BOUNDARIES OF CULTURE

Text on the project Design Nature sponsored by the IKEA-foundation

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Delft University of Technology

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INHOUD

1 Introduction

Boundaries play a leading part in architectural and urban design and in ecology. In a design every drawn line is a boundary, in ecology every boundary is a place where flora and fauna have more opportunities than in homogeneous areas.

In this essay a relation between both types of boundaries is established.

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2 Culture as nature designed

Since the transition from hunting to agriculture, about 10 000 years ago, people have cultivated areas[a].
These areas needed to be enclosed[b] and protected against the forces of nature, animal and human plundering.
The new sedentary existence that agriculture demanded made more extensive division of tasks and civilisation possible within these boundaries. Division of tasks necessitates exchange and enriches language and imagination with everything needed for making appointments, agreements, and planning.

Culture is a niche[c] for the human species, a shaped margin between the own human nature and the unutilised external nature, living or dead.
Culture is that part of nature designed and controlled by man, but nevertheless subject to natural laws and thus to nature.
As soon as human care ceases all remains of human culture return subsequently to their natural state. One can imagine nature without culture, but not culture without nature supporting it. Even human feeling and thought are natural phenomena that must be controlled and cultivated in order to be considered culture.

Culture is not the opposite of nature, but a collective part of a larger set of natural phenomena, a specific form of controlled nature.
Culture is internally limited by the uncivilized nature of inner man, but externally by the rest, the other, remaining uncontrolled nature.

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[a] The Latin masculine noun "cultus" has three meanings:

1 cultivation of land by building or planting
2 care, maintainance, life style
3 moulding, practice, worship, veneration, cultivation of language

The feminine "cultura" follows the latter meanings:

1 care, building, agriculture, arable land
2 moulding, refining, worship, praise

[b] This bounding activity has in Dutch a number of etymologically related words as "touw" (string), "omtuien" (binding), "tuin" (garden) in its turn related to the English "town".

[c] "Niche" is an ecological term for the place that a species has acquired in an ecosystem.

3 The internal boundaries of culture

The mysterious and infinite nature of our inner self which medical practitioners and psychologists never cease studying confronts the environment in a series of bounding surfaces, starting with our skin.
The touching of a loved one, of our clothes, of water, wind or sunlight, brings us into direct contact with the nature of others, the culture we share or the external nature.
Touching is directer and more real than detached seeing, hearing or smelling.
No impression is so literally a mutual in-pression as touching, the footstep in the sand, leaning against a wall, gripping a utensil.

Our skin is the innermost limit of our personal existence. Each stimulation thereof activates a primary form of consciousness without which no self-consciousness is possible[1]. If this boundary is crossed[a] we experience our existence in tension, be it pain or happiness. Subsequently the most literal meaning of "feeling" is connected with our skin.

Sometimes one tries to shift the boundary inwards by earrings, pins, tatouages, penetrating erotic games, a fond intimate embrace, ritual appetite or periods of poetic susceptibility. However, the outward shift (in clothes, territorial boundaries, architecture, images, sound and language) offers more space and stretches the area by which one can realise fascinating transitions of boundaries by design.

To this expanding shift of boundaries is only one limit: the skin of an other person. You cannot durably extend your border inside another person without attacking him or her. One can intimidate or torture another to have them tell you something, but one never can feel completely and with certainty what an other person feels. It is a universal biologically founded human right to keep your own feelings and thoughts.

Language offers the illusion of transcending these borders, but whether and how you really "touch" or "reach" an other person is fundamentally uncertain[2]. Sometimes we have the impression of understanding an other person or being under stood by him, but the only real grasp are not feelings and thoughts, but touches, words, gestures and material

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[a] The originally Latin word "existence" as well as the Greek "ecstasy": means "stepping out". Its is the active variation of the more passive "moving out", litterally the translation of e-motion.
Thomas More wrote, as far back as the Middle Ages in his "Utopia" that all human pleasures consist of the in- or output of the human body from everything that belongs to the human body or not.

expressions to which then the receiver may attach his own interpretation.

Birth, eating, agression, sex and death are all biological moments of transcending boundaries that have produced different crucial concepts, traditions and rituals in every culture. It always concerns a transition from a more natural state to a more interpersonal, cultivated state or vice versa. Consequently each transition of boundaries has the character of the head-of-Janus[a] between nature and culture.
Our migration to the outside, our holidays to areas with more culture than we are used to or less, arouse new impressions and emotions[b]. By exploring the boundaries of our existence, its value becomes measurable in relation to something outside of it.

Not only outward transcending of boundaries is exiting, but the inward transcending of the boundaries of our territory by others also. The nightly slamming of the gardengate, the footsteps on the stairs, the creaking of the door, keep us awake, be it out of fear or through desire.

---

[a] The Roman god Janus had at the front and the back of his head a face (head-of-Janus). He was the god of doors and town gates, of beginning and ending. He was portayed with two faces because he saw past and future. His attribute was the key.

[b] Emotion as physical deficit of balance is the only drive to animal and human acting and thinking. Total balance is the end of every striving. One cannot think without emotion, but one can imagine emotion without thoughts.

4 The architectonical external boundary.

The boundary between the inside, controlled by man and the outside controlled by nature, between climatized and not-climatized spaces is one of the most recognizable outward boundaries between culture and nature. More outward you find boundaries between gardens and farmland, between farmland and natural reserve, between natural reserve and sea, but none of them is so visible as the architectonic boundary. Through architecture culture shows itself to the less cultivated outer world, in which the passer-by temporarily participates.

Inversely nature shows itself to the interior and its inhabitants by variations of light, day and night, summer and winter. Only by virtue of this contrast does architecture come to life. The confrontation becomes more intensive by opening a window, by leaving or coming home. The external as well as the internal world owe most of their exstatic meaning to these boundary-transcending events[a].

