Suppositions of imagination

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INTRODUCTION

Limited imaginations

Verbal language tacitly selects a direction
For at least a million years humans lived in small, surveyable communities with little exchange.
I assume that any adult member of the community could imagine all necessary actions for its survival.
These hunters and gatherers developed a verbal language primarily to communicate these actions.
They shared a set of suppositions called 'culture' as a con-text tacitly supposed in any text. Any sentence evokes contextual imaginations, but it only reports one action of a subject on a direct object. Actions and sentences tacitly suppose a direction, a sequence of of events in time and space that cannot be turned around or read backwards. Verbal language and its logic are one dimensional. Palaeolithic cave paintings may witness the urge of still an other medium than a verbal language to show some context of what is told. A picture shows something of its environment and context left aside in verbal language: the many directions, side-roads and other occasional objects. A picture can be read in any direction. It can tell many different stories chosen by the reader. It is not unequivocal and it may contain contradictions. Spatial design shapes conditions for different actions, even if they are contradictory.

Specialisation limits imagination
Only some ten thousand years ago agriculture produced a sufficient surplus production to support more specialised actions in larger sedentary communities with substantial exchange.
The production of goods and services for survival disappeared from the view of the consumers.
In only one percent of their existence, prehistoric languages have had the opportunity to adapt to the consequences of an increasing division of tasks crossing eachother in towns, meeting at their markets. Verbal language has been enriched by many vocabularies of specialists, but it remained a prehistoric tool. It still reports or proposes direct actions. It avoids the side roads of many tacitly supposed contexts crossing the line of inference. Poetry referring to crossing stories may suggest some of them.

Verbal language lost its context of survival
Education in specialised vocabularies deepened the imagination of the individual, but it limited its wider scope. The Bible reports a Babel at an unfinished tower.
That tower may represent the required communication itself if projects become embedded in a larger context than a direct survival in the forest. And, that tower of communication lost its stairs.
Living at your own story, you are no longer aware of other stories supporting you.
After that neolitic revolution, an industrial revolution increased the number of technologies and specialised professions again. Forgetful money has become the most convincing language between them. But its limited vocabulary is not sufficient for common survival. It only enables the exchange of anonymus products and services. Their suppositions and consequences have disappeared from contemporary imagination. This thesis studies the absent suppositions usually replaced by short-cuts.

Education suggests that other people think for you
An ever increasing and overwhelming stream of information and contexts has made any selection arbitrary. No direct urge for survival and use force you to make a useful selection anymore. Ever longer periods of education did not compensate that deficiency of imagination. On the contrary, you have to choose what you want to know before you know what can be known. It convinced you that specialised and context bound knowledge is enough to survive in an actual labour market and that others will take care for the rest. But, nobody knows the rest. Education does not urge you to rethink what others have thought beyond your own role. You accept the missing links of imagination because you are not aware of them if everybody accepts them. Even if you extend your social network until you cannot remember who is who, it primarily reinforces the prejudices of your own choice. It avoids inconvenient suppositions of common survival. This thesis tries to trace back their conditional sequence by introspection, to remove useless connections and to restore missing links.

Universities sell their universality
Even universities are no longer universal. Their faculties and scholars have become specialised. They divide their tasks to compete efficiently with commercial consultancies and to deliver usefully

specialised manpower. The short term profits of valorisation then dominate a critical and integrating role for the longer term.

But at a University, sciences and humanities are supposed to exchange openly, to meet eachother for mutual understanding, doubt, criticism and cross fertilisation. That allows students to increase and improve their suppositions and imaginations, to doubt, to criticise common, traditional and even tacit suppositions. It enables them to make their own conclusions, choices and decisions fitting better in the changed conditions of their generation. It forces teachers and scholars to make their suppositions explicit, to doubt, and to try out unusual (often less profitable) ones by research and study.

The 'product' of a University is not primarily advice, but developed people. Here, 'developed' means decisive but able to cope with doubt. And, that is not a homogeneous product. It is the product of an open debate between a diversity of teachers and students, their suppositions and imaginations. That kind of diversity and simulated uncertainty counteracts the real uncertainties of coming generations. It enables to balance many imaginable long term futures.

Diversity is a risk cover for survival in changing conditions

Diversity is the risk cover for impredicable and unexpected futures at a longer term. That requires a wider overview with a sense for differences, changes, controversies and exceptions instead of a choice for the profitable average. Long term evolution grants differentiation, deviations of tradition, innovations, exceptions, mutations in the reproductive genetic code instead of a productive but risky repetition. Diversity is the best answer of evolution and ecology to environmental change.

Fast fame is often an indication of mediocrity, a support by the mean, the most. 'Beautiful minds' are not immediately famous. Many trials and errors are valuable if only one of them may enable survival in a changing environment as a successful mutation.

And, if you are not allowed to make errors at school, then you will do that later.

That does not fit in managerial prognoses and programs for a fast maximum selling of well defined products in a market that may change before you have sold your stock. Unifying the souls at clear aims is productive and profitable for the short term.

But, survival in uncertain long term futures requires individual diversity. Then, any future has a choice.

Increasing specialisation hampers mutual criticism

The many empirical disciplines involved in spatial design, differentiate in ever more separated specialisations. The narrower their scope, the more international their conferences should be to sustain their own commercial journals, books, peers, authorities, memberships, courses, judgement criteria and rewards. These global villages behave as subcultures (sets of shared suppositions, paradigms) with their own unified educations, languages and language games.

Within their more or less closed communities many suppositions are no longer discussed, experienced as 'self-evident'. Sharing them is the proof of a professional membership.

Academic criticism at other territories has become silent, 'not done'. Each has its own message.

Partial solutions live their own life.

Spatial design in particular is supposed to integrate many specialisms for futures in the long term.

But, it looses an understanding of the many professional specialisms involved. Becoming a specialism itself, its limited imagination fails to find a balance by critical response on specialist advice.

Partial problems are subcontracted and partial solutions live their own life (see *Fig. 1 - Fig. 3*).

Fig. 1 Sit wet.   *Fig. 2 Grant the dustbin its rest.*   *Fig. 3 Don't walk out of a bus if people want to go in.*

Criticism beyond your competence is not done

A university faculty oriented on spatial design regularly hosts specialised conferences. It often witnesses an invasion of foreign people marked with batches in their corridors. They discuss in a

jargon you cannot understand, they whisper about famous speakers you do not know and they advertise their research in posters promising spectacular pioneering results you cannot imagine how to apply in your design. If you take the trouble to penetrate such a conference, to read the proceedings, to attend the lectures and if you accept the invitation to ask questions after a lecture as an invitation to academic opposition, then you may experience some dread in the audience. You may have attacked an authority. You may have doubted shared suppositions. You may have used a different jargon, different distinctions. You may have disturbed their periodic sociability, their break with professional friends in long periods of solitude. You may have threatened their mission, their hope, the source of their scientific motivation. You may have damaged the fortresses at the boundaries of their territory, their hidden suppositions about the other disciplines stemming from a remote view on the rest of science, humanities, design and art.

The unavoidable specialisation in scholarly disciplines has conditional layers
Any scholar needs an understanding of her or his own suppositions compared to those of others to restore an academic appreciation of interdisciplinary critique. Even if you do not know your neighbours, you can find them upstairs and downstairs in the building of science, humanities, design and art.
In this thesis I assume that these levels and layers suppose each other downwards (see also *Fig. 12*).
Any policy or management supposes a set of shared suppositions downstairs called 'culture' (for example a reliable social behaviour acceptating a division of roles, an appropiate language to communicate them, a shared memory by a system of education to avoid mistakes of the past).
On its turn, any culture supposes its foundations of survival downstairs by an organised exchange with the environment called 'economy' (for example facilities, an exchange of goods and services, a money system motivating specialised labour).
Any economy supposes ways to separate and combine useful resources called 'technology' (for example dikes, ways, cars, machines, tools).
Any technology supposes a dispersion of resources and living conditions utilised by different competing and cooperating organisms and organisations called 'ecology' (for example different resources and conditions for different plants and animals, including people and their differentiation into different abilities and needs).
And, any ecology supposes space, time and matter integrated and understood in physics and chemistry (for example sun, wind, water, earth, life, living, their patterns and processes, their differences and changes).

Authority is no argument
Empirical sciences divide their tasks roughly according to these layers and to levels of scale. They politely limit their territory within these fields by their own peers burying their results under the cover of expensive journals. This archive multipies as plant louses without a substantial and sufficient cross fertilisation. Mutual criticism between disciplines is not done. Any discipline is captured in its own field sharing sets of tacit suppositions about the other layers of reality (subcultures called paradigms), guarded by professional exams. No uomo universale has an overview anymore. There is no other judge to sort out contradictions and controversies between them than the innocent public that has to pay them. If they meet each other in a design team, then an old fasioned territory fighting hides itself in polite phrases such as: "That is my field of competence". Authority becomes an argument again. Medieaval times returned. And, citizens do not want to pay for it anymore since any opinion can be founded on the research of some scholar engaged on television.
That may anounce a crisis in the credibility of science, humanities and of universities.

Integration stemming from one discipline is disintegration
Many attemps of integration stem from one specialised layer or level of scale pretending its dominance. Politicians and managers stress cooperation, skipping and re-arranging specialised disciplines all the time without insight or overview. Humanities stress strange integrating philosophies, mainly stemming from faculties of language and literature. Economists stress finance; engineers emphasise systems and cybernetics; biologists emphasise the interaction between genes and the environment and physicists expect their theory of everything. The disappointment of this queen of sciences, physics, in reaching her theory of everything, may result in a kind of religion. Chaos theory or complexity theory tend to hide or to accept their black holes or to extend their conclusions about boiling water upstairs to clarify biological and social organisation. Self organisation looks nice, but it has moral limits. However, essential discoveries such as a bifurcation of processes that enables very small events to determine the direction of a process should be taken serious upstairs. Small ecological, technical, economic, cultural or managerial initiatives may have greate effect. Bifurcation stimulates a search for conditions that enable individual free choice. Free choice is supposed in democracy, legislation and ethics.

