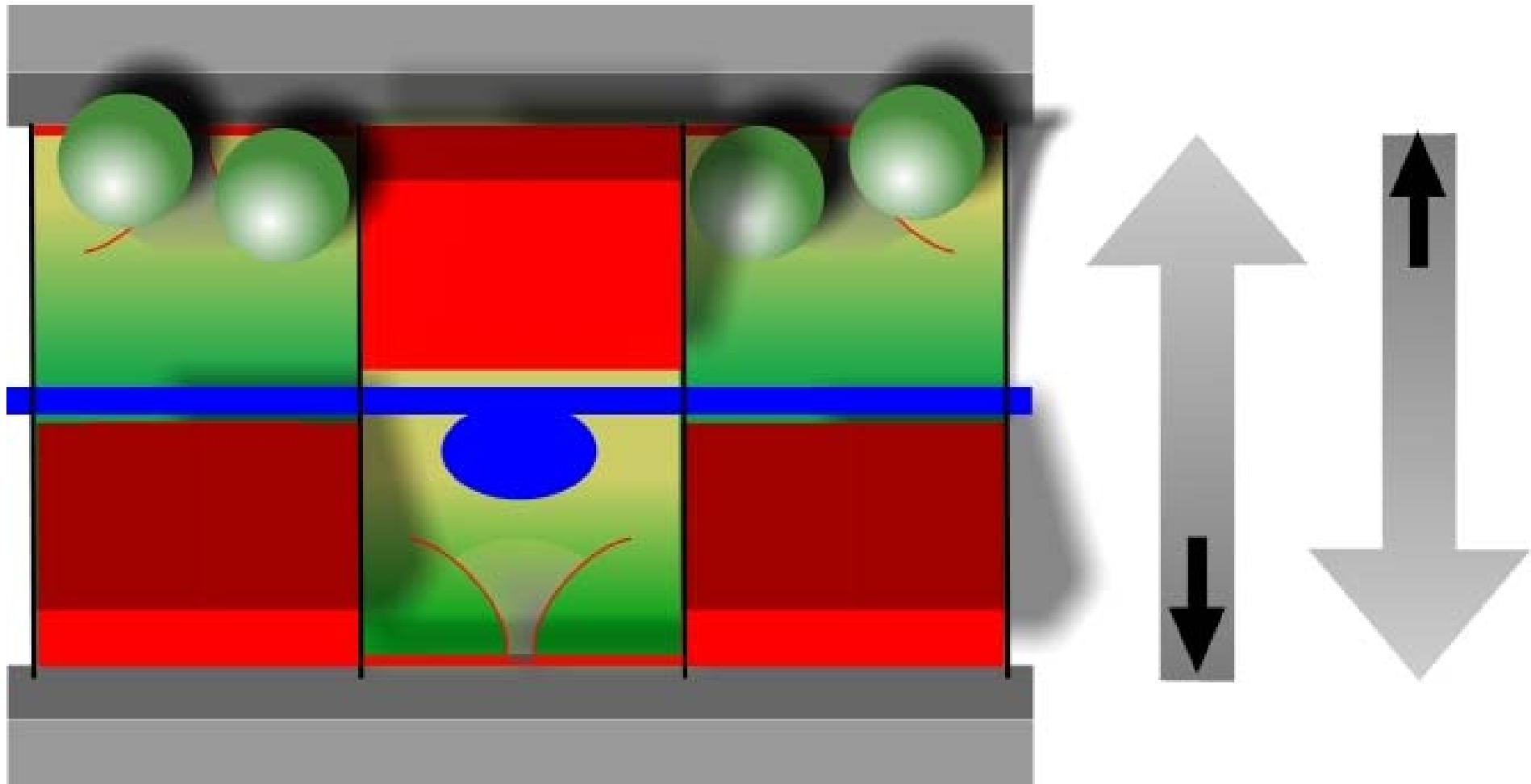
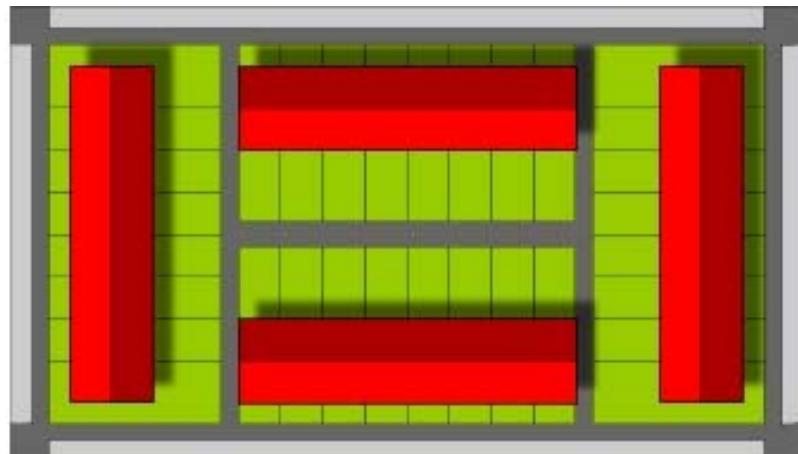
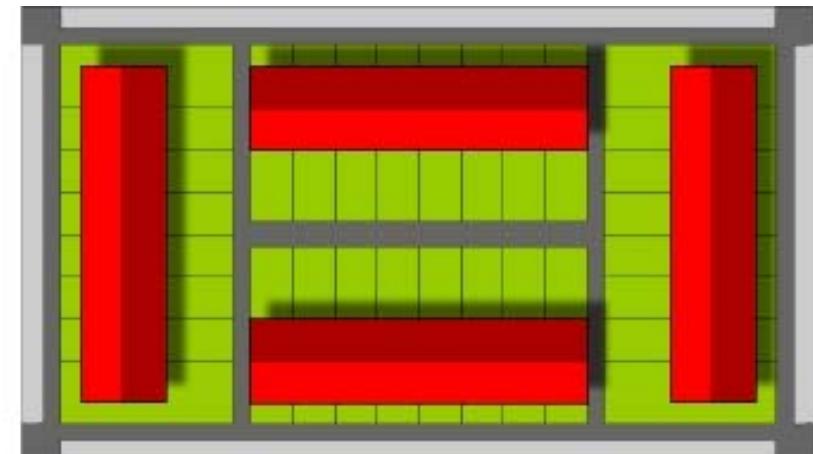


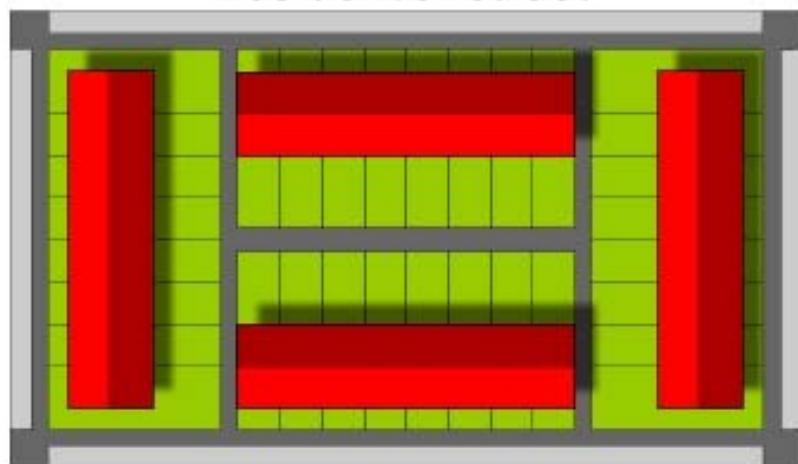
Fig. 149 Compensated counterparallel $P30m$ p. 191



residential street



neighbourhood road



100m motoric

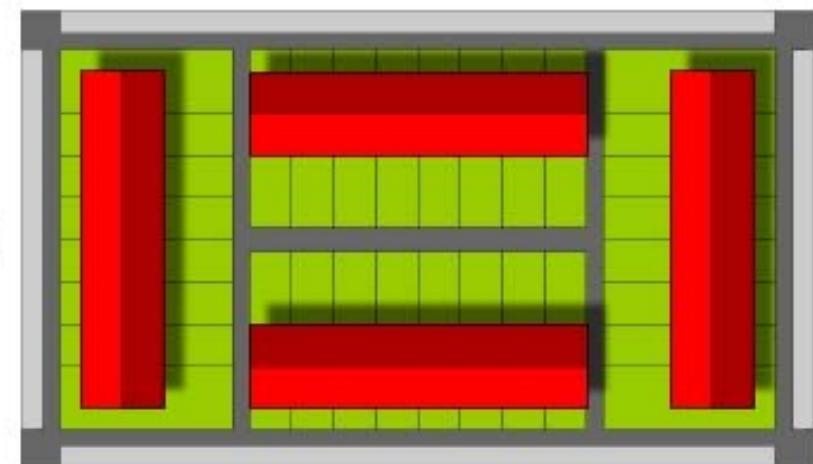


Fig. 150 polarities P_{100m} (residential street) p. 191

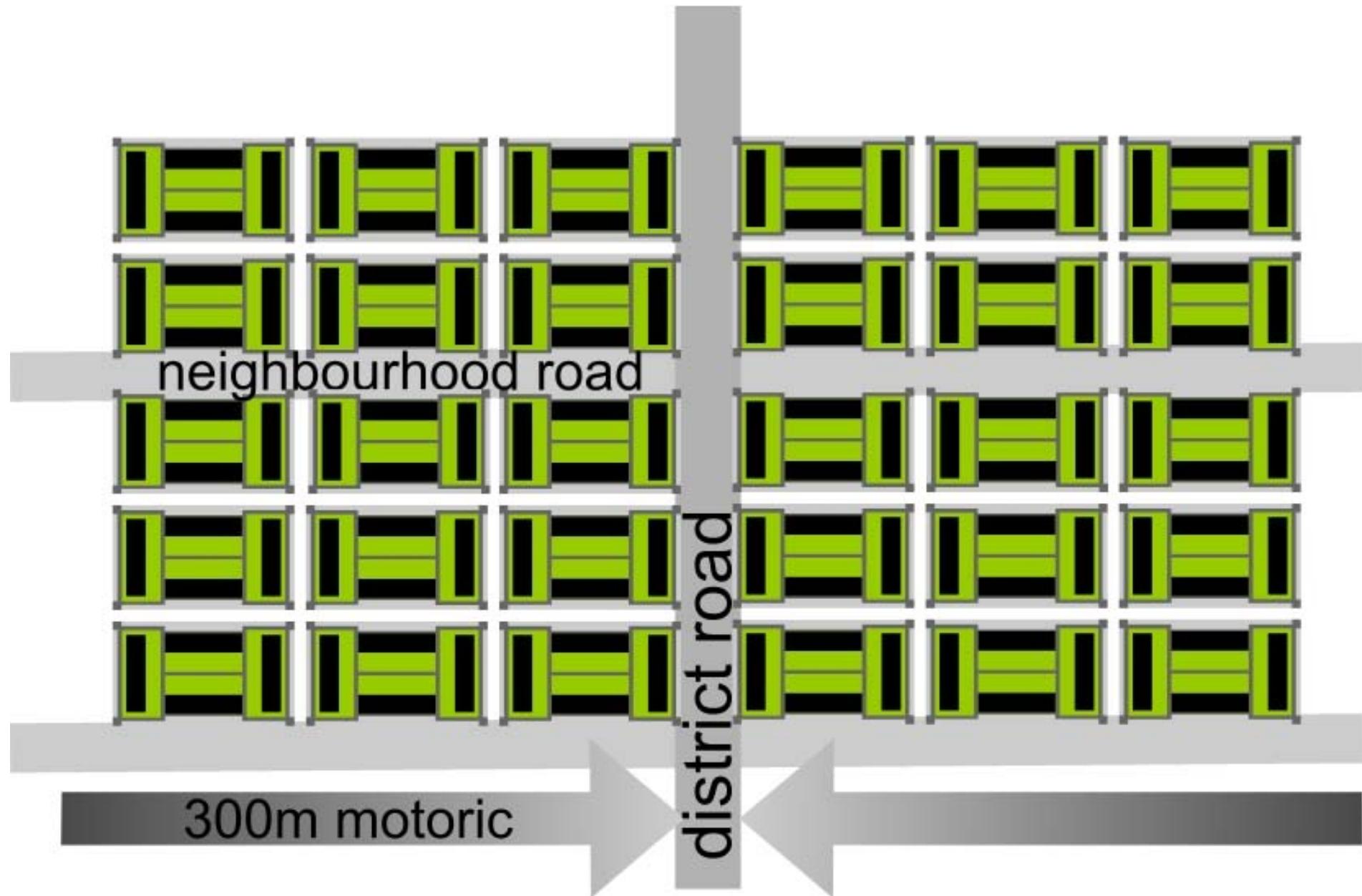


Fig. 151 P_{300m} of a neighbourhood road p. 192

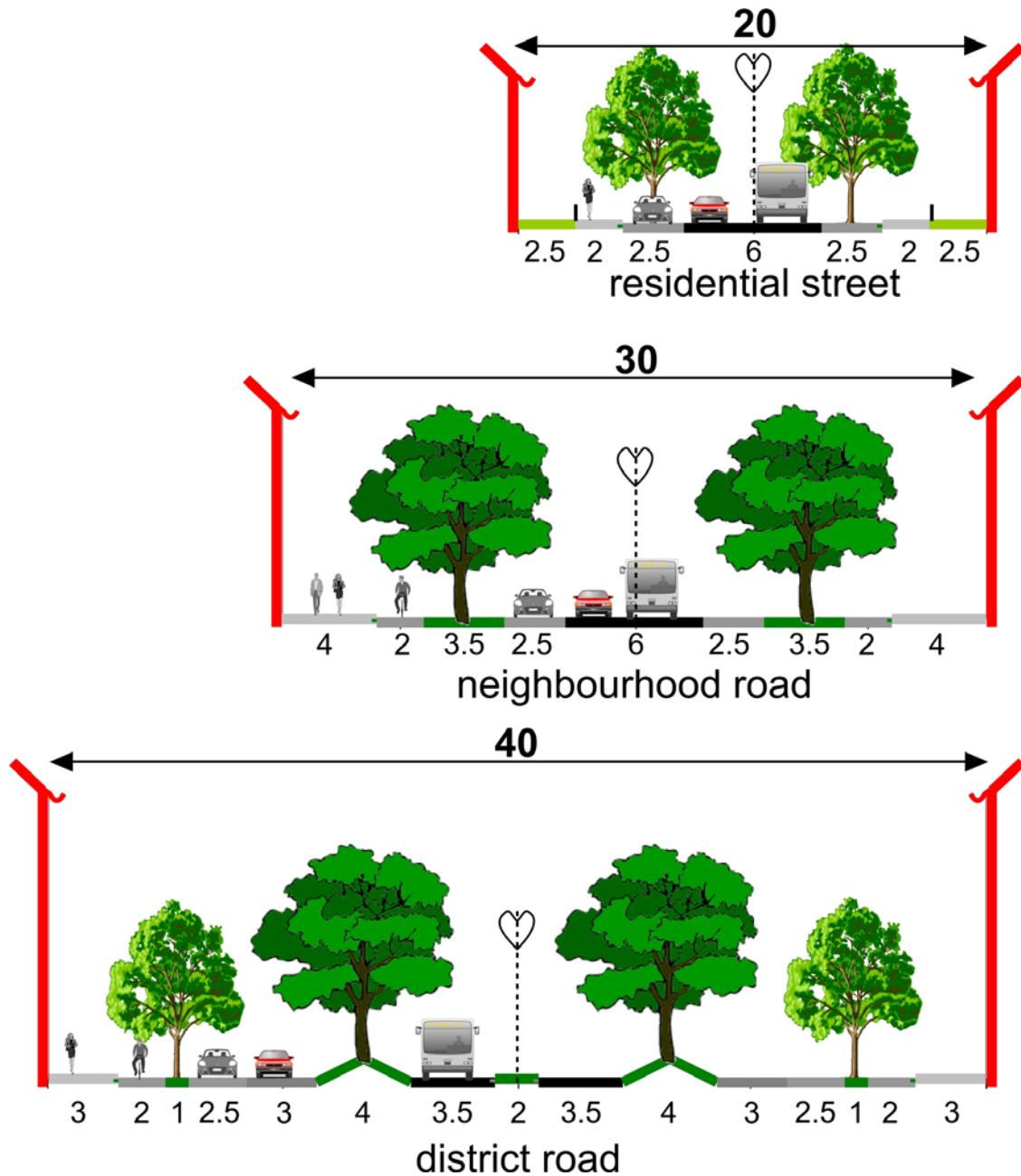


Fig. 152 R=30m Profiles of streets and roads p. 192

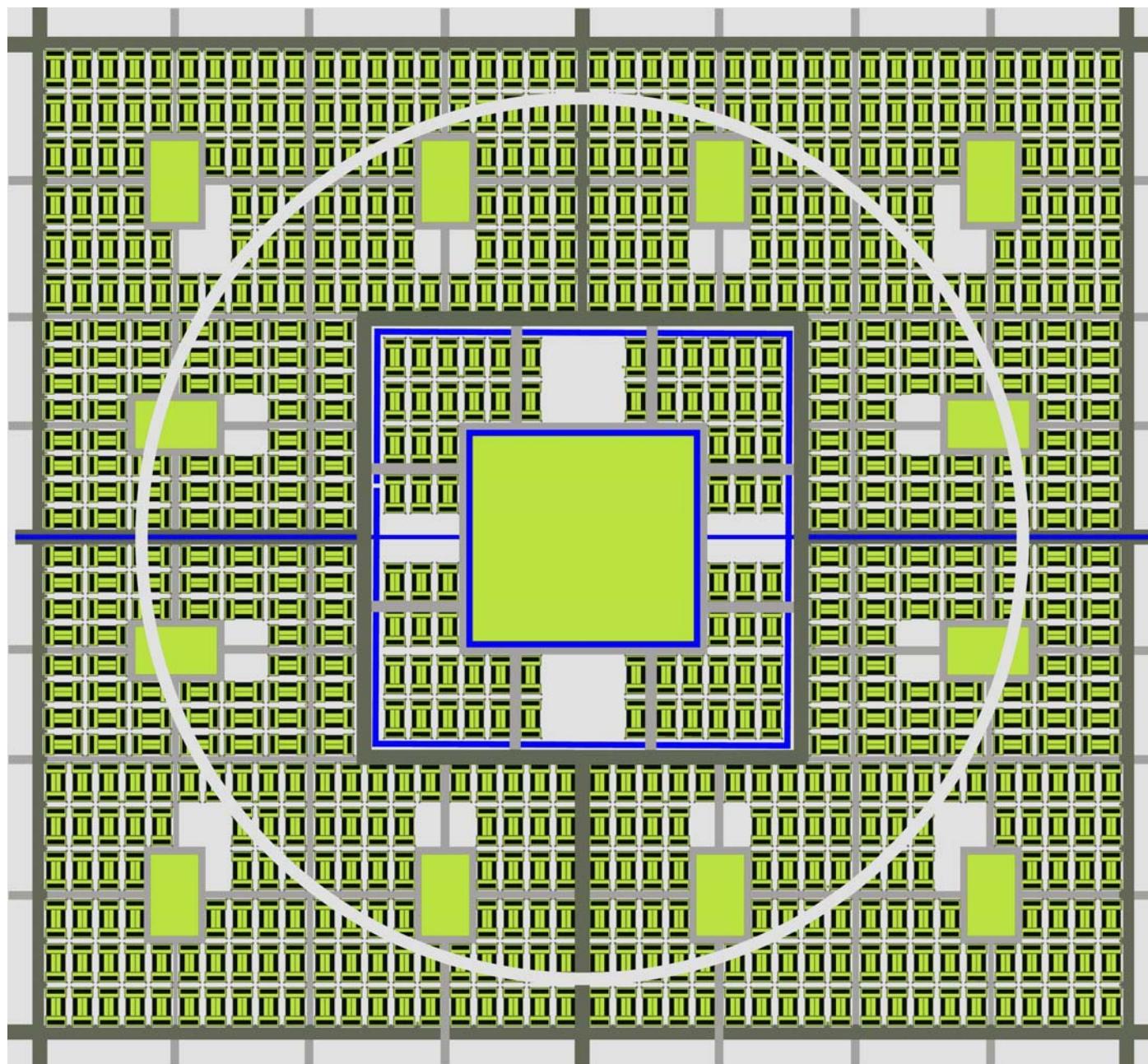


Fig. 153 R=1km Dwellings, roads, parks and facilities p.193

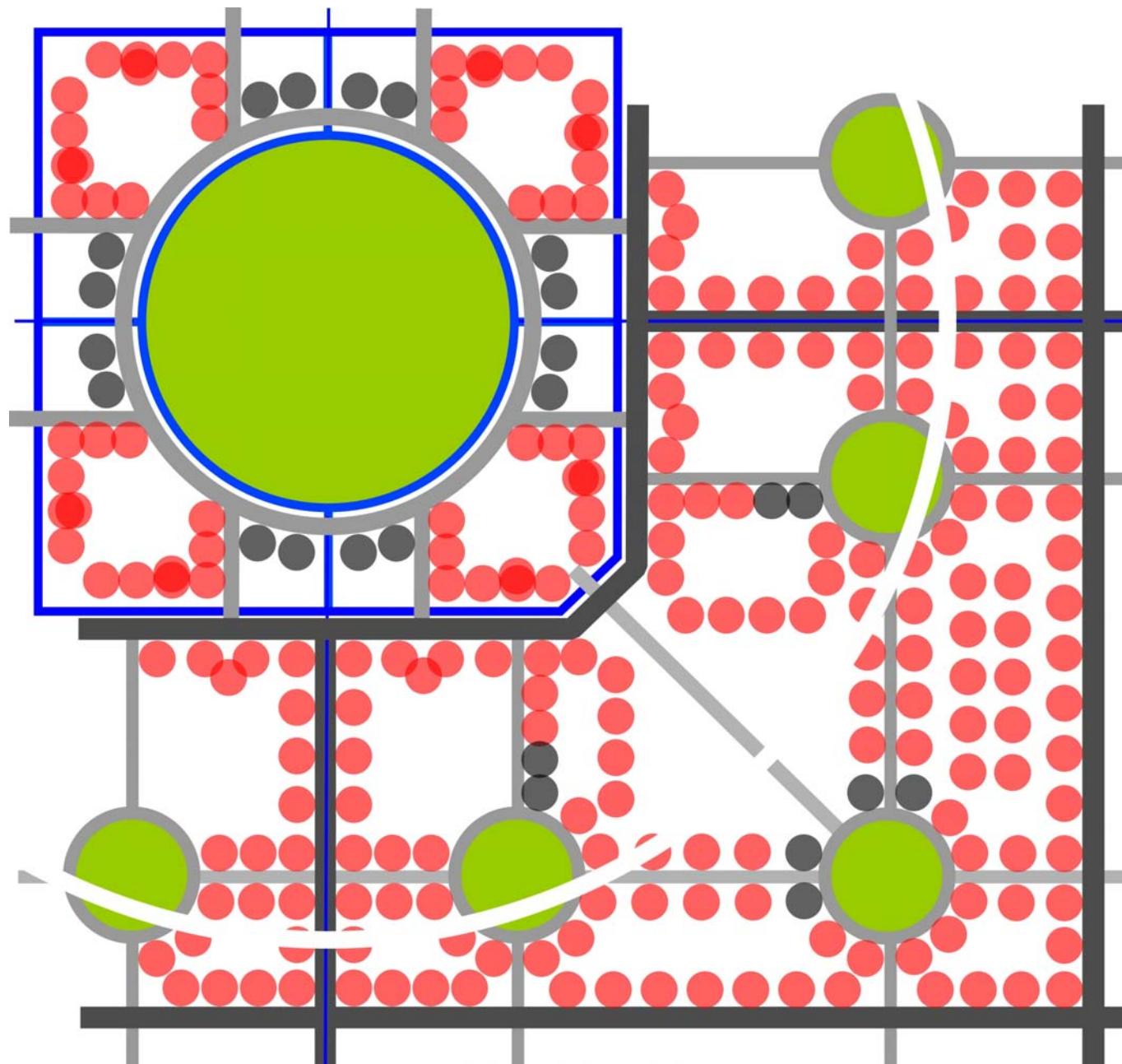


Fig. 154 $R=1\text{ km}$ Redistributing floor space p.193

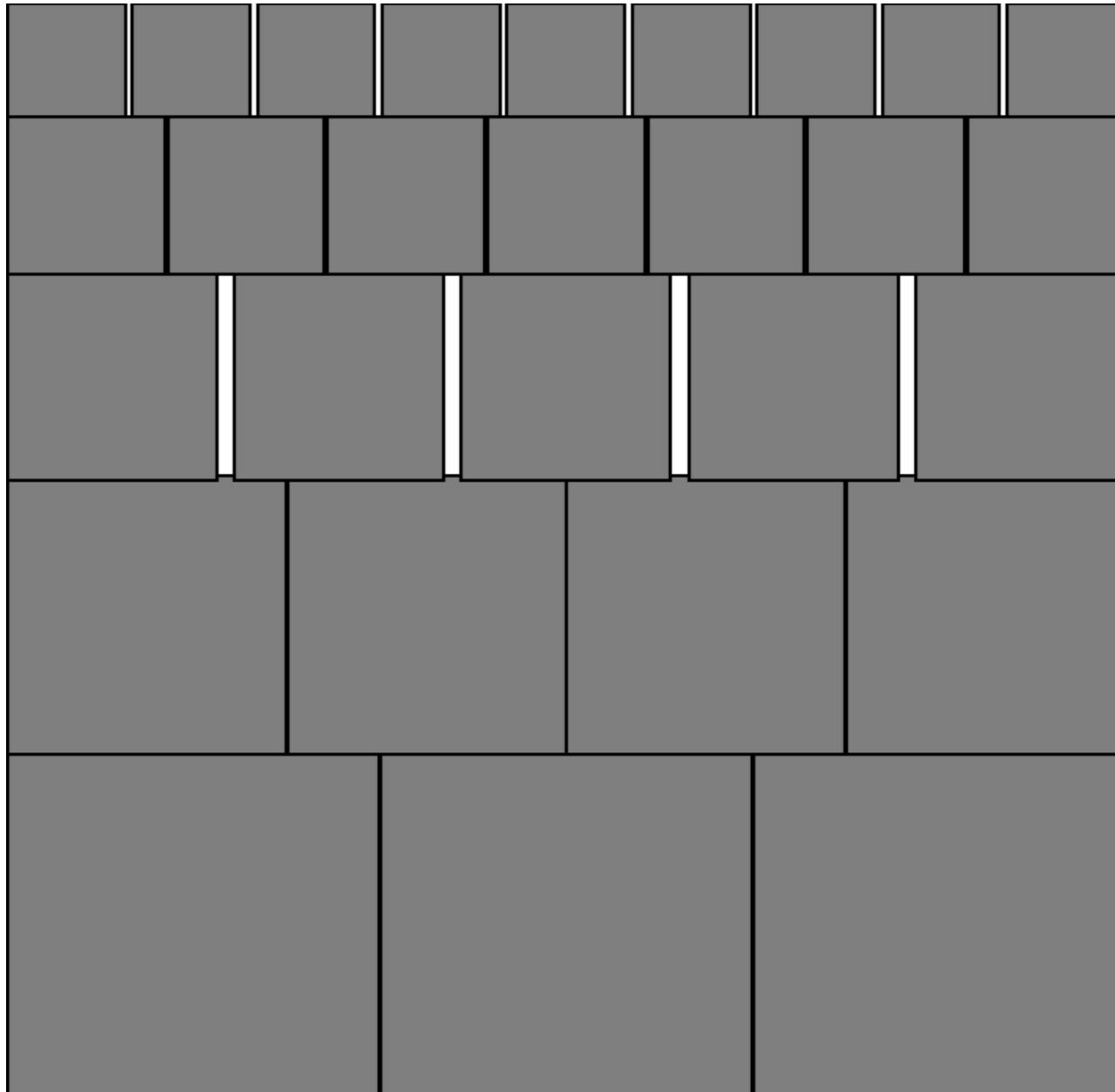


Fig. 155 Ranked order p.194

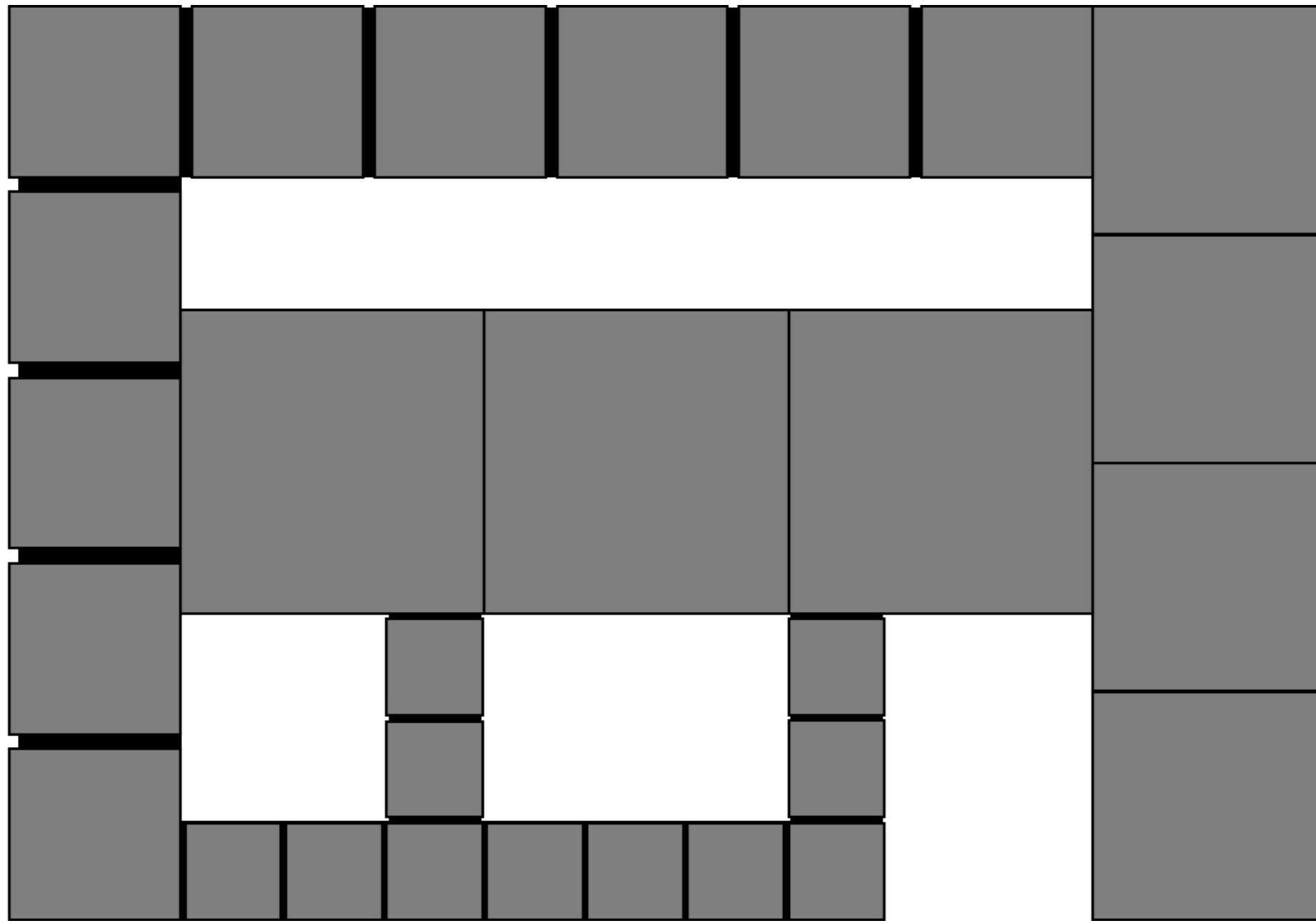


Fig. 156 Structured order p.194

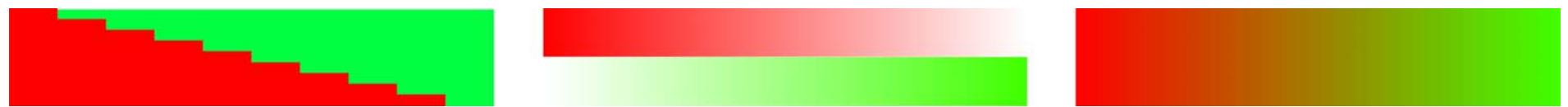
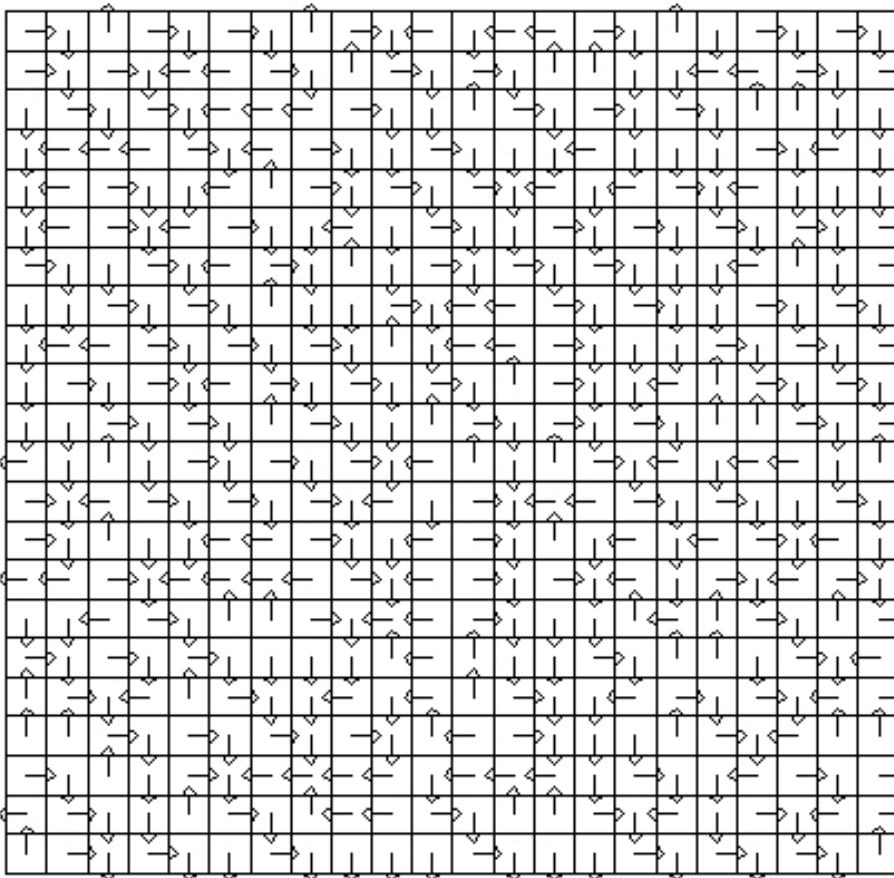