When this life-bringing confrontation is absent, and not compensated, a dead, cave-like environment appears within which walls close in on us. In a windowless interior the possibility of confrontation with nature is restricted to dead walls, the living nature of our own body or in the most favourable situation, of companions' bodies. A bathroom, bedroom or pub can be windowless as long as we don't need to be there alone for too long[b].

The same boundary gives from the inside another impression than from the outside. Leaving a building dazzles[c] initially not only because of another light regime, but also because the en-closing interior gives a so totally other impression than the ex-cluding exterior.

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[a] A contemporary Dutch expression for going into ecstasies is "going out of his roof".

[b] The "cave-like" style of many pubs is apparently meant to bring people together.

[c] Dazzle is an old word meaning "to become dim from looking at light that is too bright".

5 Boundary richness as an architectonic quality.

The stretching of the architectonic boundary to an "inbetween realm" is particularly argued by Aldo van Eyck ("Ecology in design", 1968). On razor-sharp modernistic walls he exclaimed: "Where are **the** covered outside-spaces?".

> "Birds nest and bird's flight and bird.
>
> Take off your shoes and walk along the beach through the ocean's last thin sheet of water gliding landwards and seawards. You feel reconciled in a way you would not feel if there were a forced dialogue between you and either one or the other of these great phenomena. For here, inbetween land and ocean - in this inbetween realm, something happens to you that is quite different from the seaman's alternating nostalgia. No landward yearning from the sea, no seaward yearning from the land. No yearning for the alternative - no escape from one into the other. Now there is nothing wrong with the seaman as long as we realize that he is always wanting to go home both ways."
>
> Aldo van Eyck in "Ecology in design", 1978

He observed that "razorblade-quality" of sharp boundaries also in the boundary between past and future: the present. He called both one-sided historical and futuristic fascination "nostalgia". His buildings don't contain citations but references. They don't cite space and time but refer to different places in different cultures and different occasions in past and future. Hence his designs are truly contemporary. By this he tries to escape the obligation of choice our culture is prone to: "breathing in ór breathing out, not both!"[3].
In his culture critical argument he observes that our culture lacks life-bringing "twin-phenomena" richly present in other cultures.

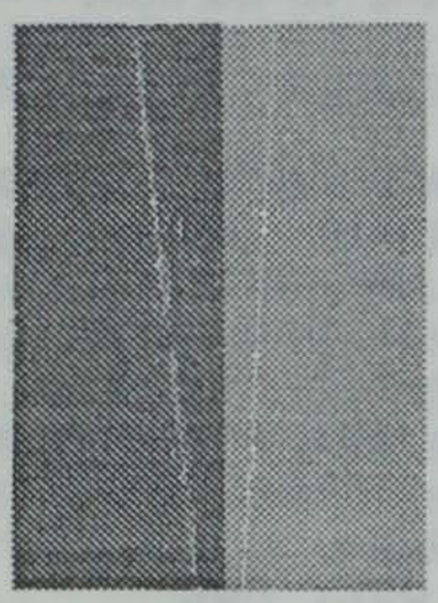
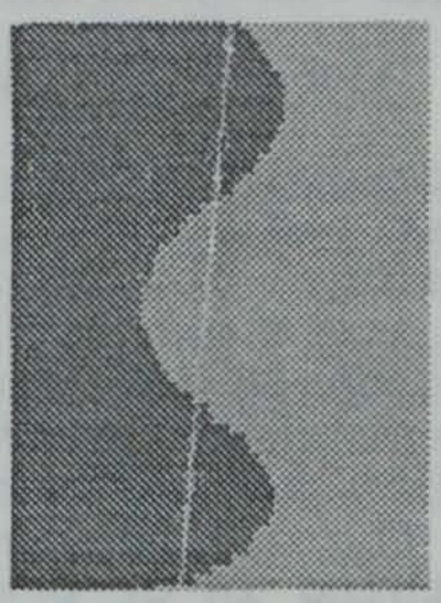
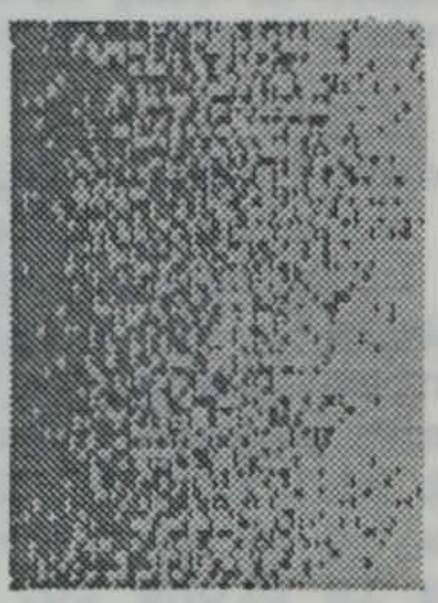
Renzo Piano refers to nature profoundly in his buildings by the details of his constructions or brings their artificialty outward (Centre Pompidou). His flower-shaped stadion accepts the infinity of the surrounding landscape into the interior and by division into shell-formed segments stretches the moment of coming in or going out.

The classical Greek temple shows this "miracle of moderation" by its colonnade.

6 Boundary richness as ecological quality

In the field of control of the natural environment in the Netherlands the Dutch ecologist Van Leeuwen[4] shifted the attention from biotopes to ecotones[a], which are the boundaries between biotopes. Where these boundaries are sharp he invariably found a dynamism in which competition caused the ruin of uncommon plants. Sharp boundaries (fronts[b]) in the vegetation always go hand-in-hand with uniformity (few species).

