In the process of demythification, a myth is created, to be passed on, demythified, and born again; and it never dies.

It's not only human scale that's needed in urbanism, but also a human dimension in the perceiving, thinking and creation.
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Foreword

This atlas is a city-level analysis on urban forms of Arnhem. It explores perspectives to capture and represent the spatial characteristics and eventually, character of the city. The approaches include city as landscape, city as planned artefact, city as categorised chaos and city as spatio-temporal entity comprised of humans and built forms. The conclusion is a synthesised portrait of the spatial history of Arnhem, expressed through metaphor, analogy and myth.

The central quest of the project is how to know something of such complexity and ambiguous definition as a city. To plan a future, the planner/designer must go through this quest, because the future is on a trajectory traced from the past and present, and constrained by the city's own character.
A Beautiful Landscape

A city doesn’t always mean a disruption to the landscape. It also enrich and enliven the landscape.

Arnhem is beautiful not just because of its forests.
Essentials: the Four Elements

- Forest
- City
- Water
- Grassland
Why circles?

This shape has only the property of size and location, which when applied to a map, filters out noise factors such as shapes - which can always be divided into smaller circles, textures, etc.

It is essentially a differentiation algorithm (although in this case it actually arise as a pattern language - which is not so different in nature).

Ecological wise, these circles may have their own meaning: patch, which is a local area of ecological order that differentiates from other areas around it.

A scientists’ poem

We are all drops in an ocean, forever bound in one.
Three element layers show a distinct directional scale and concentration pattern, while the water layer has less spatial gradient.

All of these distribution patterns are the results of combined forces of environment: invisible forces unincorporated here, and one another, the most visible forces.

This is the point when we must reconsider the thinking tendency of 'one against the environment', because when one is as prominent as all other elements around it, itself is part of its own environment.
Hypothesis: Diversity Nodes

Suppose agents inside one type of patch always seek to cross into another type, then mathematically, the one patch connected to all the other types has more visitors.

This means it has the potential of becoming a local magnet or simply has more complex dynamics. Either way, it’ll be different because of its surroundings.

In real situations, the connection may not exist, but the potential may have implications for aspects like designing.
A Sensible Machine

Analytical minds try to understand a city by extracting its structures. In doing so they make the assumption that a city is sensibly structured.

Is the city a planner that talks, or is it just our own subjective conjuring?
Analytic Impression

Entry point to analysing a city

Divide and conquer:

Break it down by impression, break it down further with generic information such as administrative division, and ask why the parts are divided and what hold them together.

Impression

the forest, the north area, the south area, two urban centers, river - the great divider, railway, and the invisible southern grassland.
Network

It is unreasonable to assume people use and experience urban green space by traveling from park to park. Therefore, these connections may seem pure fabrication just to get a networked organization.

But the connections are not just conjured up. The use of this type of function goes as people originating from various starting points and traveling to these green destinations. The routes between two parks would get relatively more 'traveling coverage' (seen in Chap. IV, mapping agent movement) than routes leading only to one park, which means statistically, there's a thicker line between two green spaces because of this overlapping effect, hence the connections.

Therefore, this network is less about accessibilities between parks but more about their distribution and function efficiency as a system for the city.

Ideal Model and Irregularity

In an ideal model where city center transitions into forest and grasslands at two ends, the existence of a river has created a belt of irregularity.

The river is more 'centered' than the centers, yet it is excluded as an outskirt, which creates a very interesting 3-dimensional gradient.

An Age-old misconception

Cities are not the axe that severs our connection to mother nature. On the contrary, it is our very medium to nature.

Urban Green System Mapping
From Green System to City Structure

Validity

Urban green system is like the veins of a city, and it complies with city structure in any sensibly planned city.

But that’s a bet on the sense of a complex thing. So why not see it another way: Just like a highly differentiated cell contains the whole set of genes, so does any sub-system of the city. Depending on our decoding ability, we can get a limited window of view on the whole. But to derive a view of the meta-system from a sub-system is therefore a grounded intuition.

Two kinds of spatial order

The difference of north and south in terms of space structure first came to light in this analyses. As one struggles to find a method of disorganisedness of the south green system, it’s hard to believe the south is actually a moderner product than the north. Eventually, the tenuous connections straightened out with neighbourhood division says the south is a grid based network while the north is a radial network, and the difference is so complete that there is no hybridized space.