Fig. 157 Two variables negative and positive ranked p.195



Fig. 158 Unranked spatial relations of values p.195



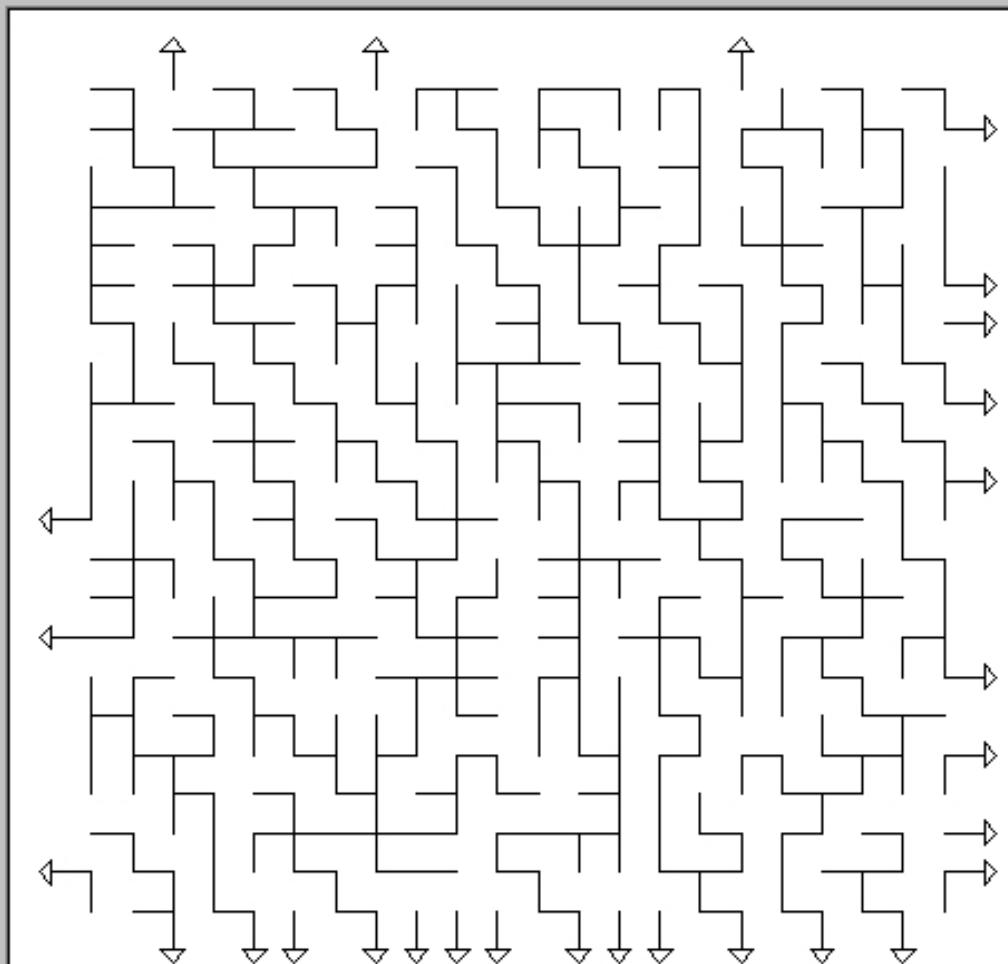
Save on clipboard by Alt+PrtSc

random 48x48

Show streams

New random with taps

Fig. 159 Directions of slopes p.196



Save on clipboard by Alt+PrtSc

random 48x48

Show drainage

New random with taps

Fig. 160 Resulting course of streams p.196

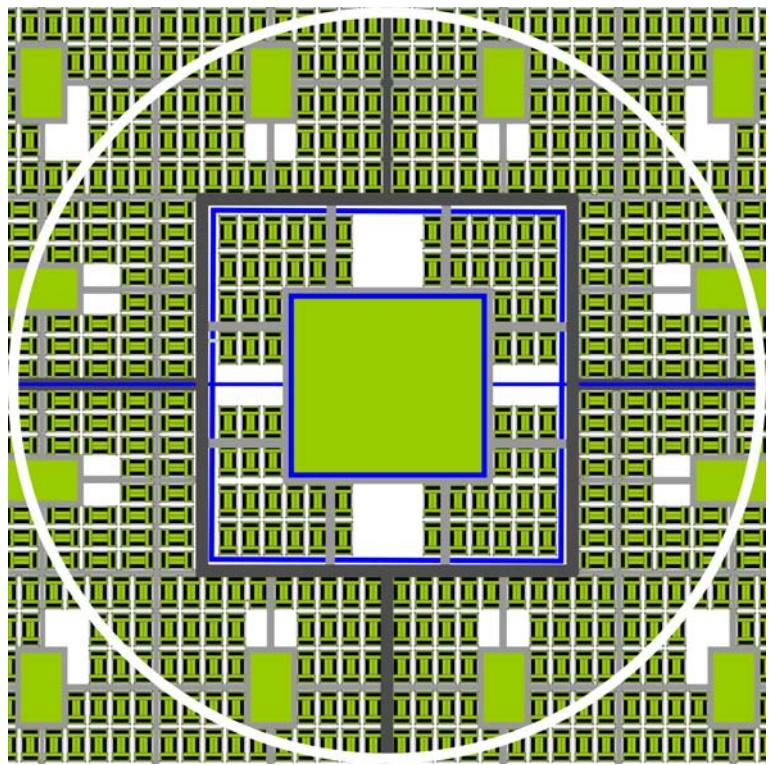


Fig. 161 $R = 1\text{km}$ frame, $r = 10\text{m}$ grain

Fig. 162 Amsterdam city $R = 1\text{km}$, $r = 30\text{m}$ grain p. 199

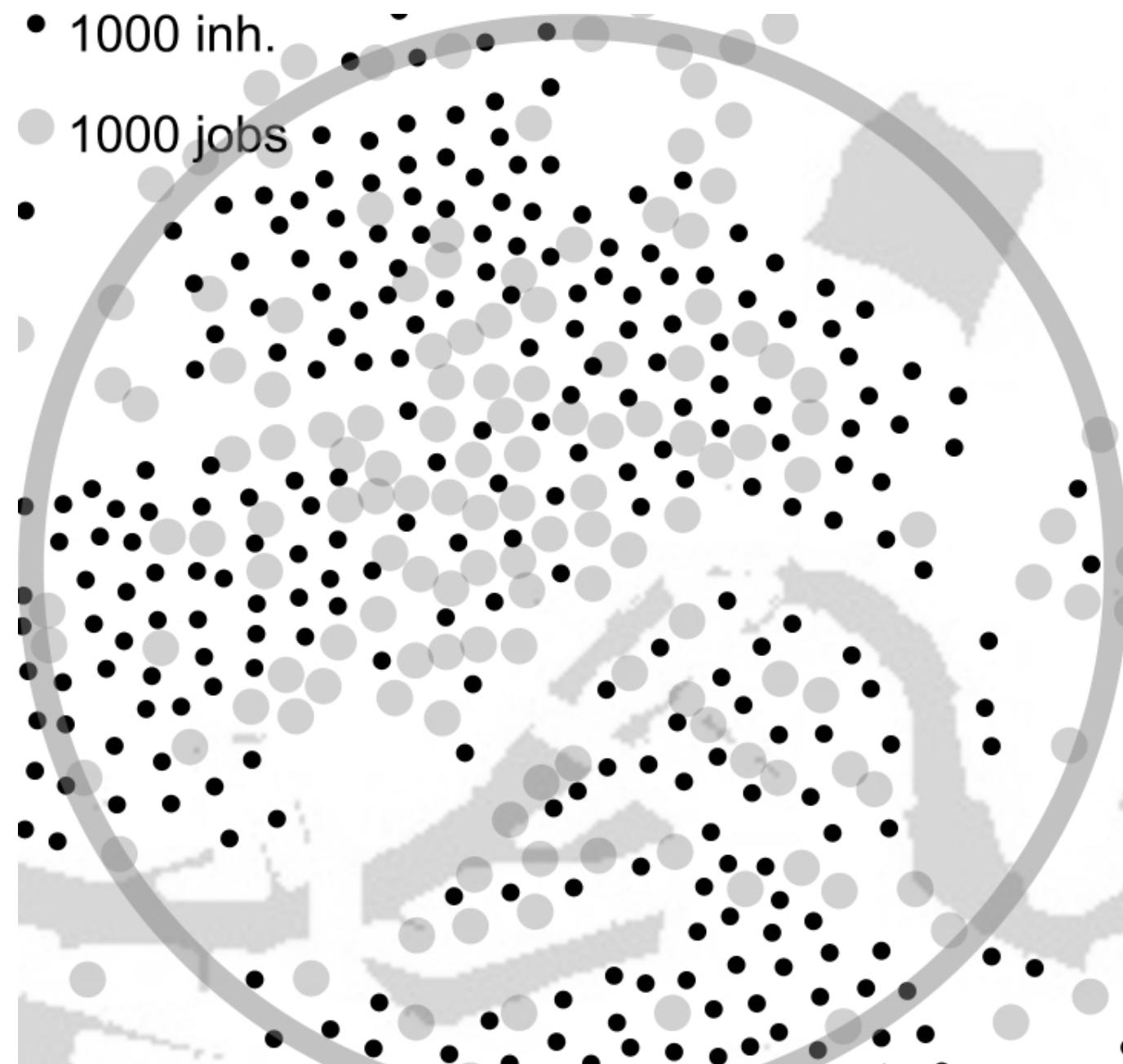


Fig. 163 R=3km detail Rotterdam p.200



Fig. 163 Space Syntax analysis at rough level of the same area p.200



Fig. 163 Space Syntax analyses at fine level of the same area p.200

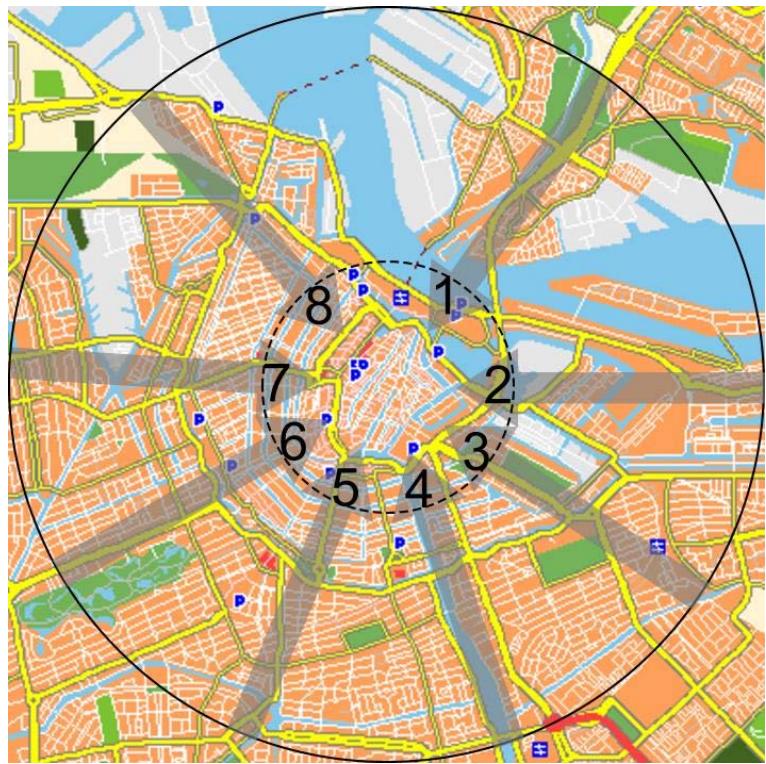


Fig. 164 Amsterdam motoric P_{3km} ; sensoric P_{10km} p.200



Fig. 166 Randstad motoric P_{30km} p.201



Fig. 167 Holland sensoric $P_{30, 100\text{km}}$ p.201



Fig. 168 Continental, fluvial $P_{1000, 300km}$ p.203

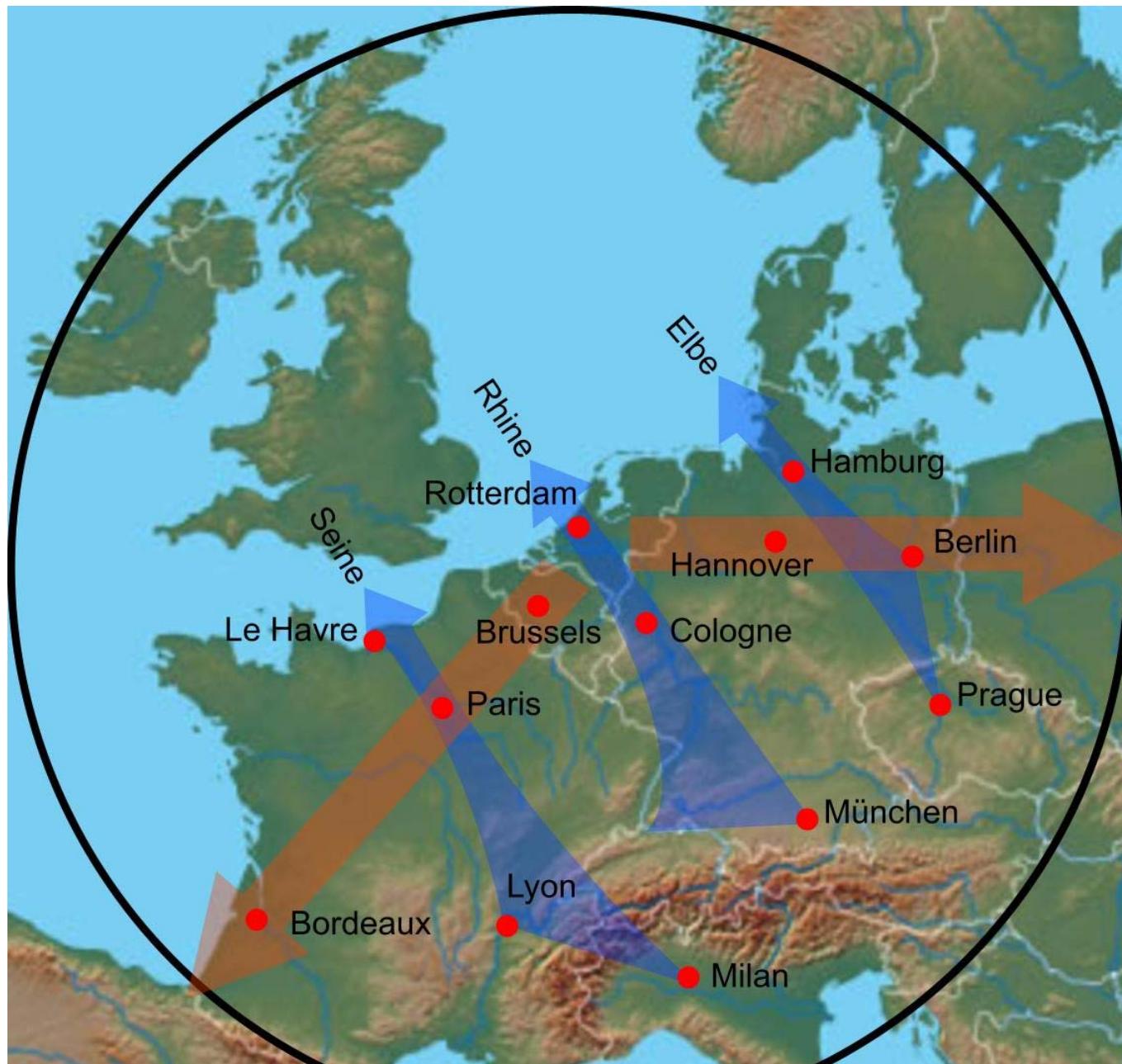


Fig. 169 Rivers P_{300km} crossed by P_{1000km} p.203

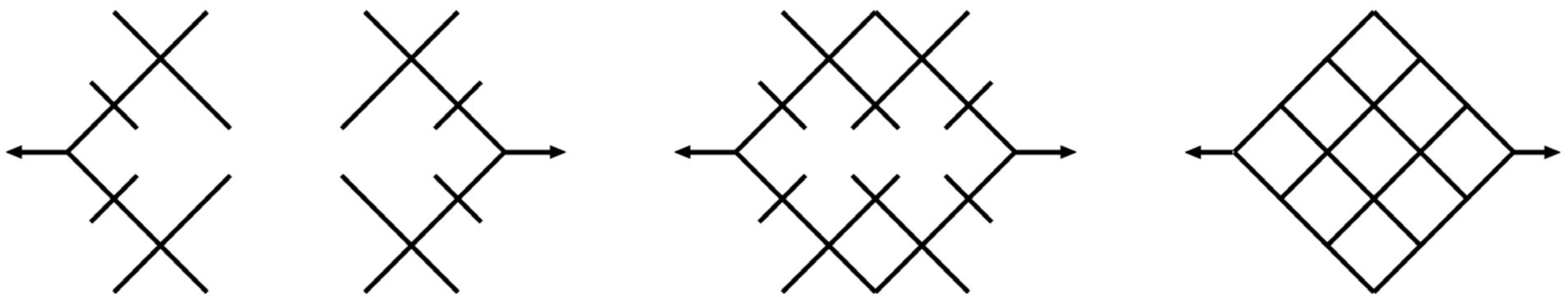


Fig. 170 A polar tree becomes a bipolar lattice p.204

	m width between façades		m mesh size		km/km² network density		Served inhabitants		km/hr design velocity		m lane width		# vehicles/hour capacity		# vehicles/hour intensity		# lanes
residential path	10	0,03	70	10	10	1,75	500	2	1,75	1,75	500	2	1	2	1	1	
residential street	20	0,1	20	100	30	2,25	2 000	20	2,25	2,25	2 000	20	2	20	2	2	
neighbourhood road	30	0,3	7	1 000	50	2,75	3 000	202	2,75	2,75	3 000	202	2	202	2	2	
district road	40	1	2	10 000	70	3,25	4 000	1 042	3,25	3,25	4 000	1 042	2	1 042	2	2	
urban highway	60	3	1	100 000	90	3,25	8 000	2 220	3,25	3,25	8 000	2 220	4	8 000	4	4	
conurbation highway	70	10	0,2	1 000 000	110	3,25	16 000	10 400	3,25	3,25	16 000	10 400	8	16 000	8	8	
regional highway	80	30	0,07		130	3,25	20 000	16 200	3,25	3,25	20 000	16 200	10	20 000	10	10	
metropolitan highway	100	30	0,07	10 000 000	150	3,25	32 000	24 000	3,25	3,25	32 000	24 000	16	32 000	16	16	
national highway		100	0,02		150	3,25			3,25	3,25			8		8	8	
fluvial highway		300	0,007		150	3,25			3,25	3,25			4		4	4	
continental highway		1000	0,002		150	3,25			3,25	3,25			4		4	4	

Fig. 171 A hierarchy of roads p.205

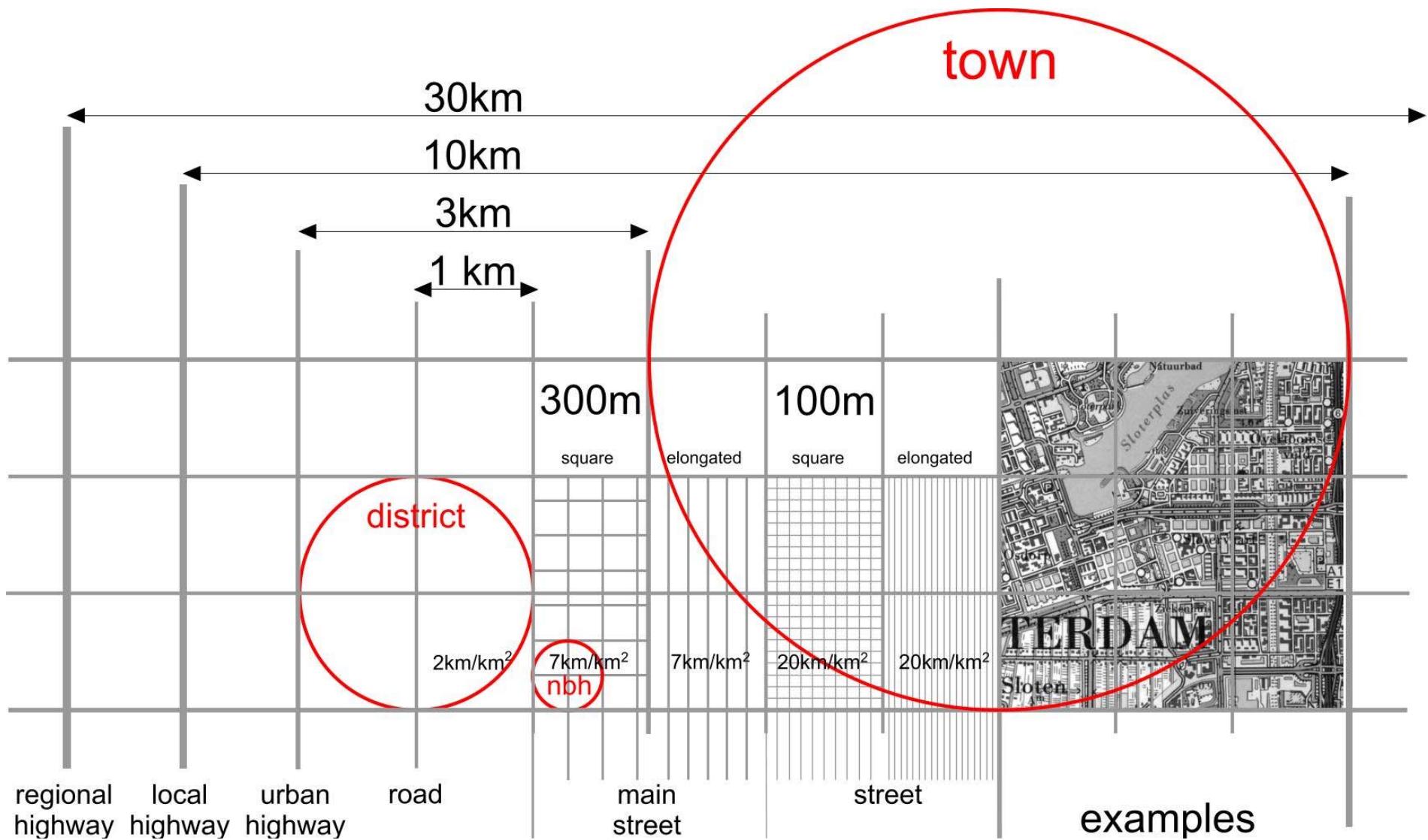


Fig. 172 Dry networks p.205

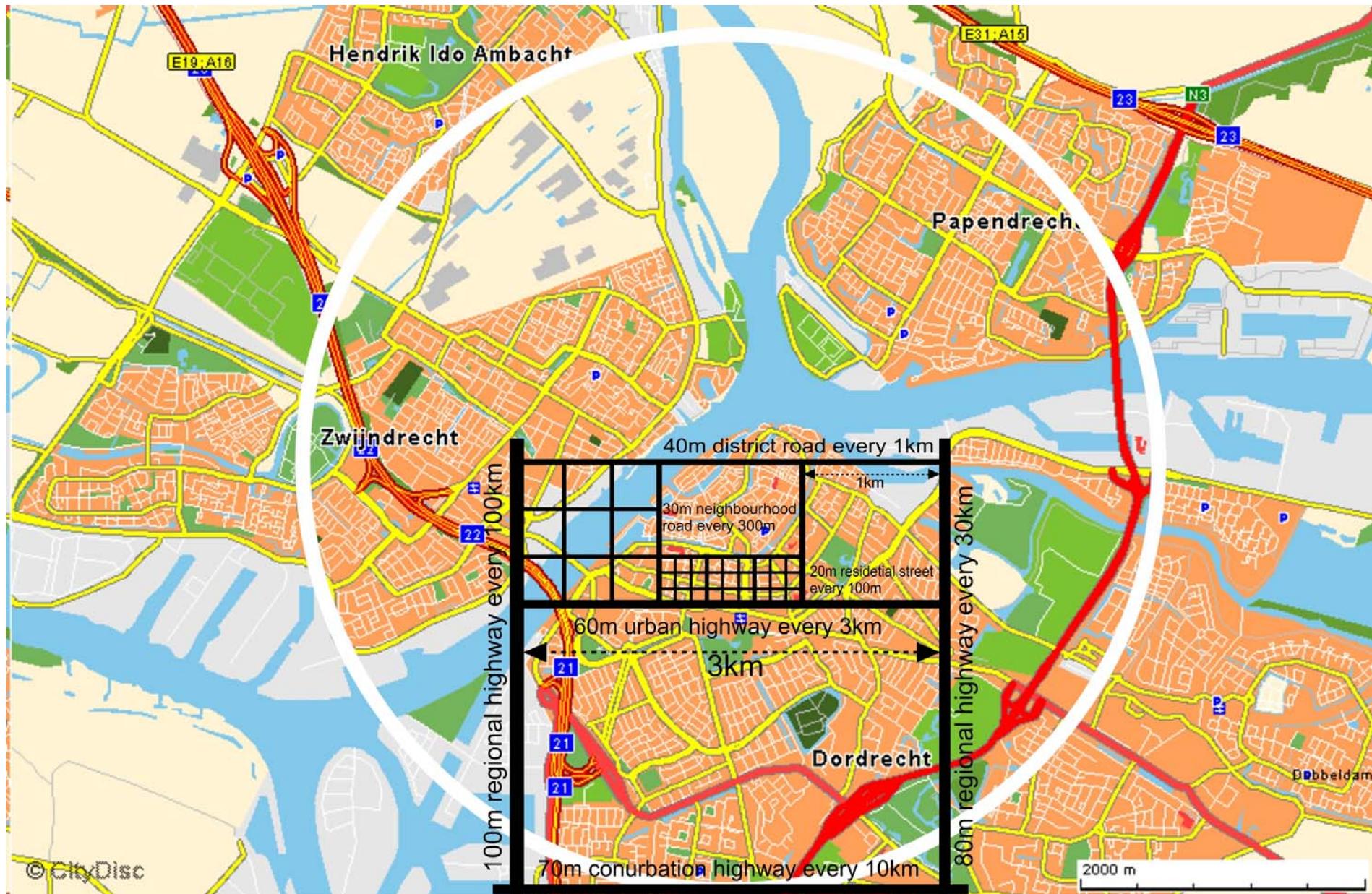


Fig. 173 R = 3km Seven road categories in a city map of Dordrecht p.206



Fig. 174 $R=100\text{km}$ National and regional highways p.207

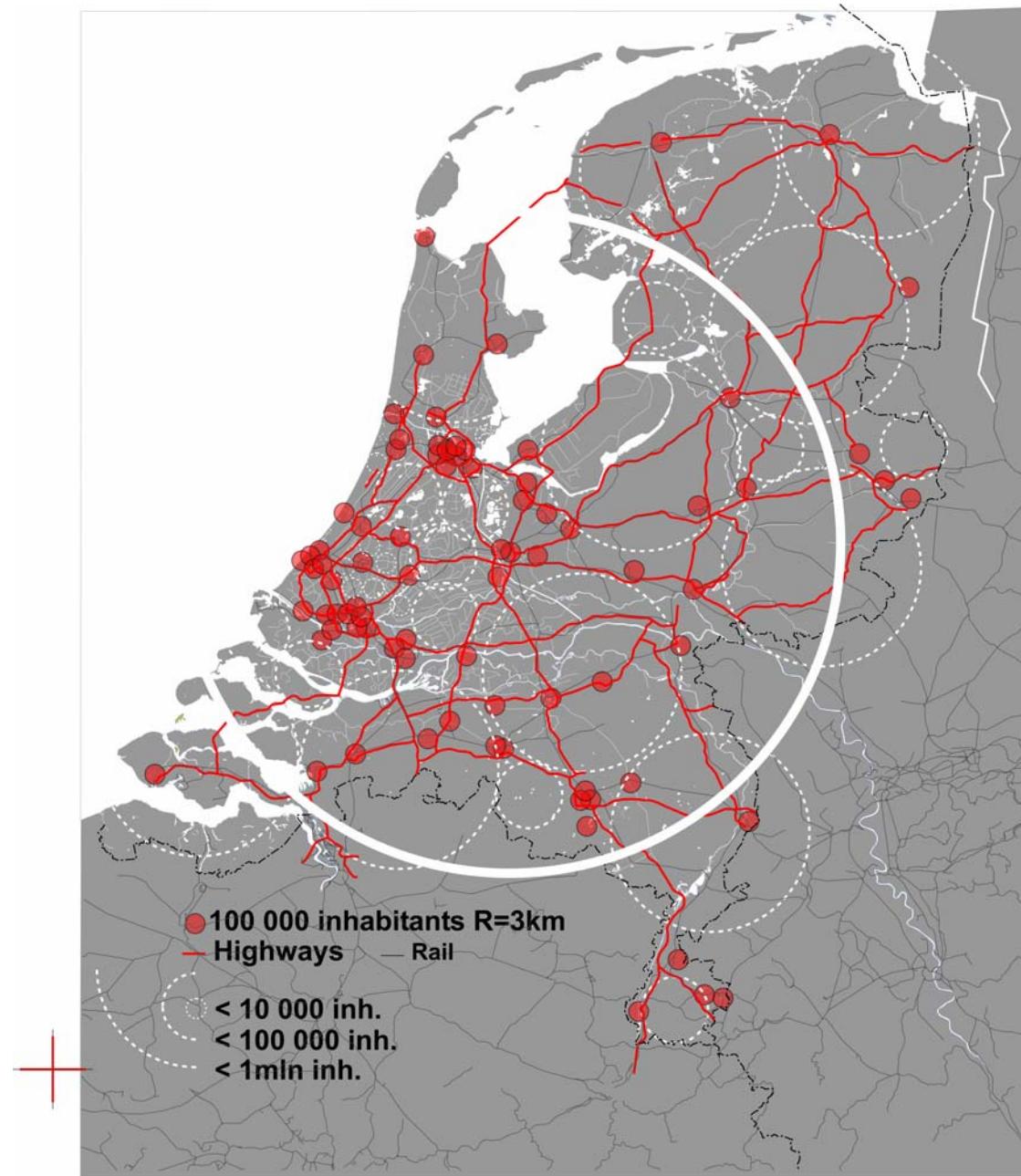


Fig. 175 $R=100\text{km}$ Distribution of urban population p.207

NETWORK		WET		DRY	
km/km ² density	km mesh size	m width 1%	NAME	m width	NAME
70	0,03	0.3	trench	10	residential path
20	0,1	1	small ditch	20	residential street
7	0,3	3	ditch	30	neighbourhood road
2	1	10	watercourse	40	district road
0,7	3	30	race	60	urban highway
0,2	10	100	brook/canal	70	conurbation highway
0,07	30	300	river/waterway	80	regional highway
0,02	100	1000	stream/pond		national highway
	300	3000	lake		fluvial highway
	1000	≥10000	sea		continental highway

Fig. 176 Similarities between wet and dry networks p.207

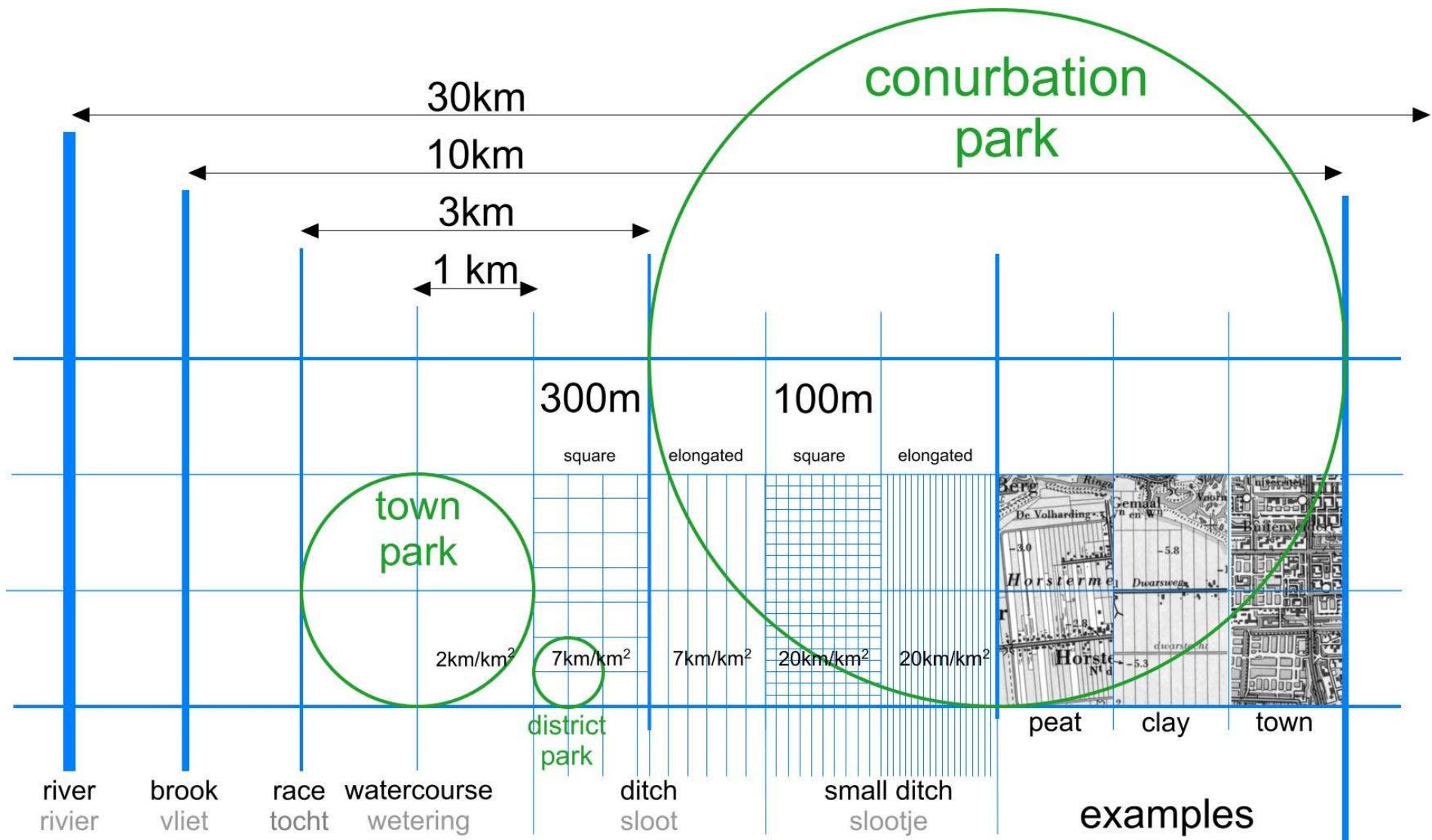


Fig. 177 Wet networks p.208

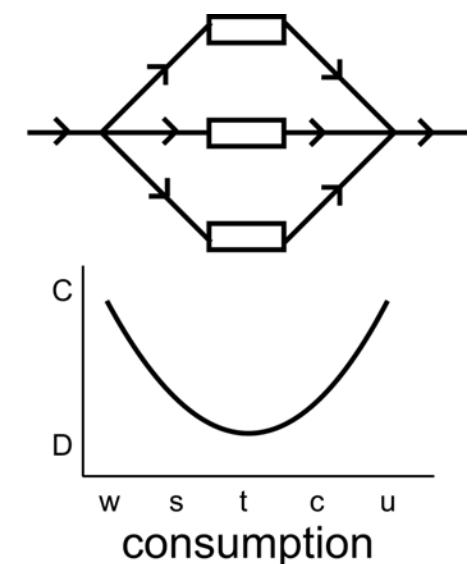
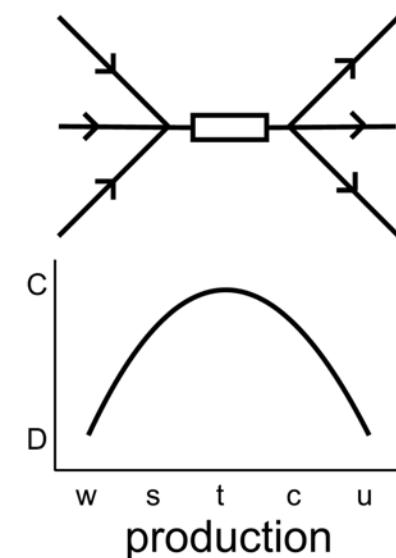
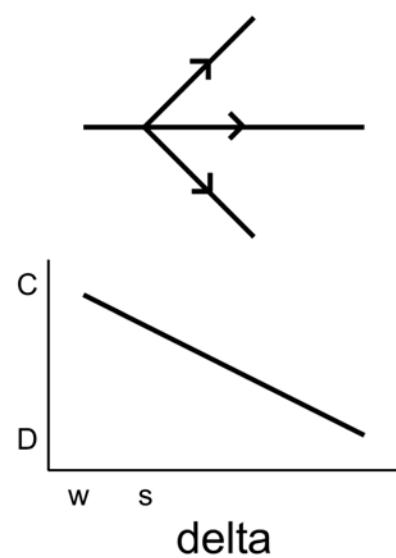
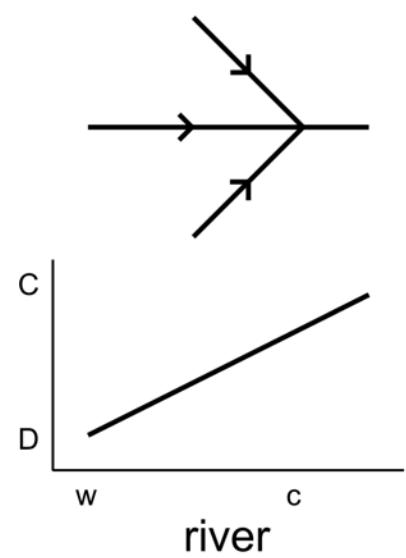
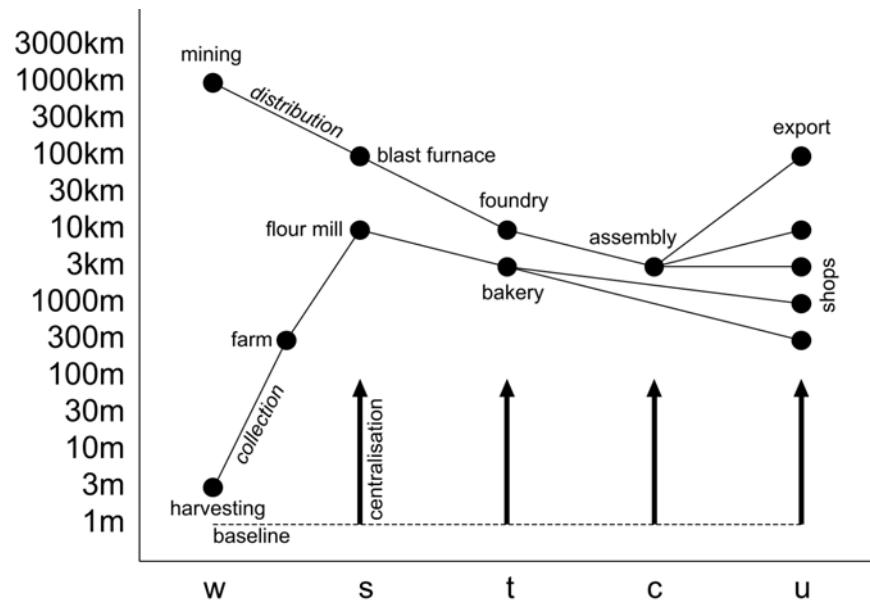
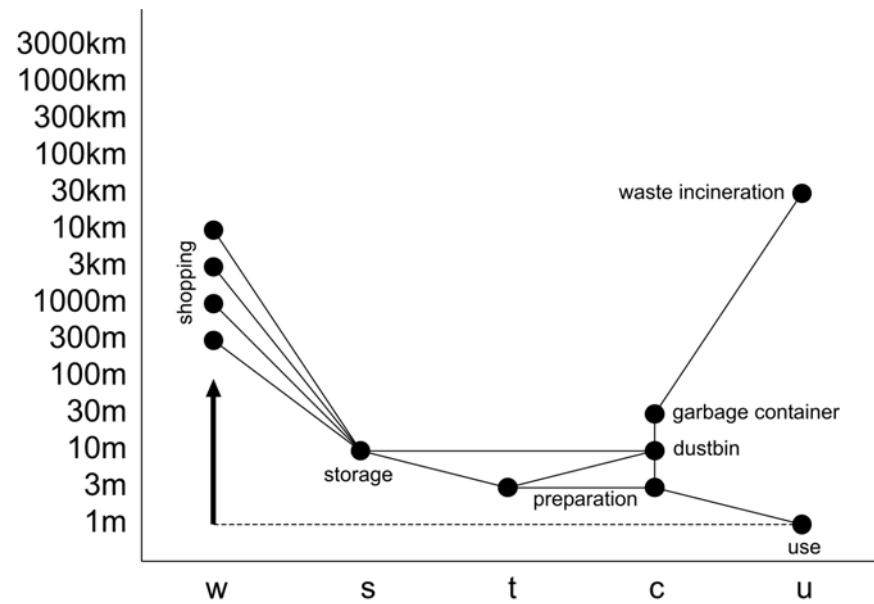