Wave-shaped borders and vague borders (gradients[c]) on the other hand were seen to produce uncommon species, which were not found in the homogeneous biotopes on either side of the border.

FRONT	WAVE-FRONT	GRADIENT
		
Van Leeuwen (1971), Ekologie		

The wave-front not only offers a longer boundary than the straight one, but also because of different orientations (to sun or wind) a larger diversity of life potential for various species.

The gradient has particular ecological significance. Settlement location factors for plants, animals and people, their dwelling or business can be plotted in a "curve of ecological tolerance":

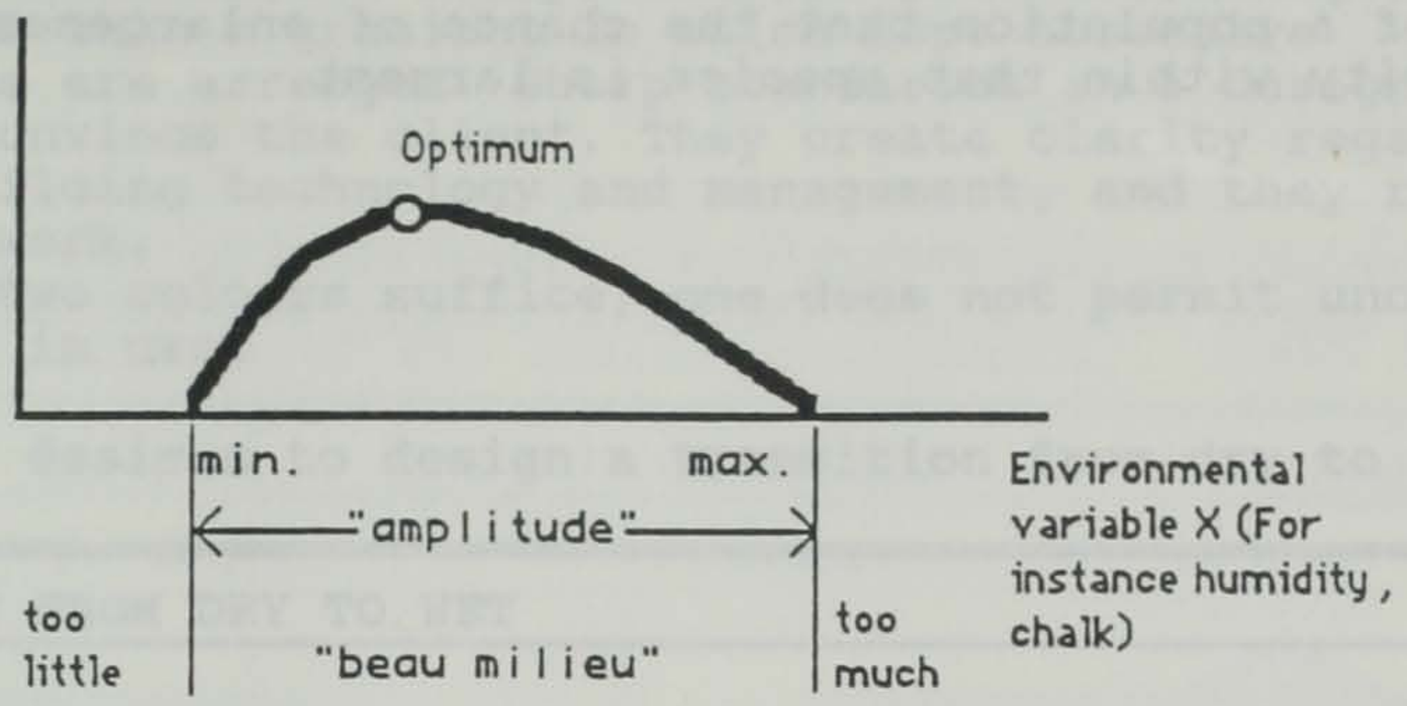
---

[a] This expression is avoided by Van Leeuwen because in Anglo-saxon literature the accent in "ecotones" is on competition.

[b] The ecological expression is "limes convergens".

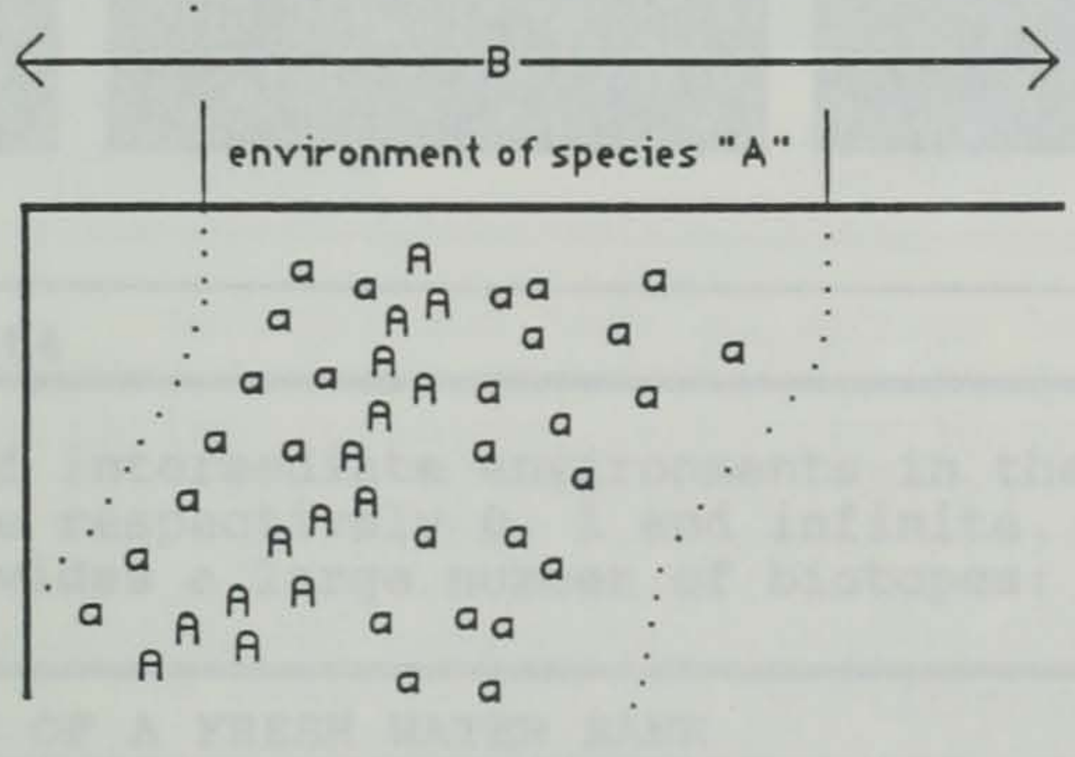
[c] The ecological expression is "limes divergens".