Compatibility

Is it possible to reconcile two kinds of spatial order? Is it possible to find common ground for a conversation?

Complexity theory says there’s always adaptation and evolution because of dynamic interaction by countless contact. As long as there’s interaction, there’s co-evolution.

City structure

Green spaces / public spaces give rise to neighbourhood identity, and neighbourhoods without lively green spaces are like voids empty of identity, with a lesser presence in the city - which is true in a cultural sense.
Structure as used

If the larger scale structure is easier to comprehend because it’s more visually presented on maps, then the structure of a highly used, dense urban area is much more difficult to underpin.

The Maps, they do lie at such a scale.

Impression by experience

The city center, although compact in structure, is characterised by distinctly different atmospheres underlying highly used, moderately used and under-used areas.

Yet the usage pattern doesn’t seem to respond any single factors:

Proximity to waterfront, accessibility to main roads, monuments or open spaces...
Spatially, s1 has also a high connectivity. The real situation is however different, and such potential is buried.

Although B is inside the center area, it carries a flowing through motorised traffic, independent from ring road A.

Just how much overlapping do 1 and 3 have?

How much does one have to go through just to get from busy street b to a (or the other way)?

distance between center and waterfront
- Open Space

Phenomena

Highly occupied spaces concentrate on 5 axes

Hotspots of public activities cluster into 2 major groups.

Clear borders on north and south sides; interaction with river weak. (On-site experience says poor design of landscape architecture is the major problem.)

For a successful public space

Positive factors
- Combination of large & small business scales
- Higher density
- Affiliating outdoor open space

Negative factors
- Unitary business scale
- No affiliating outdoor open space
- Physical obstacles
- Private space dominant
The sensible structure imposed by master planners peeled off, the city’s raw form revealed:

A discourse written over centuries, full of jumbled phrases and leaping logic. Is there a message in this picture? And who’s been talking?
The Travellers’ historical origin: a logic in response to outside conditions

- Types

Main Roads
Sub-systems communicating different directions

the Traveller I
the Traveller II
the Interceptor

Transport Routes of Limited Access
Including railway and freeways

the Cutters

Hydrological Infrastructure
Including embankment, docks, flood area and dikes.

the Unstoppable

What’s organic about infrastructure

Albeit one the most rationally engineered parts of a city, it’s most directly dictated by natural factors and anchored by history, originating from an age of no planner development. Like an organism, it respond to outside conditions, incrementally grow, organising itself in a way that will later much define modern planners’ fundamental perspectives.
‘Hairs’ indicate connection between infrastructure and urban fabrics. Evenly distributed means open access, bundled means access limited to one point.

the Traveller I

the south side almost ‘hide’ from this subsystem.
This road is highly integrated with surrounding fabrics because they evolved together over time.

Fibers condense along old neighborhoods, while new ones tend to have less fibers.

Not officially designated same height of status as the rest of selected main roads, but serves a vital function to the south.

This vital route was moved here after the construction of the cutter next to it, which played a central part to the decentralisation of the south. (See Reflection chapter)
the Interceptor

Although near symmetric north to south, its usage is heavier on the north side, indicating directionality. Coming to this area (Velp), this interceptor transforms into a local street, indicating directionality.

Historically, the south has a real center that radiate around this point. The dissolution of this spatial structure directly contributed to the loss of identity of the south. (see Reflection chapter)
cutting through urban tissue creates 'pres-
sured' areas, where considerable area of traffic is collected and vented through limited points.

On the map this appears to be a major artery in the south, yet ironically it only serves the traffic north of it. Its real nature is a cutter that prevents any spatial unitedness and centrality in the south. (see Reflection chapter)
only the dikes show the true size of the river; transition to water should start with the dikes.

without transition elements, the north side is more accessible yet less perceived than the south.
These are typical pattern types emerging from city wide study, therefore they don’t compose a system for all existing patterns. The categorisation is based on differences on the same scale, and visually identified from composition analyses. The goal of establishing types is to understand their space logic, not to pinpoint their morphogenetic constitution, therefore extremely reduction is not applied.

A more precise method would be quantification of variants like X to T crossing ratio, and cell to cell structure ratio.

There’s no crossing between linear and brick, because the latter is in essence a multiplication of linears by the rule of grid.
There’s not crossing between grid and patch, because they’re essentially modified version of each other.
Organic type can be seen as the offspring of basic types, which has gained its own properties after many generations of ‘cross-breeding’.
Possible crossings between types not present in the city are shown in dashed lines.