Any layer of reality has conditions hided in limited suppositions of imagination
The hidden suppositions at any 'higher' layer are not explicit since any discipline is disciplined, limiting its field of competence. But the urge to integrate these disciplines forces to look over the boundaries of your own paradigm. And, captured in the suppositions of your own discipline it causes an attempt to conquer the other ones. These attempts may be described as the 'conquests' 1 to 6 of *Fig. 12*.
Conquest 1 is pure voluntarism, dominant in the sixties of the last century: 'If we want it together, we can!". It is still popular in management and politics. It causes economic crises and it destroyes the universities by lack of imagination. Programming discoveries or inventions is a paradox.
Conquest 2 is humanism, popular in art and philosophy. Its antropocentric position destroys nature missing the awareness of its unrivalled diversity as a source of human modesty, required for survival.
Conquest 3 is economic determinism, dominant from the eighties until now: 'If economy wants it, it will happen'. It destroyed the freedom of many increasing the freedom of some.
Conquest 4 is technical determinism: 'Inventions change the world'. Look what happened with economy, culture and politics after the invention of book printing, the steam engine, the artificial manure, the computer. These powers and possibilities go beyond the responsibility that any individual can carry.
Conquest 5 is ecological determinism: 'The human species destroys the resources of life'. It once may produce indifference about the value of human life.
Conquest 6 is physical determinism, determinism in its purest form. But then, to calculate your future you have to measure the movements of all atoms, quarks or quantums in the universe and calculate the consequences for the next second. That requires a computer larger or smarter than the universe. Why not take the universe itself? It calculates real time, but its last results will reach us only after many years by the limited speed of light. The next step is to call the universe Gods Brain. That leaves the question open what kind of existence and responsibility you have as a little part of His Thoughts.

Context-sensitivity limits the reliability of generalisation and causation
Any of these kinds of integration are burdened by tacit suppositions themselves.
In the majority of scholar discourses the most important hidden suppositions are the reliability of generalisation and causation. They are taken as self-evident. It is so useful, so profitable, so elegant. However, the context-sensitivity of samples limits the possibility and reliability of generalisation.
The supposed possibility of generalisation hides a confidence that a sufficient number of examples may justify expectations about the other examples by induction. That may be often useful, but the less so the more context factors stemming from different layers and levels of scale you have to take into account. That number is at its maximum in the humanities and in spatial design. The higher you climb in the succession of the layers mentioned above into the humanities, the more suppositions downstairs you have to take into account as context factors and boundary conditions.
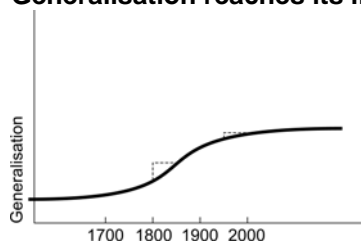
Generalisation reaches its limits

Fig. 4 Deminishing returns of generalisation

Moreover, what can be easly generalised is already generalised. What is left are ever more context bound phenomena. Consequently these are ever more limited by conditions and difficult to generalise. It takes more time and money to make the same progress now than shortly after Enlightenment and the Industrial Revolution. Since then, the number of research institutes, journals and researchers and the amount of their computerised facilities have been exploded, but their results do not increase accordingly. Ever more exceptions appear on the rules invented or supposed. Ever more studies become case studies with many context variables to be mentioned. To make them explicit by proper context analysis takes too much effort if conclusions satisfy local needs. That context remains hidden in their reports.

Causation of any probability supposes conditions of possibility
A society exists as long as it is not destroyed by a flooding, a depletion of supplies or other physical disasters. Its eventual causal relations of policy, management, culture and economy are valid within such tacit physical conditions. Humanities may silently suppose a remaining fulfillment or even an increase of abiotic and biotic conditions of human life and living.
But, even if these conditions remain fulfilled, an elegant causality found in sociology or psychology can produce self-destroying predictions as soon as people take the effects into account in their actions. The imagined effect may then precede the action as a reversed causation.
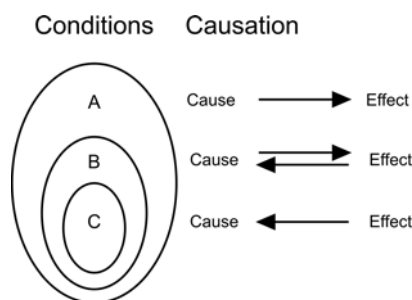
Differentiating conditions may reverse causation

Fig. 5 ABC model

This thesis primarily tries to clarify the suppositions required to imagine abiotic phenomena (see *Fig. 5* A). You have to start there, because without them you can not imagine biotic (B) or even cultural (C) phenomena without many tacit suppositions. Biotic phenomena (B) are physical, but the imagination of their causality is less straigh-forward. There are many feed-back mechanisms involved. It is easier to understand the functioning of an egg if you know what will come out. In biology, coming events often cast their shadow. That allows time saving simplifications. Humanities (C) struggle even more with causality since humans live and make plans based on many unexpressed suppositions. A previously imagined effect then precedes the initiated cause.

History is made by exceptions in a sequence of causes in changing conditions
Rare examples may have more effect than a statistical mean suggests. Exceptions are the motor of biological evolution in an ever changing environment. Inventions have made technical revolutions possible. Technical revolutions (the art of printing, the steam engine, the artificial manure, the transistor) have transformed our economy and society, even if nobody wanted it.
A sound economy has made possible that you share suppositions by education, meetings and journals. It made a culture of appointments, task divisions, reliable behaviour and the acceptation of other thoughts possible. And, that culture is the crucial underlying condition for sound politics, democracy. The other way round, within the many possibilities between these boundary *conditions* democracy *causes* a change of culture on its turn *re-arranging* economy, *asking* for new technologies, *producing* new ecological possibilities and a new use of physical resources. But, that cannot go beyond the boundary conditions of possibility.
It is a circle of *conditions* and *causes*. And, it cannot be understood without that distinction.

Culture is a set of shared suppositions
There are many conditions we are often not aware of.

> For example, if I had to summarise all of the conditions supposed in writing this thesis before I could write the very thesis, then I would need years of work before I could write it with the confidence that somebody will understand it. It would contain many suppositions such as: 'Suppose we (the writer and the reader, whatever these terms suppose itself) are humans, suppose humans have thoughts to be shared (whatever that supposes), suppose we share a language (…), suppose that language allows to express (…) thoughts, suppose that such an expression can be interpreted (…) by a reader getting the same (…) thoughts as the writer had writing it. And so on. Then at last I could conclude that I could write a thesis.

Fortunately I do not have to summarise all these suppositions if I can trust that I share them with you in a common culture. 'Culture' silently provides shared suppositions during communication.
However, it is not easy to unveil hidden suppositions if you share them with so many others.
These suppositions seem self-evident and you do not have to talk about them until something unveils them (for example in your contact with other cultures) or somebody changes them (for example in a work of science or art). Any joke changes suppositions during the joke. That makes them funny. In science and humanities a change of paradigm[a] is a change of suppositions as well. Science is fun.

Integration requires a study of suppositions
For a real integration of empirical sciences and humanities in spatial design, you have to study their suppositions themselves: their necessary sequence, the layered conditions of their construction.
That requires a purifying criticism. Purification means skipping unnecessary and misleading suppositions, adding the necessary ones to imagine well described parts of reality in a useful way. The limits of generalisation and causation then should be clarified, aware of the impossibility of a theory of everything, aware of the value of partial clarifications, usefully converging in the context at hand.

Design requires a critical review of diverging suppositions
In 1992 I studied some of the common tacit abiotic suppositions of science, technology, humanities,

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[a]Kuhn, T. S. (1962) *The structure of scientific revolutions* (Chicago) University of Chicago Press

design and art to understand their possible contributions in urban, architectural, technical[a] and ecological[b] design [c]. The method applied to select the essential suppositions and to determine their sequence I called 'conditional analysis' (see page 10). This thesis is an elaboration of that effort after twenty years of study in different disciplines possibly supporting spatial design.

Design requires more imagination to be less vulnerable
To balance and integrate these separated and specialised contributions in a spatial design, requires a critical imagination of their possibilities and limitations. It requires an imagination of the distinguished boundaries, the different suppositions, distinctions, terms, approaches, possible overlaps, contradictions and controversies of the many specialisms involved to become less vulnerable in their company as a designer.

Limited imagination hampers access to what is possible
The final purpose of this thesis is then, to get an effective access to what is probable, possible, imaginable and desirable (see *Fig. 6- Fig. 9*) by design. The method is reviewing limited imaginations and their suppositions. If you are not aware of physical, ecological, technological, economic, cultural and political or managerial possibilities, then specialists may break off your design. They do that by the best intentions with a sense of responsibility for their own field of competence, and you have to follow them on trust. If their partial inquiries in depth (often supported by mathematical evidence) convince your client, then some depth wins from width.
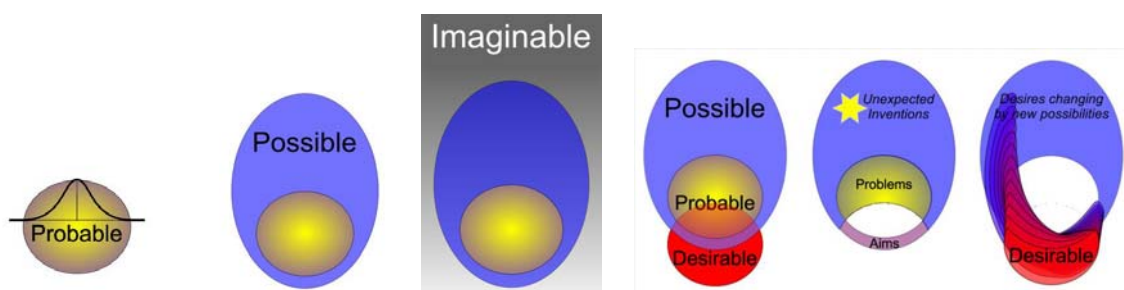

Fig. 6 The role of   Fig. 7 The role of   Fig. 8 Art's   Fig. 9 The role of management and policy
empirical research   technical design   role[d]

The modal sequence presented in *Fig. 6- Fig. 9* is elaborated from page 15 onward.