Fig. 178 Collecting, distributing, processing logistics p.208



production



consumption

Fig. 179 Spatial logistics p.209

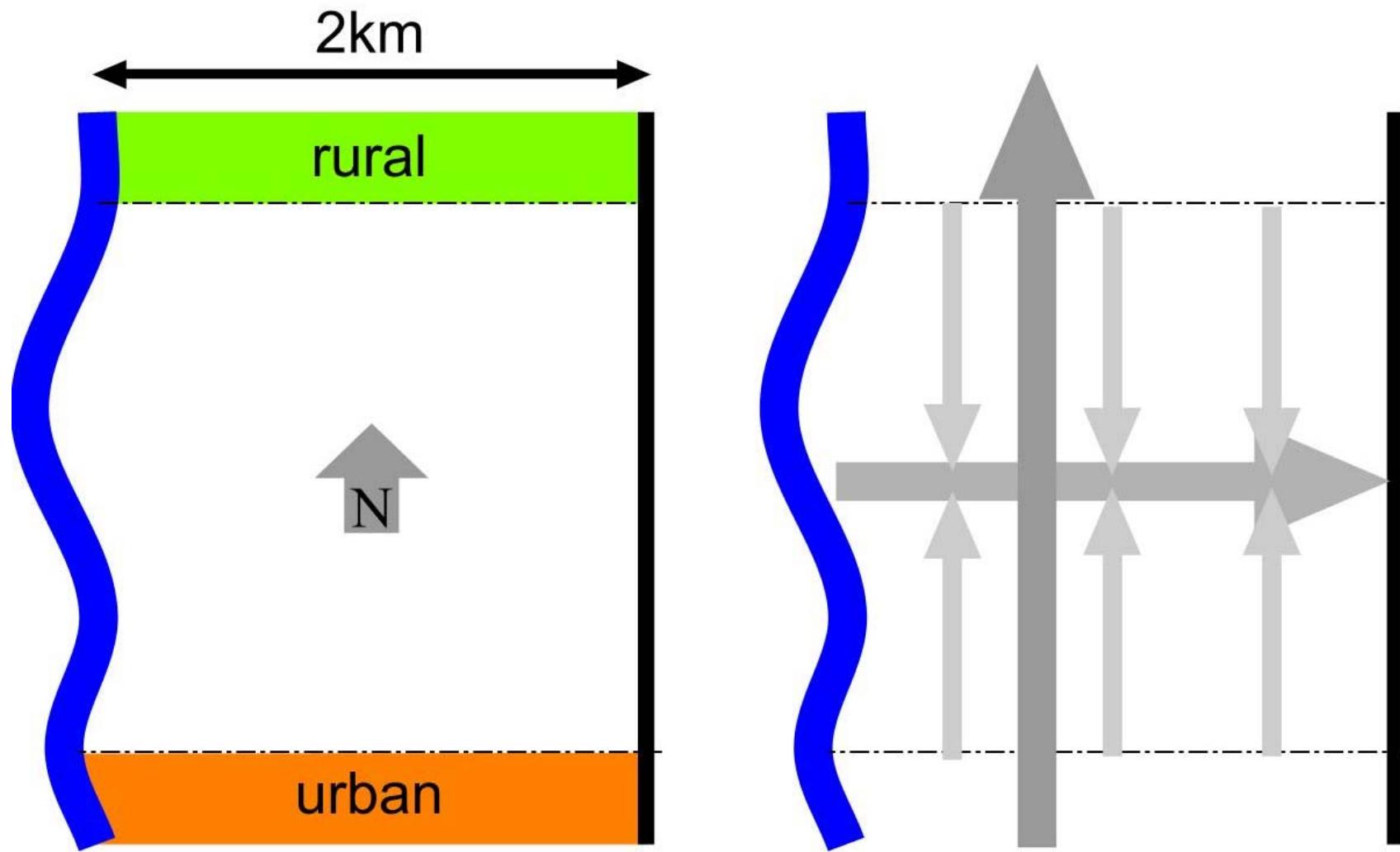


Fig. 180 R=1km Existing polarisations p.210

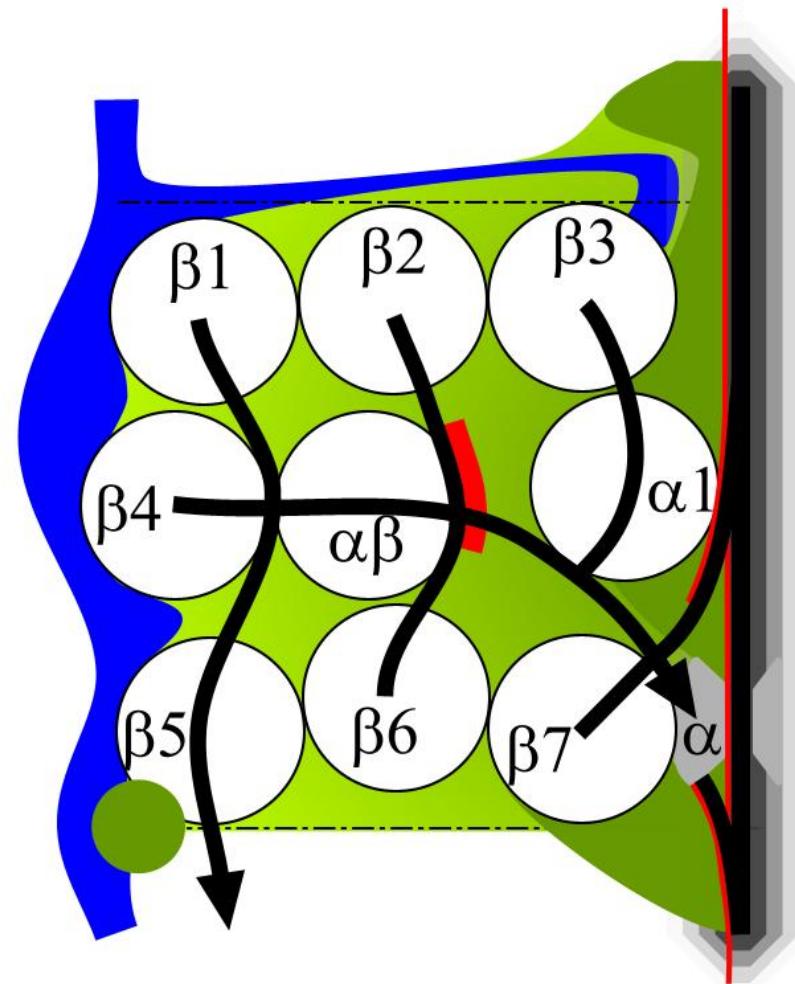
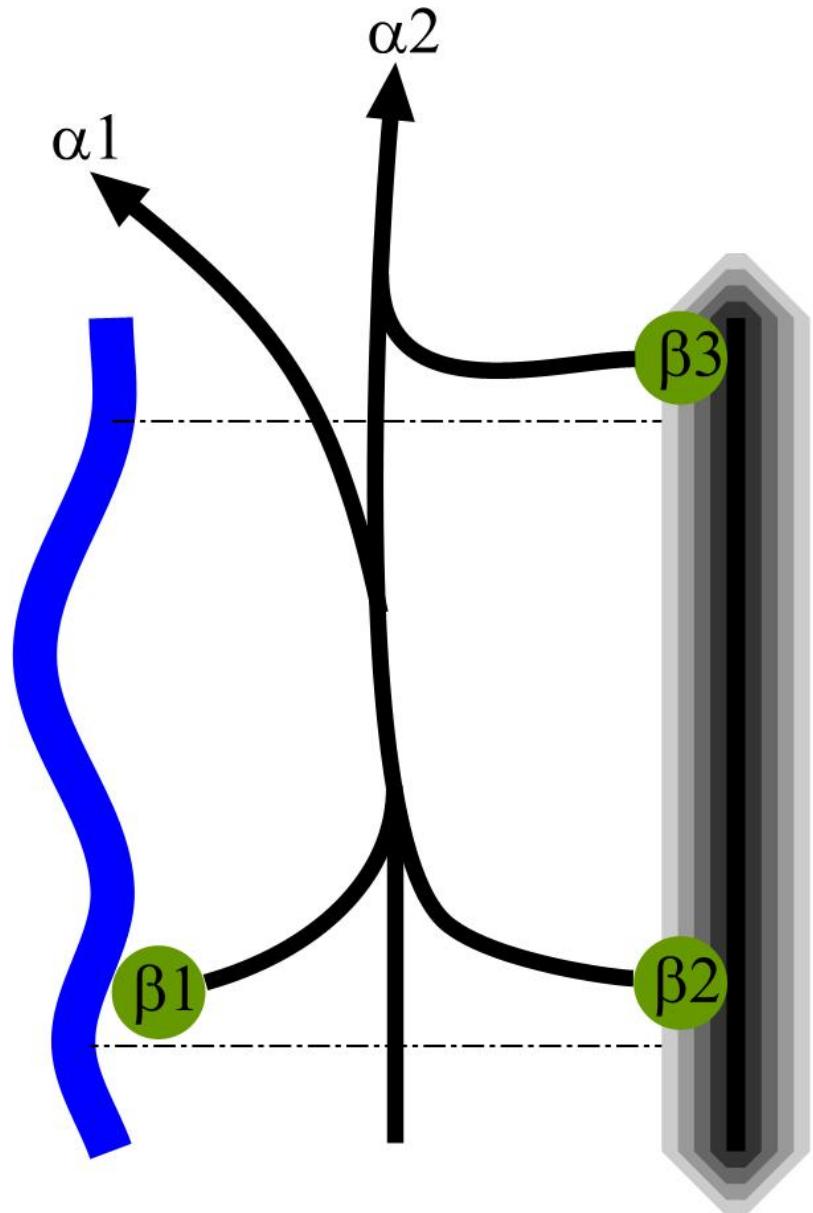


Fig. 181 $R=1\text{km}$ Splitting, curving, combining p.210

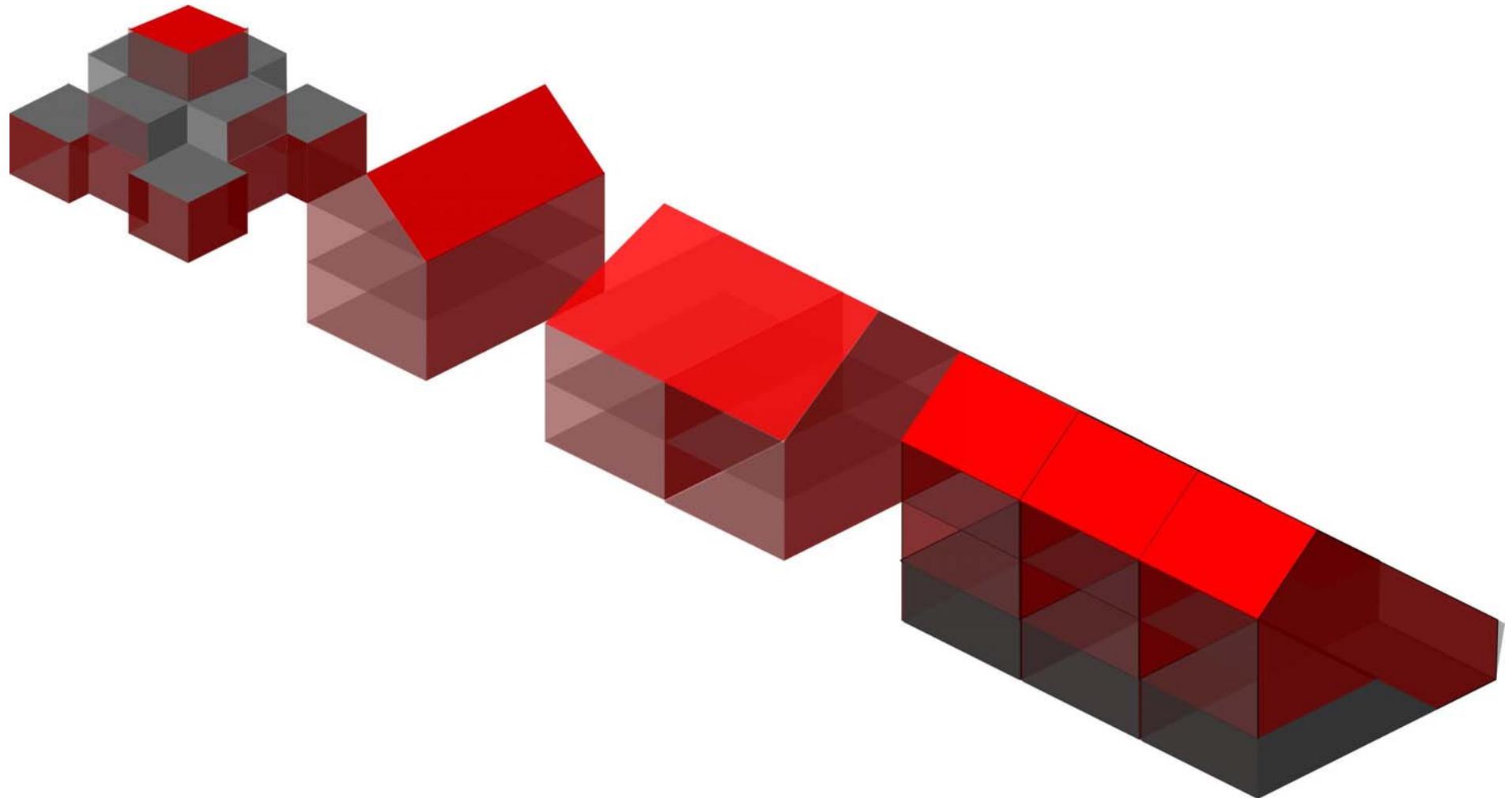


Fig. 182 R=30m Open-closed dwellings in P_{3km} p.211

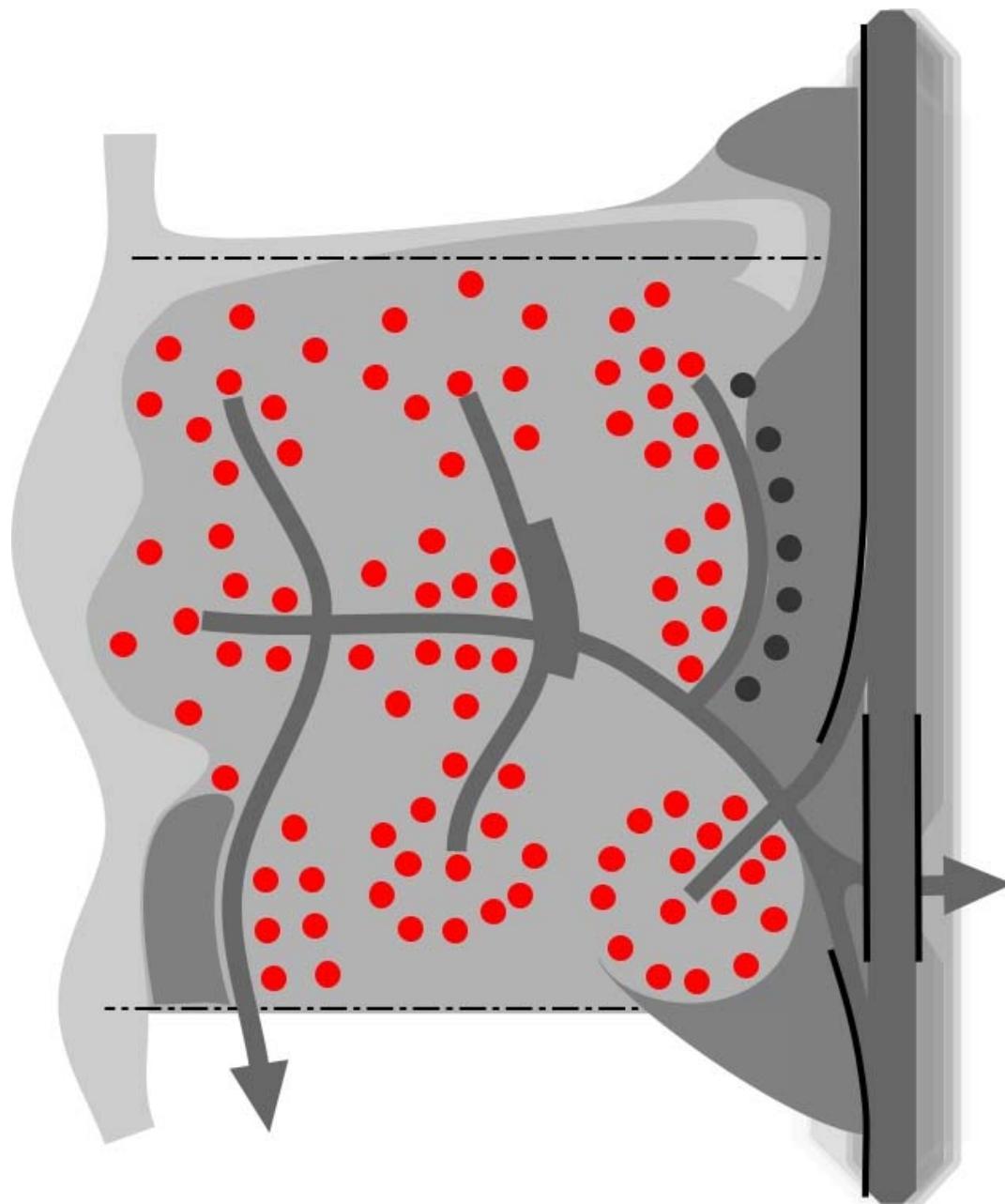


Fig. 183 $R=1\text{km}$ Density p.211

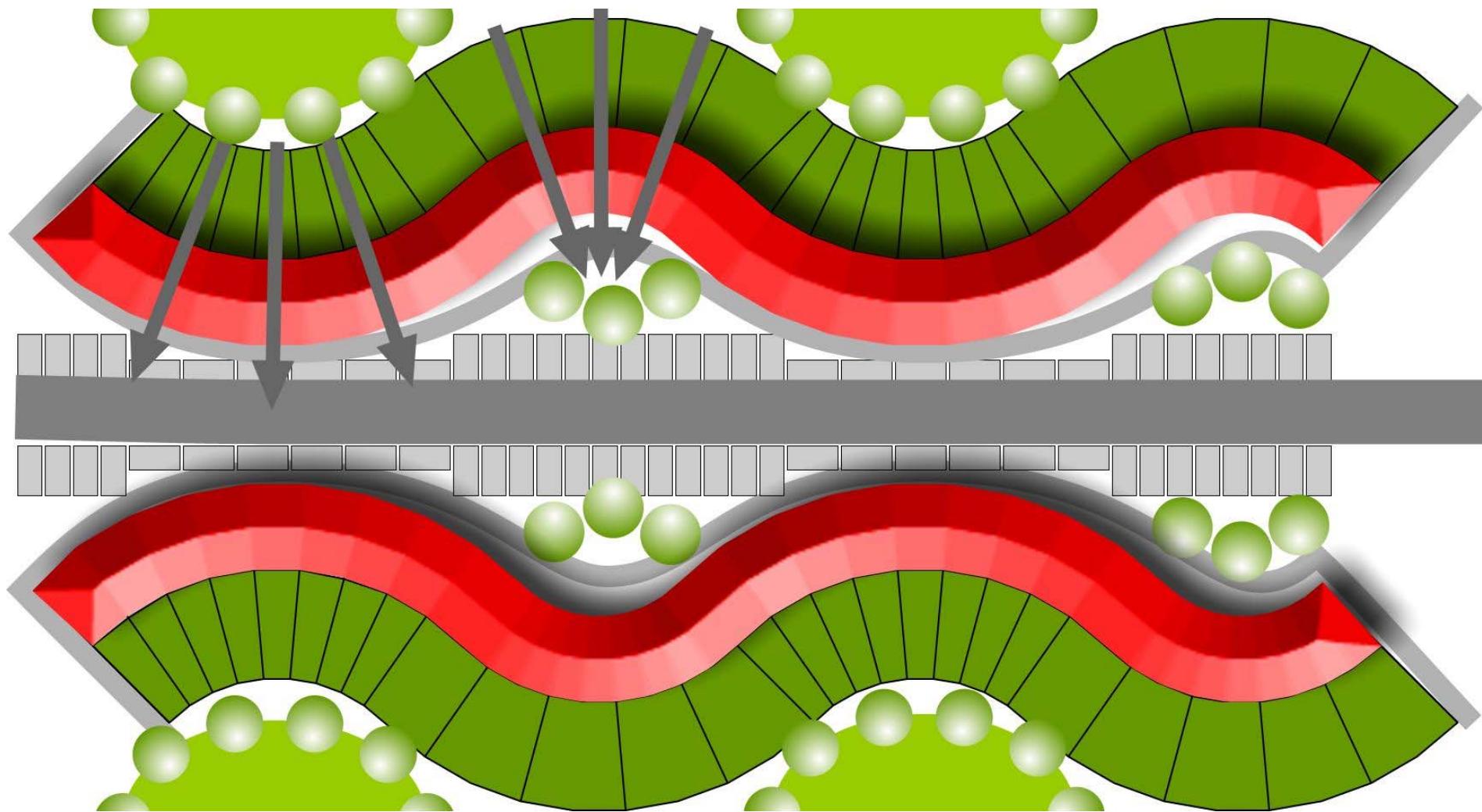


Fig. 184 R=30m Symmetric p.212

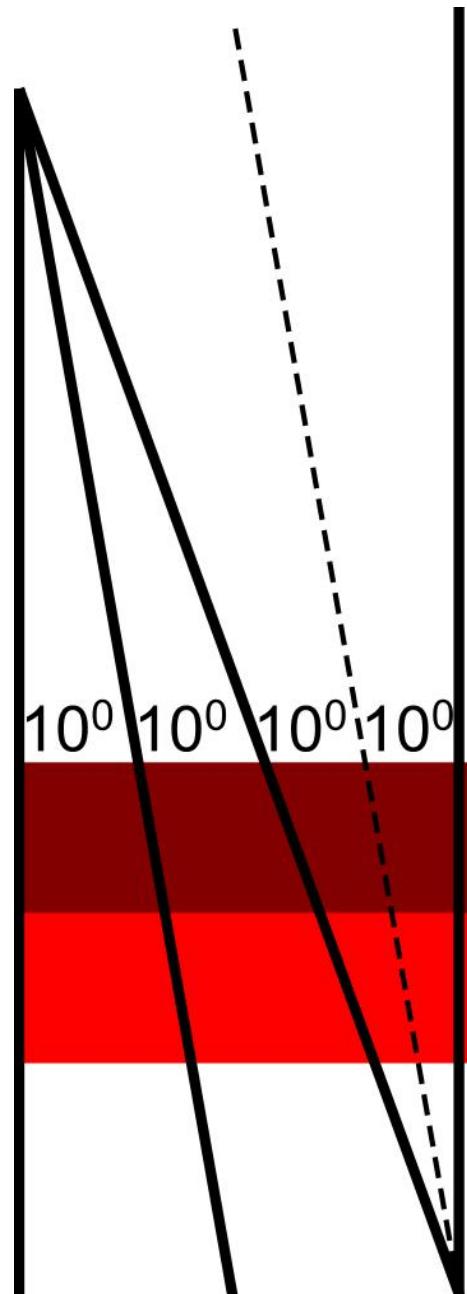


Fig. 185 R=10m p.212

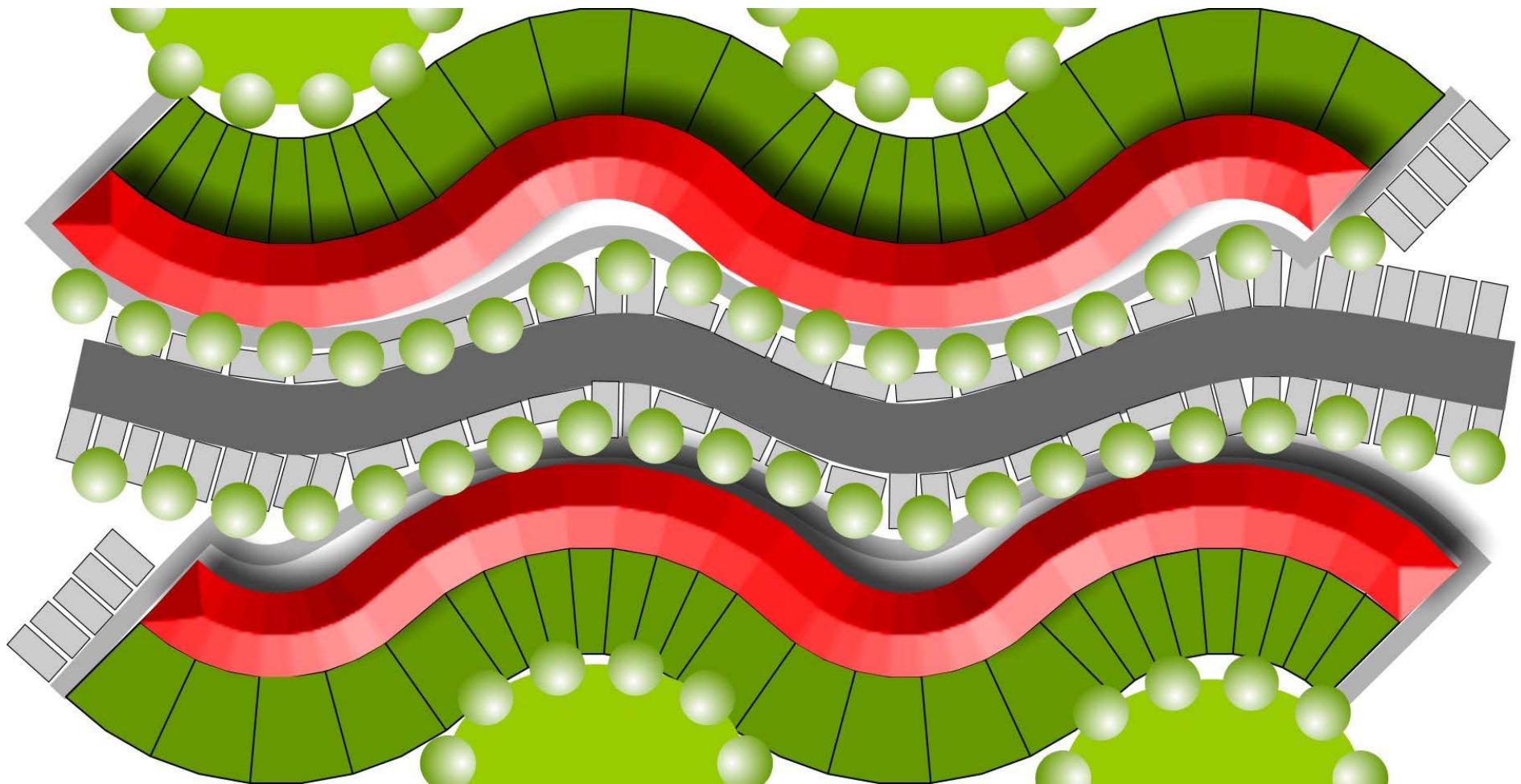
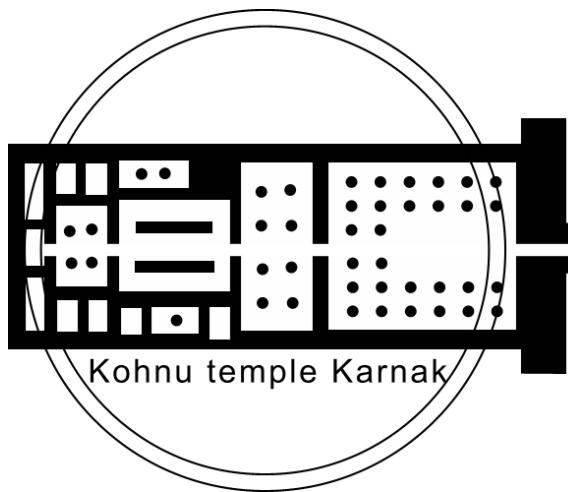
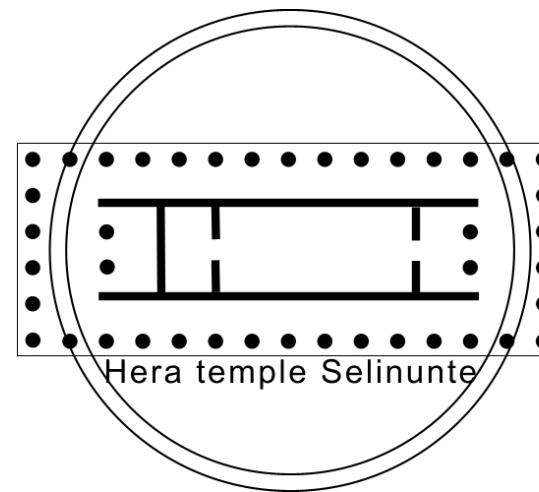


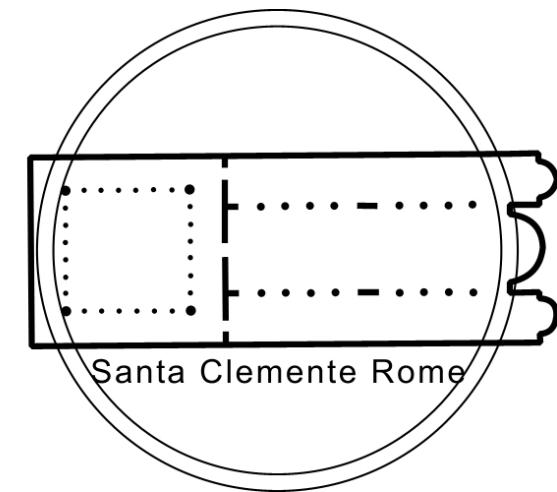
Fig. 186 R=30m Parallel p.212



Kohnu temple Karnak



Hera temple Selinunte



Santa Clemente Rome

Fig. 187 $R=30m$ Introvert Egyptian, extravert Greek, introvert Roman p.212

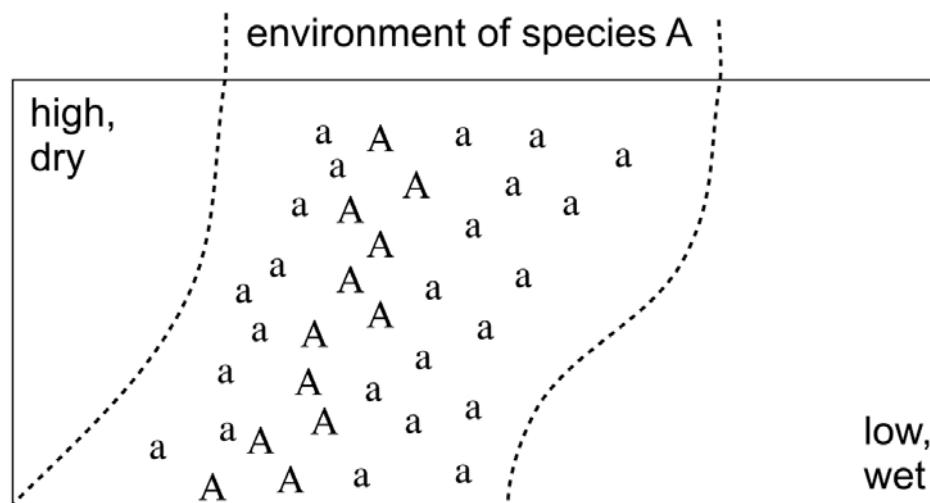
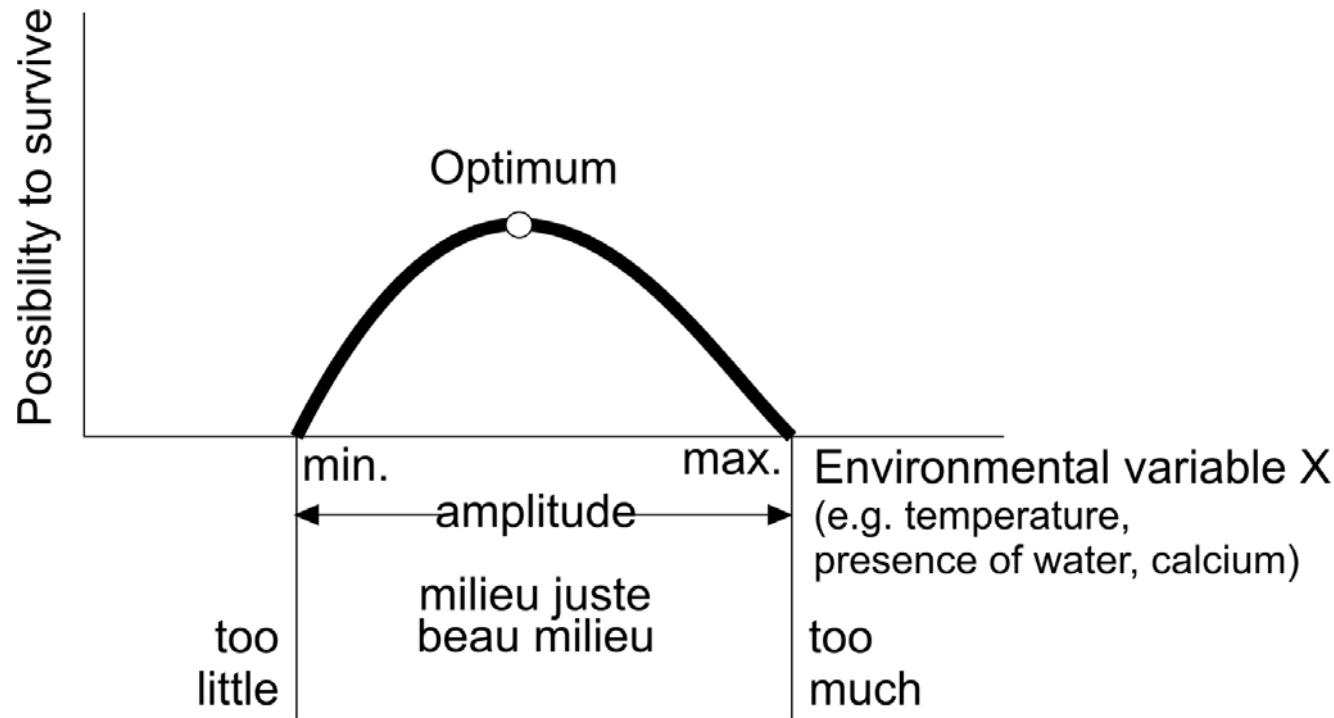