Cross-breeding formula:
1. radial x grid
2. linear x grid
3. linear x patch
4. patch

Street Pattern Typological System

grid

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<th>C4</th>
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bricks

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organic
resembles mismatched patch on top of one another. Corners are partially merged into the pattern.

linear
characterised by secondary, one-end-connected lines aligned linearly to a primary line.

radial
characterised by multiple lines concentrating onto one point/area.

tetris

organic
advanced patchiness

radial x grid

linear x patch

grid x patch x brick?
Unlike building type distribution pattern, street pattern displays less 'belt' stratification responding to city expansions, but rather shows a concentrating coherence.

Hypotheses:

First, street pattern has a less dramatical evolution path than building types;

Second, street pattern is more sensitive to logic factors other than periodic design trend.

Note:

Connections between elements are based on human perception capacity, i.e. reflecting experinencible spatial continuation. Therefore connecting all the same elements regardless of distribution or separation is NOT the case here.

A distinct interruption of continuity, suggesting void for future consideration.
Because human experience is based on units, the goal of this study is set to know the relation between units and their environment, which prompted the idea of 'niche' and the use of some equally complex yet culturally iconic animals for analogies.

Therefore, this categorisation is not dependent on architectural style, construction period, size or function, but rather a logic of space. This adds a new dimension to the properties of the studied space.
Ambiguity - the mortal enemy of any categorisation, resides in all natural phenomena. Addressing this problem is key to making a category model operable in real situations. And where to draw the line is sometimes less quantitative than subjective.

Each circle indicate a criterion; elements are distributed inside, outside or ambiguously on the line (a distributed representation). The criteria represent a differentiation on a polarized gradient of properties as shown below.

Cat Horse Bull Lion Elephant Dinosaur

1. Cat
2. Horse
3. Lion
4. Elephant
5. Bull
6. Dinosaur

1. Ambiguity: Dog
2. Composition: modular
3. Flocking tendency: unitary
4. Scale of component: beyond human
5. Relation to environment: high integration

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Dog neighbourhoods are, as the name suggests, sociable and comfortable communities where people have their own privacy but enough interaction possibilities.

Horse type is the most 'street friendly' type, or, even 'street genetic' type. Their highly disciplined nature and close flocking form street space without more interventions.

Although the lion type is not seen flocking since most places only accommodates one lion at a time, it is essential to forming order in traditional neighbourhoods.

The difference between a lion and a dinosaur? A lion live with its subjects, but a dinosaur is alien to other types.

An elephant is not agressive, it's just indifferent to human scale, which can always be remedied, like in the case of well-designed malls.

Lion addresses to human scale however big the whole is; dinosaur irreversibly out of scale however one tries to patch it up.
C = cat
D = dog
H = horse
L = lion
B = bull
P = pigeon (holes)
E = elephant
Di = dinosaur

Building Type Distribution Pattern
- Grouping

Note: The percentages are rough estimation.
This area is a mix of all the types around it and is rather decentralised, therefore its role in the whole transition is diminished.

An empty area weakens EB to EB coherence. But whether such EB group should abut a city center in the first place deserve consideration.

Spatial Pattern

- Transition from center to edge

1. HBL
2. HBP
3. HP
4. HBP, EB, EDi

- Type 1
- Type 2
- Type 3
- Type 4

C = cat
D = dog
H = horse
L = lion
B = bull
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Di = dinosaur

- This area is highly fragmented, punctuated by large bull or elephant types.

- An empty area weakens EB to EB coherence. But whether such EB group should abut a city center in the first place deserve consideration.
Throughout ages, the boundaries of D, C belt may have been continually overwritten by H, B, and pushed further outwards.

1900 area suggests D, C type serve as boundaries of classic city before modernisation.

Almost all of DP groups emerges after 1950, which may be a reaction to the population boom.

C = cat
D = dog
H = horse
L = lion
B = bull
P = pigeon (holes)
E = elephant
Di = dinosaur

H type highly concentrates within 1850 area.
An Idiosyncratic Creature

If I say the city is half-human, you would not disagree. But what is the whole?
Some patterns are more resilient than others; some are just waiting to happen, pre-determined by environment (landscape elements, e.g. landform).
A lot of growth happened along major roads, resulting in this radiating pattern. Some areas have more favorable conditions, whereas the river bank wasn’t touched till the first wave of growth boom.
Social factors like religion, ideology, technology, etc. also play a huge part in shaping a city. No quantifiable energy or material flow can be detected in this kind of influence, yet these information come to materialise in physical form that steers a city’s course.