Reconstructing supposions of imagination

Suppositions can be purified by reconstruction
The basic assumption of this thesis is, that imaginations and the rest of reality do not share anything else than conditions imagined as suppositions starting with 'difference'. The issue is then, to detect the underlying tacitly imagined differences (distinctions) constructed in empirical research, design studies, art and management. The challenge is, to discover them as successive hidden suppositions required to construct any imagination. The final question is: 'Which of them are effective in design?'. Its significance is a possibility to reject your useless[e] suppositions and to add effective ones.

Imaginations and the rest of reality do not share anything else than 'differences'
It implies that imaginations are 'real' as a part of a larger reality of 'differences'[f]. Differences are (re)constructed by imagination as 'distinctions'. That construction is 'real', but not yet 'existent'[g].

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[a] Jong, T.M.d.; Voordt, D.J.H.v.d. [eds.] (2002) *Ways to research and study urban, architectural and technical design* (Delft) DUP Science
[b] Jong, Taeke M. de; Dekker, J.N.M. ; Posthoorn, R.; eds. (2007) Landscape ecology in the Dutch Context, Nature, Town and Infrastructure (Zeist) KNNV Publishing
[c] Jong, Taeke M. de (1992) Kleine methodologie voor ontwerpend onderzoek (Meppel) Boom
[d] Jong, Taeke M. de (2008) Art's task for science (Den Haag) Opening course Art Science 2008-2009
[e] The term 'useless' may unvail a pragmatic position of this thesis.
[f] Sub-stance as an under-lying sup-position is under-stood (four times the same word!) or imagined here simply as a set of differences containing any content of both internal mind and external existence.
    That position is closer to Spinoza than to Descartes, Leibniz or Kant.
[g] Ex-sistent is Latin for 'stand outside'. It will be used accordingly and exclusively for the 'exterior' part of reality. In that sense the inner reality of a unicorn does not 'exist' until it is expressed in a picture. Imaginations are real (you also say: "I realise myself that ..."). Expressed imaginations are in addition existent.

Introduction   Reconstructing supposions of imagination

An imagination becomes ex-sistent if it is ex-pressed or even carried-out (ex-secuted)[a]. Imaginations may be different from an existent 'rest of reality', but that difference is only one of the many differences. Any experience of amazement[b] demonstrates the existence of that larger reality.
Amazement is a discovery of differences beyond actual imagination and its underlying suppositions[c].
A repeated amazement[d] indicates that there are many more existent differences than you imagine.
Designing is then *making* distinctions[e] beyond any existing reality (eventually surprising other people).

There is no other being than being different

If there is no other being than being different[f], then epistemology becomes a part of ontology.
Space and time, Kantian categories such as quality and quantity are not 'a priori' or innate concepts, but created distinctions, composed and constructed by man into effective suppositions of imagination.
The resulting sciences, humanities, designs and art are not discovered, but constructed next to an existing reality. The first question of this thesis is then: 'How can imaginations be (re)constructed?'.
Clarifying that, may extend the ability to imagine improbable possibilities, the core of design.

Imagination is constructed upon underlying suppositions

Some consequences of the basic assumption above and its elaboration are:

- Even 'change' is only the difference from an underlying impression, remembered as 'previous'.
- Differences are physically reduced by our senses into distinctions stored in impressions.
- Impressions then are selections of observed differences.
- Imagination can forget, deny or manipulate their existing (spatial or temporal) limitations.
- That allows generalisation in qualities, quantities, categories, sets, classes, nouns and verbs.
- It allows to construct a composition or a sequence different from anything observed (design).
- Imagination is constructed upon underlying (tacit) 'suppositions' hidden in a passive memory.

The main hypotheses then to be demonstrated in this thesis are:

- Any imagination contains earlier created suppositions, often silently shared as self-evident.
- Some of them are no longer effective in changed conditions.
- These suppositions can be detected by an introspective test ('conditional analysis').
- Conditional analysis results in a necessary sequence of suppositions.

A main restriction is:

- To stop where metaphysical concerns may start of they cannot refer to any observation.

I will try to use imaginable constructions only if these have an ever observed external physical 'difference' to refer to. The word 'impression' is a good example.
Let me give some preliminary explanation of these assumptions.

Any imagination contains salient suppositions

The main hypothesis of this thesis is, that any imagination contains silent suppositions that can be made explicit from the very start (difference) by conditional analysis (see page 9).
Only if these suppositions are explicit you can check them and eventually change your tree of suppositions to catch what you really need to survive.

Existing reality and imagination are different, but they share differences

Imagined colours do not have wavelengths. What then does the imagination of colours share with existing reality? Even if the difference between two colours is different in existing reality and in imagination, then there still may be something in common. Even if the colours at both sides of the difference may be reduced into shades of grey, then the image may still remain.

The artist choosing precisely the colour (s)he has in mind may realise a painting (s)he may not

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[a] Dif-ferrent itself is Latin for carried-out; if it is 'ex-secuted' (out-followed) then it becomes 'ex-sistent' (out-standing).
[b] That is different from a Cartesian cogito ('I doubt') experience.
[c] The word 'sup-position' will be used in its original sense of under-lying parts of any mental construction to be explored.
  The word 'assumption' is used only as 'supposition' of this thesis as a whole.
[d] Amazement is mainly followed by an attempt to include unfamiliar facts in your suppositions of imagination. Surprise is less.
  The term 'surprise' will be used for the experience of unexpected synthetic results of your own constructions, imaginations.
[e] For example: a distinction between 'inside' and 'outside'.
[f] Bruggen, Carry van (1980) *Prometheus* (Amsterdam) Van Oorschot

recognise observing its result in the framed picture. It is realised in a different environment. That changes the intended impression of colour. Impressionists invented an application of colours different from the observed, but sharing their differences. Expressionists utilised that discovery to express or construct imaginations not expressible until then.

The antique idea that imagination and existent reality may share the form instead of the content fails if we can imagine matters as clay at the level of scale[a] of daily experience. But, at the sizeless limit inbetween an object and its environment, existent reality and imagination only share a difference.

Existent reality shows more diversity than any imagination
There are more differences in an existent reality than in any imagination.
You are blind for most of these differences until you discover them with amazement.
If you still cannot imagine (reconstruct) them, you try to change your construction of suppositions or you neglect and forget them. But, even then I assume they are still there, otherwise we never could be amazed[b] (for example by using a telescope or a microscope).

Realisation is an expression bound to composition and sequence
Some of your imaginations can be expressed in sentences, drawings or even be executed. Others may remain inexpressible or impossible. That is what you have to accept. But, it is also the very core of your freedom that the inexpressible source of personal thoughts are inalienable.
Expression and execution require a temporal sequence and a spatial composition whereas imagination does not. Imagination may rearrange components independently from an existent reality while that reality is captured in limitations of space and time, place and occasion, composition and sequence. Possible worlds are imaginable but not all imaginable worlds are also possible.
So, possible worlds are a part of our imagination, not the reverse (see *Fig. 8* at page 8).

Probability, possibility and desirability

Truth supposes probability
'Truth' supposes 'probability', because you can not imagine truth without any probability, but the reverse you can. However, 'truth' is restricted to the present. The past is stricly spoken not observable. A tacit supposition about 'continuity of time' let you imagine that actual impressions (memory being part of it) show a 'truth'. But, it is reconstructed by inference from these actual and remembered impressions. If the succesive layers of sediments you call 'memory' show equalities with its upper layer of actual impressions, then you call that supposition 'truth'[c]. But, different people report different equalities in their layers of memory.
The future is not observable either. You only can construct it by imagination. Using the available suppositions you construct upon that surface different imaginations next to eachother called 'futures'.

A future is not true
A future cannot be called 'true'. You suppose one of the constructed futures will 'become' present and observable to check your suppositions of truth. However, it is not more than 'probable' that something happened in the past or will happen in a future. If you suppose continuing 'laws' of possibility, then you may 'prove' that an imagined past or future is *not* probable if it is not imaginably possible. That negative judgement may be called 'true'. A design contains suppositions from the sedimented past avoiding that negative judgement, but it does not reconstruct the past. It is supposed to construct a possible future that is not probable. If it was probable, then a design would be a prediction.
I will avoid then to speak about 'truth' and consequently avoid to speak about 'knowledge'.
I will use the words 'probable' and 'set of shared suppositions' instead.

Probability supposes possibility
You can imagine possible futures without probable ones, but the reverse you can't.
After all, probable futures should be possible, otherwise they can not be probable at all.
So, 'probability' supposes 'possibility'. *Fig. 7* referring to *Fig. 6* at page 8 shows a Venn-diagram of probable and possible futures representing their suppositions.

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[a] Socrates' father was a sculptor, making forms. Plato may have concluded that these forms existed before the sculpture, but what about the form of stone or clay before it was reduced into the form of the sculpture? Michelangelo's explanation that the form already existed in the stone (only to be 'freed' by the sculptor) does not hold for clay.
[b] In the Critique of Pure Reason by Kant(1781) the words amazement and surprise do not occur.
[c] The origin of 'true' has a meaning of 'faithful'.

Possibility supposes imaginability
Could you imagine impossible futures? Concerning phantasies like science fiction I have to say 'Yes!'. The other way round, could you imagine there are possible futures you can not imagine? I am inclined to say 'No!'. That is why I have drawn no possibilities beyond the imaginable in *Fig. 8* at page 8 as if possibility supposes imaginability. But I doubt. After all, in the second order (imagining imagination) you can imagine there may be undiscovered probabilities, uninvented possibilities or images you still can't imagine until an artist draws them for you. However, before such an imagination you would not call them true, probable, possible or even imaginable. You would not name them at all, just because you still can not imagine them. But, 'not yet imaginable' does not mean 'not imaginable at all'. The same counts for 'not yet possible' or 'not yet probable'. That is why I have to take 'futures' into account to give 'imaginable', 'possible' and 'probable' a comprehensive meaning.