Fig. 188 Ecological tolerance p.218

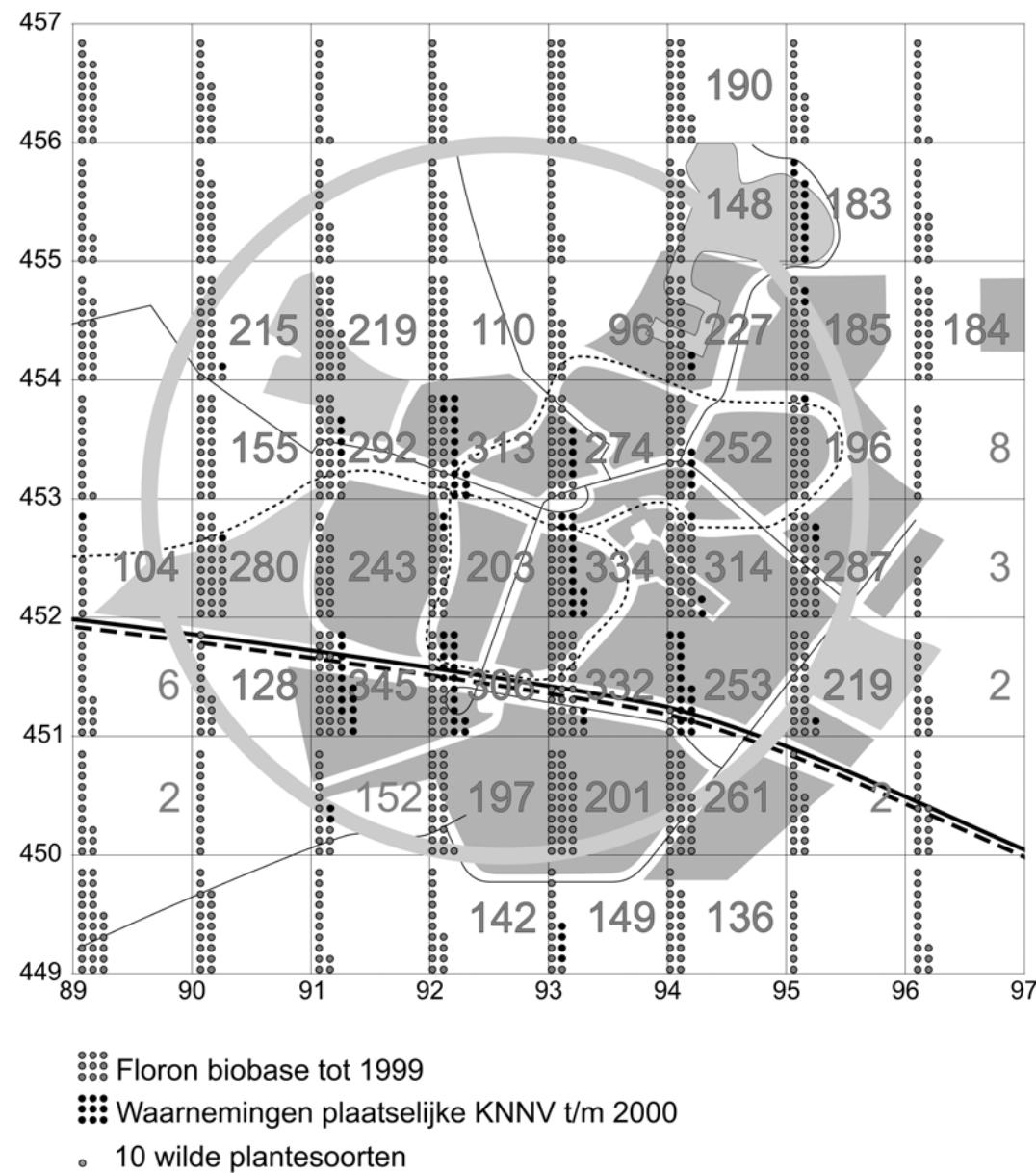


Fig. 189 R=3km Zoetermeer in 1999: more wild plant species in the town than in its agricultural environment p.219

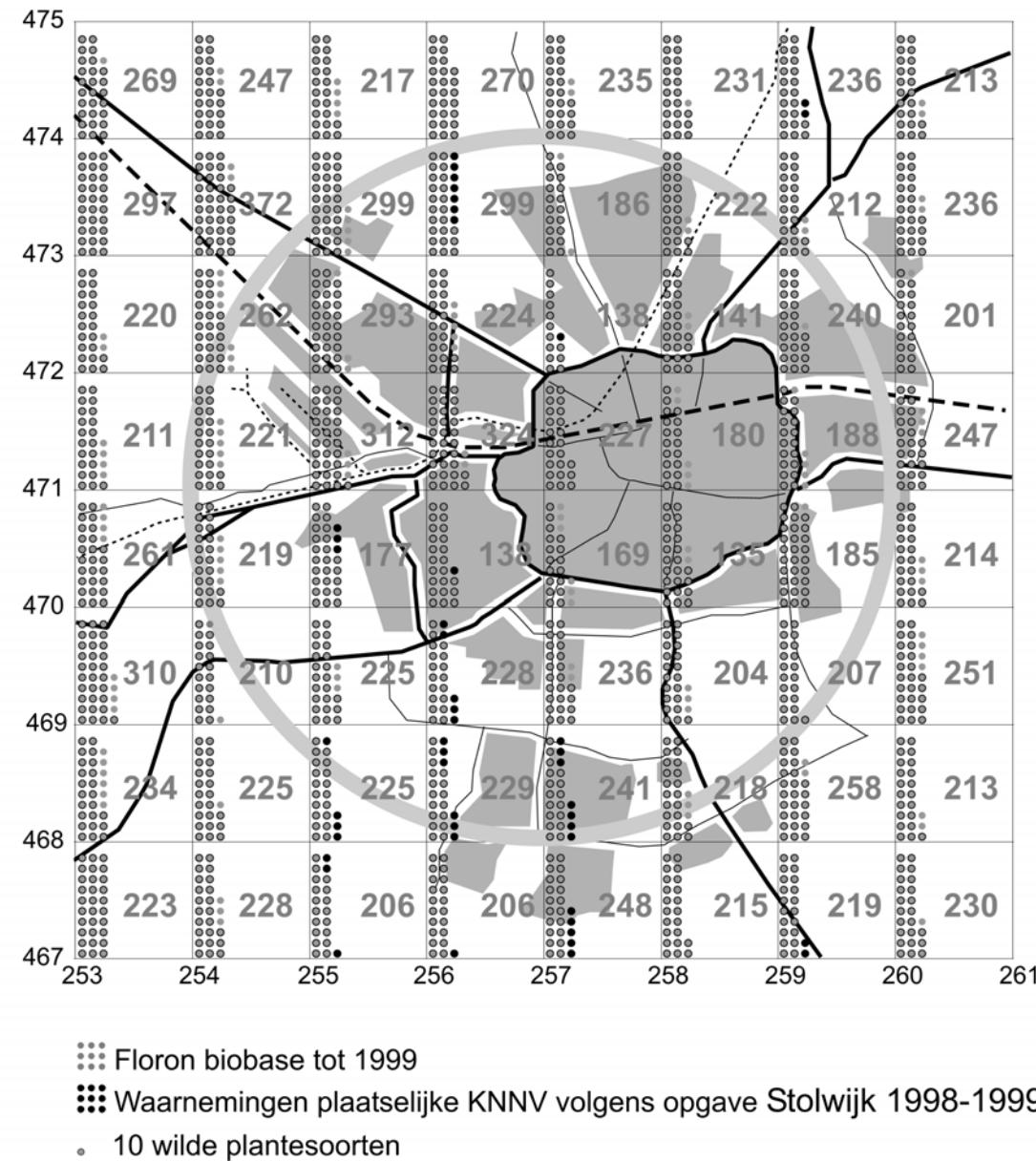
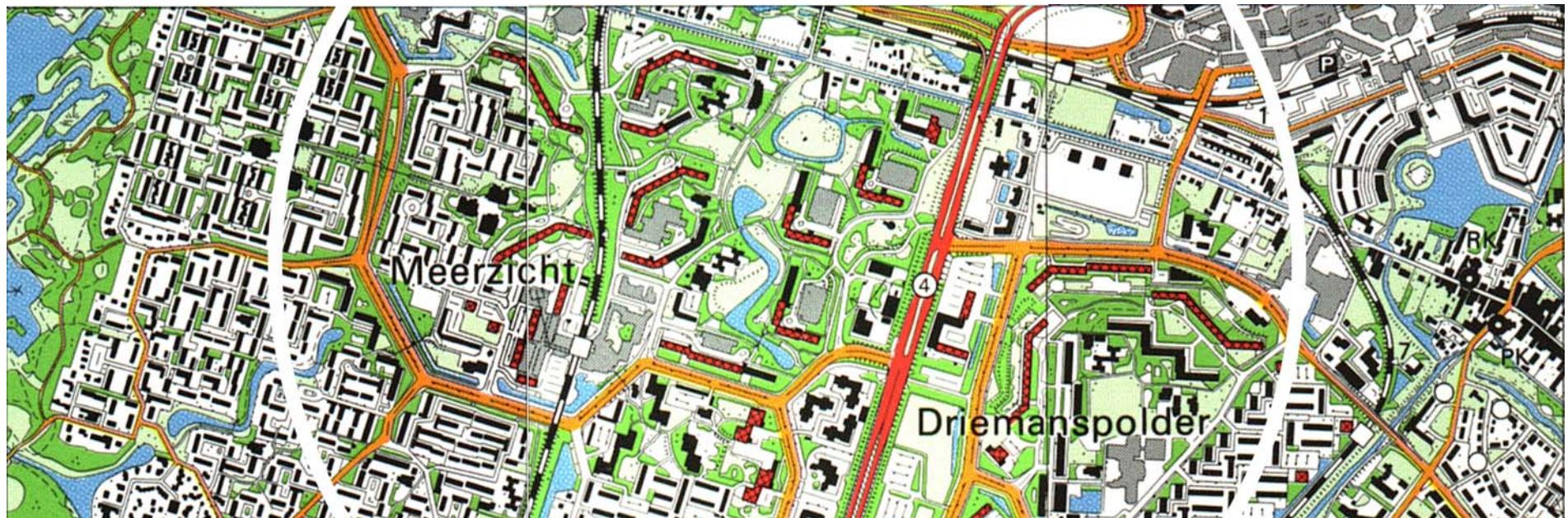


Fig. 190 R=3km Enschede 1999, comparable to its forest environment p.219



346 wild plant species

308 wild plant species

332 wild plant species

Fig. 191 R=1km Zoetermeer number of species from the outskirts into the centre p.219

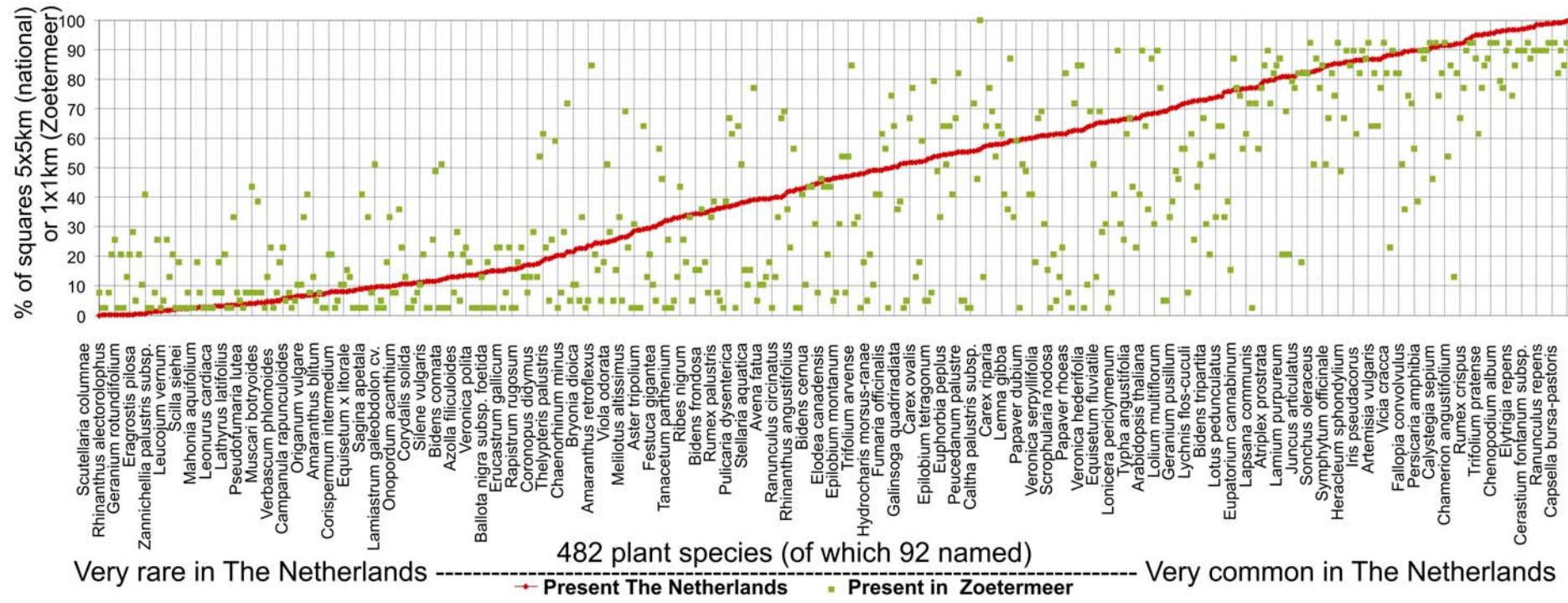


Fig. 192 National rareness of 500 urban plant species in Zoetermeer p.219

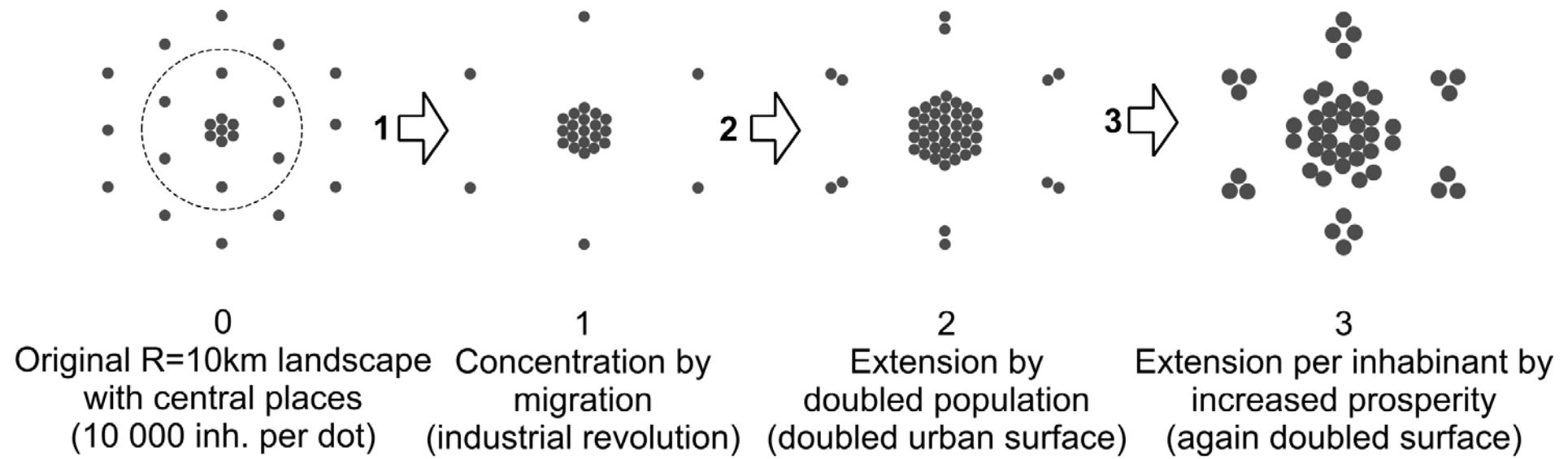


Fig. 193 Three processes increasing the urban surface $R=10\text{km}$ p.223



Fig. 194 The urban history of the Netherlands p.223



Fig. 194 The urban history of the Netherlands p.223



Fig. 194 The urban history of the Netherlands p.223

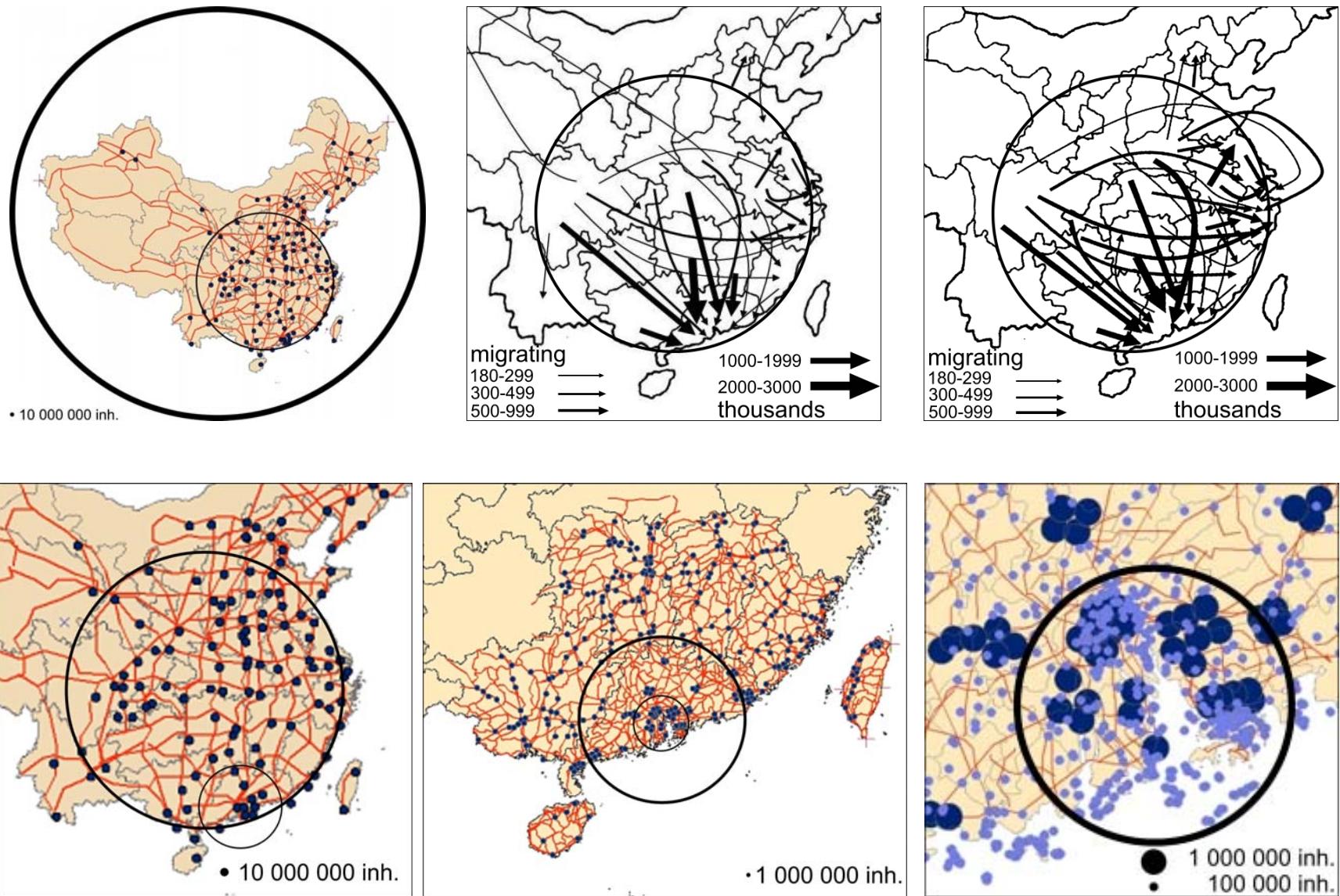


Fig. 195 $R=\{3000, 1000, 300, 100\text{km}\}$ China inhabitants p.224

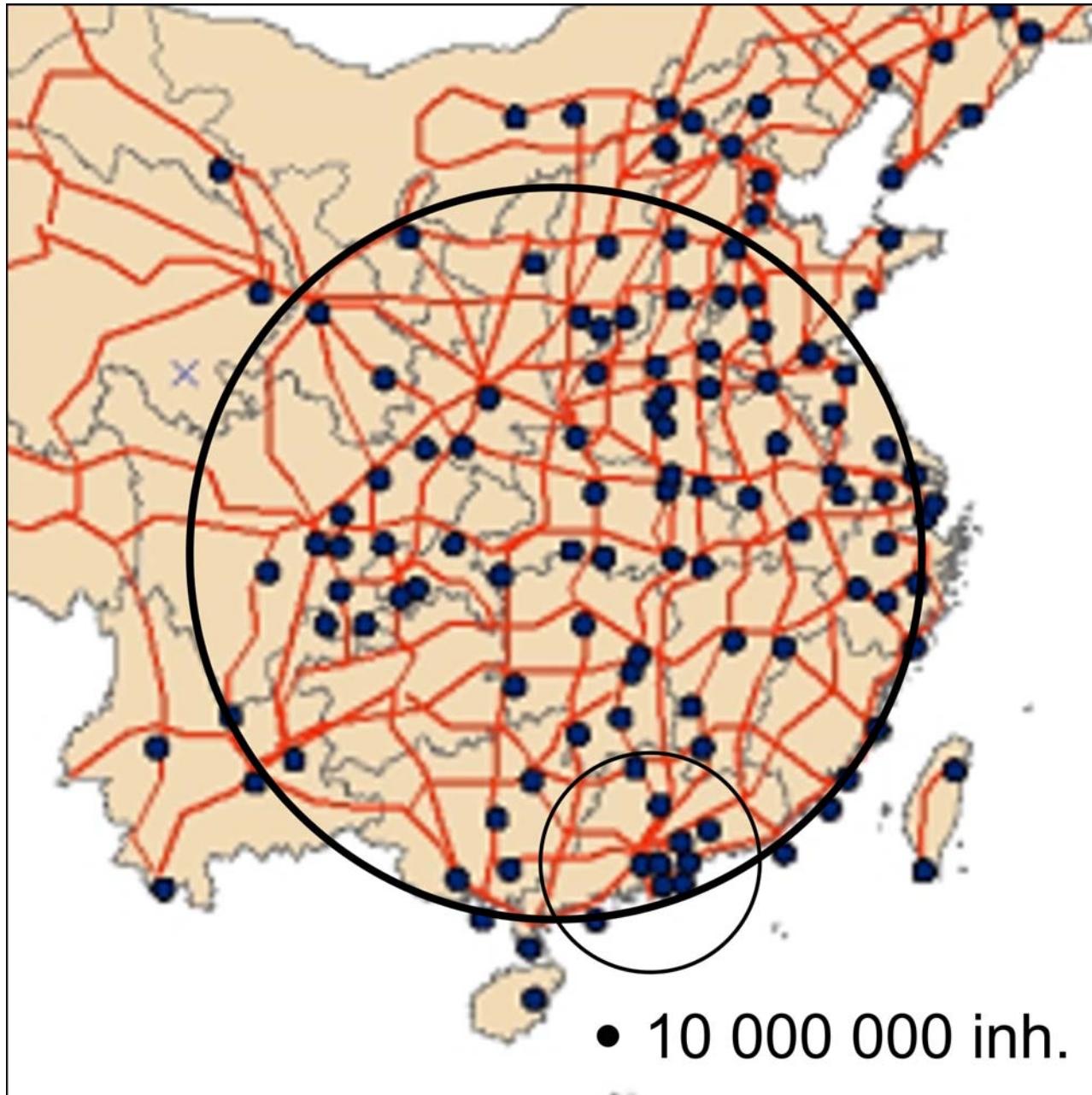


Fig. 198 $R=1000\text{km}$ p.224

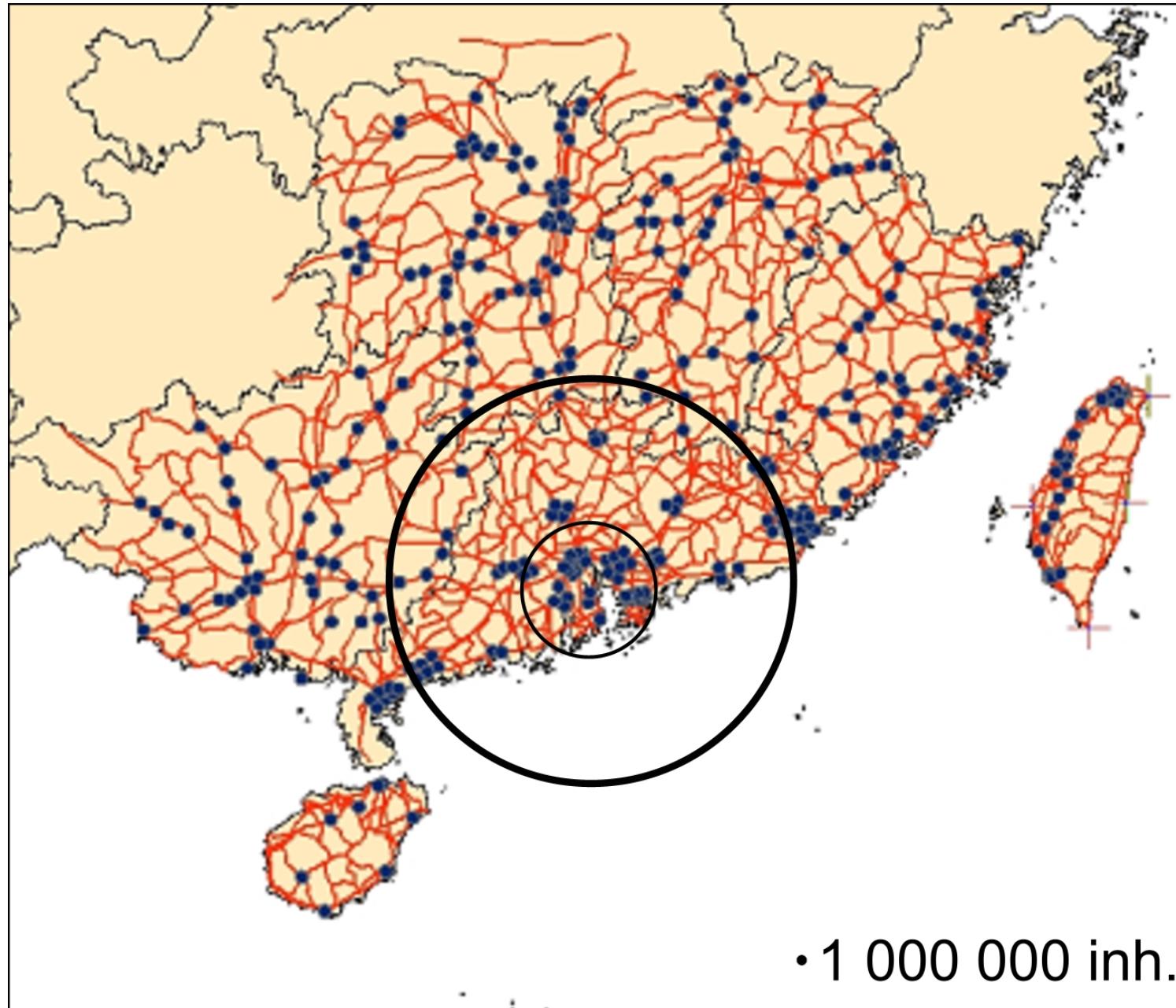


Fig. 199 R=300km p.224

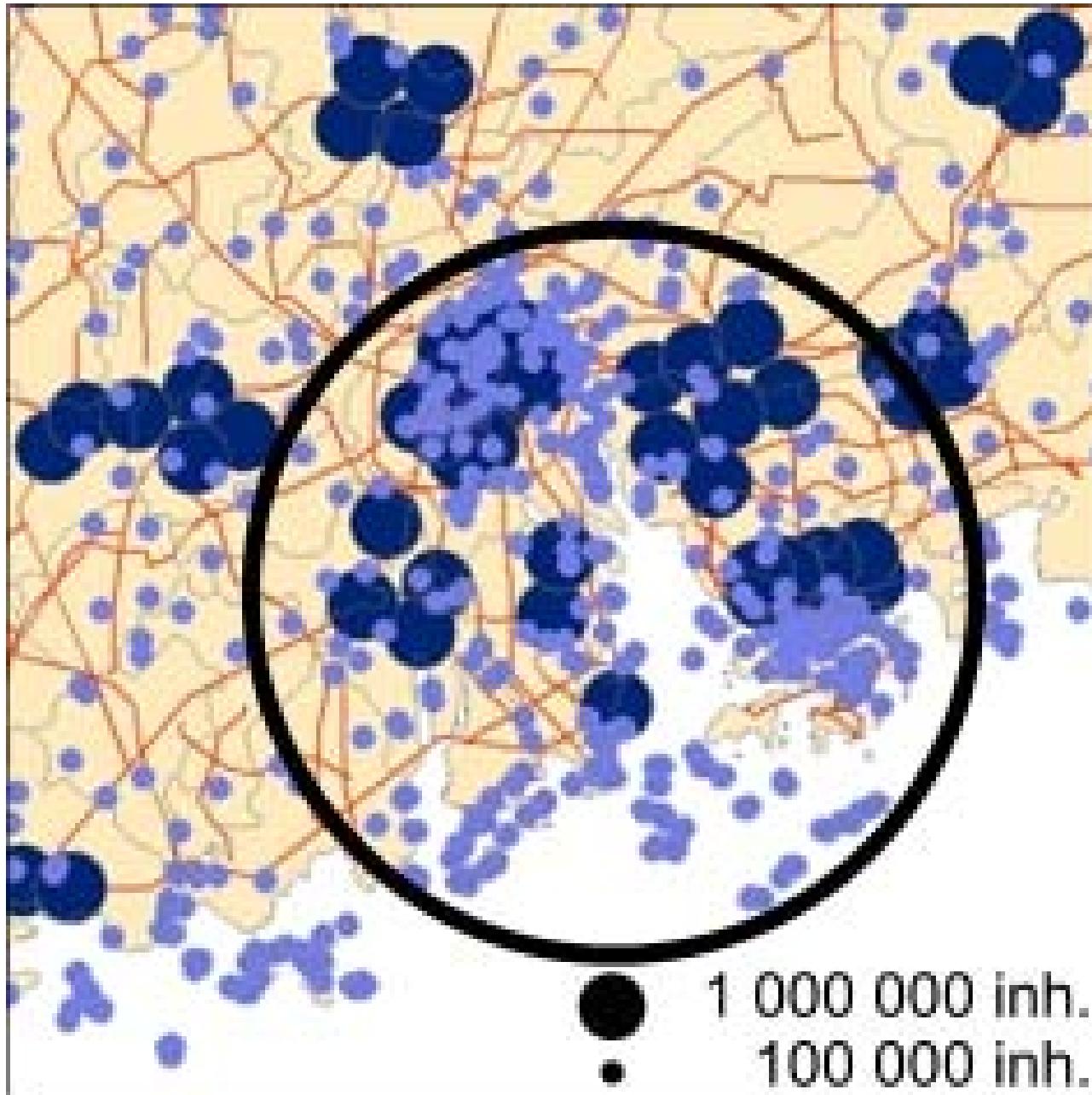


Fig. 200 R=100km p.224

Specialisation
Administration
Culture
Economy

Urban facilities
castle, palace
church, cloister, schools
market, shops, small businesses, dwellings

Fig. 201 Trias urbanica in the Middle Ages p.225

	Specialisation	Urban facilities
Politics	legislative power legal/administrative executive power	town hall law court/government services police station, prisons, military facilities
Culture	religion/ ideology art/science up-bringing/education	churches, monuments, signs museums, institutes, libraries schools
Economy	Production Exchange Consumption	companies, offices infrastructure, shops, banks hospitals, leisure facilities, parks, dwellings