Questions

How to weigh the factors and decide the leading forces that shaped Arnhem?

How can we weigh between these factors and get grasp of its identity?

Can we really use factors to pin down the course of a city?

Keywords

Religion
Trade

Politics
Privileges
Trade

Enlightenment

Industrialisation

Democracy
Urbanization

Post-war
Growth

church
market
port

city walls
estates
bridge

(demolition of) city walls
landscape

railway
factories

industrial district
city expansion
education

reconstruction
housing
creative industry
The city is created, modified and developed by people’s use of it. (shaped by agents)

How do people use it? (agent mechanism)

What in people cause such uses? (agent properties)

What influence people? (influence on agents)

People are also changed by the city they use.

---

**A Model**

The last frame leads to a model that unites all the questions into a three-dimensional (relation, space, time) analyses based on historical data, revealing the co-evolutionary human-city entity.

The premise is that humans have the active role, so the analyses start with the agent. Simplifications are also made to the bilateral influence dynamic to get a picture of this basic model.
The connections between elements are colored according to agents’ purposes. Not only the connections shift, but the nature of them between the same elements may change as well.

While agents shape the city, the city also changes the agents. Their interaction compose a complex process of co-evolution.

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While agents shape the city, the city also changes the agents. Their interaction compose a complex process of co-evolution.
From System to Arhem

- Mapping Agent Movement Pattern

Phase I

Phase II

Phase III
Due to the complexity and the huge area of phase VI, inefficiency of hand drawing resulted in this blank box.

- Complex system of modern city is better researched with modern means.

HOWEVER abstraction and analogy serve still at this scale - see From Arnhem to Arnhem.
Like wind and water carve rocks, humans carve their cities. People shape the city by using it. From dynamic daily usage to physical formation, it’s a carving process where layer upon layer of new features or modifications are added, perpetually shaping the city onto the next stage.

- One drop of water would not know the shape of the rock, neither do one human individual.
From Arhem to Arnhem

One can't really understand a living thing without putting it in a temporal context.

If we can see a city's history as a biography, it wouldn't be unlike a hundreds-of-year old mythical legend.

Humans' mortal lives extend into the city's immortality, and combined they become the legend.
Although hand drawing failed to map agent movement pattern, it can still capture the story.

This is a phase when the north appears to have digested the centre of the south, took up the latter’s space and syphoning up energy to feed its own growth. (This is what hasn’t happened yet. There’s no map to abstract from, and no hard data to support a hypothesis.)

But there can be a vision based on what we know of Arnhem so far.

See next chapter.
Once upon a time, the forest touched the clouds and the river freely roamed the land. A giant shadow hovered over the triangle land between Veluwe, the Rijn and the mountains of the east. Legends say the strength of the buried mountains, the power of the Rijn, the spirit of Veluwe and the essence of earth were at the center of it and a powerful being was waiting to be given life. The ancestors, messengers between mountains and sea, brought Arneym into being.

Centuries went by when there was nothing but the flow of winds, water, and fire, and Arneym waited, drinking in the energy flowing through this land, until the Rijn brought its first prey, whose power added to Arneym’s own, and its wings began to unfold. Yet before long, itself fell prey to another, and became caged within stones, until its wings grew strong enough to break free.

From lands all around came slithering serpents of flowing fire. Arneym caught them and drank in their fire. Its wings beating ever more powerful and reaching ever further, it conquered new territories and captured new preys.

The winds swept over the southern lands, breathing life into the green sea, where shapes arose, vague in the mist, resembling hares, sheep or other benign creatures. Blinded by greed, Arneym sank its talons into their soft flesh. Yet these creatures were not what they seem, and slowly, they morphed into different kinds of beautiful winged forms. Arneym realised they were of its own life, because they share the same breath, the same beat of heart and the same joy and pain.

Together their wings and Arneym’s own created winds so magical, that they awoke many more beautiful dreams sleeping within the land, of nature’s, humans’, and cities’...