CURVE OF ECOLOGICAL TOLERANCE



The vertical axis in this figure expresses the response from an organism to the offered environment, measured by the chance of survival[5].

ECOLOGICAL GRADIENT



In the above figure a spatial situation is shown in which an environmental variable changes over a distance B from "too little" to "too much" for species "a" (an ecological gradient).

Suppose for instance this is a slope where the moisture content of the soil changes with the height. On this moisture gradient of moist from high to low a broad border (limes divergens) between "dry" and "wet", an organism can precisely "choose" its optimum location from a number of alternative locations. Next to his own location species "a" leaves space free for species with preference for higher or lower moisture. There species "a" is weakened by less favourable conditions, driven away by species that are more ideally situated and thus in optimum condition[6].

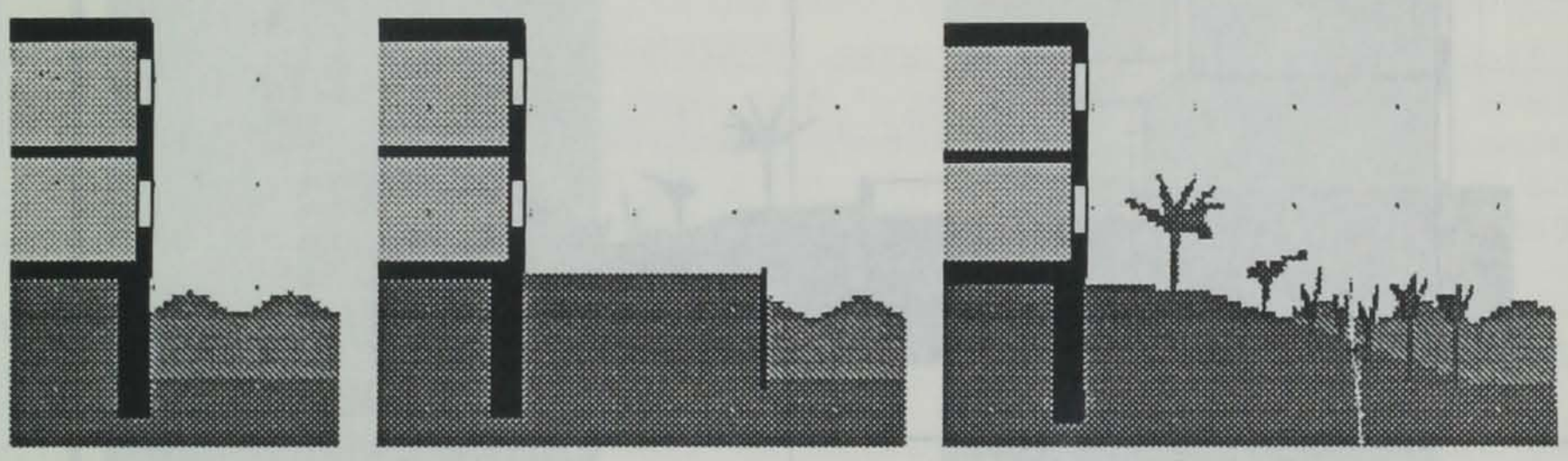
Marginally existing specimens of a plant species have special ecological value as food for insects and other animals. Moreover, it is precisely within systematic differences in the habitat of a population that the chance of enlargement of biodiversity within that species is largest.

7 Designing gradients

It is easier to design a sharp contrast with two homogeneous possibilities than a gradient in which more succesive possibilities are arranged. Sharp boundaries in a design, after all, convince the client. They create clarity regarding property, building technology and management, and they require less design work.
One line or two colours suffice, one does not permit uncertain developments in use.

Suppose, one desires to design a transition from dry to wet:

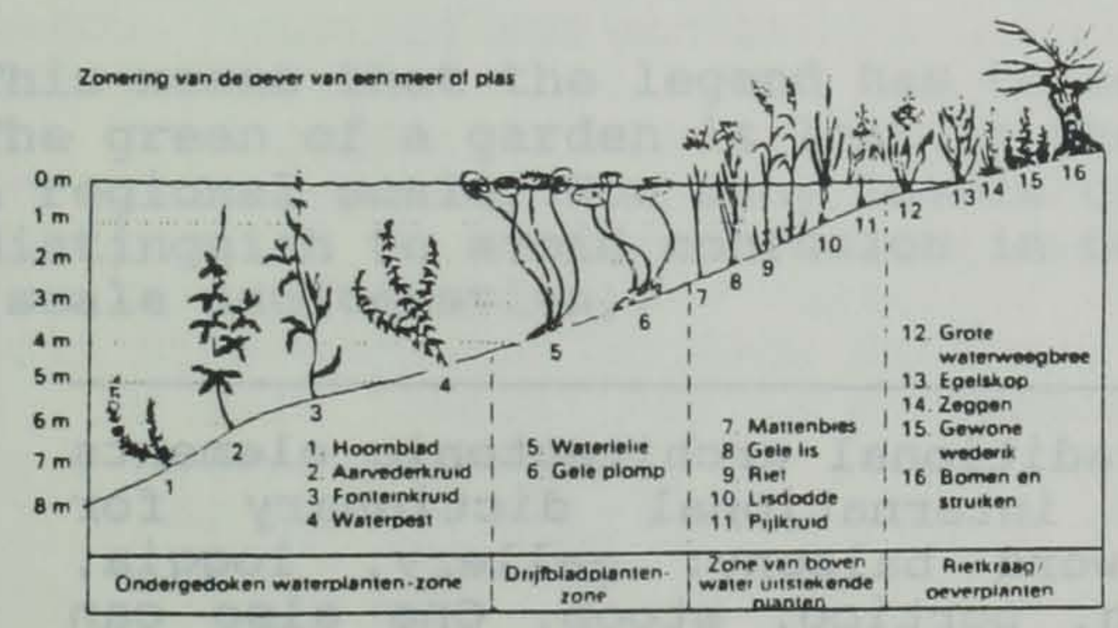
TRANSITION FROM DRY TO WET



File Desnat4

The number of intermediate environments in these three solutions are respectively 0, 1 and infinite. The slope suddenly provides a large number of biotopes:

THE ZONING OF A FRESH WATER BANK

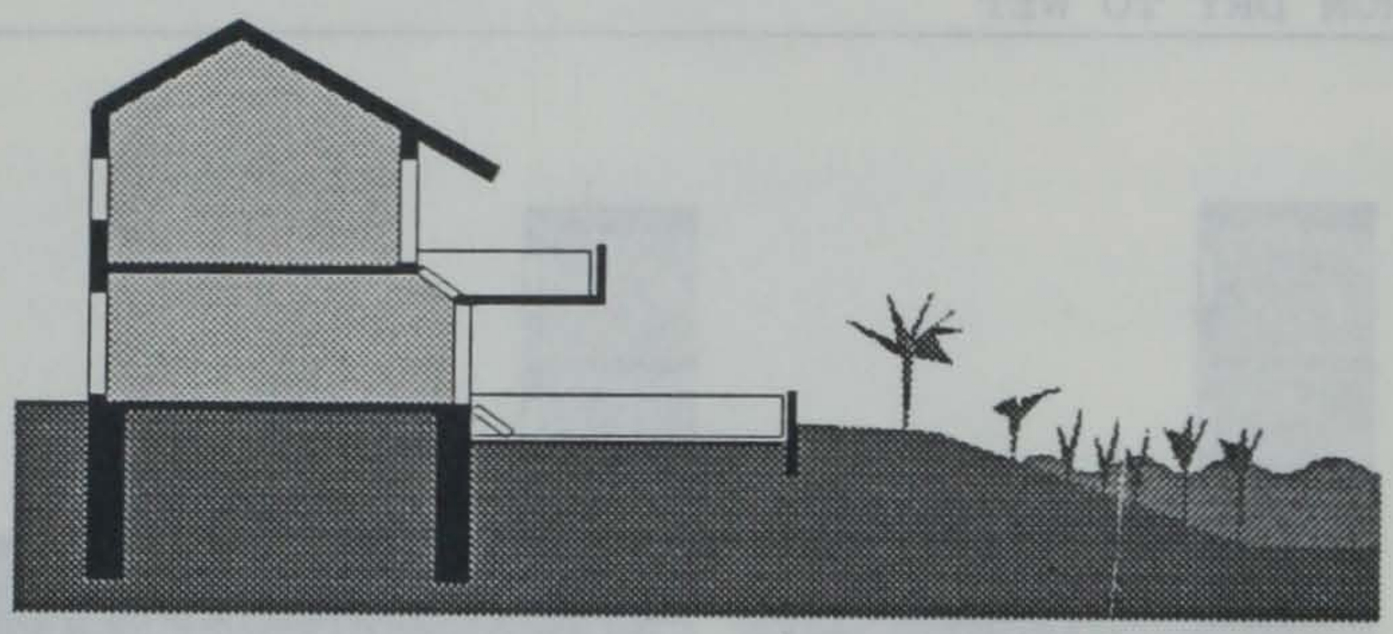


Kelle and Sturm, 1980, p. 134

This gradient offers an optimum for more species than an sharp boundary such as a campshed and offers all depths between the bottom of the water and the ground level. Nevertheless, in this example on page 11 a sharp boundary between inside the building and outside exists without Van Eycks "inbetween realm".

Covered outside spaces create new values between the dry climatized space inside and the potentially wet garden:

INTERMEDIATE BETWEEN INSIDE AND OUTSIDE



File Desnat5

This transition can of course be spun out further architectonically by partially covering the balcony and terrace. One can think of sunrooms, pergolas, galleries[a]. Such transitions are not only utilized by plants and animals[b], they are also of interest to people, because one can derive from them a freedom of choice immediately meeting an occurring need (for instance moving to a little less or more shelter) impossible on sharp boundaries.