Fig. 202 Social and urban specialisation recognisable in modern towns p.225

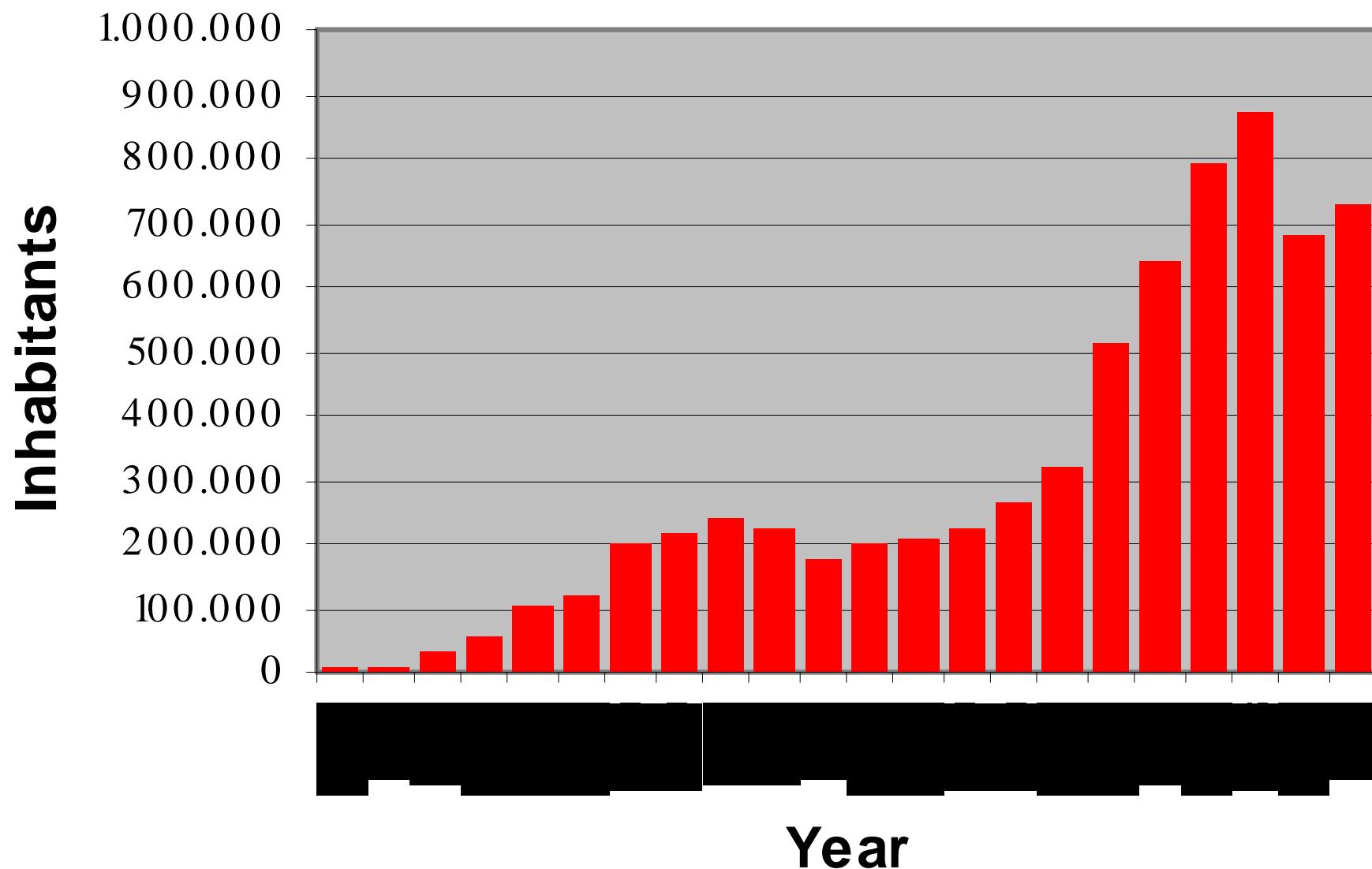


Fig. 203 Amsterdam population p.226

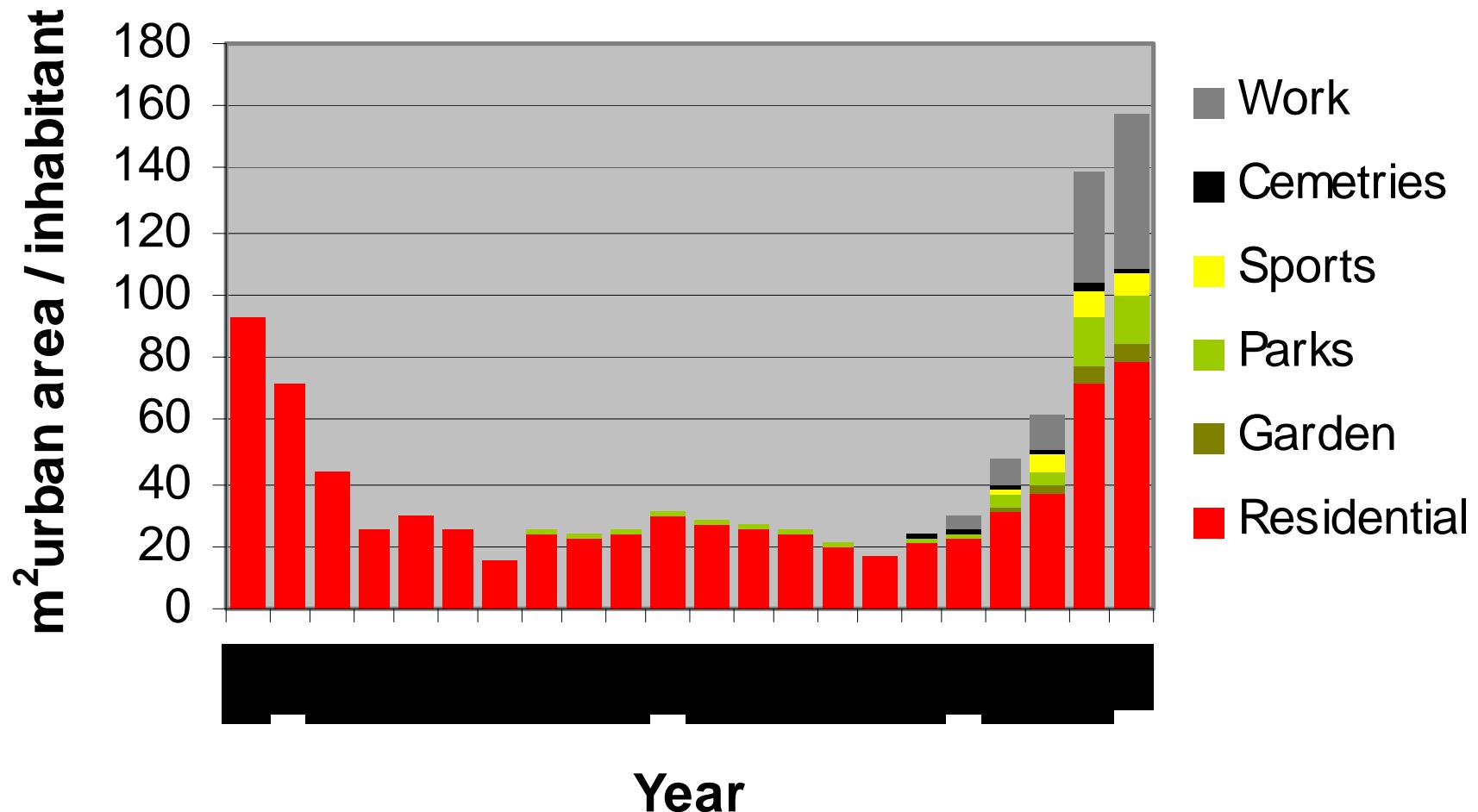


Fig. 204 Urban surface per inhabitant p.226

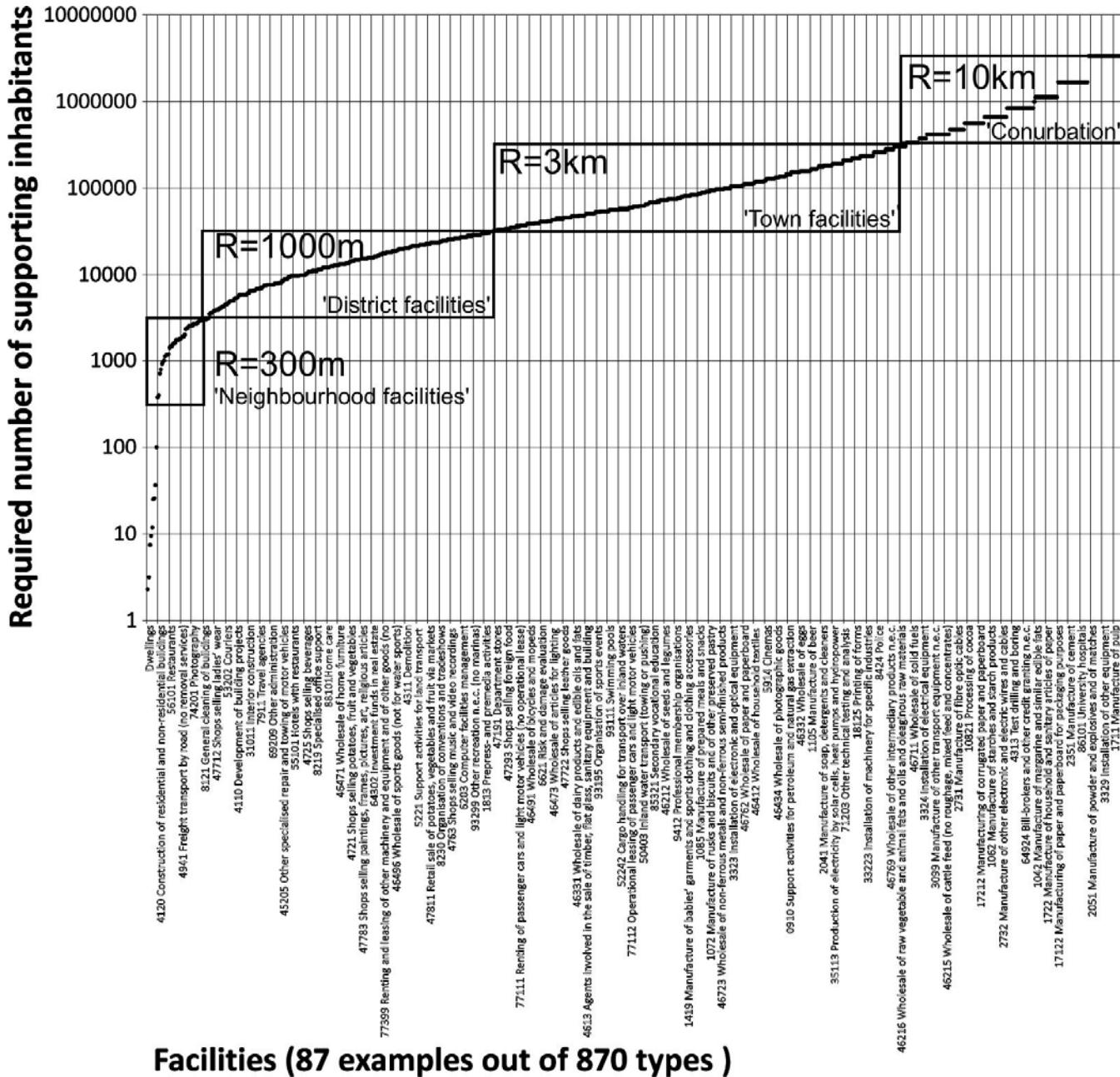


Fig. 205 The average number of inhabitants required p.227

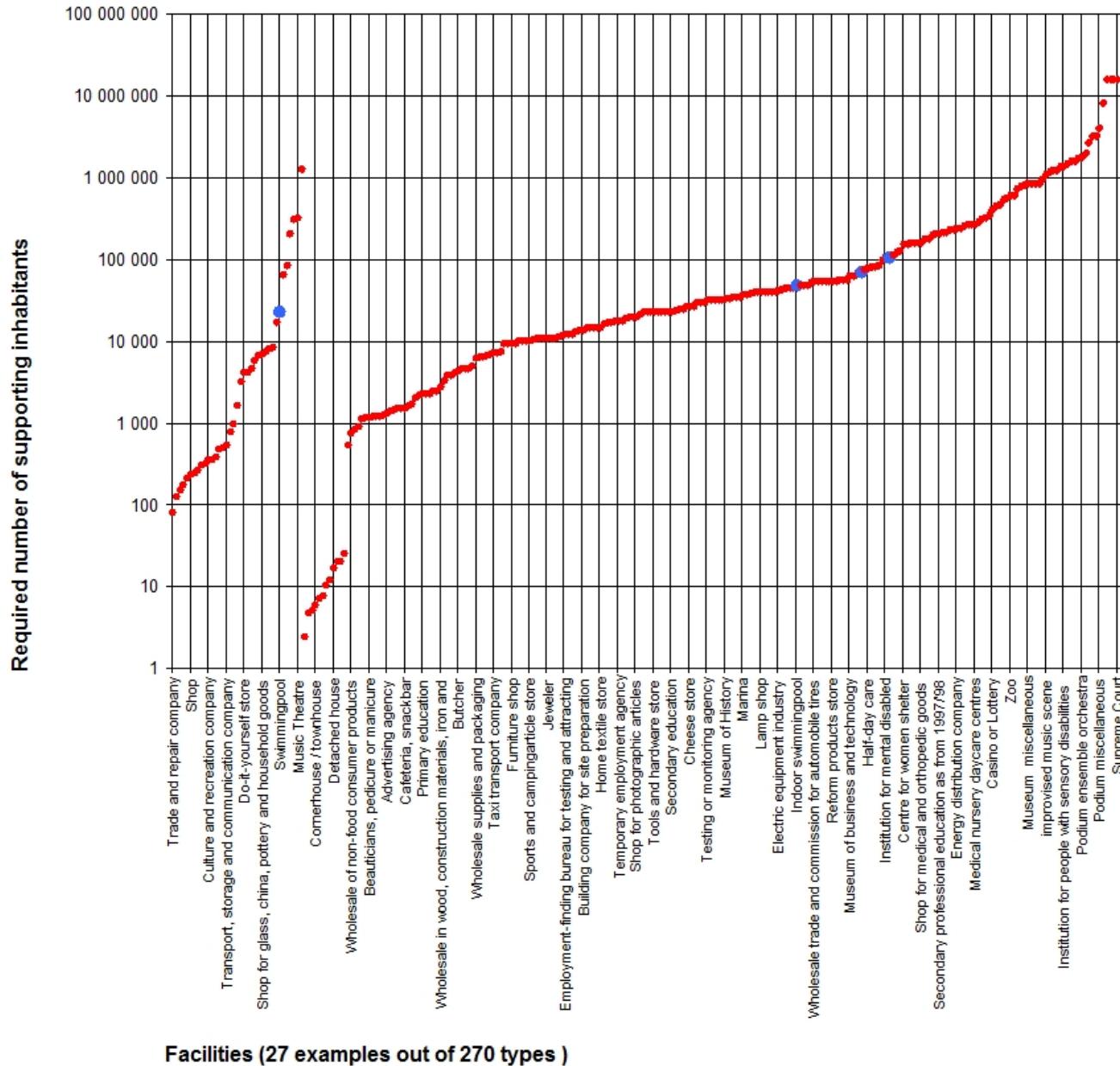
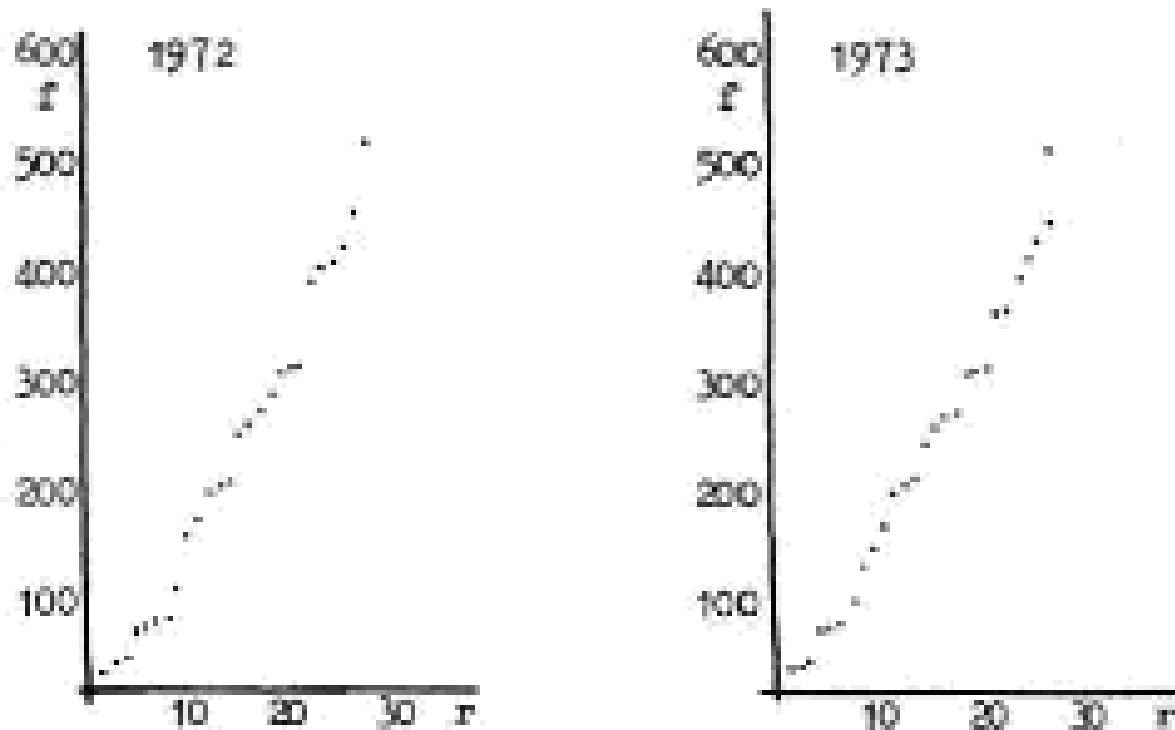


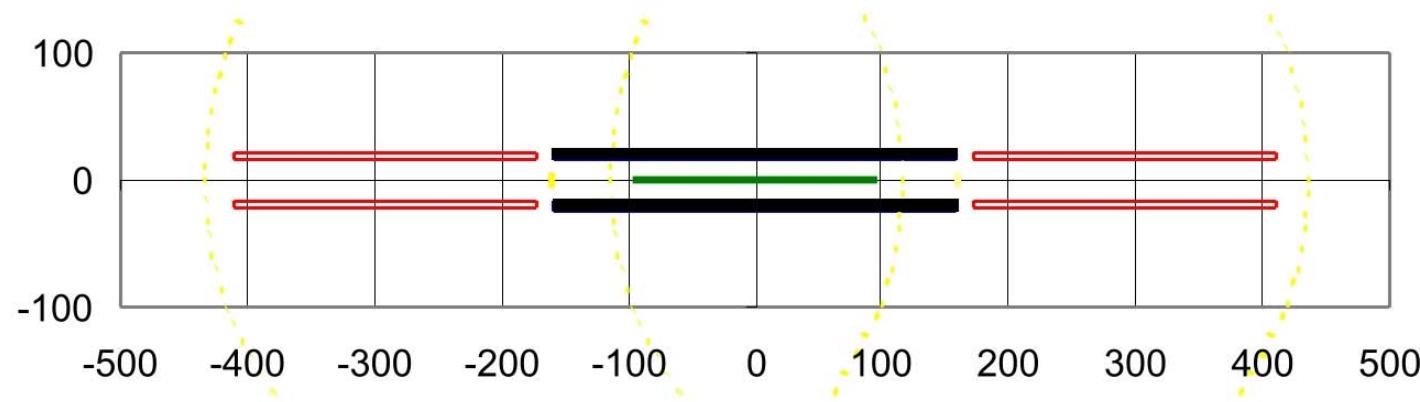
Fig. 206 National discontinuities 2000 p.228

Wanneer ik bijvoorbeeld binnen een stad (in dit geval 's-Gravenhage) het aantal winkels in een bepaalde branche (f) uitzet tegen het rangnummer van deze frequentie (r), dan zien we in de loop der jaren een toenemend continu verband (naar cijfers uit het tijdschrift 's-Gravenhage, 28(1973)10(okt)):



Wanneer men het inwonertal (hier ca 500 000) van de stad deelt door de frequentie (f), krijgt men een "gemiddeld draagvlak", dat voor een éénmalig voorkomen van een voorziening derhalve de hele stad zou overvatten.

Fig. 207 Urban discontinuities 1973 p.228



Shop surface

Parking surface

Bicycles

Public transport

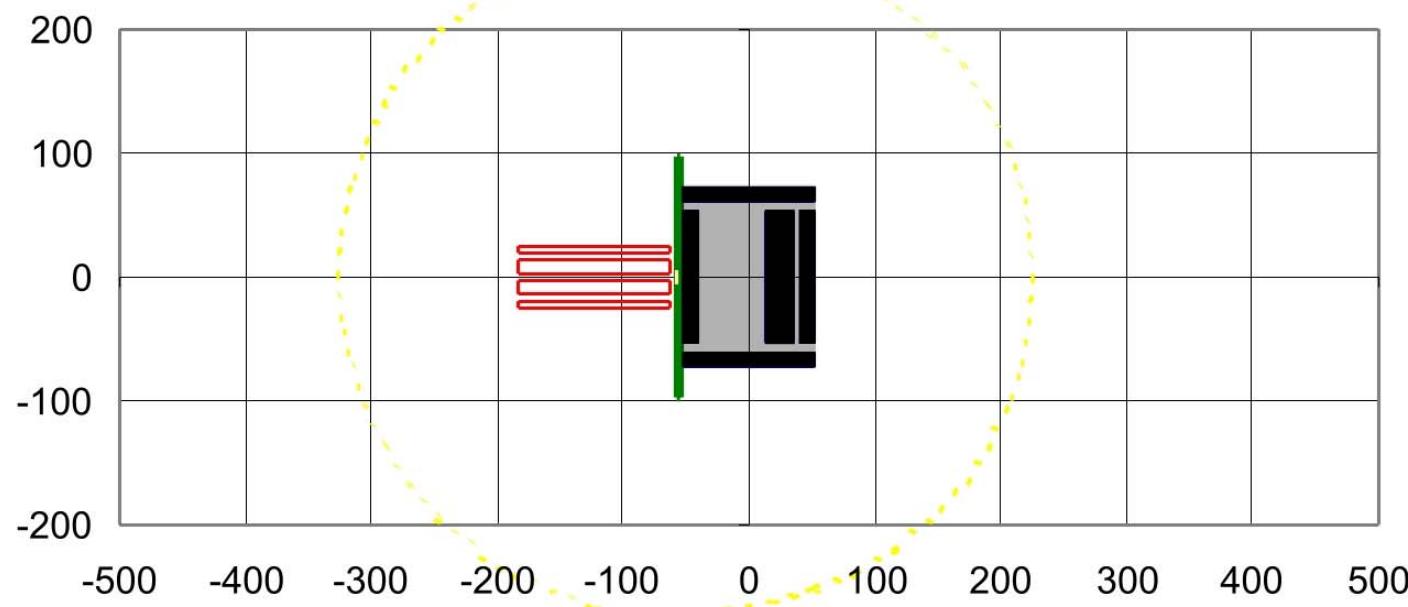


Fig. 208 $R=\{300, 100m\}$ 10 000m 2 floor space 10m deep p.229

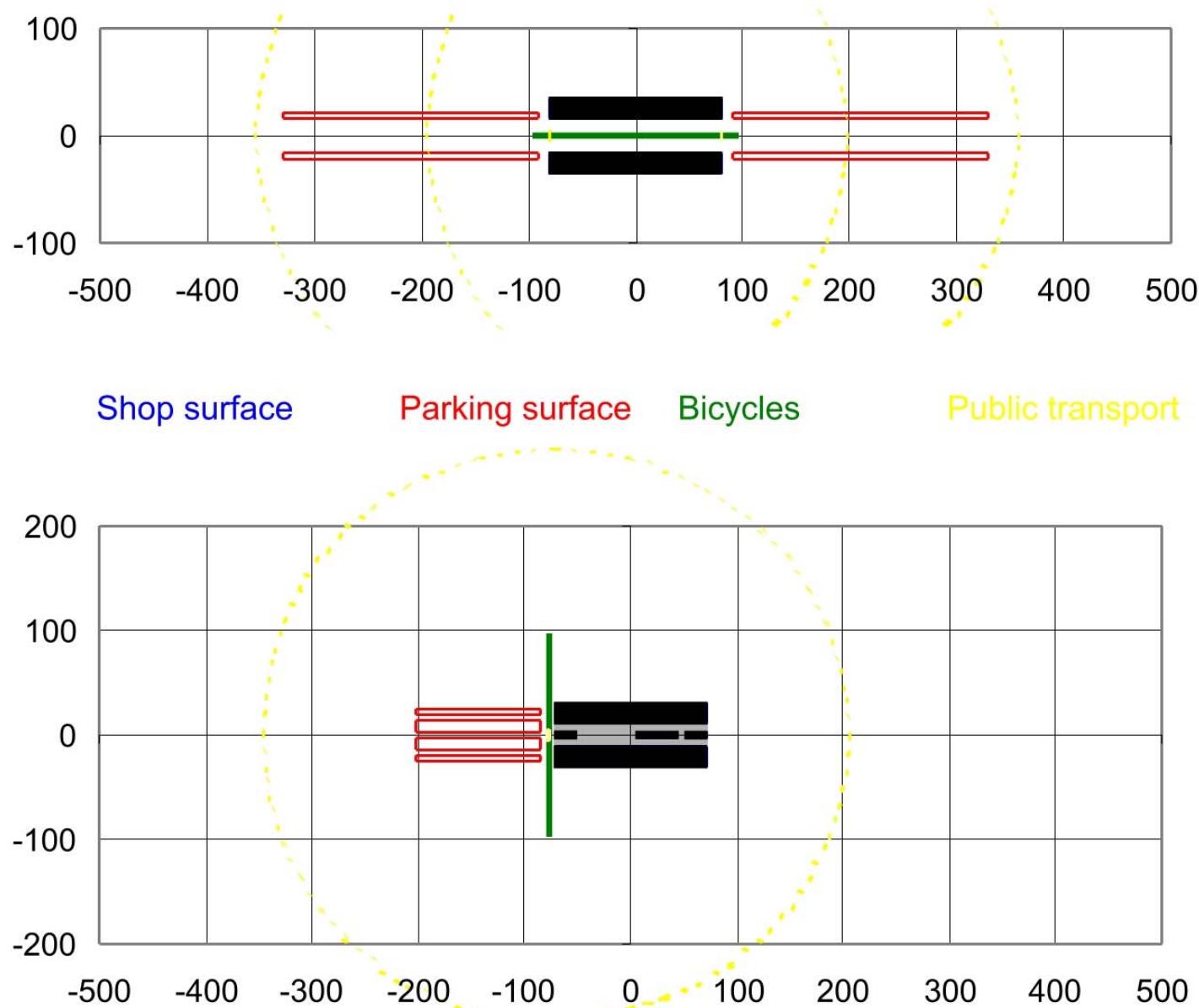


Fig. 209 $R=\{300, 100m\}$ 10 000m 2 floor space 20m deep p.229

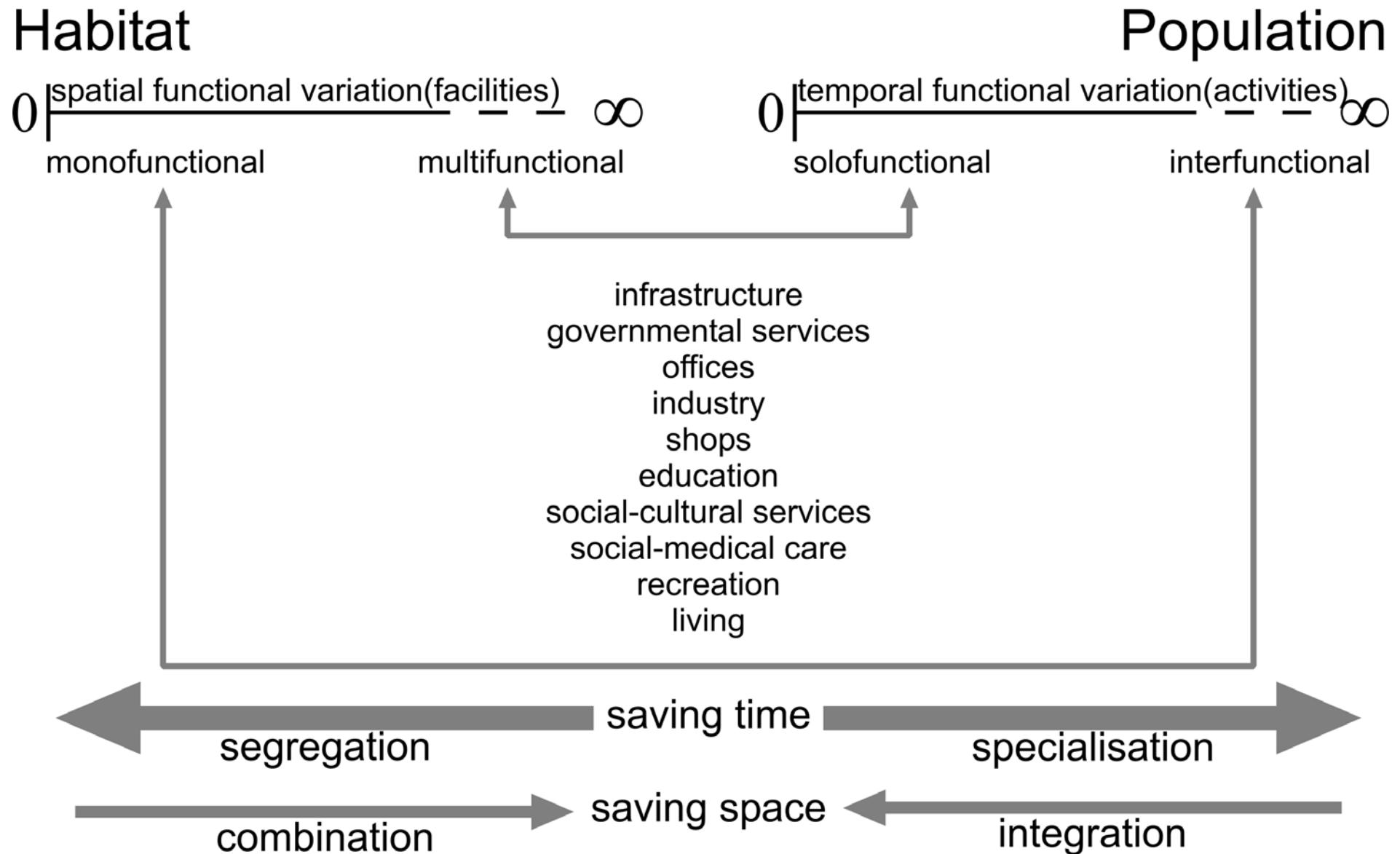


Fig. 210 Urban functional variation ... p.232

	1970 ^a	1970 ^b	1970 ^c	1983 ^d	2000 ^c
infrastructure	70	14	52	91	71
government	1	1		1	
offices	2	1		3	
industry	12	10	18	67	83
shops	6	2		2	
education	6	1		6	
cultural	5	4		8	10
care	3	2		4	
recreation	45	30		64	56
residential	60	145	145	137	139
	210	210	215	383	359

Fig. 211 .. m2/inhabitant p.232

1983	hr/ inhabitant	m²/ inhabitant	hr/ m²
infrastructure	387	91	4
government	61	1	61
offices	51	3	17
industry	298	67	4
shops	238	2	119
education	374	6	62
cultural	539	8	67
care	77	4	19
recreation	198	64	3
residential	6526	137	48
total, average	8749	383	41
(agriculture	11	1667	0.01)