Desirable is not always possible
The modal verb 'want to' indicates there is a fourth mode of future: desirable futures (see *Fig. 9*). That is not a question of cognition. It is a question of motivation (putting into motion, activating). Let us limit ourselves first to the futures commonly desired (preliminary neglecting rare individual desires), for example as they appear in political or managerial programmes.
The social task division between politicians or managers, scientists and designers produces different language games according to different modes of future (see *Fig. 10*).

Language games:	**being able**	**knowing**	**choosing**
Modes:	possible	probable	desirable
Sectors:	technique	science	management
Activities:	design	research	policy
Reductions as to			
Character:	legend	variables	agenda
Location or time:	tolerances	relations	appointments

Fig. 10 Different language games as a primary foundation of task division

The three professional groups reduce their imaginations differently into categories with the hidden suppositions of specialised language games. That often produces a confusion of tongues in practice. Conditional analysis may solve such problems of mutual understanding.

The content of imagination can increase and decrease
The content of imagination can increase, a basis of amazement (changing the boundaries of imagination). Growing up, we learn to imagine an increasing amount of phenomena that happen(ed) at other times and at other places to be able to imagine what could happen or done in the future. We could not imagine them before. The other way round many imaginations are unlearned as 'impossible'.

> I assume nowadays we can imagine more than prehistoric humans. They would be amazed by our world. But, in what sense would we be amazed by their world? That is an other kind of amazement. Many current conditions we concern as self-evident, lacked in prehistory. We have to *skip* many suppositions to image their life just as they would have to *add* many suppositions to imagine ours. However, that could be the other way round also. To imagine something unfamiliar we have to change (increase or decrease) our suppositions.

We can change the boundary of our limited imagination, but we can not draw the boundary of what is imaginable at all. Because drawing it, we should know both sides of that boundary imagining what we can not imagine (as Wittgenstein argued about 'thought'[a]).
But, we may trace back necessary suppositions of imagination by conditional analysis.

Problems and aims suppose causal relations
The main inference of empirical research is causal reasoning, based on probability calculations as described in many methodology books. Even stating the problem and the aim of the research supposes causal relations. What *causes* the problem, and which means may *cause* a solution to reach the aim? However, spatial design cannot isolate problems and aims. It has to combine a *field* of aims in a concept solving a *field* of problems stated by the many specialists and stakeholders involved.

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a   See preface of Wittgenstein (1919, 1959) Tractatus logico-philosophicus (Oxford) Basil Blackwell

An aim and its supposed problem are always a part of a *field* of problems and aims
If we depict desirable futures upon the possible and probable ones (see *Fig. 9* at page 8), we get two interesting subsets: a field of problems (probable but not desirable) and a field of aims (desirable and possible, but not probable).
The subset of desirable but also probable futures is less interesting. Why should we take action if one of these futures will probably occur anyhow? Desirable futures that are not possible are not very interesting either. Why should we aim at impossible futures? We are only motivated (set in motion) to take action by problems and aims within the area of futures supposed to be possible.
The probable ones should be found by empirical research, the improbable ones by design.

A design does not suppose probability or even desirability
To find improbable possibilities is the role of design, even if these are not yet commonly desirable.
The question is then, if possibilities that are currently neither probable nor desirable might be interesting. I am inclined to say 'Yes!', because desirable futures can change as soon as we discover new possibilities invented somewhere unexpectedly or unintendedly (see *Fig. 9* right at page 8).

Hume was right
Assuming a 'continuity of time' we remember or learn repeating sequences of 'cause' and 'effect', useful to initiate any activity probably causing a desired result in the expected future.[a]

> However, if we read in the journal that there was a collision of two cars 'because' one of the drivers lost his control over the steering wheel, there are many hidden suppositions. If the cars would have been standing still and one of the drivers would have lost his control over the wheel, there would not have been a collision. So, one hidden supposition of the journal was at least that the cars were moving into each others' direction. But, there are many other hidden suppositions: there was enough petrol in both cars, they did not loose their wheels (or the function of any other necessary part of their moving system to keep them moving) until the collision occurred, there was no sudden obstacle between both cars and so on.
> So, there were many conditions fulfilled to make a collision *possible*. The condition that one of the drivers lost his control over the wheel was only the last added condition to produce a collision.

Any cause is a condition (and may imply many additional saliently supposed conditions).

> If we design and build a house, then we do not *cause* a household.
> We make many kinds of households *possible* by shaping some of the material conditions.

A cause is the last added condition
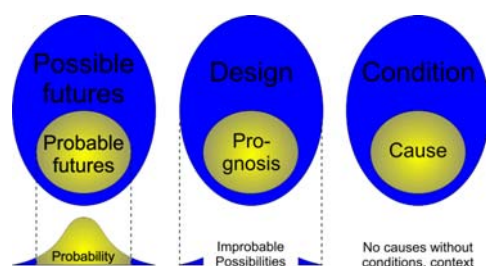In this thesis, 'cause' is imagined as the last added condition of something to happen.

Not all conditions are also a cause (see the right part of *Fig. 11*).
While *prognosis* searches for probability, often formulated in causes and effects (if we can simulate them), spatial *design* searches for possibilities formulated in a set of conditions, an environment (often summarised in a drawing rather than in verbal expressions as they are bound to a linear temporal sequence).

Fig. 11 Cause and condition

But, if 'conditional reasoning' is the core of design, how could we clarify that kind of reasoning as a rational kind?

Curiosity and playing do not require a problem or a purpose
A subsequent question is, how that kind of inventions are motivated if they do not solve any currently percieved problem or if they do not serve any existing purpose. These inventions are often done as a side effects of research, technology and practice, or simply by aimless playing and experimenting with the means given for fun or by fascination. Here, rare individual desires begin to play a role.

Means-directed study does not require a directing problem or purpose
A search for possible applications may follow, changing the sequence of aims and means as effect and cause in *Fig. 5* at page 7. I would call them means-directed study opposed to aim-directed study.

a   Hume, David (1777) *An Enquiry concerning Human Understanding* (London) Cadell

Many of the invented applications remain useless, but some of them may unchain a revolution.

> For example, the human history of discovering and appying electricity shows a period with many 'useless' apparatuses, before its revolutionary applications appeared, solving many problems and serving many purposes.

So, explaining inventions always supposing a solving of existing problems or always directed by aims[a] is not the whole story. It may be even less than half the story.

Different possibilities condition each other
You can not imagine social possibilities without an economic basis and you can not imagine economic possibilities without the technical and ecological possibilities to realise them. The reverse you can.
So, social possibilities then suppose economic and at their turn technical possibilities (see *Fig. 12* left). However, that does not yet mean that social initiatives could not *cause* technical innovations choosing from a multitude of economic and social possibilities. It solely means they should be possible at all, obeying the boundary *conditions* of (economically, technically or ecologically) possible futures.
Then , there is a difference between conditional and causal thinking indeed.
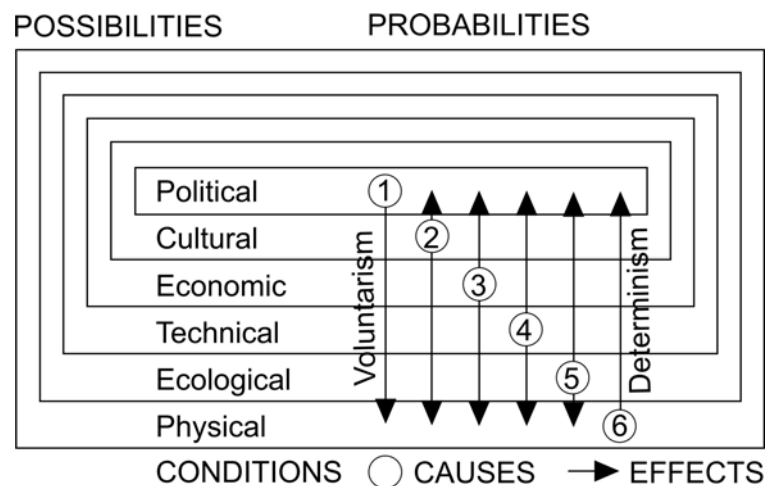That may clarify a different rationality of design searching for conditions and research searching for causes.

Fig. 12 Conditions supposed in deterministic causation

In a changing environment of supposed possibilities, the suppositions of causation may be different.

> For example, a golden bridge may be a technical possibility, but not an economic one.
> Solving poverty by killing the poor is an economic possibility, but fortunately not a social one.

However, there are less imaginary examples.

> In the beginning of the 20th century geography contained a paradigm of physical determinism (see *Fig. 12* nr. 6). Physical determinism supposed that a specific physical environment *caused* the emergence of a specific economy on its turn determining a specific culture.[b]
> However, similar environments often appeared to produce different economies and cultures choosing other possibilities to survive. So, physical determinism had to be rejected soon.
> Then, a period of social determinism (see *Fig. 12* nr. 1) followed: "If society wants it, economy and technology will follow." ('makable society'). However, that supposed sufficient economic, technical and environmental possibilities. Globalisation and the ecological crisis apparently forced nations to follow anonymus laws of the international market (Eigendynamik[c]). Social determinism met its boudary conditions.
> So, at the end of the 20th century the paradigm of a 'makable society' was on its turn replaced by economic determinism (see *Fig. 12* nr. 3): "If economy 'wants' it, society and technology will

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[a]   Simon (1982) *The sciences of the artificial* (Cambridge Mass.) MIT press
[b] Claval (1976) *Essay sur l' Évolution de la Geographie Humane* (Paris) Les belles lettres
[c] Krupp (1996) *Zukunftland Japan. Globale Evolution und Eigendynamik* (Darmstadt) Wissenschafliche Buchgesellschaft

follow.". But, technology will not follow if ecological boundary conditions limit its development.