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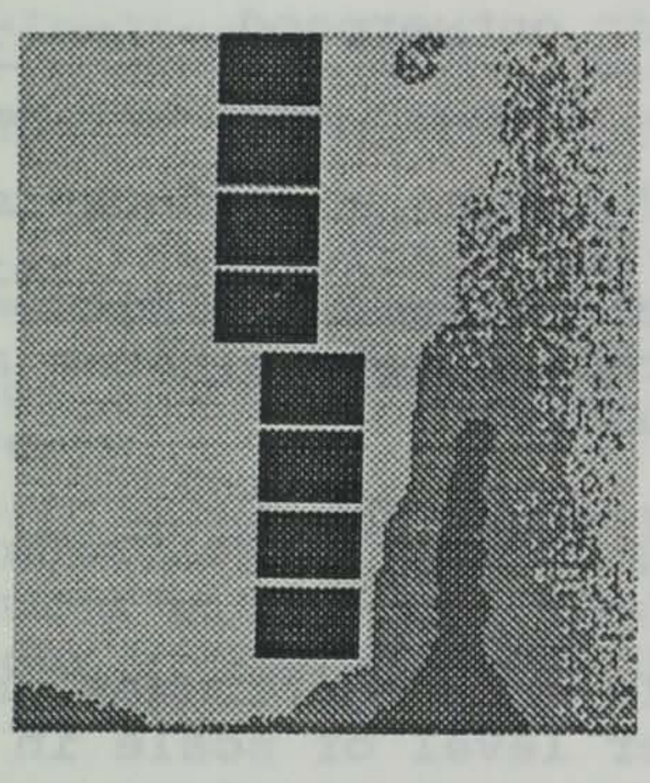
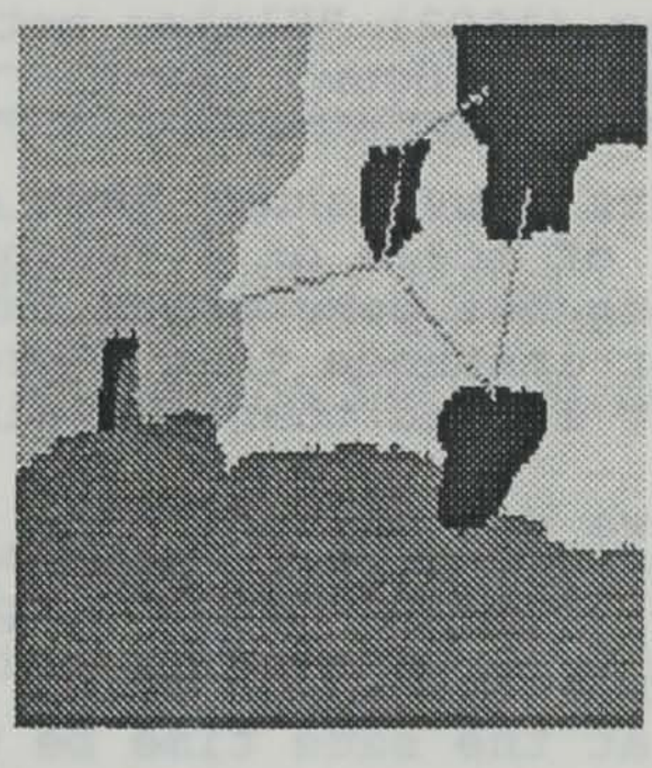
[a] In this field a number of traditional architectonic elements exist. Webster's third new international dictionary for instance mentions with the word balcony: gallery, loggia, arcade, veranda, piazza, porch, portico, stoop. One also can think of a sunshade, arbour, baldachin.

[b] Particularly birds, bats, insects, but also fungii and vermin!

8 Scale and legend

In the figure below left all the above solutions can be located. This location is in turn part of the figure below right.

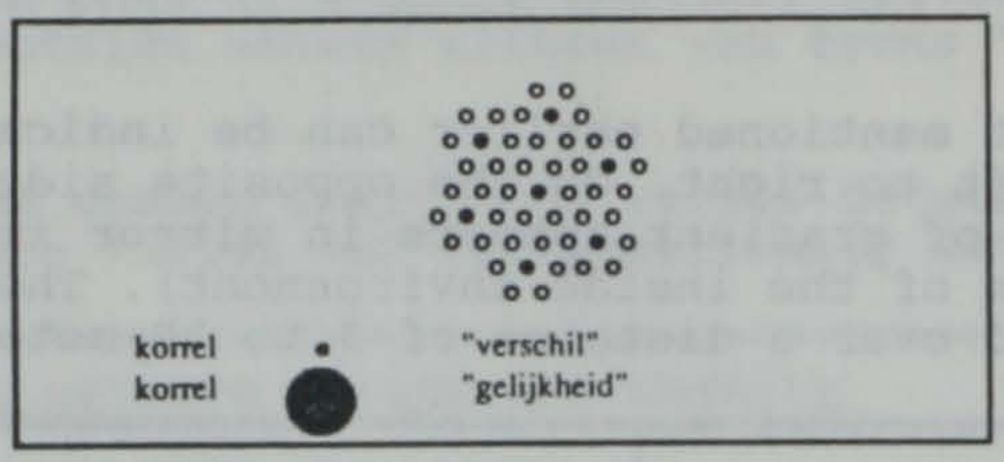
The dry-wet-gradient mentioned earlier can be indicated in the left figure from left to right. On the opposite side of the water the same kind of gradient appears in mirror image (without the extreme of the inside environment). These dry-wet-gradients extend over a distance of 3 to 30 meters.

radius ca. 30 meters	radius ca. 300 meters
	
Desnat 6	Desnat 7

Perpendicular to these gradients, from high to low, these ground plans show the existence of dry-wet transitions of a much larger scale. This gradient also has another character. When one also takes into consideration the groundwater level in relation to the height, one can also call this a moisture-gradient. But the arising environmental differences have another scale and nature than that of interior-garden-water.

This means that the legend has to be redefined on every scale. The green of a garden is lost in the red of built-up areas on a regional scale. How many levels of scale do we have to distinguish to avoid confusion in determining the legend (scale adulteration)?