Fig. 212 Intensity of use p.233

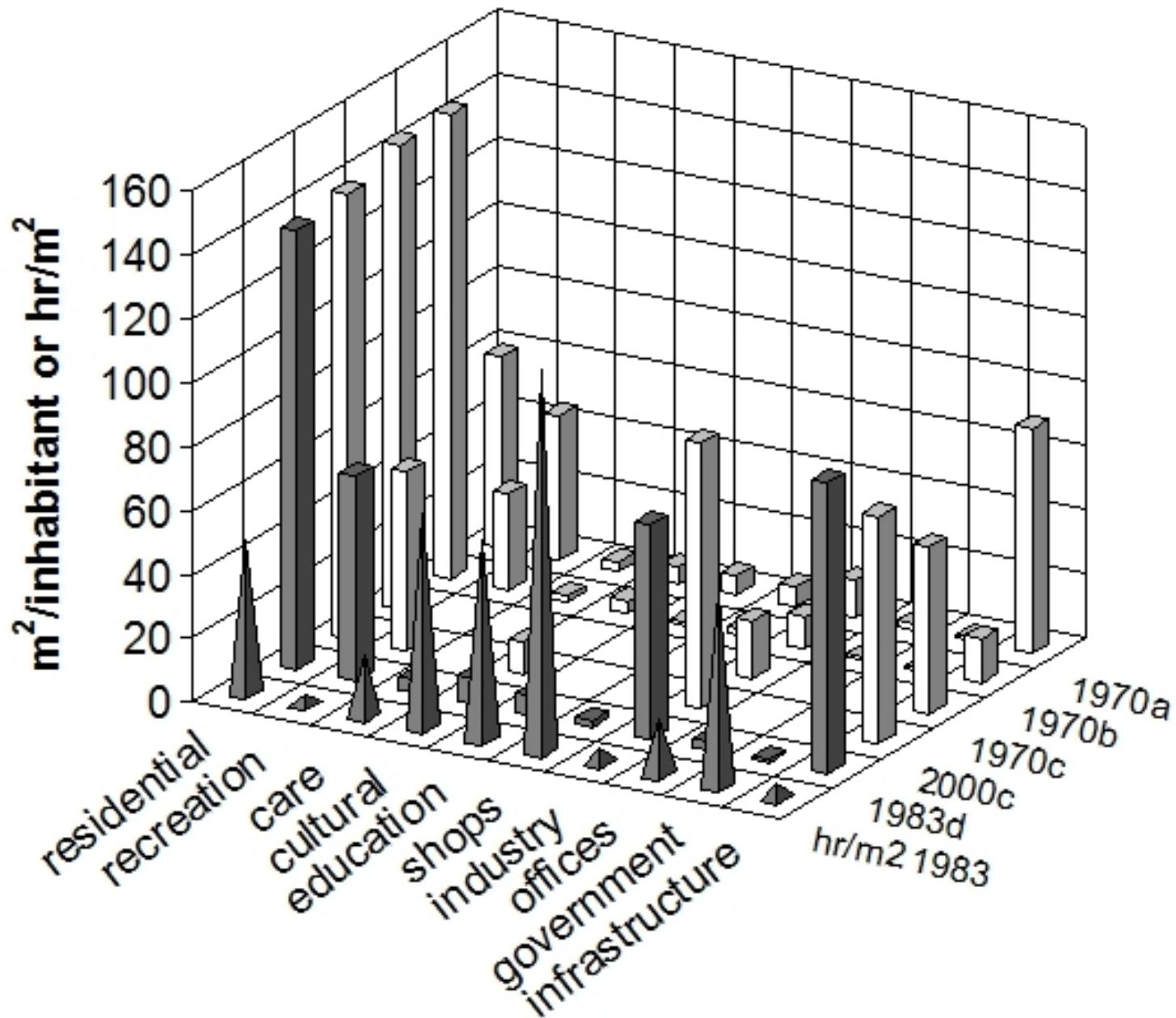


Fig. 213 Surface and intensity p.233

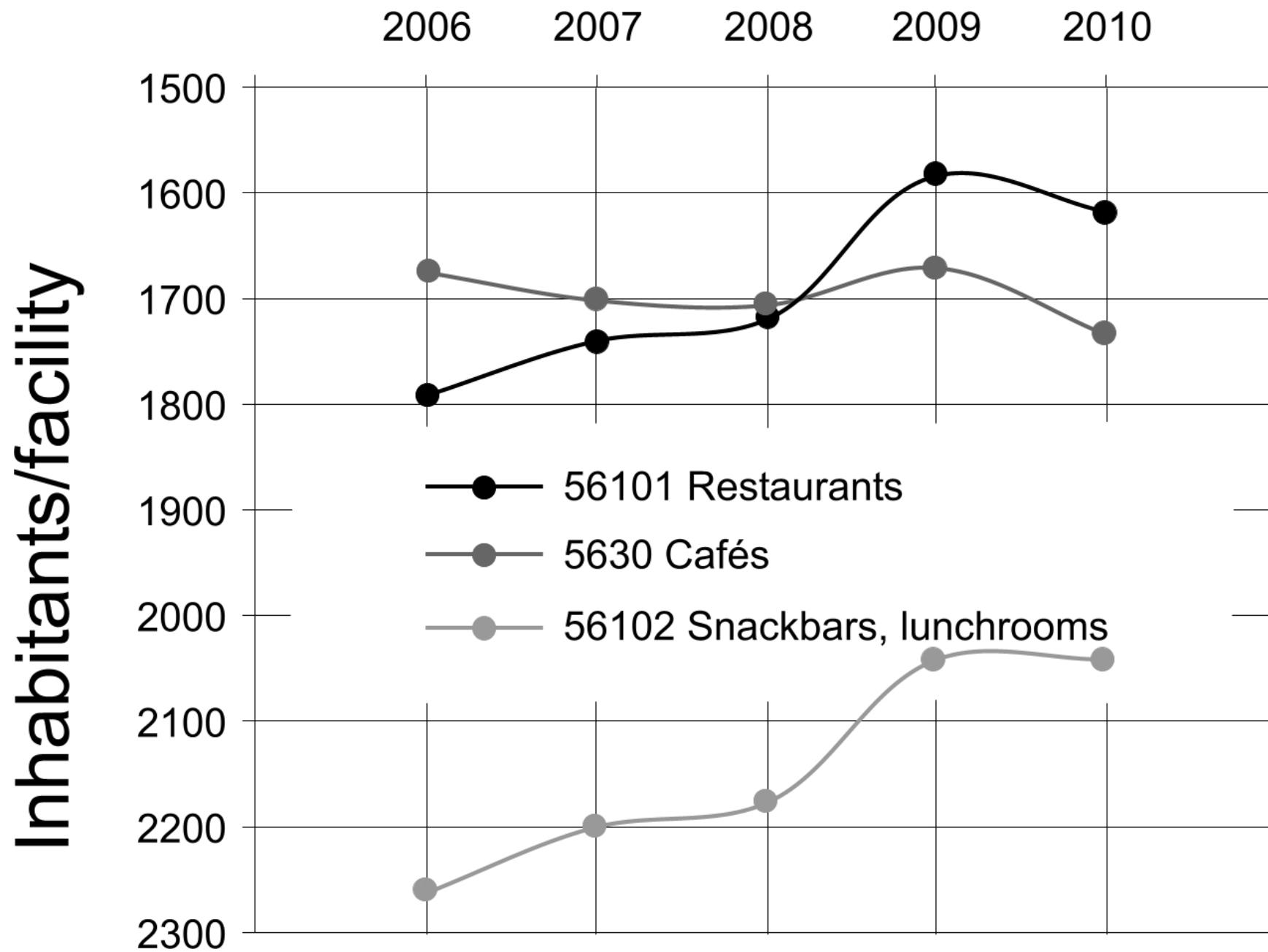


Fig. 214 $R=300m$ increasing ... p.233

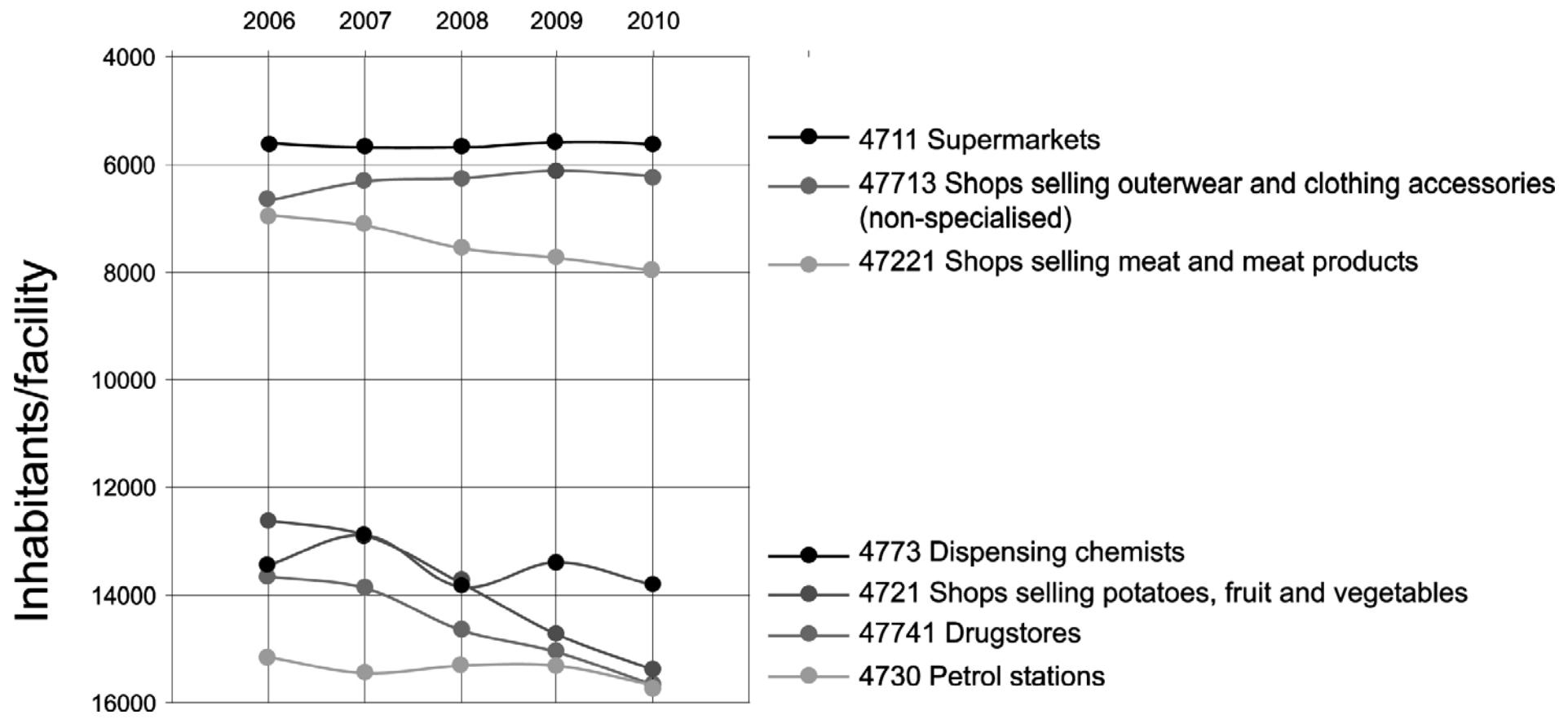
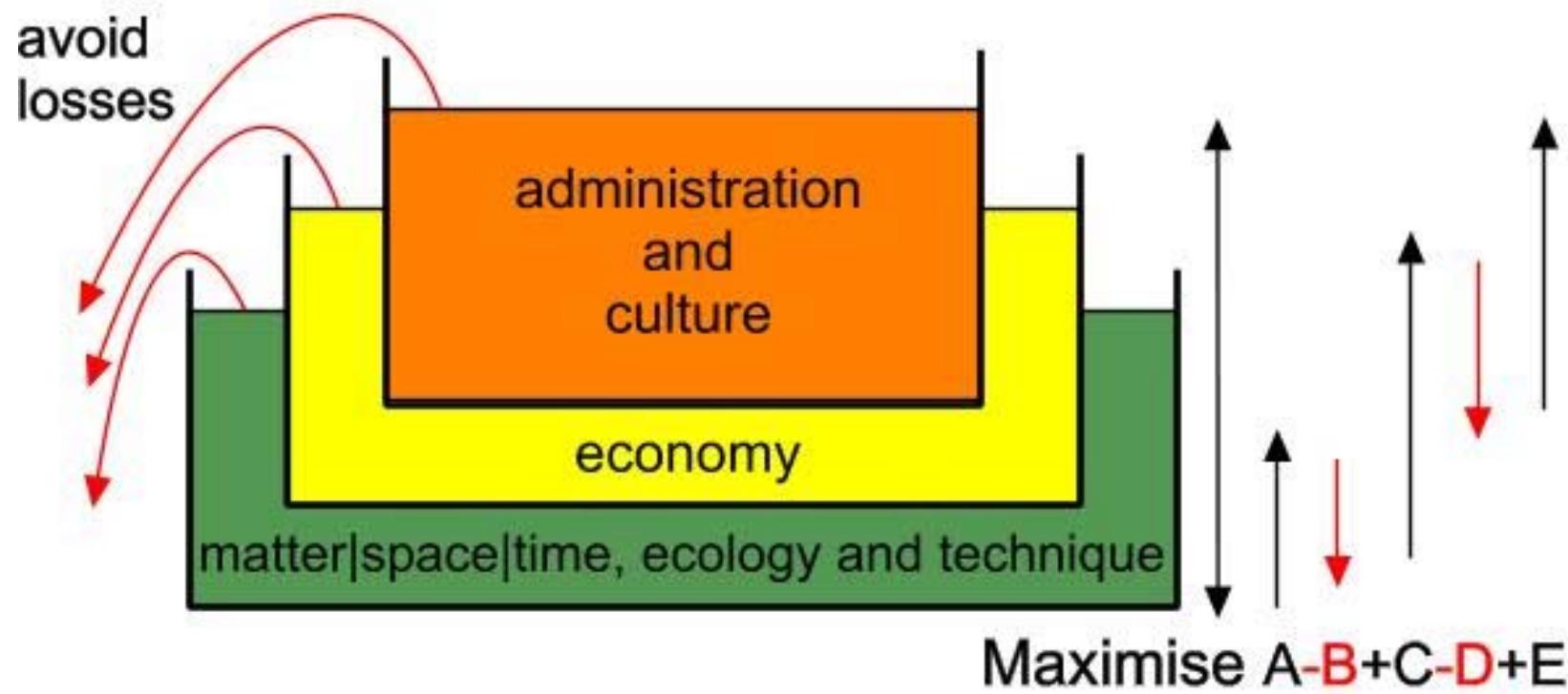


Fig. 215 ... and R=1km decreasing support p.233



- A Increase carrying capacity (spatial, ecological, technical)**
- B Decrease economic pressure (unlinking)**
- C Increase economic carrying capacity (economic)**
- D Decrease social pressure (social effectiveness)**
- E Increase social capacity (social quality)**

Fig. 216 Carrying capacity p.234

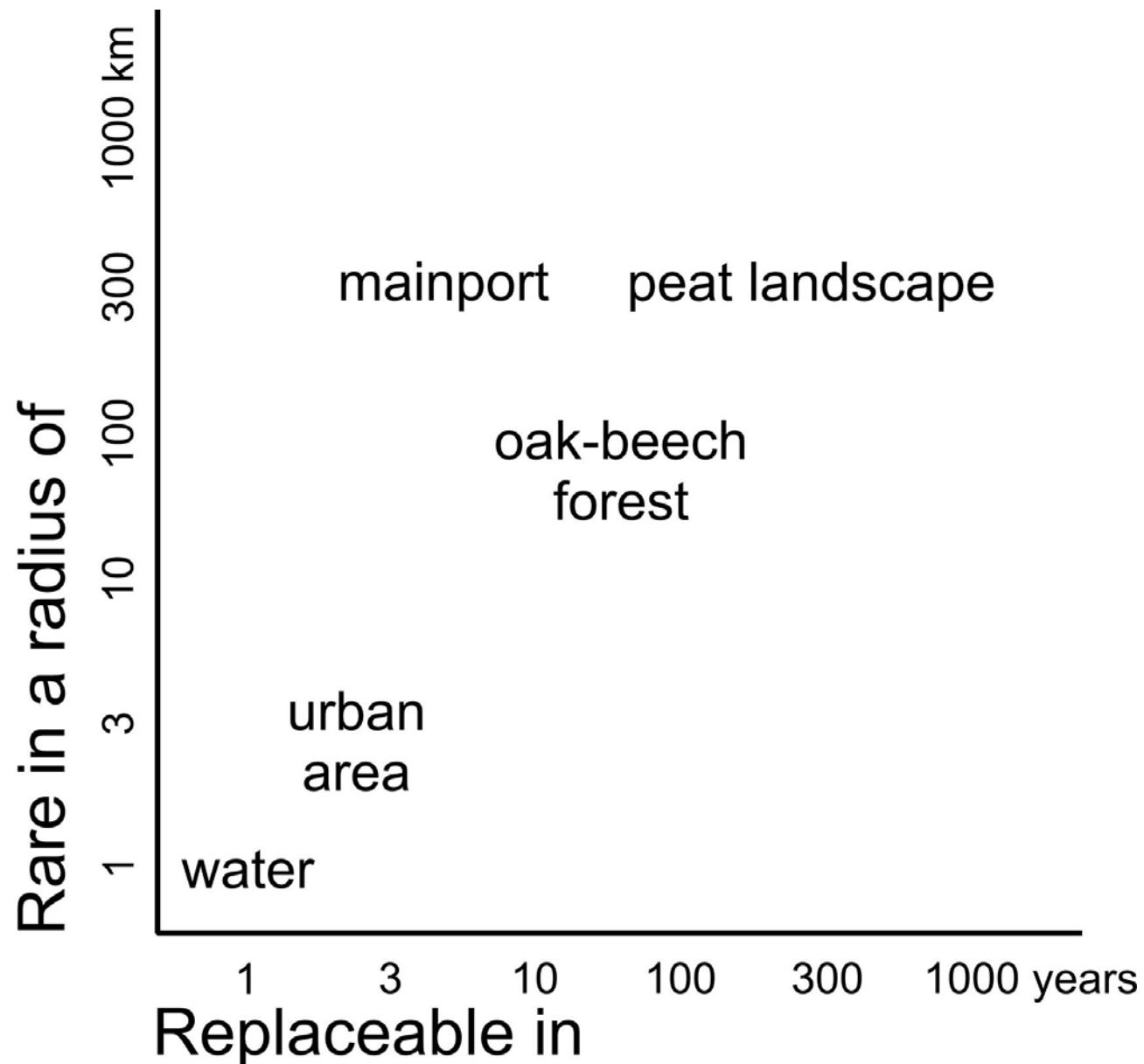


Fig. 217 Rarity and replaceability p.234

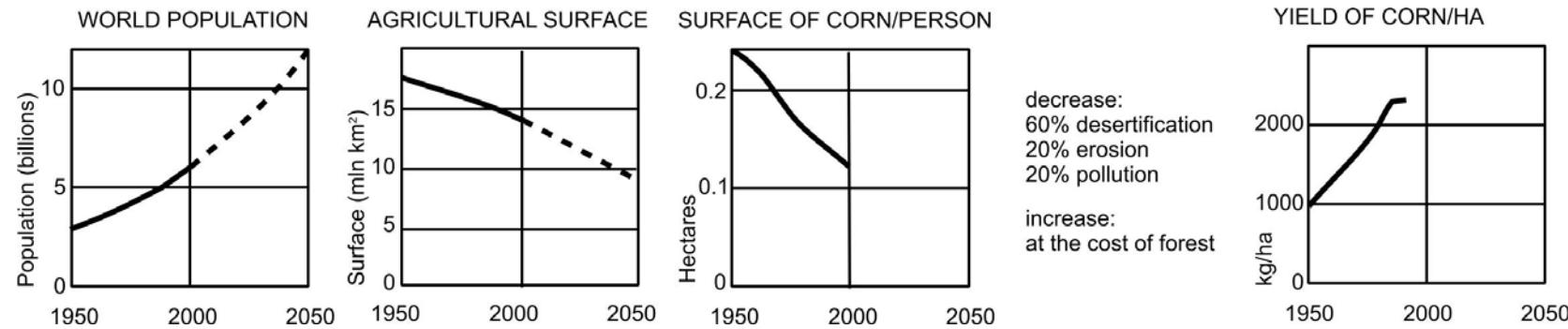


Fig. 218 Increasing population, decreasing agricultural surface, increasing productivity p.236

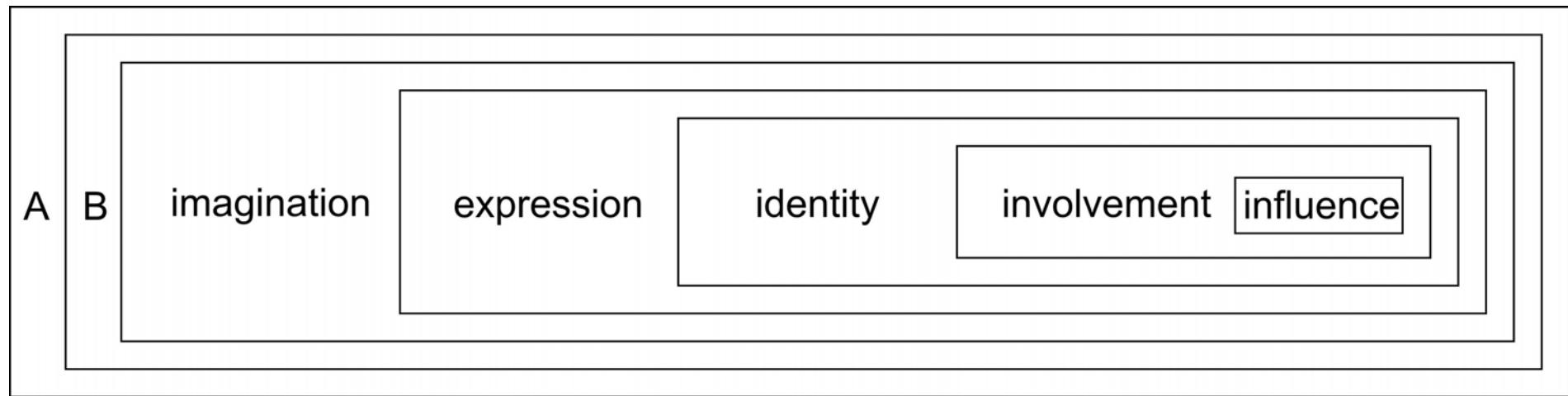


Fig. 219 Conceptual conditions p.240

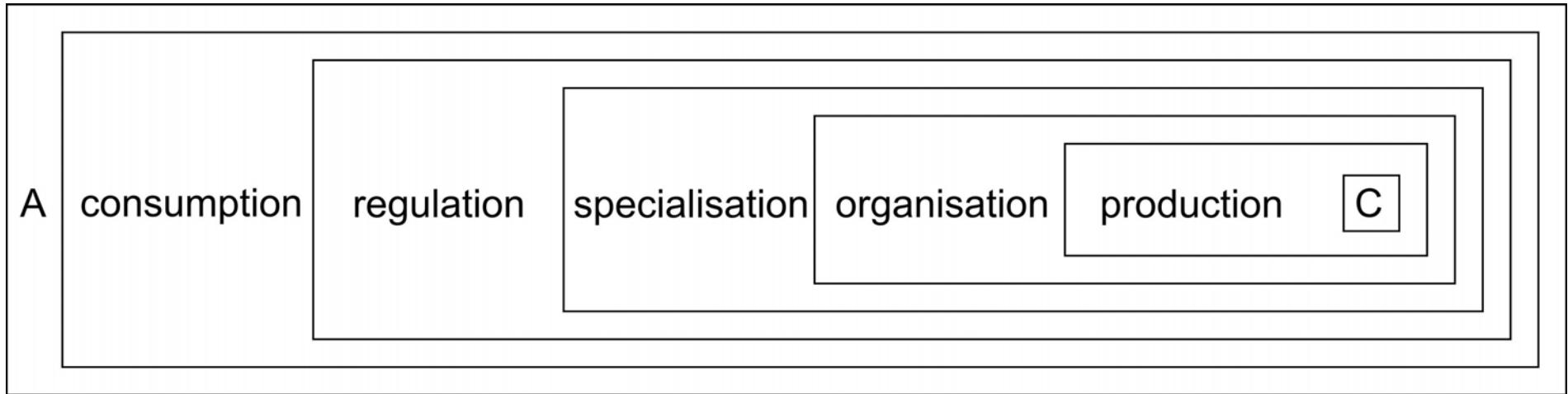


Fig. 220 Biotic conditions p.240

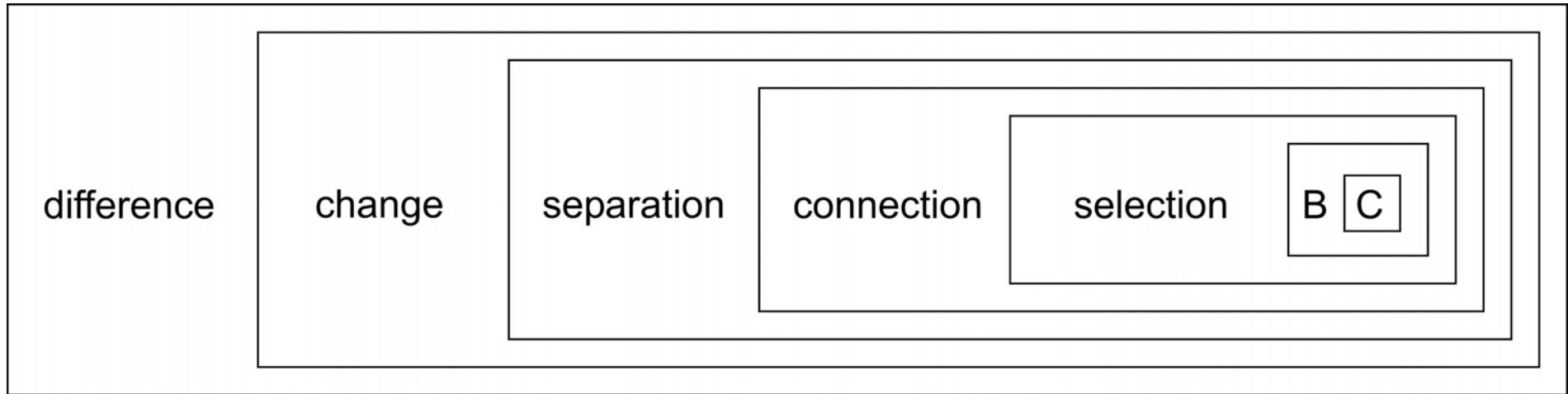


Fig. 221 A-biotic conditions p.241

	1	2	3	4	5
A A-biotic	difference	change	separation	connection	selection
B Biotic	consumption	regulation	specialisation	organisation	production
C Conceptual	imagination	expression	identity	involvement	influence

Fig. 222 A checklist of conditions p.242

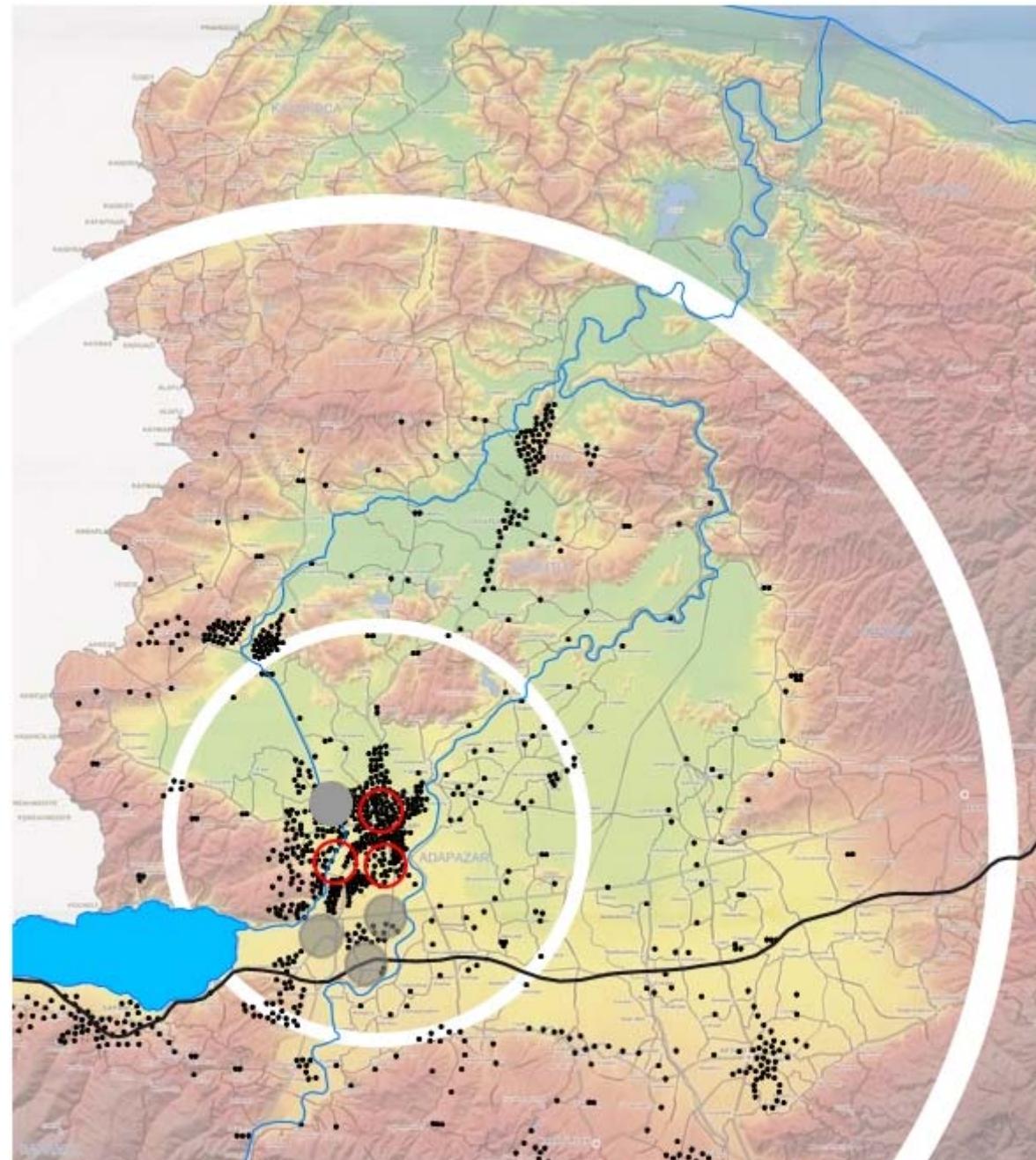


Fig. 223 $R=\{30, 10\text{km}\}$ Adapazarı 2000 p.248

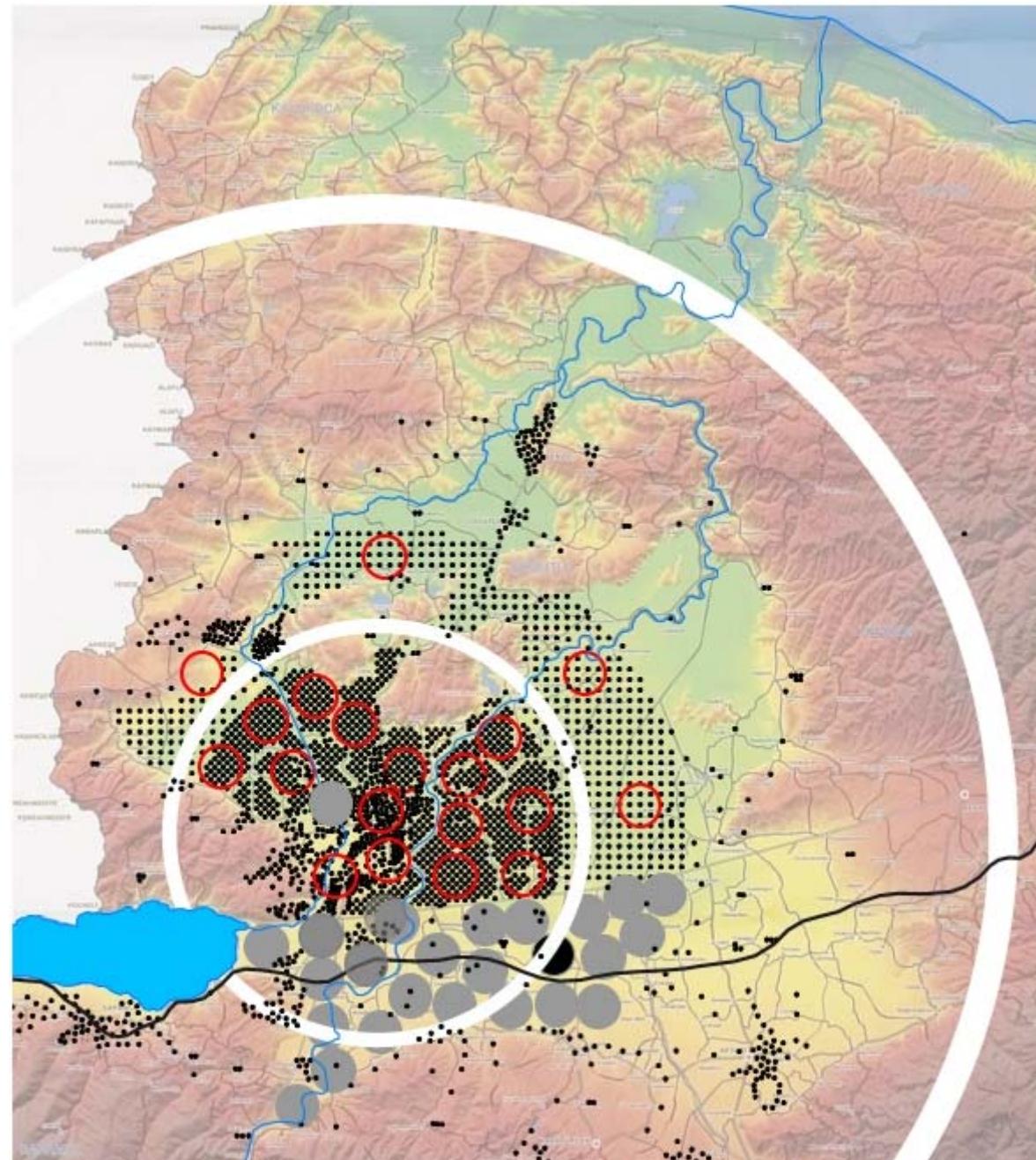


Fig. 224 $R=\{30, 10\text{km}\}$ Adapazari worst case p.248

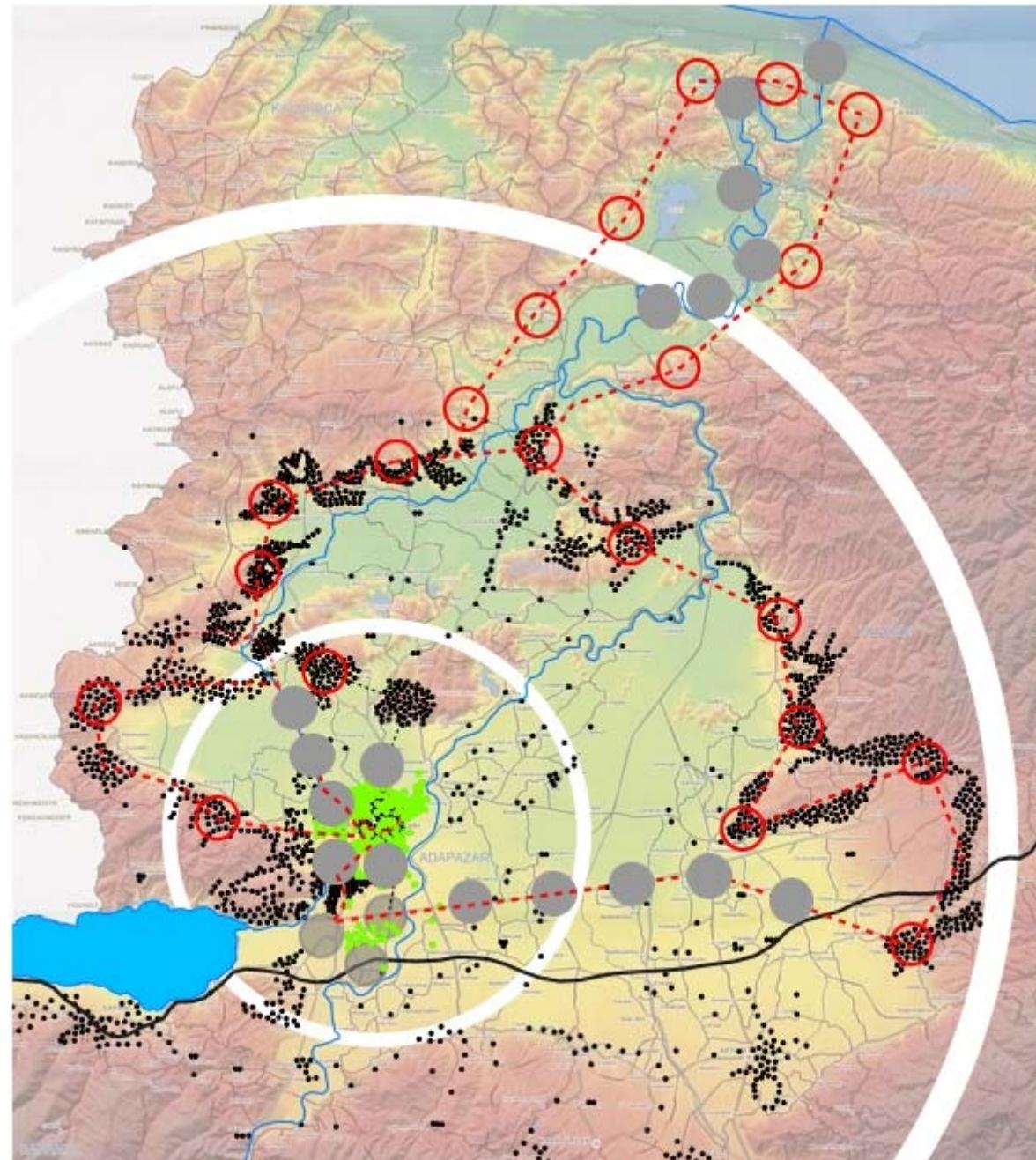


Fig. 225 $R=\{30, 10\text{km}\}$ Adapazarı 2030 p.248

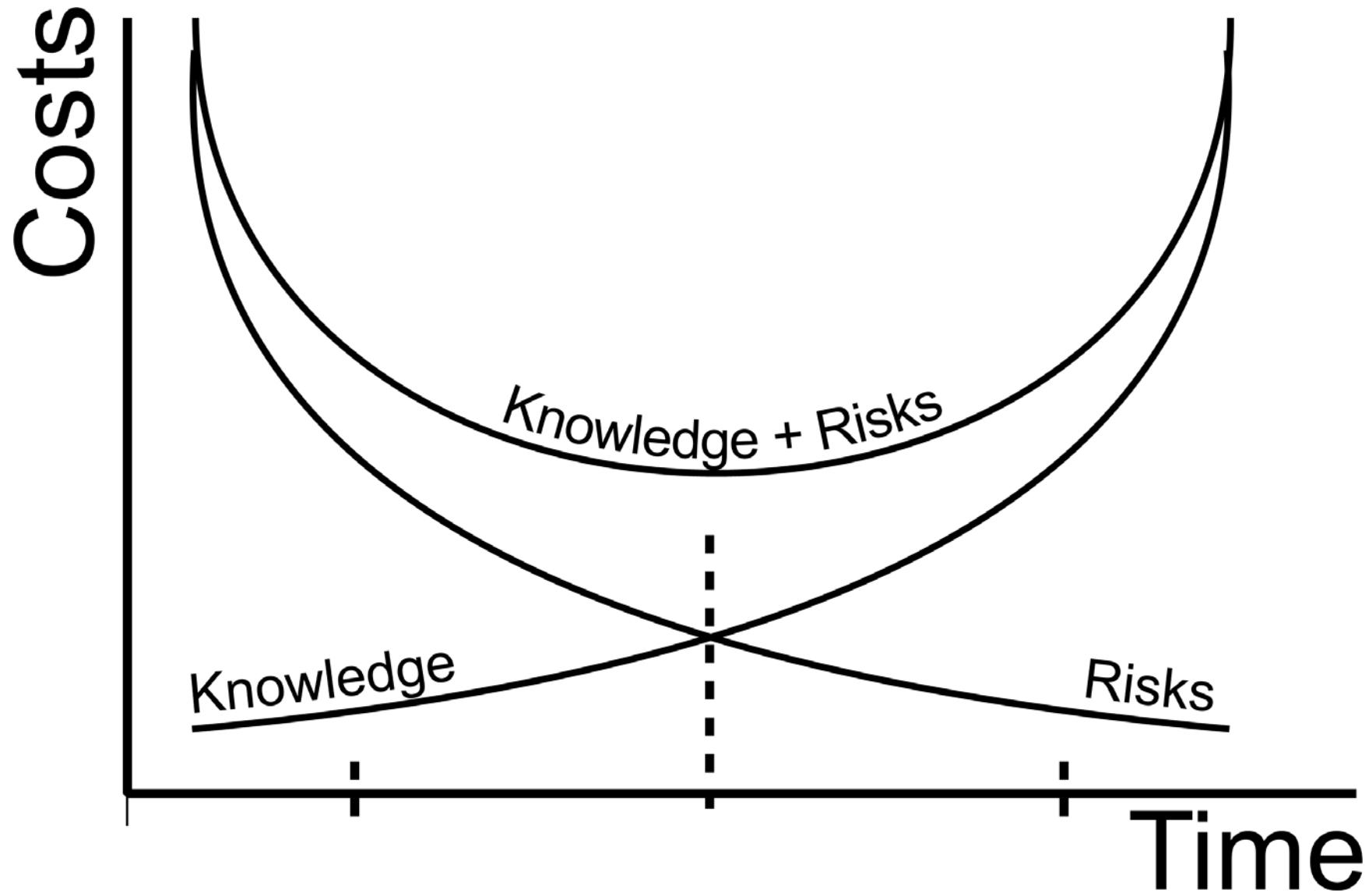


Fig. 226 The costs of increasing knowledge and reducing risks p.248

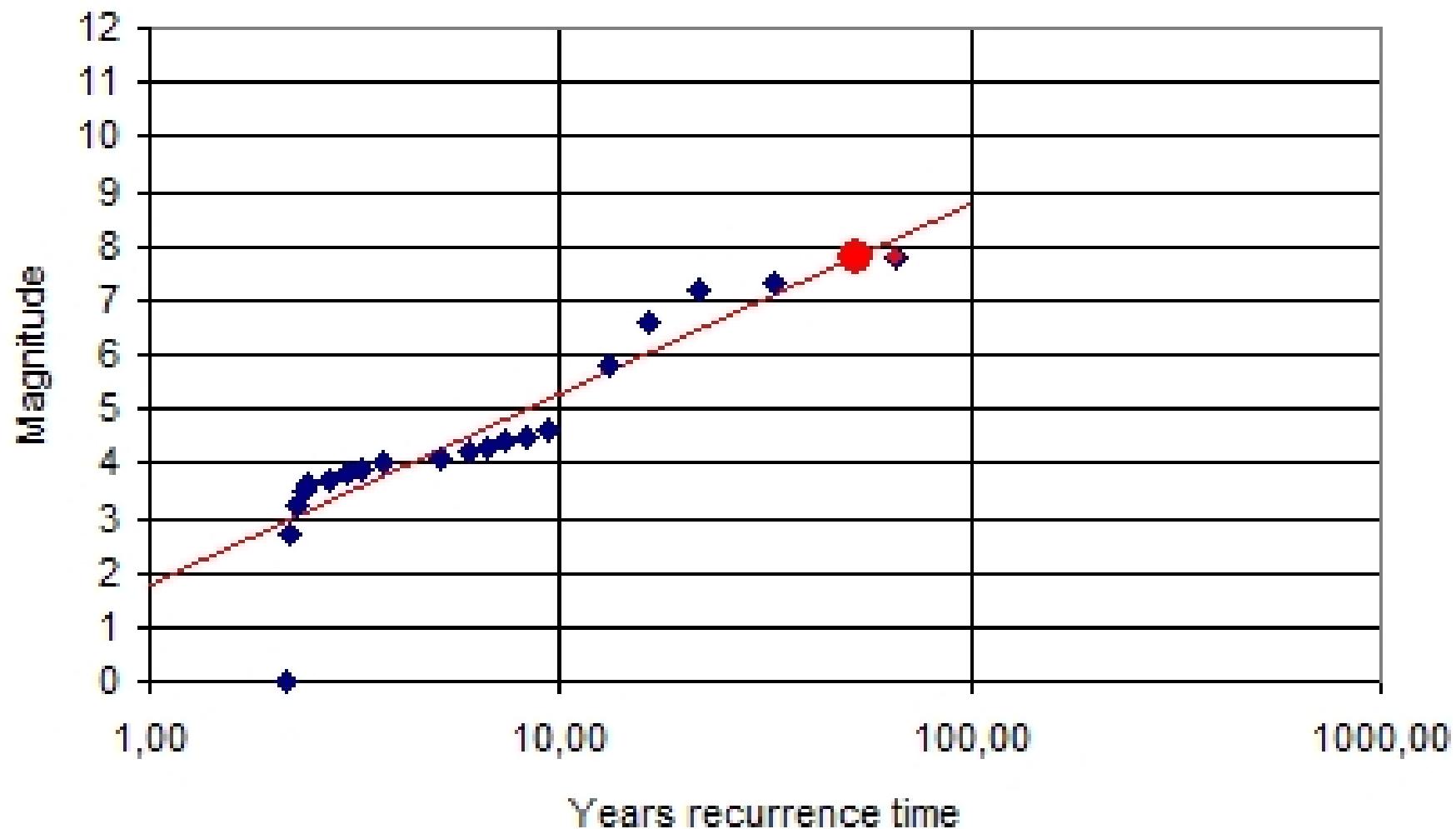


Fig. 227 Ranking the earthquakes 100km around Adapazari in the past 50 years p.248