So, any deterministic causal thinking is burdened by many suppositions (conditions) indeed.
In from page 22 onwards I will give some examples of hidden suppositions in academic disciplines often taken for granted because they are shared by so many. How to make them explicit?

Conditional analysis, the method

Conditional analysis is introspective
'Conditional analysis' refers to repeated introspective tests such as: 'If you can imagine abiotic phenomena (A) without biotic ones (B) but not the reverse, then biotic phenomena 'suppose' abiotic ones.' (in short notation: B $\Downarrow$ A).

Conditional analysis clarifies hidden suppositions
The purpose of conditional analysis is then to clarify hidden (forgotten) suppositions of imagination. That may be useful to understand, to develop or to explain any idea or design by reading, learning, writing, drawing, computer programming or teaching. Understanding and explaining requires many tacit suppositions you do not always share with other people, even if you think so. But, if you would have to summarise them all at any meeting it would take a long time before you could start the communication you intended (see the example at page 7).

Conditional analysis compares concepts
For that purpose this thesis compares again approximately 200 scientific and technical (primarily abiotic) concepts by conditional analysis (40 000 comparisons, taking a year of work[a]). What supposes what? As much as possible I chose the words with a physical *and* a metaphysical meaning to bridge Descartes' gap. If words do have a methaphysical meaning only, I will try to avoid them.
It produces a list of suppositions supposing each other in an assumed necessary, eventually branched sequence. Any such a sequence should start by at least one first 'axiomatic' condition not containing any other suppositions (in this thesis that is 'difference').

Suppositions are conditions, but not the reverse
The word 'condition' ('with-given') will be used in this thesis often instead of 'supposition' to enable a more physical interpretation as a prerequisite of any construction (see further page 41).
But then, 'condition' can not be used here in the sense of a logical (necessary or sufficient) condition making a combined if p then q statement *true*, but as a basic requirement to make any construction *possible*.
That 'possible' still does not separate 'imaginable' from 'realisable' otherwise than that anything realisable or executable should be imaginable, but not the reverse. Since you can say 'I realise that …' (taking imaginations as 'real', be it less or more 'realistic') the concept of 'reality' is relative. It may have an unreachable limit in Kants 'Ding an sich', but the word 'condition' avoids that kind of discussion. Anything has 'conditions', be it inside (as suppositions) or outside the brain.

Suppositions are prerequisits of imagination
Any 'supposition' concluded here, is primarily a prerequisite beforehand to be able to imagine or to construct a more composed concept. A supposition is not yet a well-formed 'hypothesis' appropriate to be tested afterwards. To grasp or *comprehend* such concepts[b] requires a previous *understanding* of underlying (sup-posed)[c] concepts. In that sense non-living phenomena (for example space, time, mass) are tacitly 'supposed' in the imagination of living phenomena (in short notation: A $\Uparrow$ B). They come to life and return to death.

Design proposes reduced conditions based on suppositions
Realising a design implies to take all relevant (spatial, ecological, technical, economic, cultural, administrative) conditions into account. A design then selects conditions to make something possible. That requires a selection from many more con-ditions 'given with' a situation.
You have to reduce them in usual and usable categories to be able to imagine and manage them.

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[a] Earlier done rudimentary in Dutch: Jong, T.M. de (1992) *Kleine methodologie voor ontwerpend onderzoek* (Meppel) Boom
[b] The Latin 'concept' means 'grasped together' referring to a synthetis of different things. And 'syn-thesis' is old Greek for 'being put together'.
[c] The Latin 'supponere' means 'putting under'. By choosing these words I assume here that 'under-standing' is different from 'grasping' or 'comprehending'. In education therefore it may be useful to distinguish the subsequent stages of understanding and comprehension. Students have to 'understand ' the suppositions before they can 'grasp' a new concept.

Reduction is misleading

Fortunately we are nearly blind in a world of inconceivable diversity. I assume that 'real' diversity 'proves' its existence beyond our limited and accidental observation by amazement. Amazement may change their boundaries. Our senses and brains make a preselection avoiding a chaos of impressions. But, that selection may be misleading. We should never stop then to check its categories and their suppositions.

Art, design, technology and science extend, improve or skip suppositions of imagination

The role of art, design, technology and science is to extend, improve or skip our suppositions. Contemporary humans share many unconscious suppositions about their abiotic, biotic and cultural environment. Science checks if these are valid and reliable, technology extends them shaping new conditions, art doubts and extends them increasing the space of imagination.
Conditional analysis may unveil them.

'Difference' is the first supposition

In this thesis I assume that first condition should be 'difference'[a].
After all, without any difference nothing can be observed, chosen or made.

> For example, if everything would be white, then you could not distinguish, see or choose anything.

And, what you make is by definition different from what already exists.

Even equality supposes difference

Even the concept of 'equality' supposes 'difference'. You can imagine 'different differences' such as 'more' or 'less' difference. Only if you can not imagine less difference than a given difference, you call it 'equality'. However, if it is not the same thing, then it is still different in space or time.
Within that spatial or temporal difference a similarity is called 'repetition'. That still supposes a difference of 'location'.[b] The other way round, 'difference' can not be derived from 'equality'[c].
'Equal equalities' does not produce difference as 'different differences' may produce equality.
Equality then supposes difference.

Science, technology and humanities share a hidden supposition of equality

But, amongst others the construction of 'equality' is supposed in generalisations of set theory, verbal language (nouns, verbs, the plural form), logic, mathematics, sciences and causation.
Some of these suppositions are summarised from page 37 onwards, but that is not the very core of this thesis. The core is, to transcend the boundaries of truth, probability and causation in a still rational way to reach a frontier of *possibility* and its *conditions*, the core of design.

Imagination goes beyond possibility and beyond abiotic conditions.

To speak 'about' possibility supposes a position 'outside' the mode of possibility. That mode should be 'imagination' as a typical capacity of man elaborated further at page 26. The modes of 'truth', 'probability', 'possibility' and 'imaginability' suppose each other in this sequence. And, that conditional sequence can be visualised as sets (see *Fig. 6 - Fig. 8* at page 8). These modal boundaries had to be elaborated first. In the next chapters the examples of hidden academic suppositions and those in the field of urban design that gave rise to this thesis are elaborated. It is its field of problems.
But, before doing so, I will give an outlook of what conditional analysis could provide if it were extended beyond abiotic suppositions.

Imaginations of man hide abiotic and biotic suppositions.

This thesis limits itself to abiotic suppositions, but the suppositions of biology and humanities once have to be made explicit also. How can we proceed and what is the end of such an ongoing conditional analysis? Could we at last construct a concept of man by piling up supposition on supposition? How many levels of construction you have to pass to reach that point? Let us now leave the elaboration of the concept of difference into different differences on the line of variation. We will start there again with shorter notations. This section is an exercise to explore that perspective in bigger steps than those that will be elaborated in the chapters concerning abiotic suppositions only.
In *Fig. 5* at page 7 I assumed that suppositions about man (cultural or conceptual conditions C) suppose biotic conditions (B) and biotic conditions suppose a-biotic (A) ones (in short notation C ⇓ B ⇓ A). These rough steps between A, B and C can be divided in smaller steps A1, A2 and so on,

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[a] Eleborating the work of Van Leeuwen (1965), Derrida (1972) and Deleuze (1997)
[b] Deleuze (1994) supposes more difference or gradual change in his concept of repetition. I would call that 'reproduction'.
[c] Ross Ashby, W. (1957, 1956) An Introduction to cybernetics (New York) Wiley

supposing eachother in this sequence. An inquiry into these suppositions then could be outlined as as depicted in Fig. 13.
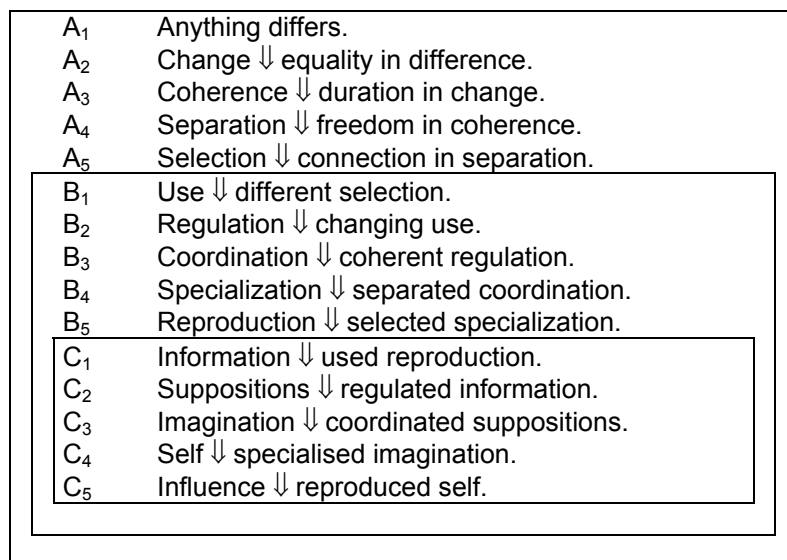
A_1	Anything differs.
A_2	Change $\Downarrow$ equality in difference.
A_3	Coherence $\Downarrow$ duration in change.
A_4	Separation $\Downarrow$ freedom in coherence.
A_5	Selection $\Downarrow$ connection in separation.
B_1	Use $\Downarrow$ different selection.
B_2	Regulation $\Downarrow$ changing use.
B_3	Coordination $\Downarrow$ coherent regulation.
B_4	Specialization $\Downarrow$ separated coordination.
B_5	Reproduction $\Downarrow$ selected specialization.
C_1	Information $\Downarrow$ used reproduction.
C_2	Suppositions $\Downarrow$ regulated information.
C_3	Imagination $\Downarrow$ coordinated suppositions.
C_4	Self $\Downarrow$ specialised imagination.
C_5	Influence $\Downarrow$ reproduced self.