SCALE ADULTERATION



De Jong (1992) "Kleine methodologie voor ontwerpend onderzoek", Boom, Meppel

The figure above shows that even "grains" having a difference in level of scale of a factor 3 can turn the conclusion concerning the perception into the complete opposite. This means for instance that a grain of 1 cm radius necessitates a different legend than a grain of 3 cm radius.

How can we get unity in the legend on different levels of scale without risking scale adulteration?

Which variable has on every level of scale meaning for design and can at the same time be worked out per level of scale in other units of legend? This variable is the measure of cultivation.

In many designs the representation of this variable in a legend consisting of the primary colours is already common. Red and orange are often applied to urban or built up areas, yellow to agriculture ("culture" in its oldest sense!), green to nature and blue to water. In this progression one also finds a decreasing amount of cultivation.

On every level of scale, starting with a grain of 1 mm. radius rising from 3, 10, 30, 100, 300 mm. to 300 km the primary colours can be given a new meaning.
Mixing the colours gives the designer an infinite number of possibilities to represent his intentions. The development of a personal legend starts with the personal palette.

The diameter or radius of the smallest unit of colour used, the "grain", has a specific proportion to the largest size of the paper on which the design is drawn. On the sketch design this proportion is approx. 100. On the definitive design this proportion can rise to 1000.

Each unit of legend has its own state of dispersion varying between complete accumulation and dispersion.

LEGEND (r = ca. 30 meter[a])	ACCUMULATION	DISPERSION
	CONCENTRATION <---------- ----------> DECONCENTRATION	
Built-up area	urban	village
Paved area	coarse netted	fine netted
Agricultural area	farms	kitchen gardens
Green	one nature reserve	shredded green
Water	one great lake	many ponds

Design (form) occurs in the infinite variation between both extremes.

Accumulation in one direction and dispersion in another produces within two dimensions **oblong** forms or "lines". In four dimensions (XYZT) the following scheme can be developed:

CONCENTRATING	XYZ	XY	X		IN TIME
DECONCENTRATING		Z	XY	XYZ	
RESULT	mass	line	sur-face	com-plete sprawl	accumu-lation of events

An accumulation of events in one moment, like a happening sometimes demands dispersion in space (more accesses to the beach, more office windows, a larger surface). Inversely concentration in space can lead to waiting ("congestion").

On a given location (a set of location possibilities represented as a square below) and spatial programme (quantity per unit of legend) the number of dispersion possibilities per unit of legend is limited.

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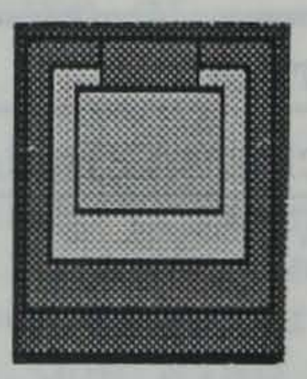
[a] By r = ca. 30 meters is meant "radius between 10 and 100 meters".

NOT UNIFIED	UNIFIED	CENTERED
		
chess board	sharp boundary	centre and periphery

In the figures above an equal area of black and grey units of legend is realized within the same location in different ways. As soon as one concentrates one unit of legend in the centre, the others have to be deconcentrated to a certain degree, to the periphery. The surface of the peripherial unit of legend seems smaller.

When there is a large number of units of legend with a specific sequence, for instance the measure of cultivation, one can concentrate them in this sequence or merge them in a gradient. One can also try to make a design in which all possible exposures between the different units of legend are realized.

1 EXPOSURE	2	MORE
		

Subsequently these exposures can appear in different orientations (for instance in relation to the sun).

10 Structure

The connection between units of legend of one kind may be called cohesion. The connection between different units of legend must then be called adhesion[a]. We shall restrict ourselves in this instance to adhesion. Cohesion becomes adhesion on a lower level of scale by further differentiation of the legend.
Connection can be stimulated by spatial nearness and realized by infrastructure.

SPATIAL CONNECTION					
---------->	R	O	Y	G	B
Red					
Orange					
Yellow					
Green					
Blue					

In the table above five arbitrary units of legend, in the colours of the rainbow (except purple), are exposed to each other. They are not yet connected by exposure in that sense that they are jointly more than the sum of two colours. Just being adjacent doesn't give them "structure". The boundaries and possible spatial connections between two units of legend can be studied systematically by working them out in detail. One can design more detailed images by which these border situations acquire a lasting connection, "structure". Often an intermediate structure has to be designed for that purpose which determines how the boundary "works".

The connection can be asymmetrical, for instance because one unit of legend is dominant over the other in a certain respect. The direction of dominance is indicated in the table above with an arrow. Thus the transition from orange to red is a different one than the transition from red to orange. In the first case the boundary is so designed that, in a certain way, the orange area influences the red area more than the reverse. The asymmetry can also be enforced by "field features". If red is situated above orange, then water will flow from red to orange. If orange is situated south of red, red can be situated in the shadow of orange during the largest part of the day.

Structure in a drawing is generally represented by black lines, dots and symbols that miss "measure" in one or more dimensions, thereby referring to the larger scale of the detail.

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[a] By analogy with the use of words in physical chemistry.

11 Function

The function of the built and non-built environment comprises different values such as the short-term perception value, the longer term utilization value, the future value in the longer term and the survival value in the very long term.
It concerns per definition the value for man. The value for animals and plants is included in as far as man attaches value thereto.

For perception value "form" with some "order" is sufficient, a great deal of "structure" causing a lasting form is not necessary.
For the other values structure is increasingly necessary. Structure should be designed as such, it is a "prerequisite" for these values.

12 Intention

Usually the design is preceded by a programme of requirements, based on the wishes of the client. To meet these requirements the designer has to create, within his design, the prerequisites that will make the satisfaction of these requirements possible. He thereby poses additional requirements, stemming from his experience and his vision of future use and perception.