Object of study

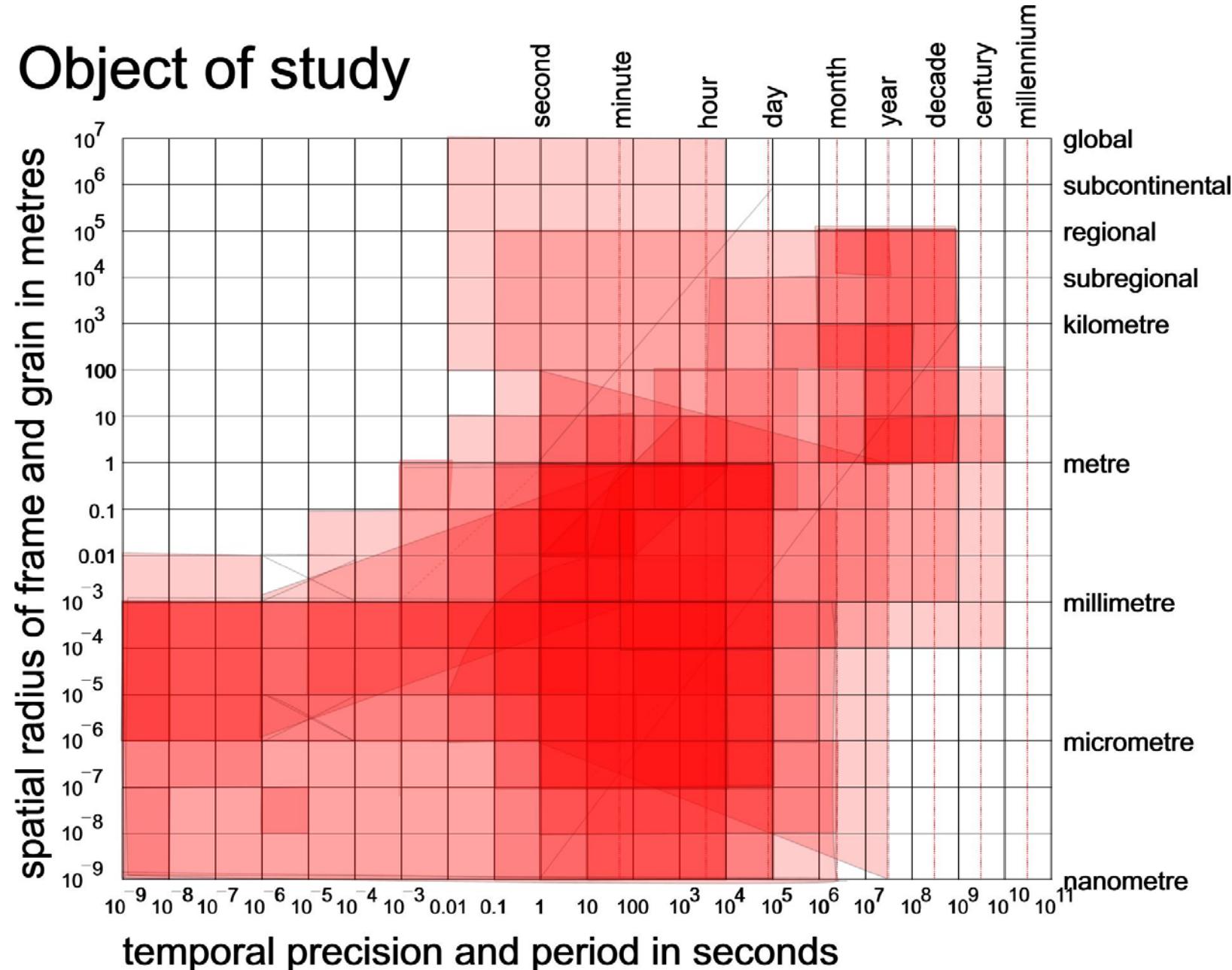


Fig. 228 60 PhD studies TU Delft p.249

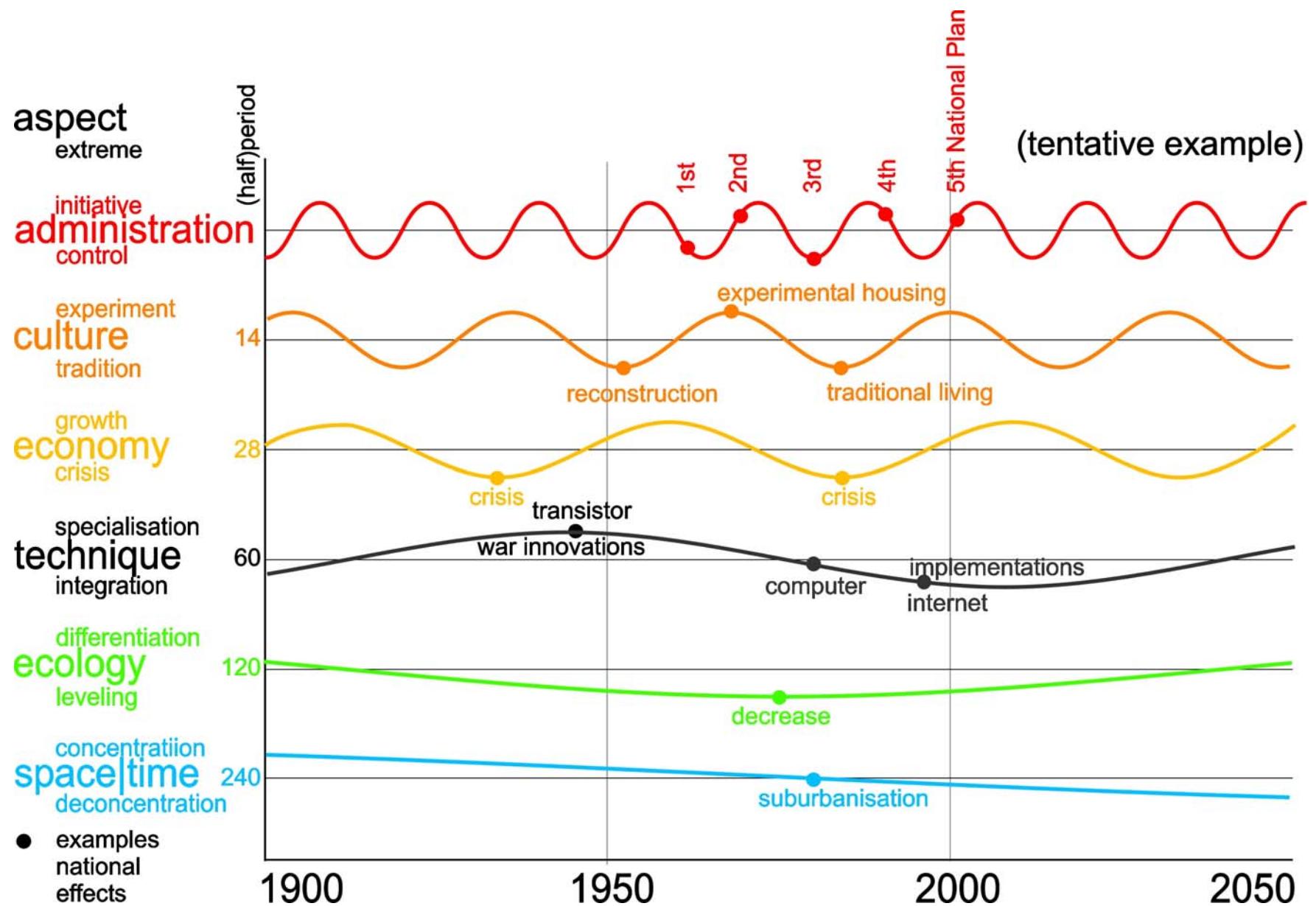


Fig. 229 Different wavelengths per layer p.249

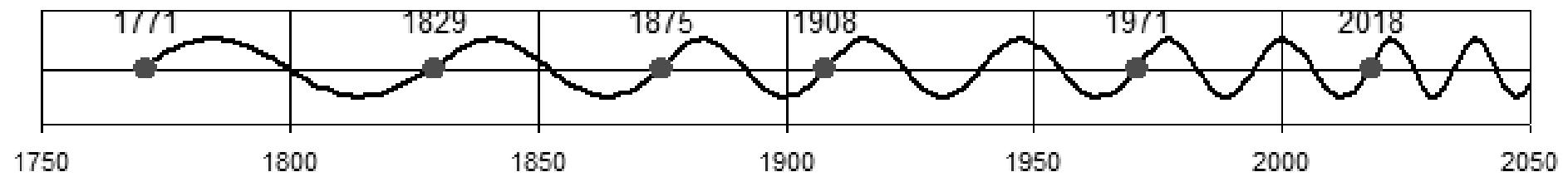


Fig. 230 A free interpretation of the Schumpeter-Freeman-Perez cycle p.250

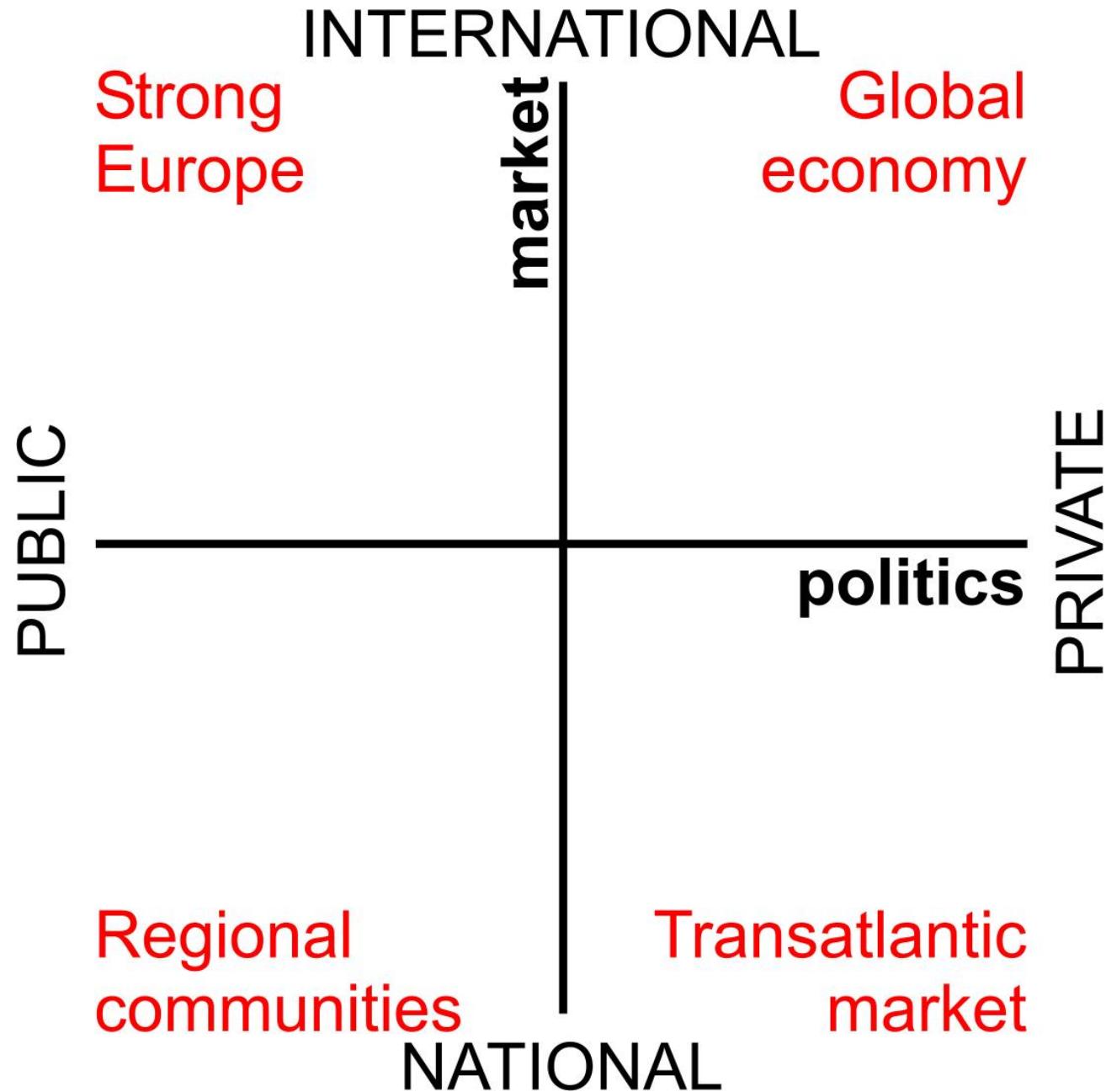


Fig. 231 CPB 2004 scenarios 2040 p.253

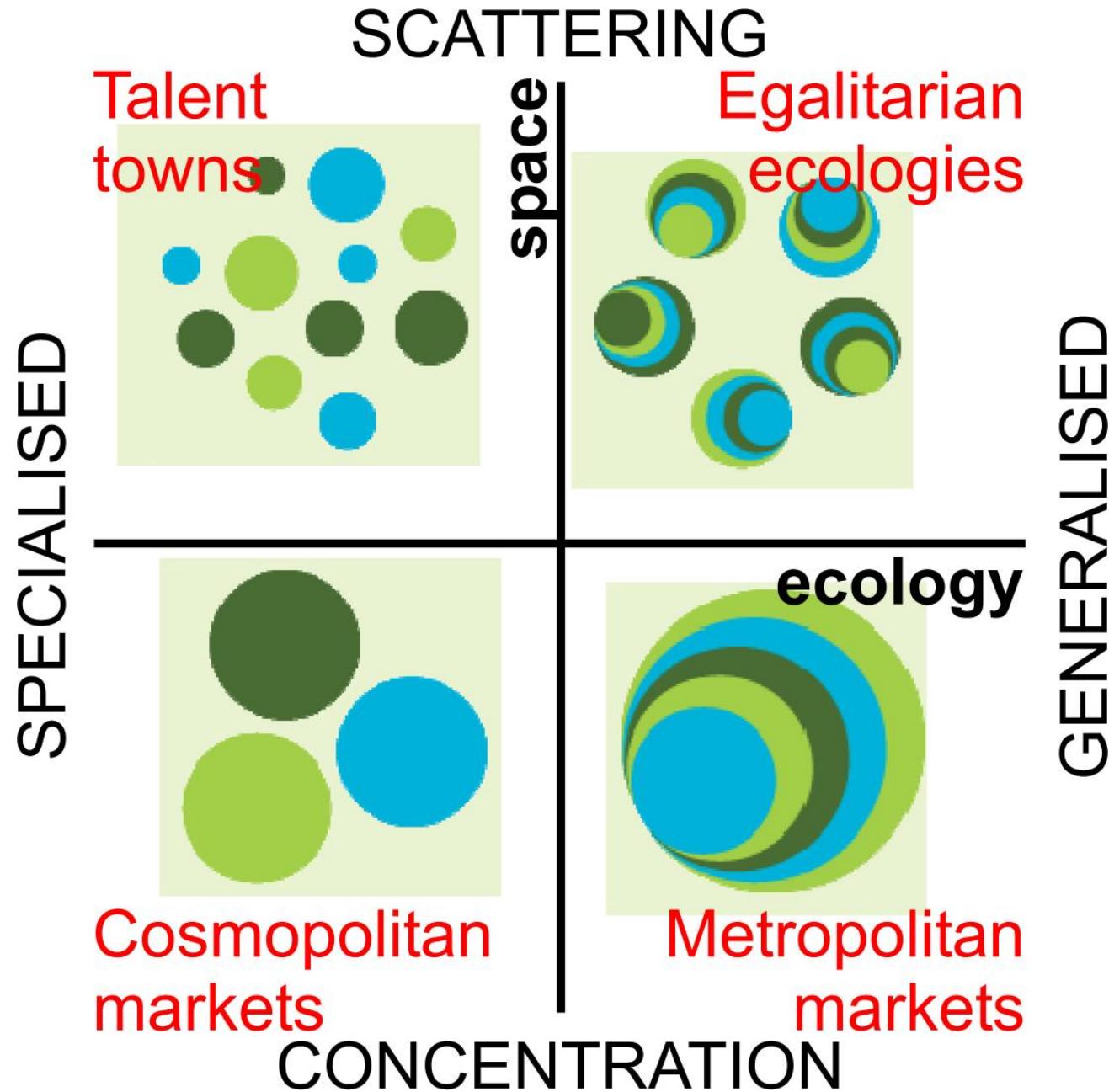


Fig. 232 CPB 2010 scenarios 2040 p.253

10000km	Global
3000km	Continental
1000km	Subcontinental
300km	National
100km	Regional
30km	Sub-regional
10km	Conurbation
3km	Town
1km	District
300m	Neighbourhood
100m	Ensemble
30m	Building complex
10m	Building
3m	Building segment
1m	Building part
300mm	Building component
100mm	Super element
30mm	Element
10mm	Sub element
3mm	Super material
1mm	Material
<1mm	Sub material

Fig. 233 Relevant levels of scale (expressed in R) to check possible impacts
p.255

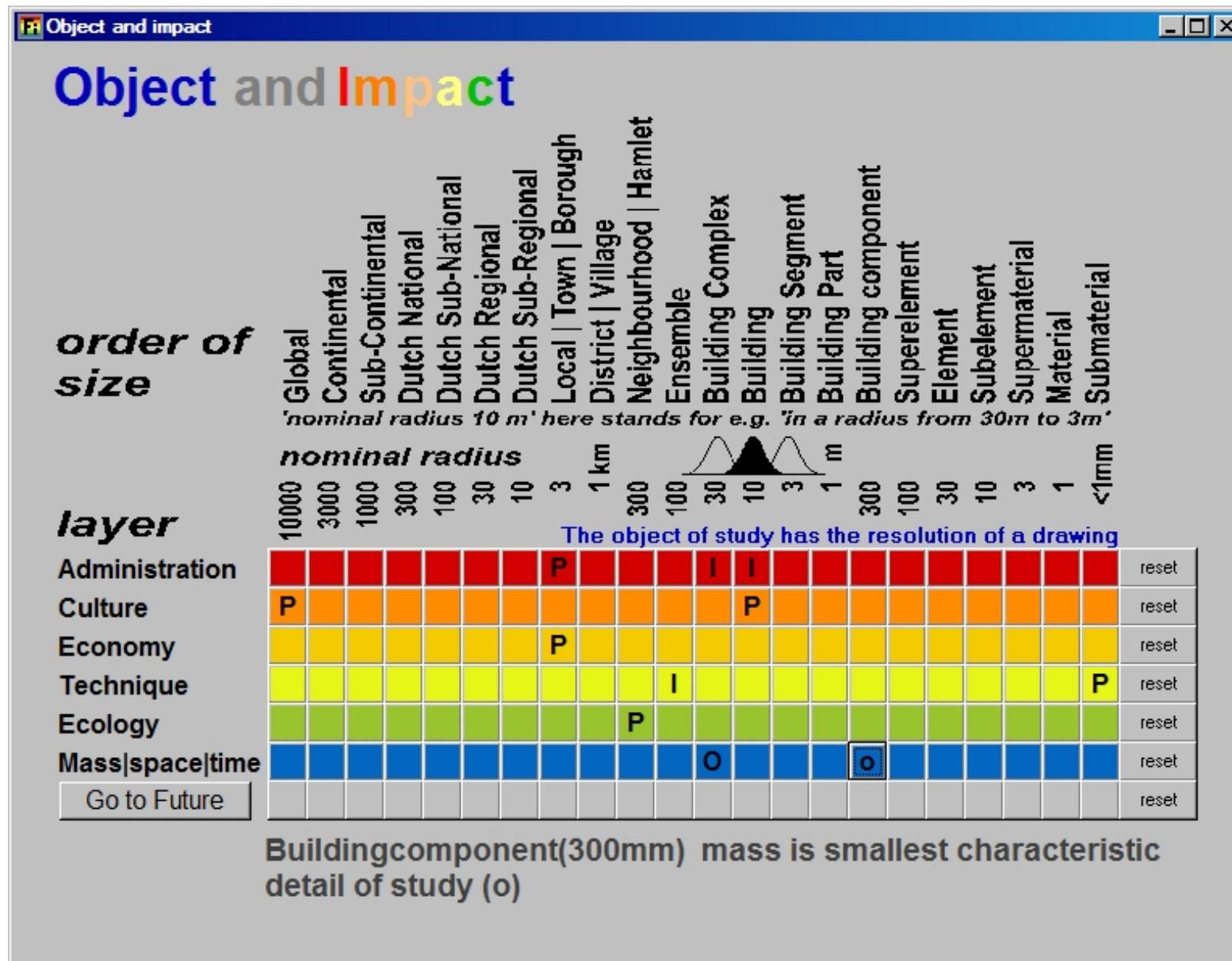


Fig. 234 Locating impacts (I) and positive impacts (P) as a programme of object O...o p.256

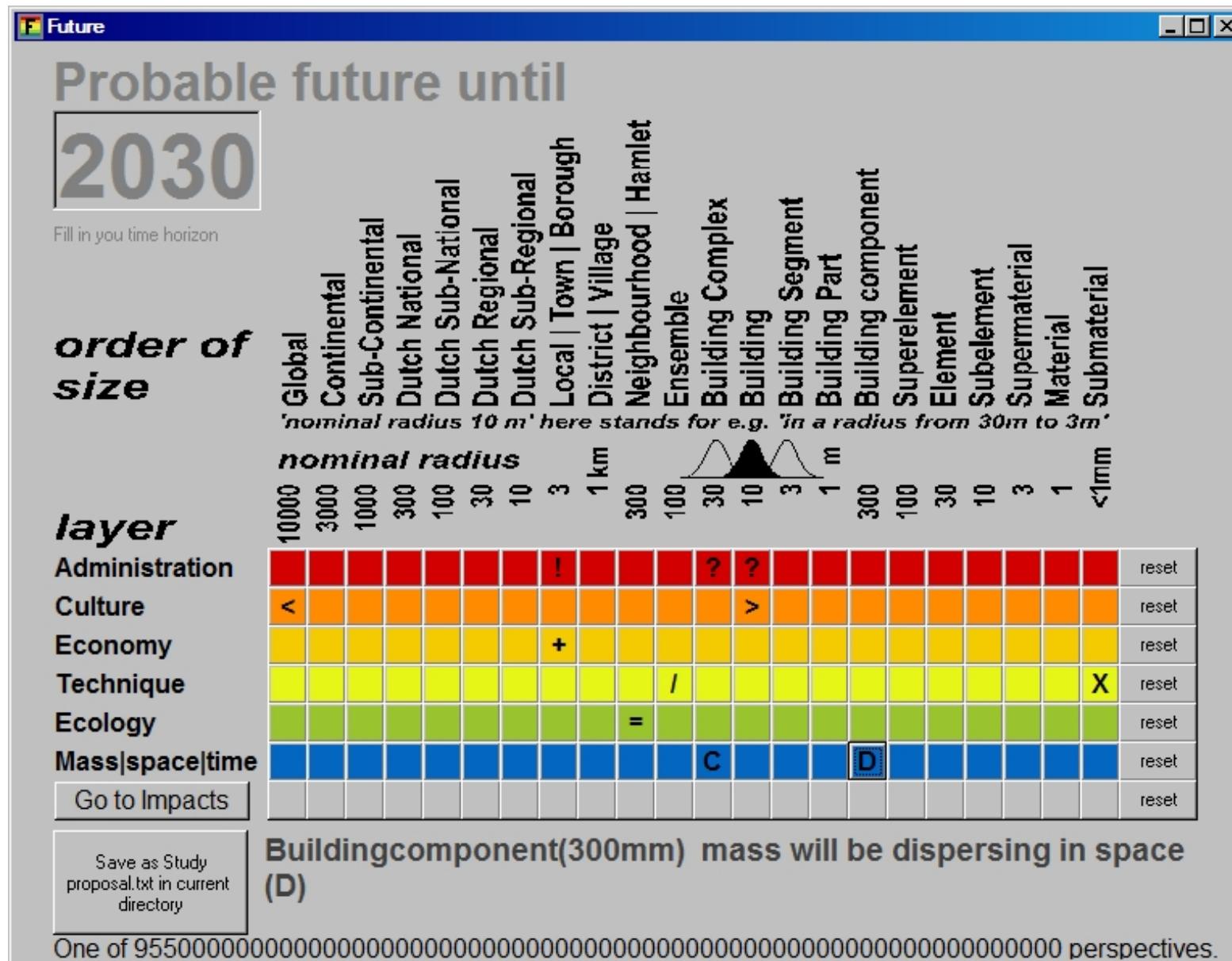


Fig. 235 Making expectations about the context of these impacts in 2030 explicit p.256

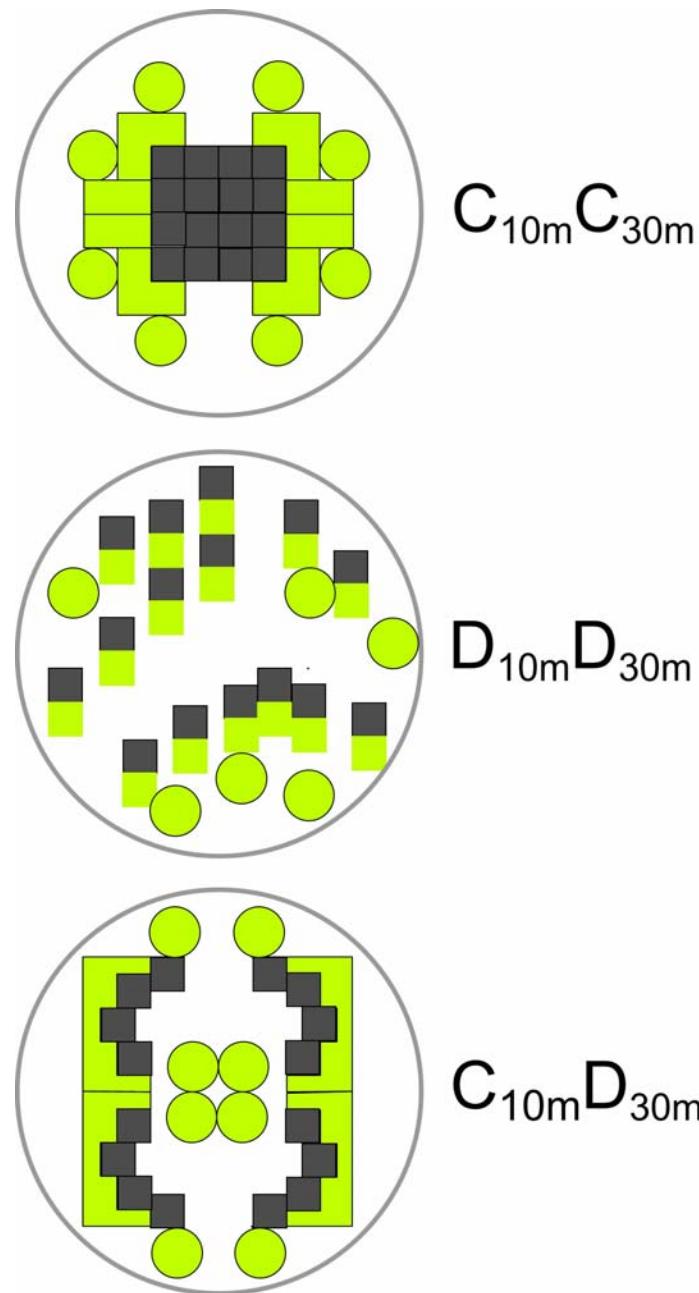
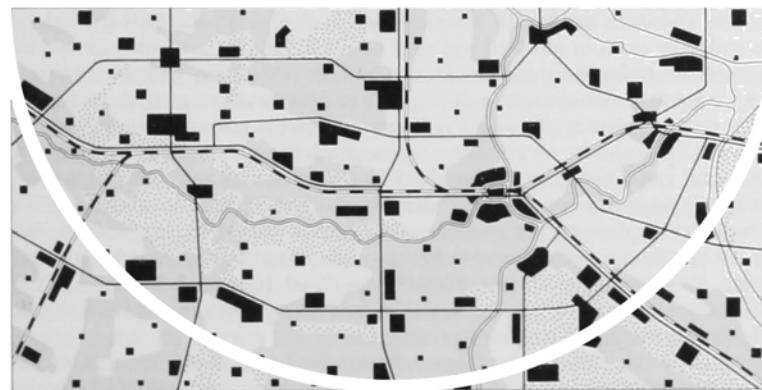


Fig. 236 R=30m States of dispersion p.258



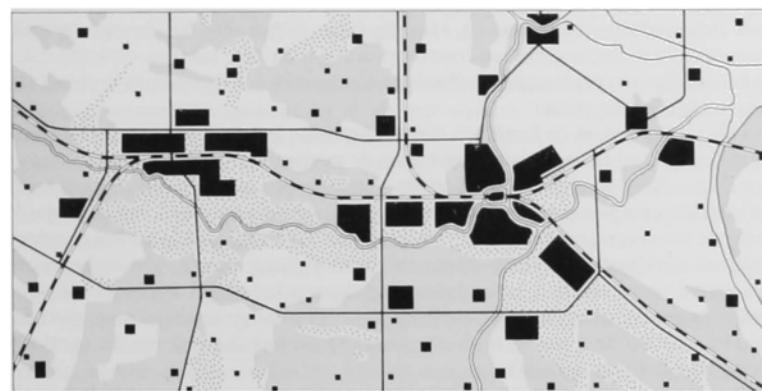
C_{10km} C_{30km}

'Example of concentration in the pattern of centres'



D_{10km} D_{30km}

'Example of deconcentration in the pattern of centres'



C_{10km} D_{30km}

'Example of bundled deconcentration in the pattern of centres'