Fig. 13 Conditional analysis extending into life and culture

Except A_1, any proposition of Fig. 13 synthesises two previous suppositions.
Change (A_2) supposes equality (the zero-value of A_1) in difference (A_1), symbolised: $A_2 \Downarrow A_1(_0A_1)$.
Then: $A_3 \Downarrow A_2(_0A_2)$ and so on: $A_x \Downarrow A_{x-1}(_0A_{x-1}) \mid 2 \le x \le 5$. In the B-range the zero-values are replaced by the values of the previous layer: $B_1 \Downarrow A_5(A_1)$, $B_2 \Downarrow B_1(A_2)$ and so on: $B_x \Downarrow B_{x-1}(A_x) \mid 1 \le x \le 5$ if $B_0=A_5$.
The C-range develops in the same way $C_x \Downarrow C_{x-1}(B_x) \mid 1 \le x \le 5$ if $C_0=B_5$.
The division in three times (A,B,C) five steps (1...5) is arbitrary. They are milestones chosen in a more continuus tree of suppositions. They are chosen to check if a forced sequence of big steps results in a useful construction. They assume many more intermediate steps not yet mentioned to keep an overview. In the next chapters this thesis will only elaborate $A_1 - A_5$. That is one of its limitations. It will also choose a limited amount of approximately 200 smaller steps of the possible steps $Y_x \Downarrow Y_{x-1}(Y_{x-z})$ where $2 \le z < x$.
But before doing so, the bigger steps A_1 to C_5 are roughly clarified below to get a feeling of the kind of questions that may arise by ongoing conditional analysis in smaller steps.

A_1 Anything differs
Difference is always supposed. Everything is nothing. There should be something different to observe or think about. You cannot observe, choose or imagine anything if there is no object to be distinguished from its environment. The delimited object of *attention* should be different from an undetermined environment you still may be *aware* of. There is a difference between attention and awareness.
But, there are different differences to distinguish as described from page 41 onwards (object, quality, quantity as different kinds of difference supposing eachother in that sequence).
Proposition A_1, then, is layered in many suppositions itself.
Apart from the suppositions of object, environment, quality and quantity, A_1 covers for example suppositions of form, shape, limit, denial, direction, sequence$_1$, reductions of frame and grain, levels of scale, distance, variable and so on.
That second order sequence$_2$ (imagining imagination: what supposes what) is crucial to construct an imagination properly founded on explicit suppositions supposing eachother. For example, their sequence$_2$ determines if a term can be used for a definition or not. That avoids circular definitions.
And, to determine that sequence still requires many comparisons of conditional analysis not yet elaborated here. These smaller steps are assumed to be covered by proposition A_1 of Fig. 13 to make the bigger step into 'change'. Change also supposes direction, sequence, reductions of frame and grain, levels of scale, distance, variable, but in a more specific sense.

A_2 Change $\Downarrow$ equality in difference
Change supposes a difference between two successive impressions ('before' and 'after'). They are

sythesised into a third impression called 'change'.[a] The equality in that difference is its direction, the 'arrow of time'. However, 'time' is not yet necessarily supposed then. It is rather the other way round. If nothing changes, you cannot imagine 'time'. If you imagine memory as a spatially layered part of the present, then impressions fade into a background of sediments keeping a spatial sequence you once may call 'time'. The imagination of sequence precedes an imagination of time. But even without an awareness of 'time', a difference called 'change' is still a special, directed kind of difference.

> You can imagine that a chick goes back into its egg, closes the egg and goes back into another chicken. That imagination may be real but not realistic, as a film shown in the reverse. You do not classify that sequence as 'possible' and consequently not as 'probable'. It has no precedent in the layers of other impressions you may dig out in the sediments of your memory.

Any change you observe cannot be undone. The sequence remains in your memory and you observe the last (topmost) case in an existent reality. Even if you deny it, you observe it. You can review it as a video, but the existent reality does not have an 'undo'-button to erase what is supposed to have happened. At best you can restore the remembered initial state by another change.

The A_2 supposition of change allows many other suppositions before we require an A_3 supposition of coherence. The ongoing conditional analysis of 'change' and its derivates still to be elaborated (such as time, duration, order, process, movement, orientation, velocity, approaching, receding, past, future and so on) is covered by proposition A_2.

Just as 'difference' (with a zero-point called 'equality'), 'change' has a zero-point called 'duration'.

A_3 Coherence ⇓ duration in change

If an object changes less than its environment (object constancy), then the object within its environment (the 'case') shows a 'duration in change'. You may call their synthesis 'coherence'. That is a necessary supposition for imagining 'relations' in patterns and processes, their conditions and causes for possibilities and probabilities (see *Fig. 11* at page 12).

These suppositions for further construction are covered by proposition A_3, supposed in proposition A_4 about separation and connection. But before the suppositions covered by A_4 are involved, some of A_3 suppositions are elaborated in more detail below to get some feeling about the consequences of A_3.

The imagination of 'coherence' still does not necessarily suppose attracting and repulsing 'forces' or even observable connections and separations (structure). It is simply a synthesis of change and duration, a dual imagination unified by a new imagination of 'coherence'.

That awareness precedes any search of conditions and causes to construct an observed coherence.

> If you see a cloud drifting in a windy sky, you may suppose a 'coherent' mass.
> How to imagine that coherence otherwise than a duration in change?
> A historical imagination by supposing a local cooling somewhere else in the past, transported by a coherent air movement still does not answer that question. That causal relation already supposes coherence (a duration in change) itself. You can imagine that a local cooling 'caused' condensation of damp into drops, little enough to stay floating in the air and to intercept sunlight. But, that raises many more questions to answer by using even more hidden suppositions based on coherence (such as 'cause').
> Why do these drops not have been dispersed equally into a world-wide fog or have been condensated enough to fall down as rain immediately? In both opposite cases the apparent coherence against a blue sky is still not clarified.
> If you then suppose an equilibrium by condensation and its accompanying warming-up balancing attracting and dispersing forces at a given temperature, then you hide amongst many other suppositions a supposition of 'force'.
> But, a supposed 'force' cannot be indicated in an existing reality otherwise than by its effect: the acceleration (a changing change) of a coherent body. Newton accepted 'force' as a metaphysical, non observable imagination, because it could be calculated with practical results. Modern physics even avoid a concept of 'force'. Conditional analysis unveils already from the beginning that force supposes coherence, not the reverse. While 'force' is a metaphysical 'cause' of an observable effect (acceleration), coherence can simply be observed and indicated. A cloud is an observable enduring difference from the blue sky.

The difference between object and its environment now can be a difference in coherence as well.

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[a] That synthesis itself seems to suppose already a A_3 'coherence' between 'before' and 'after'. But, that supposition is made imagining$_2$ imagination$_1$ in a metalinguistic sentence *about* imagination$_1$.

A ball flying over a football field is a coherent object in a less coherent environment.
A ball filled with air has an environmental coherence with a less coherent content.

Fig. 14 Coherence

These examples distinguish also an inward coherence from an outward coherence. The first is a body in free space, the other a cavity in a body (see Fig. 14). The cavity or hole may be less imaginable as an object, but it is different from its environment and it has a size. You cannot handle it, but you can imagine it as a possibility, an emptyness to fill, a potential storage or a mould.

The ongoing conditional analysis of 'coherence' and its derivates still to be elaborated (such as repetition, synthesis, causation, cohesion, force, concentration, deconcentration and so on) is covered by proposition A_3.

Just as 'change' (with a zero-point called 'duration'), 'coherence' has a zero-point called 'freedom'. Here, 'freedom' is still an abiotic (A) concept such as a freedom of movement or boundless change. It is not yet burdened by any imagination of desirable futures (free will).

A_4 Separation $\Downarrow$ freedom in coherence

If the boundary between an object and its environment is substantially different from both, then that boundary can become an object of attention on its own.
If the boundary is substantially different in coherence, then it is called a separation.

Fig. 15
Separation

The boundary may be substantially more or less coherent than the environment (see Fig. 15). It is remarkable that you call it a 'separation' in both opposite cases. It apparently does not matter if the boundary is coherent or not, as long as there is a substantial *difference* in coherence with its environment.

Differences between an inner and an outer environment suppose a separation.

A house with a coherence of joined building materials provides many kinds of freedom for its dwellers. It separates them from disturbing and restricting patterns and processes outside (obstacles, rain, pickpockets, cars, costs, required public behaviour, legal restrictions). Apart from their *desires*, the dwellers do have *possibilities* inside different from outside, supported by many facilities not operating in the open air.
Separation from an environment provides a different freedom.

You now can imagine that differences are 'conditioned' or even 'caused' (A_3) by separation. Replacing your attention into the inner environment, you can construct separations to divide that object into more objects (rooms in a building or blocks from a rock). Division then supposes separation. In the same time it prepares an awareness of more objects, multitude.
The ongoing conditional analysis of 'separation' and its derivates still to be elaborated (such as division, multitude, counting, multiplication, concentration, deconcentration, development, binding, integration, desintegration and so on) is covered by proposition A_4.
Just as 'coherence' (with a zero-point called 'freedom'), 'separation' has a zero-point called 'connection'.

A_5 Selection $\Downarrow$ connection in separation.

If you suppose different directions, then separation and connection in different directions may produce different kinds of selection (see Fig. 16).

Fig. 16 Selectors

A deck separates in one direction, a dam in two, a gutter in three, a pipe in four and a bowl in five directions. These devices you may call 'selectors'.

If you take time into account, then a wedge divides an object, a wheel and a tap select movements.
If you take size into account, then a sieve selects large and small.

A window separates for moist, wind and temperature, but it connects for light.
A door separates for light, noise, temperature, but it connects for selected movements.
A cell membrane separates for some chemicals, but it connects for others.