The executed design will be used and perceived in a different way from that which client and designer had in mind. This often leads to a plea for flexibility in the design "leaving possibilities open". This means designing less.
From the same point of view one can also defend a variety of environment which offers freedom of choice, not only leaving the unsuspected open, but also making it possible. This demands a greater design effort.
A painting which prescribes the viewer's emotion, such as the child-with-tear, is as much a work of art as a piece of white paper would be.

Nature has no wishes. Nevertheless being men, we try to make a programme of requirements for the development of nature[a]. We do this with a primitive and often false conception of the use by plants, animals and man, of the environments designed by man.
Time and again we are surprised by the way nature uses these.

We cannot make a programme of requirements for nature: each species has its own programme of requirements of which we understand little and there are at least 1 500 000 species besides man.
We can only create diversity of environment and wait to see what nature will use.
This design intention not to determine, not to leave open, but to make possible, to explore the possible, seems to me of importance not only for nature, but also for man as long as we believe in his freedom of choice.

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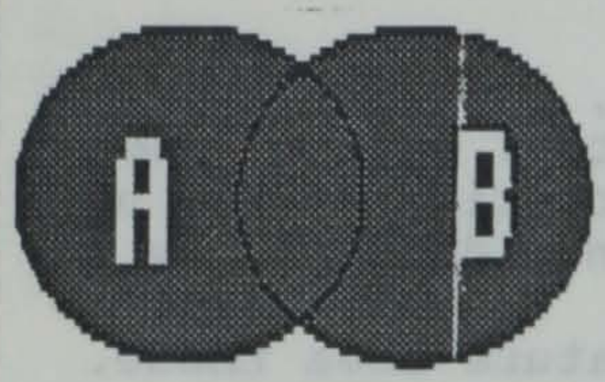
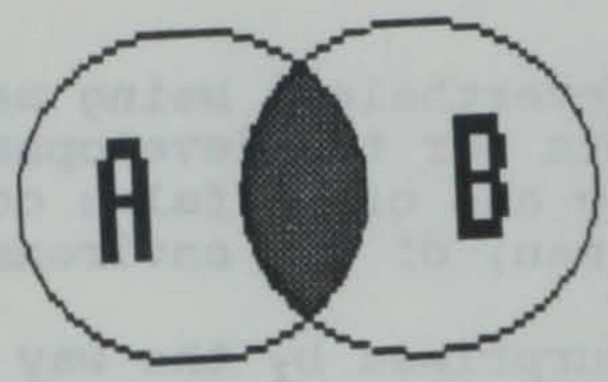
[a] For example the "ecological infrastructure" requirement in the Dutch national nature reserve plan.

NOTES

1. Psychiatry confirms that the durable lack of this stimulus leads to despair. This is a biological fact. Newborn deer not licked by their mother will die. (See for instance Montagu, A., Touching, Columbia University Press, New York and London, 1971)

2. Language is a means of pushing back frontiers to penetrate beyond the skin of an other person. According to Wittgenstein (1918, Tractatus Logico-philosophicus, proposition 5.6) the frontiers of my language are the frontiers of of my world. If my world extends beyond the skin of another then what the Dutch poet Leo Vroman writes in "God and godess": "Nearer than in one's brain we cannot touch each other."

3. The classically logical term "or" excludes nothing :

"or"	"and"	"either ... or"
		
$\cup$ (unification) $\vee$ (logical sum)	$\cap$ (cross-section) $\wedge$ (logical product)	$A \wedge \neg B \vee \neg A \wedge B$ ($\neg$ = "not")

It would be interesting to investigate whether the word "or" already had the ex-clusive meaning "either .. either" before the industrial revolution. That would explain why in the nineteenth century a formal notation became necessary for formal logic.

4. Van Leeuwen made a "gradient map" for the Second National Regional Plan (1968). This map still serves as a foundation for nature conservation in the Netherlands.

5. In the background, the idea of the curve of ecological tolerance plays of course an important part in agriculture and architecture. In both instances it concerns after all the optimizing of environmental variables in favour of a special "useful" crop or a special "useful" animal (like man).

6. Optimizing environmental variables for one organism can lead to worsening of conditions for other organisms.
When we realize an overall optimum for species "a" by say equalizing soil and water levels we also cause the optima for other species to disappear.

That, however, is not the only effect: one also introduces new risks for species "a" itself.
Suppose for instance that it is going to rain or remain dry for a long period of time. In an ecological gradient the habitat of population "a" would only have to move to a higher and dryer level or conversely, to a lower and wetter level. Parts of the population, previously marginally sited, would suddenly be close to the optimum and hence have a greater chance of survival. Only a part of the population would not survive the disaster. After leveling however, the entire population is put at risk. Spatial differentiation in the environment offers more chance of survival also for a single species.

SUPPLEMENT EXERCISE "BOUNDARIES"

1 Give each cell in the next table a meaning in words or images:

LEGEND	CULTURE <----------->NATURE				
RADIUS GRAIN	RED	ORANGE	YELLOW	GREEN	BLUE
1 mm					
3 mm					
10 mm					
30 mm					
100 mm					
300 mm					
1 m					
3 m					
10 m					
30 m					
100 m					
300 m					
1 km					
3 km					

2 Give each cell in the next table a meaning in words or images:

TRANSITIONS WITH A GRAIN OF R = ca. 10 METER					
---------->	R	O	Y	G	B
Red					
Orange					
Yellow					
Green					
Blue					

3 Make - either on or off location - a sketch design with the five colours in which all transitions above appear, each at

least in four wind directions. Make of at least 3 transitions
a detailed sketch design with a grain of approx. 30 cm.