To Tell a Story

No multi-factor analyses, no mass movement, no hypotheses-arguments... Just one simple story of one hero, folk style, as has been the oldest way of knowledge passing...
Once upon a time, the forest touched the clouds and the river freely roamed the land. A giant shadow hovered over the triangle land between Veluwe, the Rijn and the mountains of the east. Legends say the strength of the buried mountains, the power of the Rijn, the spirit of Veluwe and the essence of earth were at the center of it and a powerful being was waiting to be given life. The ancestors, messengers between mountains and sea, brought Arneym into being.

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1. the glacier geology
2. the two brooks
3. soil
4. agents carrying out the exchanging process between regions
5. energy and material flows influencing the built environment; fire specially refers to human activities
6. resources that sparkle urban growth
7. extension of urban fabric
8. spatial growth stagnated within castle walls
9. the railway

The first product is a script of the story, merged from the flotsam and jetsam by the shores of analytical routines. Professionals tend to dismiss these as side product of thinking, but it’s actually a soul we have fashioned for the object studied.

The second step is abstracting images by means of analogy from maps, as shown in the previous chapter, From Arnhem to Arnhem. The analogy is meant to reflect form, structure and relations.

The third step is to enact the story, environs the creatures and taking them out of the map. In this step no map reference is used, street pattern are drawn onto the moving animals like TATOS, and building types are incorporated to reflect historical origin of urban fabrics.

This creates a narrative space where the events and scales can merge into one coherent message.

Creation of the Story
However advanced our analytical tools are, and however insightful our perspectives, the syntheses of information and the passing of knowledge can be overwhelmingly complex for human purposes.

A fable is an all-purpose generic cognitive model that can be easily passed on. Its images are simple and contagious like DNA; its information endlessly multilayered and implicative, leading to facts, vision or humour; its interface empathetic, accessible solely for non-machine beings.

And a model isn’t the end, but rather the beginning. All the implications, the analogy, even the coincidences can be raised questions about, disputed over, explored further, etc. In the end, people will build around this seed of a model a forest of their own cognition, generating explanations, predictions, even feelings.

Because it’s not only human scale that’s needed in urbanism, but also a human dimension in the perceiving, thinking and creating.
Reflections

What’s happening to the central old town?
What’s between the North and the South?
A Vision
What's happening to the central old town?

What's between the North and the South?

Strategy

Extend public place network to riverbank (vertical lines);

use riverside promenade to connect with flanking active areas, reviving south edge;

open up key visual corridor into the southbank landscape.

A Relation Profile

physical division

North has no visual connection to south urban fabrics; Two high bridges (ironically) limit the immediate connection between two sides (see below: movement pattern).

The historical anchor-flow structure kept both south edge and inner places along the flow route active. Dissolution of anchors cause the route to fall out of popularity.

The south is fragmented by all kinds of infrastructure, and its parts cannot hold an equal conversation with the north, which is united around its center as a whole.

Movement Pattern

When people from the northside go south, they go through south, while people from the south actually into north.

The closed section of highway that cuts the south in half serves only those north of it; and the two huge bridge serve high speed, long range traffic more than immediate connection.

Colonisation Aftermath

The postwar re-development made the south, lead by large housing projects. The true center of original south, Elden, was erased.

The re-development, exploiting the space of the south without regard to its spatial integration, is like colonisation. Yet colonising a land doesn’t make you part of it.

The south people is no more of the south than the north; it’s just they have to live in this estranged space.
This is a vision for integrating urban fabric, connecting urban places and re-structuring the relation between north and south.

A basic understanding is that urban fabrics are connected by flows of agents, which mostly move between two destinations (anchors). To vitalise a public place, a strong, self-sustaining flow must be introduced, hence a route between important anchors or a closed circle is sought.

In the fragmented south space, where modern infrastructure and rapid development has proved against integration, a historical organic state before modernisation is of much significance. A self-developed center, Elden, dated back centuries, and its life source was the flow to and from Arnhem center.

Rediscovering this life-sustaining flow route is important to reviving the south from within, because modern traffic flow of cars and trains cannot achieve what human driven flow brings: liveliness, interaction, prosperity, etc.

Combine this route with current places, a new route is proposed: a central belt leading from southeast residential area, through cultural and sports area, into the largest park of the south. Along this belt, more connections to the rest places can be more easily made, eventually forming multi-layered circles. By pulling the south into a gravity center, this center can bind with the north center more efficiently.