Selectors are elementary components of technical and biological structures (sets of separations and connections). If their primary function within that structure is to separate or to connect, then there are four primary functions (see Fig. 17).
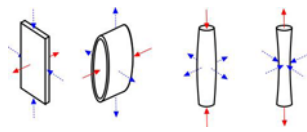

A wall has the function to separate, but it cannot fulfull that function without proper connections perpendicular to the direction of separation. A tube has the function to connect, but it cannot fulfull that function without proper separations perpendicular to the direction of connection.

Fig. 17 Wall, tube, column, stave

Mechanical functions should resist pressure (a column) or tension (a stave or cable). Perpendicular to that function they have to resist the opposite.

The ongoing conditional analysis of 'selection' and its derivates still to be elaborated (such as open, closed, structure, function, resistance, retention, mechanism and so on) is covered by proposition A_5. Just as 'separation' (with a zero-point called 'connection'), 'selection' has a zero-point called 'mixture'.

B_1 Use ⇓ different selection.
A pipe does not 'use' the matter it transports. 'Use' supposes a difference between input and output. That supposes selection at an entrance (input), an internal transformation or conversion (throughput) and selection at the exit (output) of a 'system'. If the throughput is concerned as a 'black box', then systems analysis reconstructs what happens inside only studying the input and output. Systems can be 'nested' (contain subsystems or be part of larger systems). The black box then may contain smaller subsystems to be distinguished or the environment may show a larger supersystem.
Changing the level of scale concerned, there still remains an input, a 'black box' and an output.
The ongoing conditional analysis of 'use' and its derivates is covered by proposition B_1.

B_2 Regulation ⇓ changing use.
Regulation supposes a feed-back from output into input. A feed-back changes the use of environment to match a 'demand'. The environment with its resources is an external condition, but the demand still can be internal (to sustain the system itself). Then, the output is 'useless'. It increases the entropy of the environment in favour of an internally decreasing entropy. The feed-back flow should be large enough to change the function of the selectors that regulate the input and output, but that flow is per definition smaller. Regulation is the primary object of cybernetics.

B_3 Coordination ⇓ coherent regulation.
Survival supposes coherence (duration in change). To survive, systems regulate (increase or decrease) their use of environment. Competition and cooperation are both a kind of coordination (for example to divide an environment in separated territories of use).
That does not yet suppose specialisation (B_4) as long as there is no external demand.
Coordination is the primary object of neurology, management or government.

B_4 Specialisation ⇓ separated coordination.
Specialisation supposes coordination (including synchronisation), not the reverse. You can imagine coordination without specialisation (such as a division of territories), but not a specialism without externally coordinated exchange, separated from an internal coordination of workspace and actions.

> A baker and a smith require a market to exchange their products and a separated workspace. The workspace and activities of a baker and a smith also have to be separated, otherwise there is no specialisation.
> The many membranes in a living cel show a complex structure of separations and connections. These separated environments are required for specialised chemical processes with their own coordination and sychronisation.

B_5 Reproduction ⇓ selected specialisation.
'Natural selection' selects the fittest (best specialised) organisms for an ever changing environment. Less fitting species and specimens do not reproduce, but die.[a] Reproduction as intended here then is not merely a repeated B_1 production without leaving any possibility of 'choice' (a repeated output or a clone, a copied parent). It supposes differences in the produced copies to allow a selection of the

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[a] You may object that selection supposes reproduction first, otherwise there is nothing to select. Then I can return that there was already a selection before an organsm started to reproduce itself. It found its territory, its niche, its partner, it built its nest amidst many that did not. But, such a causal sequence is not the point here. The point is a conditional sequence to make something imaginable.

fittest specialisation in any future environment.[a] If there are many differences, there is only 'likeness' such as an image of something. Reproduction is often concerned as the final criterion to distinguish living phenomena from non-living phenomena. But, it only supposes specialisation, coordination, regulation and use. And, there are many technical examples showing these properties. Should an artifact then be called 'biotic' as soon as it is able to reproduce? No, these properties are only some necessary suppositions to imagine 'life'. The same suppositions may serve other imaginations or images. Since any reproduction supposes differences from the reproduced, the reproduction can be very partial, incomplete, only containing some specific 'information' (as messenger RNA transporting a message from DNA).

C₁ Information ⇓ used reproduction.

Information is reproduced by a source and 'used' by a receiver. If it does not reproduce anything, then it is no information. If it is not used (interpreted) by any receiver, then it is mere light, noise or an other kind of flow. Information supposes 'use', because it supposes selection at both sides of a channel. Since information supposes reproduction it should also suppose specialisation and consequently separated coordination. Here, conditional analysis unveils the many suppositions concerning a concept such as 'information'. Which specialisation or separated coordination is involved here? It should be the separated coordination of the source and the receiver. If coordination supposes coherent regulation and regulation supposes changing use, then both the source and receiver suppose that properties. The supposition of 'use' then is involved at least twice.

> If you read a book, then the information has already passed a selection and a reproduction of the author and it passes your selection and reproduction (interpretation) as the reader. If you take a closer look at these selections and conversions, then they can be separated further. Any information then has passed many selections and conversions that may raise doubt about what you read. How can you get 'certainty' about what you read?

C₂ Suppositions ⇓ regulated information.

Suppositions suppose the use of information changed by feed-back (regulation). Information itself already supposed a *used* reproduction of some reality. Then 'use' is involved twice. The used₁ reproduction supposed that you selected and converted it earlier into some expression as output. That output changed the input flow of ongoing information you use₂ now (selective observation). That regulated information is then supposed in any supposition.
This is not only valid for individuals, but also for groups at different levels of scale regulating information by the media into a set of shared suppositions (culture or subculture). The other way round, even individuals can be separated into the roles they play in different environments with different shared suppositions.

C₃ Imagination ⇓ coordinated suppositions.

Imagination is earlier assumed to be 'constructed' upon many underlying (often tacit) suppositions. 'Construction' supposes coordination of these suppositions to get the coherence (supposing duration in change) you call 'imagination'. Imaginations are scale-sensitive. They also can be shared in groups or be differentiated within an individual according to the actual environment at hand.

C₄ Self ⇓ specialised imagination.

If specialisation supposes separated coordination, then 'self' is an imagination separated from any other imagination. That assumes the typically human ability of dual imagination mentioned earlier (imagining an imagining subject and an imagined object in the same time). The concentric and eccentric coordination of their suppositions is different and separated. If 'identity' is defined as 'difference from the rest and continuity in itself', then self-consciousness is making that enduring difference opposed to the 'rest'.
Groups as larger systems than individuals can also have a shared imagination of identity opposed to the identity of other groups in their environment. Inversely, individuals can have different imaginations of themselves in different groups according to their role (specialisation) or 'ímage'. Self-consciousness develops by identification and projection in groups and their feed-back. That input regulates the output of an continuously corrected self image.

C₅ Influence ⇓ reproduced self.

The urge to reproduce is a common characteristic of life. It extends into an urge to occupy, to possess a territory, to have influence, artifacts, capital and power. In human life it extends in an urge to recognise a stamp of your existence, a footprint of your presence, a feed back of your actions,

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[a] The difference in 'reproduction' is what Deleuze (1994) already supposed in the word 'repetition'.

property, authority. That may be most urgent in people doubting about their self image. They desperately want a mirror in their environment, a proof to meet themselves in anything else or even anyone else. But in that circular identity you may loose your self. It destroys the difference essential for the very identity. You are not what you have, you are what distinguishes you from the rest. There is no other being than being different. An unlimited lust for power may continuously try to push back its limits, but by doing so you never recognise the other side as the difference that shapes the very self. Limitations of influence are the enduring source of self esteem and satisfaction. Missing limits continuously urges to further conquest. And, technology has pushed forward human limits. Nearly everything seems possible or possessible. That postpones your final self image until the funeral orations you will never hear.

The image of humanity constructed here seems to end where it began: in difference. But now, it is the difference between people at the boundary of their cultural, biotic and abiotic extensions or existence.

Conditional synthesis of differences can produce an image of man
This exercise to construct an imagination of man in big steps from the very beginning of abiotic 'difference' repeatedly applied on itself may be still unsatisfactory. But, I assume it has been proven to be possible. It is convincing enough to elaborate the abiotic foundations in more detail in the next sections with that perspective. The bigger steps were not chosen in an opportunistic way, but by a synthesis of two earlier suppositions prescribed by a systematic choice. The repeated synthesis was each time based on the same conditional test. However, that test is essentially introspective. If someone else would do the same exercise, then the results could be different. But, if someone else takes the effort to do so, the differences can be analysed and clarify different hidden suppositions. If it is done by a different systematic choice of the steps, the results will not be comparable, but gaps of the bigger steps explored here may be filled with the footprints of other steps. Their combination can be checked by conditional analysis. If that might not result in a conditional sequence it anyhow clarifies a difference in suppositions.

Ongoing conditional analysis of human imaginations and artifacts
Science and humanities are shared imaginations. The next chapter studies their suppositions.

ACADEMIC SUPPOSITIONS

Suppositions of academic disciplines
Cooperating academic disciplines (subcultures) are confronted by different tacit suppositions in communication. An inquiry into these suppositions is a primary, but often neglected task of philosophy. Some of the questions for that inquiry are summarised below.

Sets

The concept of sets has many suppositions; subsets have even more
If you concern living phenomena B as a *subset* of physical ones A (B $\subset$ A), then you suppose that living phenomena are special cases of physical ones sharing all criteria defining the larger set.
So, you already suppose concepts as 'special', 'case', 'criterion', a plural form and so on.
But, to distinguish subset B from set A using these suppositions, you need even more suppositions (additional properties) paradoxically resulting in a larger description of the smaller set.

> For example: 'any Biotic phenomenon is an Abiotic phenomenon conditioned by membranes with a selective throughput'.

But then, to exclude buildings and other human artifacts with that properties you would need even more properties. And, properties are suppositions (mainly about the expected behaviour of phenomena gathered in the set).