Fig. 237 R=30km Accumulation, Sprawl, Bundled De-concentration p.258

field of
PROBLEMS
probable, but
not desirable

field of
AIMS
desirable, but
not probable

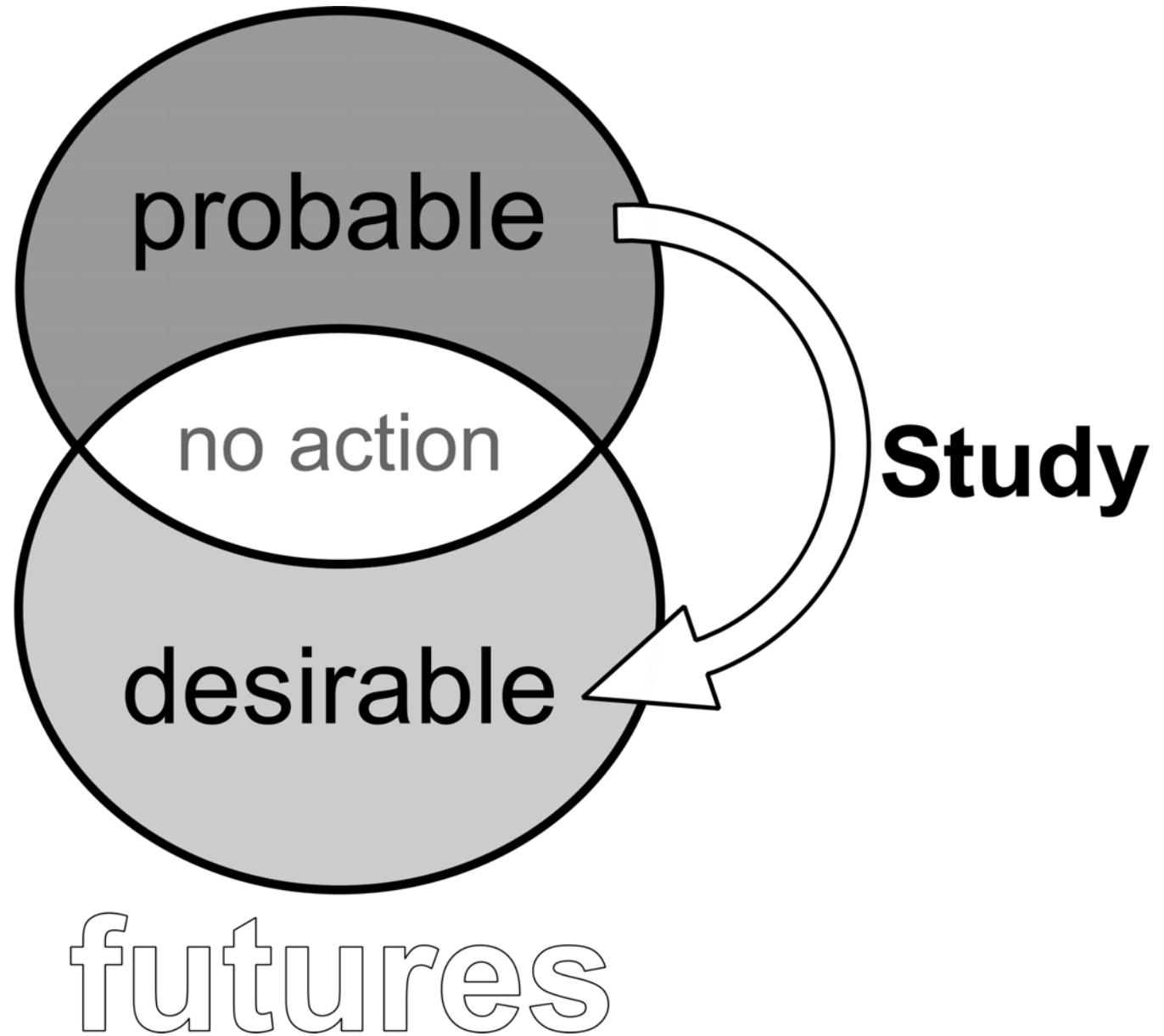


Fig. 238 Subtracting futures into fields of problems and aims p.259

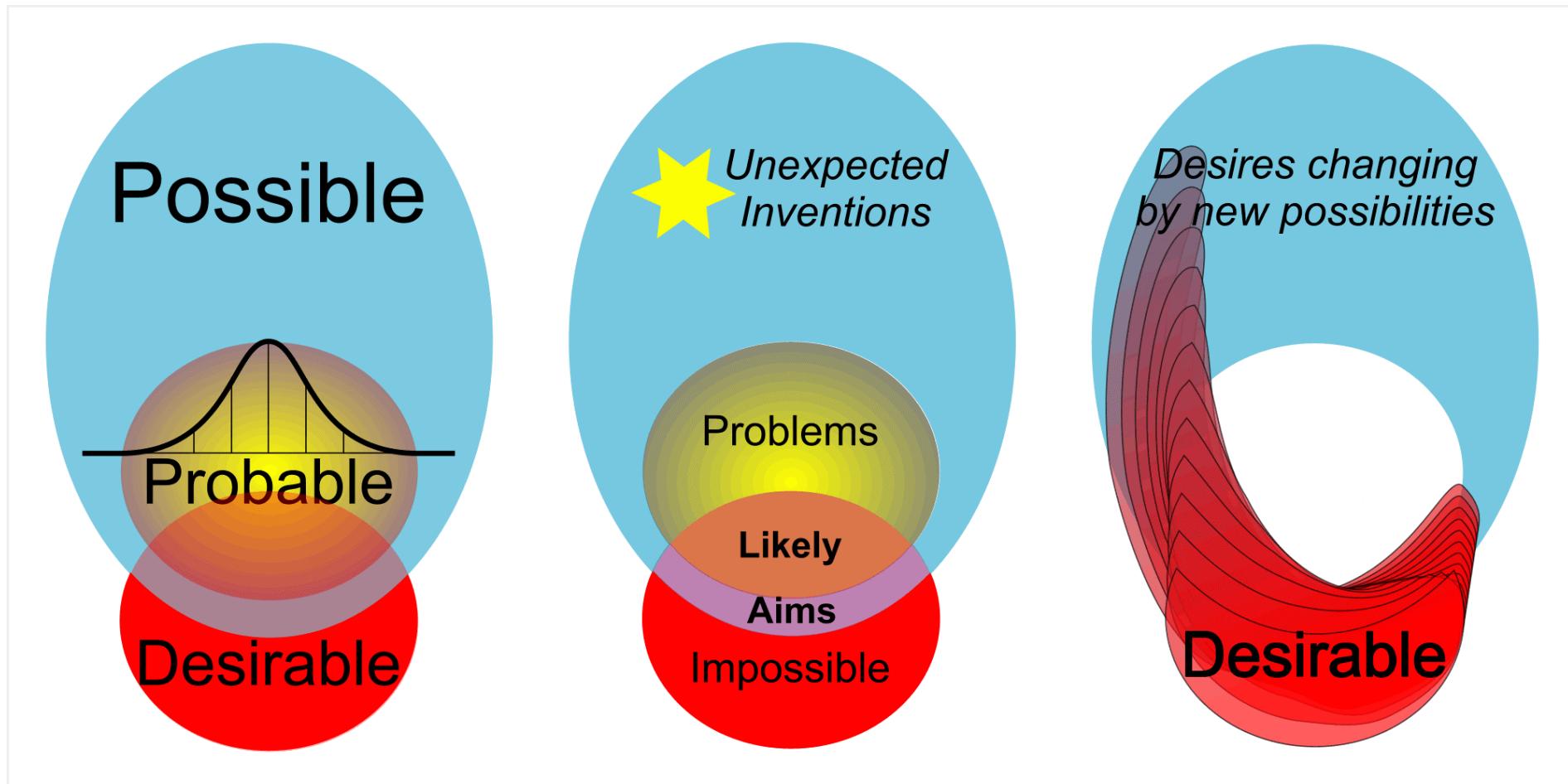


Fig. 239 Adding possible futures, p.259

influence ↓
involvement ↓
identity ↓
expression ↓
imagination ↓

production ↓
organisation ↓
specialisation ↓
regulation ↓
consumption ↓

selection ↓
connection ↓
separation ↓
change ↓
difference

Conceptual ↓

Biotic ↓

A-biotic

Fig. 240 Outward conditions p.264

probability ↓
possibility ↓
imaginability
(overlapping)
desirability

Modes

management ↓
culture ↓
economy ↓
technique ↓
ecology ↓
space

Layers

intention ↓
function ↓
structure ↓
form ↓
content ↓
scale

Orders

Fig. 241 Inward conditions p.264

conditional

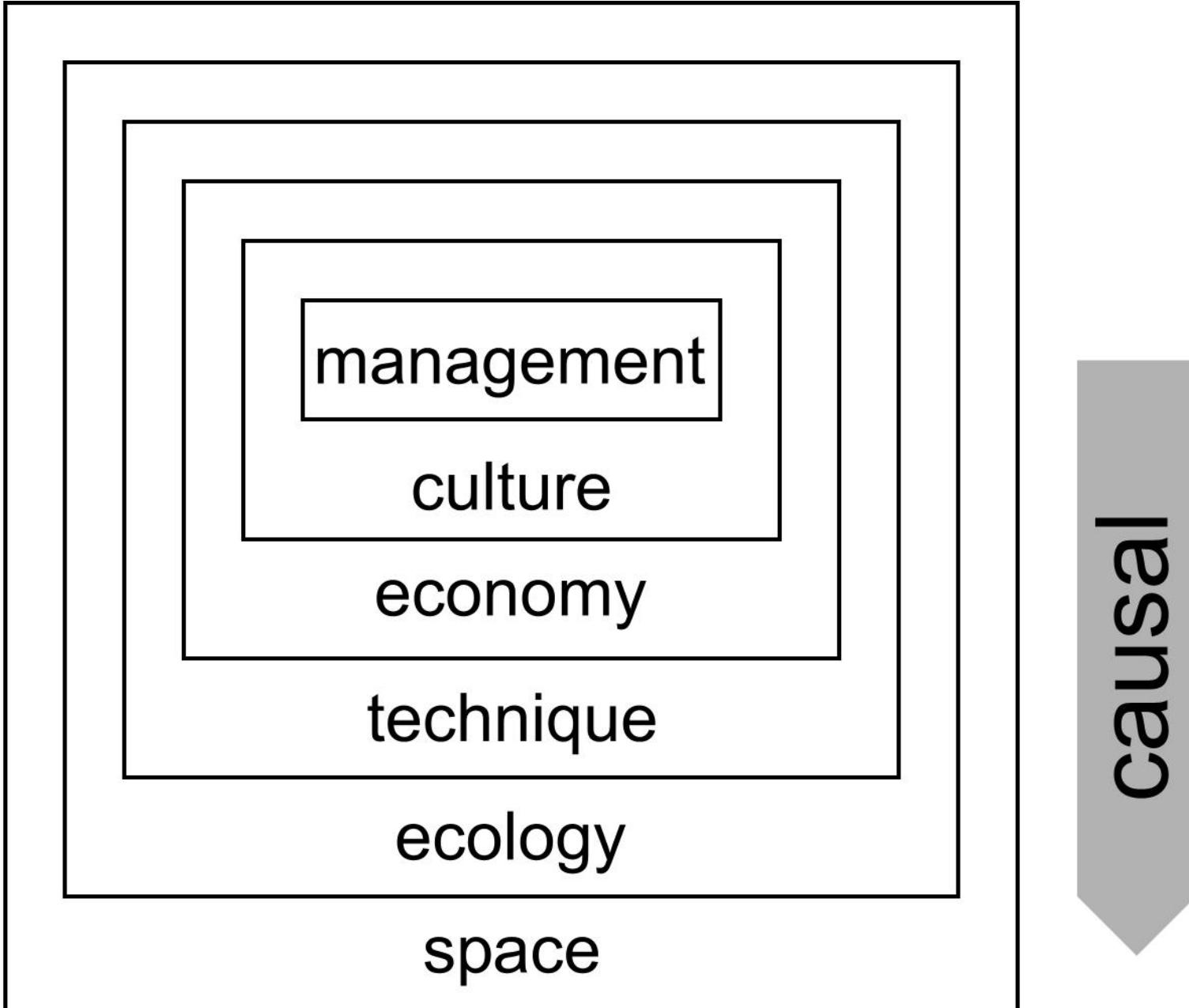


Fig. 242 Layers inward and outward p.265

conditional

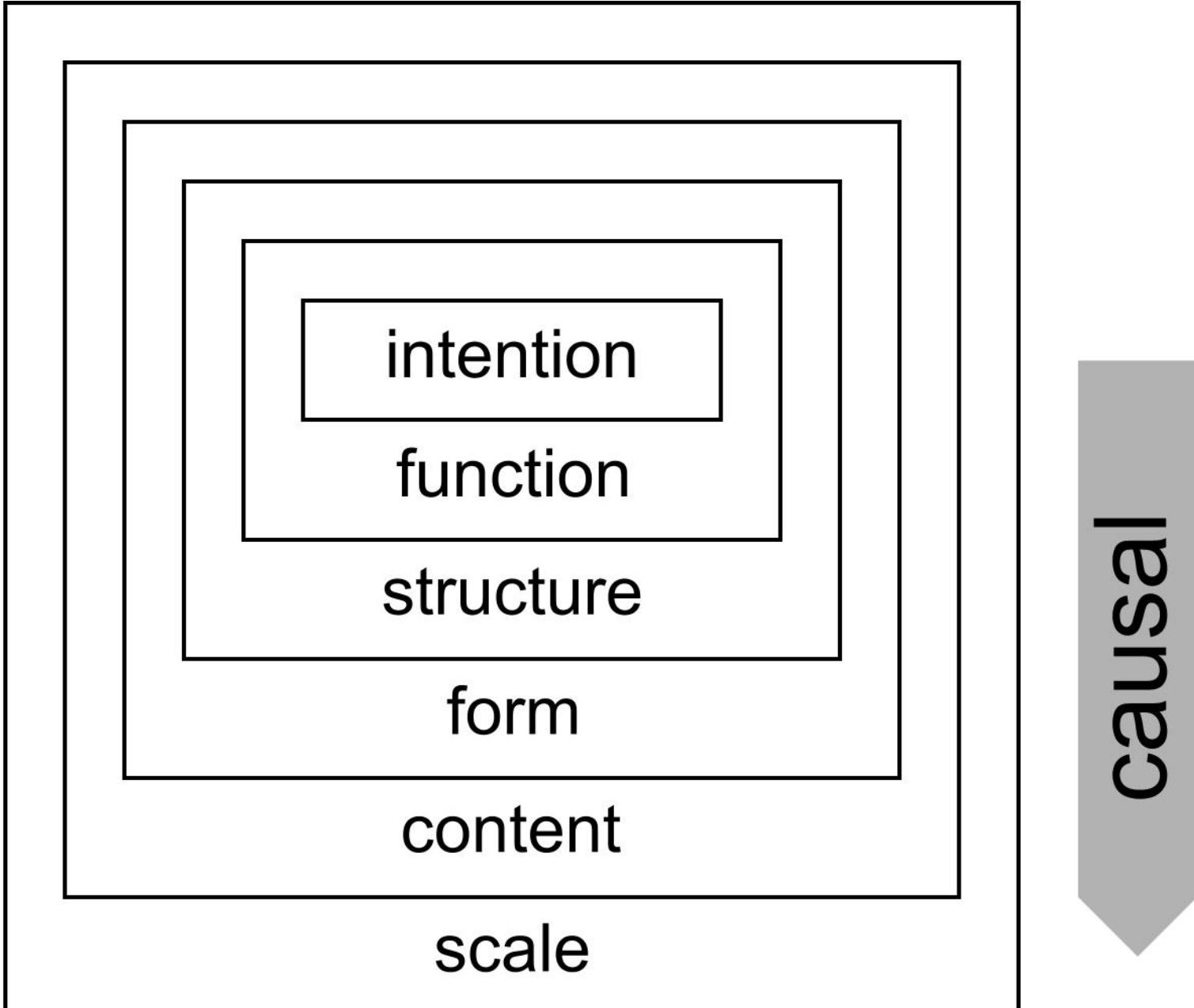


Fig. 243 Orders inward and outward p.265



Fig. 244 Students making a dot map 1:25 000 2030 with stickers $r=1.2\text{cm}$ (300m in reality). p.266

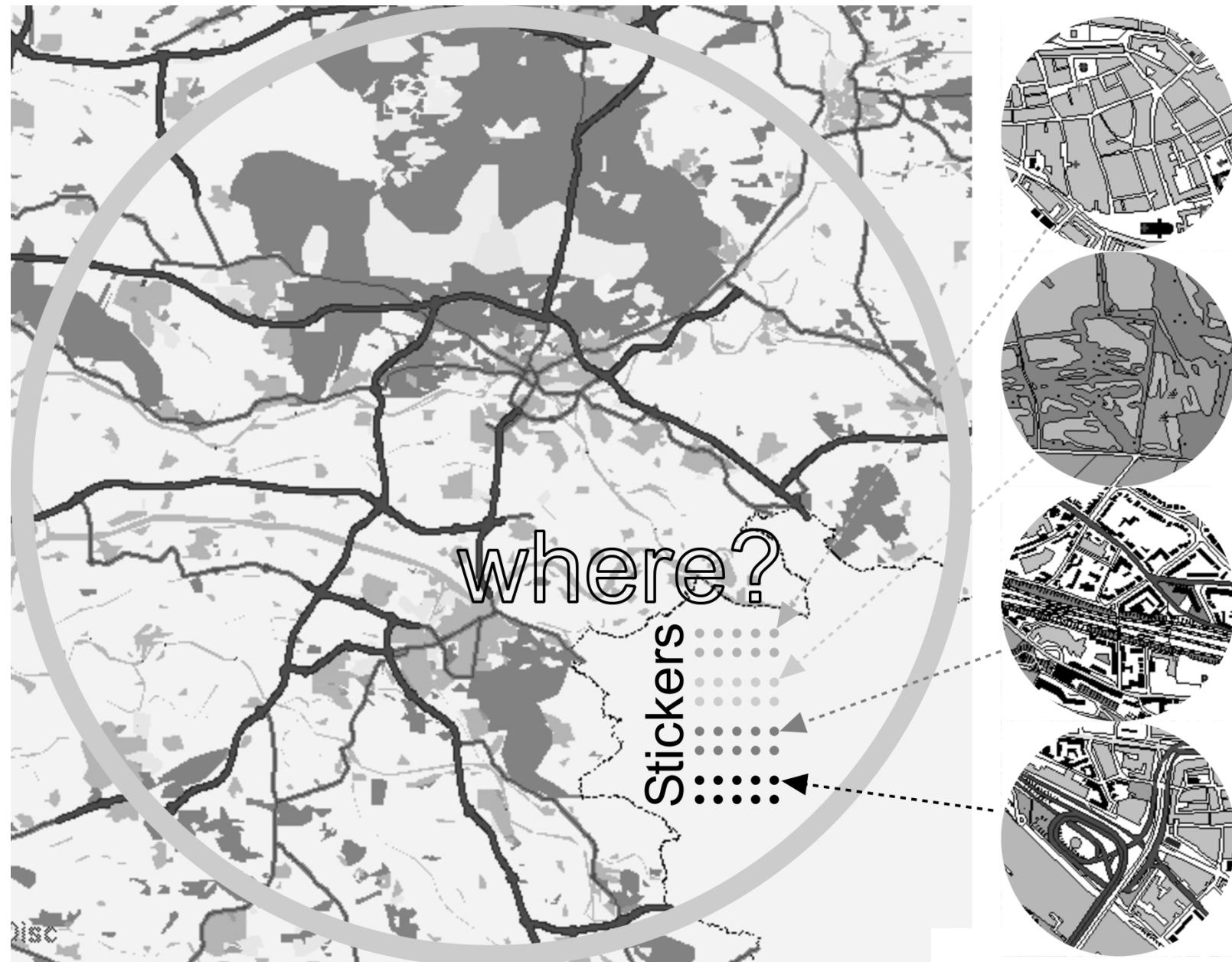


Fig. 245 $R=30\text{km}$ Region Veluwe-Arnhem-Nijmegen to be filled with dots p.266

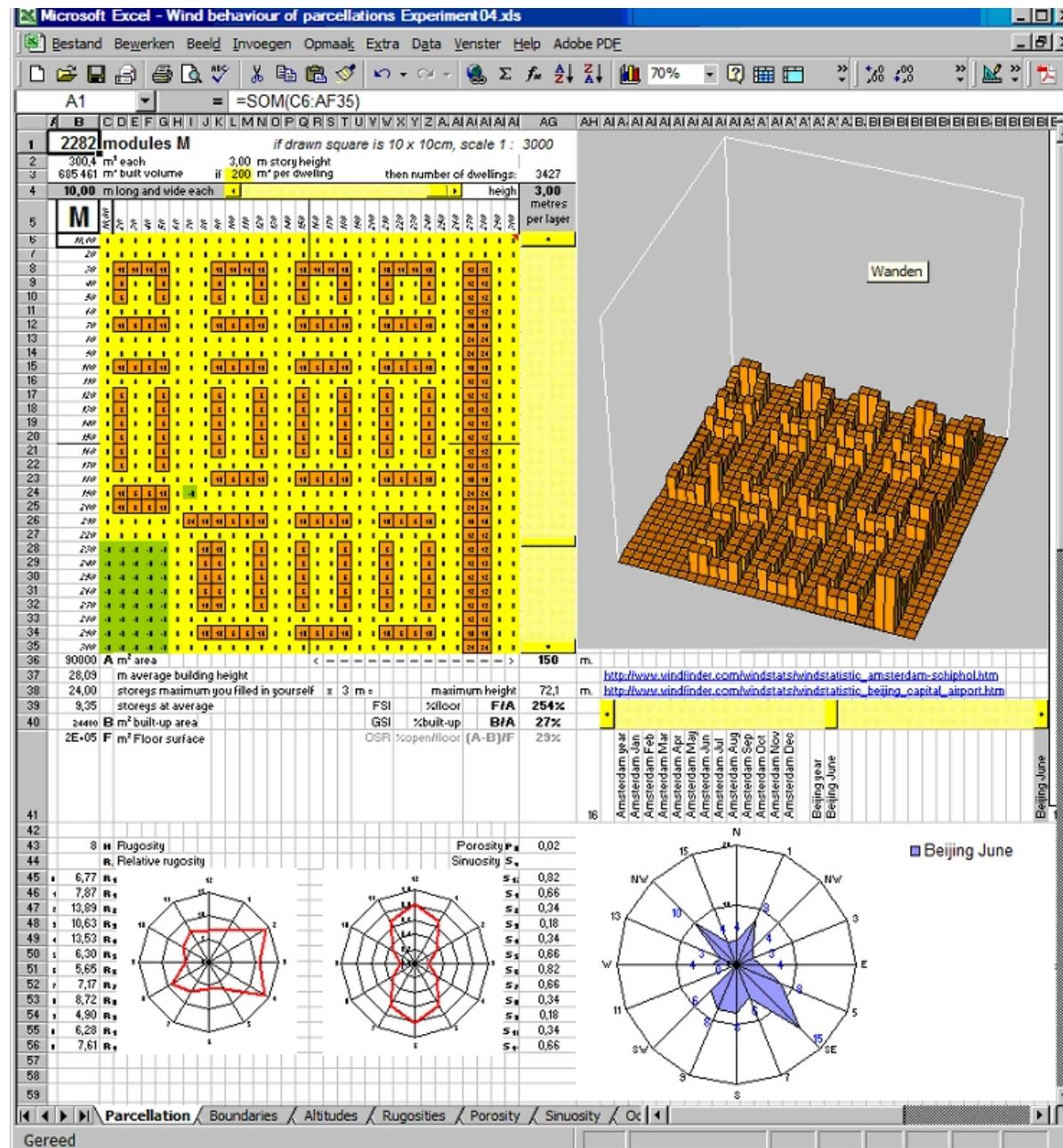


Fig. 246 R=100m Simulating wind p.269

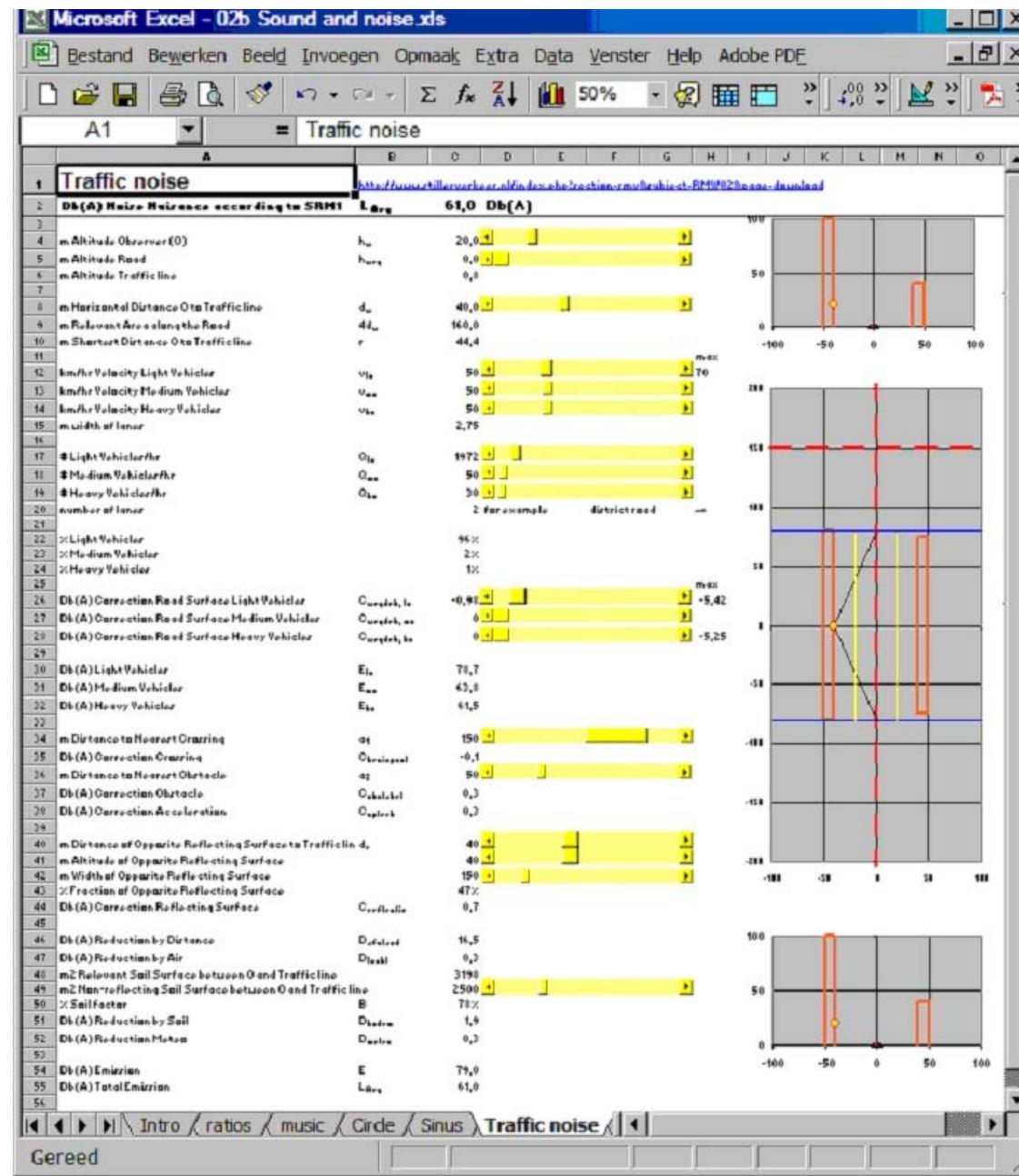


Fig. 247 R=30m Simulating noise p.269

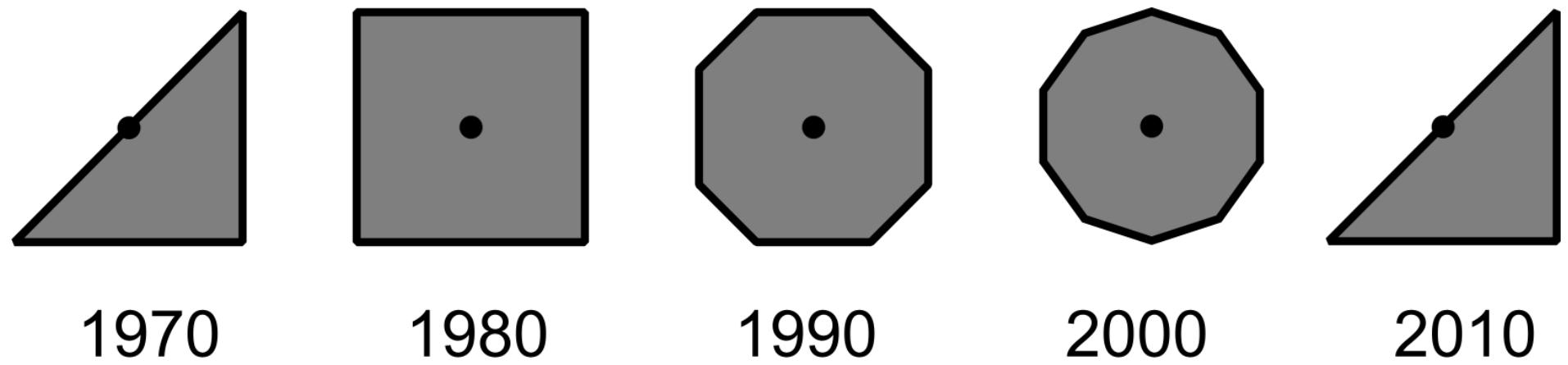


Fig. 248 Methodology of design study and research: p.273

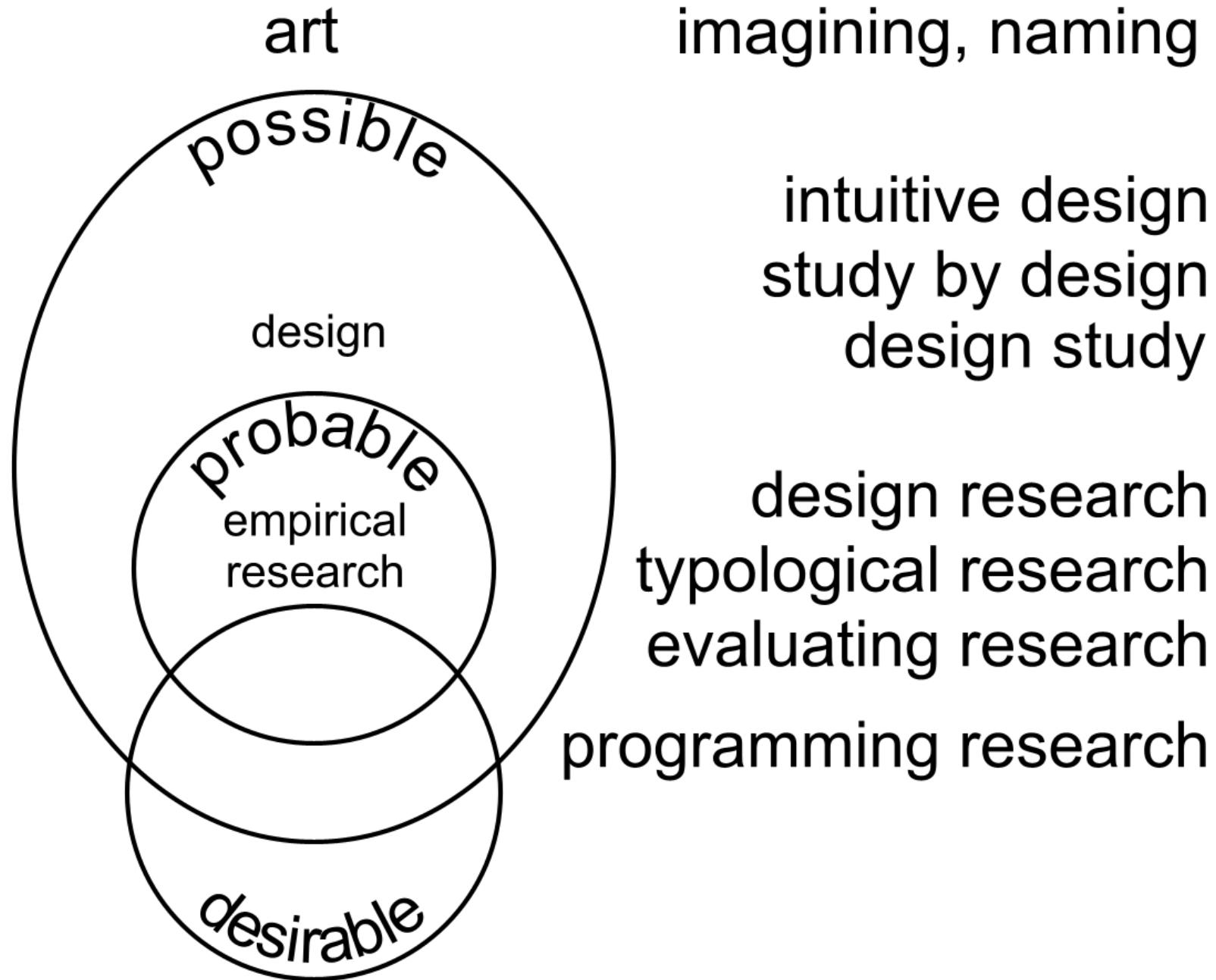
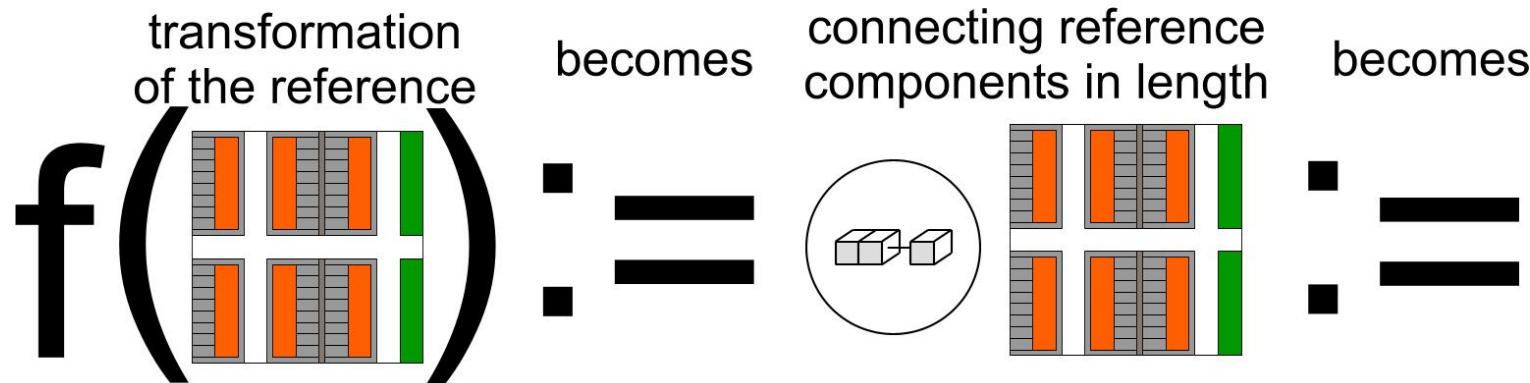


Fig. 249 Kinds of study relevant for design p.273

operationalisation:



Any operation O on any reference X :

$$f_i(x_j) := O_i x_j$$

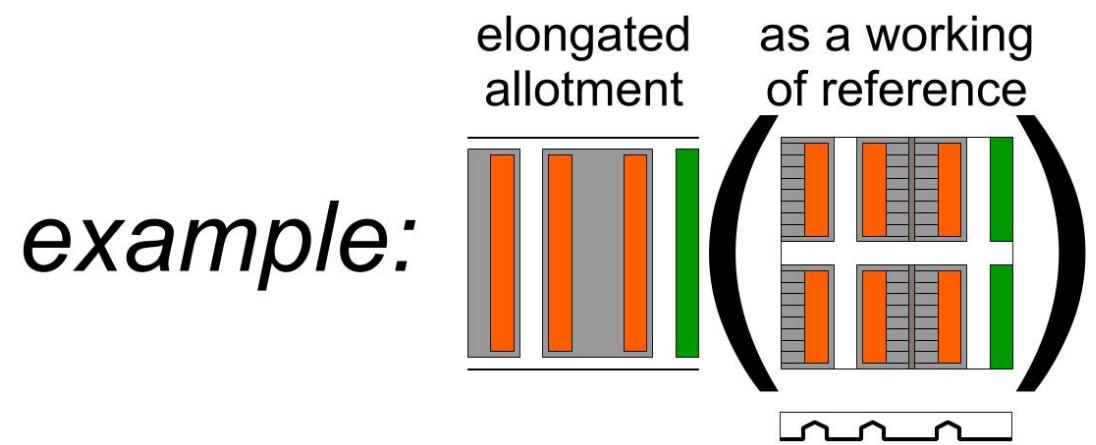
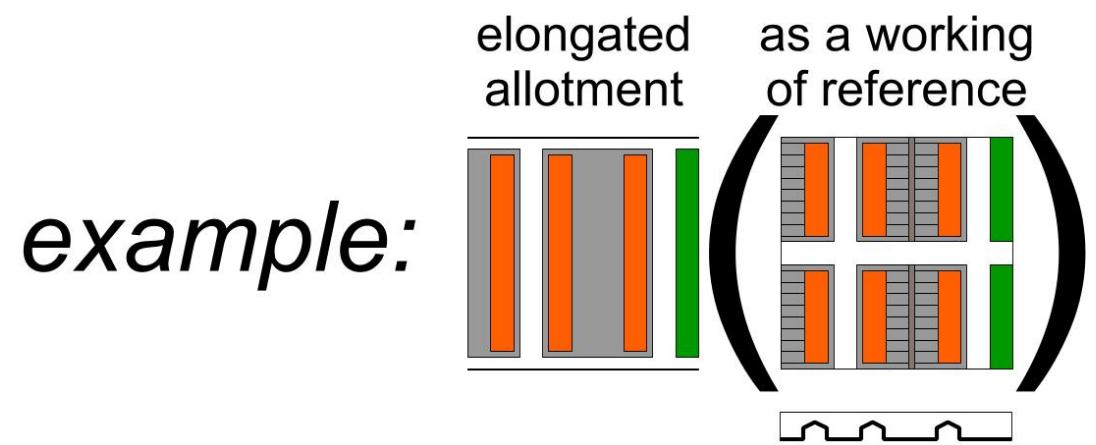
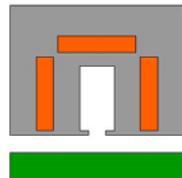


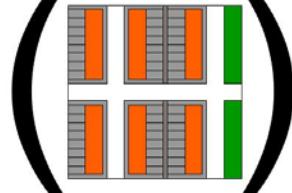
Fig. 250 Design operations p.274

allotment(reference)

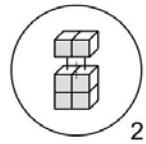
high rise
allotment



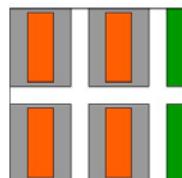
as a working
of reference



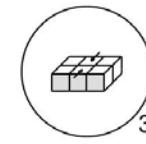
connecting
in height



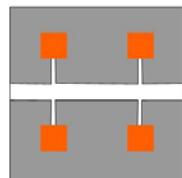
back to back
allotment



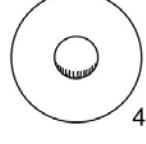
connecting
in depth



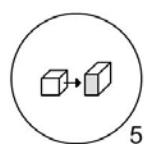
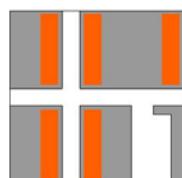
urban
villa s



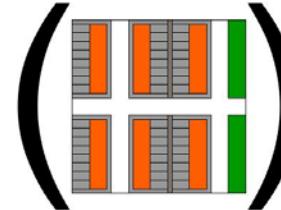
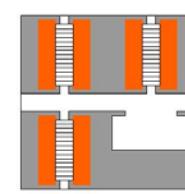
compact
building



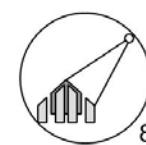
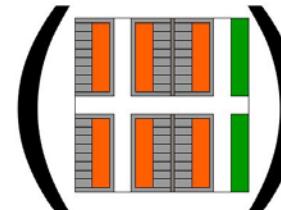
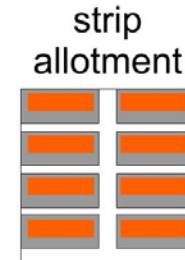
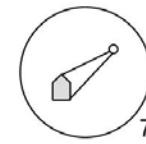
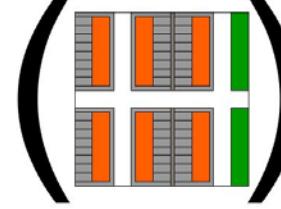
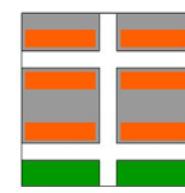
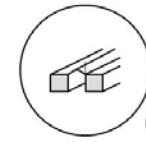
narrow deep
allotment



full sentence function



operation o



A design as a result of
a reference and an operation

Fig. 251 Results of design operations p.274



Fig. 252 The God of longevity p.305