Any description is incomplete
However, describing a phenomenon summing up a limited amount of properties cannot be complete, otherwise it should be the phenomenon itself. It is a selection of observable properties.
Any description is at least bound to an upper and a lower limit (frame and grain of description).

> For example, describing a building does not contain the position and movement of all of its atoms or its environment at any level of spatial or temporal scale until the scale of a supposed universe.

These environmental properties are neglected in the description (outside the range of attention).
And, neglect is also an (often hidden) supposition.

Sets are suppositions
So, I can not imagine sets without suppositions. But, I can imagine suppositions without sets.

> For example: Suppose that you can not imagine time without space, but the reverse you can. In that case the imagination of time supposes an imagination of space (as I hope to demonstrate later). But, that does not yet mean time is imagined as a *subset* of space.

Venn diagrams show suppositions in an different direction
I will use images like Venn diagrams (see *Fig. 18*) to clarify that B *supposes* A (see *Fig. 20*) rather than B is a *subset* of A. Imagining a third dimension (see *Fig. 19* and *Fig. 20*) may clarify the difference.
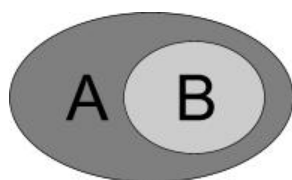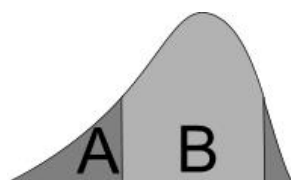

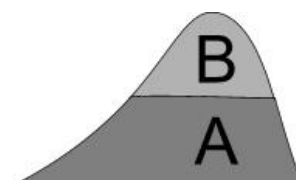*Fig. 18* B $\subset$ A *or* B $\Downarrow$ A   *Fig. 19* B $\subset$ A   *Fig. 20* B $\Downarrow$ A

Set theoretical operators other than '$\subset$' or '$\supset$' ($\cap$, $\cup$, $\in$) do not have an equivalent in a conditional analysis. These operators only restore imprecise features (overlapping concepts) of verbal language.

Verbal language and logic

Verbal language supposes equality
One important supposition of verbal language is again the 'equality' of elements in a set, silently supposed in the verbal categorisation of nouns, verbs and the plural form.

> For example: we can imagine the subset of humans C | C $\subset$ B $\subset$ A according to a criterion of humanity, saliently neglecting all mutual differences between humans.
> That criterion could be: 'A Biotic phenomenon being able to imagine a range of activities of which only the first is executable and only the last is motivating'[a].
> Then again we can define subsets such as men, women, children, elderly people and so on.

No language can cover all differences
We will never cover all possible differences, adding new criteria all the time.

> Because we are all different, we would have to distiguish every person from any other at last.
> And, even if we *name* a person (s)he will immediately change into a different person of increased age.

A hidden supposition of equality is dangereous
The hidden supposition of equality may have bad effects in practice.

> For example: to predict side effects of a medicine in any *increasing* distinction of human subsets *decreases* the statistical mass necessary to prove that side effect. So, I can not prove by statistical means that the medicine healing my cough half a year before, in my special case caused a heart-attack now[b].

Verbal language forces to generalisation
So, verbal language seems to force us into generalisation by using words representing sets, neglecting differences not covered by a verbal definition.
And, negligences are (hidden) suppositions as well.
How to clarify such suppositions by verbal language, if these are necessarily supposed in any verbal language? However, in this thesis I have to clarify them by verbal language and images.
That limits the enterprise.

Propositions contain a verb primarily connected to a subject
Any verbal language uses propositions connecting pronouns, names or nouns to a verb.
A full proposition represented as y(x), contains a passive object y, affected by a function (working, operation) of an active (conditioning or even causing) subject x, connected by a verb (represented by the brackets). The verb represents a change (including continuity as a special kind of change).
To make the verb explicit you can use the expression f(x). That 'f(x)' is primarily a working, a function or even a property *of* x. That it may also be a working '*on* y' may be omitted.

Sentences without an object suppose an object
There are sentences without an object (for example 'He laughs.') not telling who or what is affected.
But even then, there is at least a tacitly supposed effect on the reporter making the sentence possible.
The reporter is the affected object, omitted in the sentence as self-evident. The working itself () or the 'working on y' y() are both called 'predicate'. But, the hidden supposition of that concept, the working as a working 'on' an object is confusing if the working 'of' a subject precedes that working.
The acting subject x may have different workings in different directions on different objects in the environment, but the action is primarily connected to the acting subject before its effect on any object can appear. The working *on* an object is apparently preferred by linguists and in logic because it is mainly unique and unambiguous *per object*.

> For example, if 'he laughs', then object x in the environment may think 'at me' and z 'about me'.
> The same working of the object may have different effects: sympathy on y and animosity on z.
> If $f(x)=x^2$, then y becomes the square of x ($y:=x^2$). If $f(x)=x^3$, then you should imagine an other object z, because it becomes the cube of x ($z:=x^3$). Since you should imagine z as different from y, the question arises what kind of difference that is. Is it a difference in the workings of x,

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[a]Proposed by Harrison, G. A., Weiner, J. S., et al. (1964) *Human Biology* (Oxford) The Clarendon Press.
[b]Jong, Taeke M. de (2004) *The ecology of health in regional design perspective* (Delft) paper for 2nd WHO International
  Housing & Health Symposium 2004 Vilnius Lithuania.

or is it the different accessibility of y and z for the working of x. It should be the first.
In everyday life it may be imagined as the difference between a volume (z) and a plane (y) such as a cubic building z and a square floor y (not necessarily part of the building z). Your actual attention for y has an other 'direction' than your attention for z (apart from the possible awareness that z itself may have more directions or dimensions than y). If any attention supposes a direction, then any object of attention supposes a direction and so do verbal language and any of its propositions. Verbal language is directed, one dimensional in time. The statement 'f(x)=x^2 *and* f(x)=x^{3}' may then be contradictory in proposition logic. But, it is not contradictory if your imagination has more than one direction with attention for the building and for the floor.
You can also state imagination(suppositions): 'Suppositions have a working on imagination.".
Then the question may arise 'What kind of working?'. That question can be expressed as f(suppositions) in imagination(suppositions).

The term 'predicate' is misleading
The division of a sentence in a subject and a predicate connects the verb silently to an object. But, it is not occasional that a verb is conjugated to the subject, because it is primarily connected to the actor.

> For example, if the sentence 'You are a human.' is divided in the subject 'You' and the predicate 'are a human.', then the verb 'are' is primariy connected to the object 'a human'. Both sections of 'You' and 'being a human' are determined as indicatable or definable and that is useful for linguists and in logic.
> But, if you connect the verb primarily to the subject ('You are'), then there is already a sentence, whatever may follow. However, that sentence may not say much if you are not a philosopher. It may have a hidden object if it expresses an effect of you on the speaker as the sentence 'He laughs.' did. As soon as 'a human.' is added, then that sentence is only more specified by an object. Any addition, be it 'a human.', 'an animal.' or 'a body.' is ony reducing your being to a set. The supposed set of humans is affected, extended by adding you to the set. If you already supposed to be a human yourself, than the sentence may have no other message for you than that the speaker (already tacitly present as a presupposed object of the sentence) may have come to that same insight.

If you suppose continuation of a function f(x) in y(x) between past and future ('present'), then the full sentence represents a 'truth value' or (better) a 'probability value' (fuzzy logic).

Full-sentences are valued by modal suppositions
Full-sentences can be modally 'valued' by supposed truth, probability, possibility, imaginability or desirability, sometimes indicated by a 'modal verb' preceding the verb (will, can, may, want to, should and so on). The modal verb indicates the 'language game' played.
Without a modal verb the sentence is mainly supposed to represent a truth~ or probability value.
In that mode a verb supposes a causal operation: 'x causes an impact on y' expressing an expectation.

> For example, if 'I take an apple', then that sentence supposes a working of me on the apple: 'apple(I)' and that working is reduced to 'f(I)= take'. It is primarily supposed to be 'true'. But, I can judge that only if it appears afterwards that I have taken an apple indeed. And, in that case the sentence is no longer true, but I can judge that it once '*was* true'. 'Truth' then only refers to a supposed past. However, to specify that working, I can also fill in f(I) = {will take, can take, may take, want to take or should take}. These modal additions to the verb all refer primarily to a future, even if I imagine it happened in the past (would have taken, could have taken and so on). Imagination can neglect time, space and sequence, but in verbal language modal verbs keep a sequence, an arrow of time.

After all, truth supposes probability, because anything true is probable, but not the reverse.
The object and the subject are mainly represented as a pronoun, a noun or a name (a set or one of its subsets or elements). The function itself, hidden in the usual sequence with brackets y(x), explicit as f(x), is mainly expressed as a verb in everyday language. However, any function may be different in different environments. So, even a verb hides tacit suppositions as nouns and pronouns do.

Definitions replace the problem
Apart from the internal structure of a proposition, propositions can be mutually connected by a conjunction (a logical operation such as or, and, if p then q).
If you suppose biotic phenomena B logically imply abiotic phenomena A (if B then A, B $\Rightarrow$ A), then you

suppose defined D() sets of A and B: D(A) and D(B) and operations between D(A) and D(B) expressed in a verbal language: D(B) $\Rightarrow$ D(A).

Possibility cannot be derived from truth
Modal logic adds the mode of 'possibility' to that of 'truth' or 'probability', using truth- or probability based logic with additional operators ($\square$, $\lozenge$). However, conditional analysis unveils you can imagine possible futures without probable ones, but not the reverse (probable $\Downarrow$ possible). So, possibility can not be derived fully from truth or probability. You could say 'it is possible that it is true', but since truth *supposes* possibility you can not state a circular 'it is true that it is possible'.
Only realisation (making it true) can prove that something is possible. That is why probability calculation should start with a kind of possibility calculation (combinatorics, limiting possibility by many suppositions), not the other way round (probable $\Downarrow$ possible, see also *Fig. 11*).
The conclusion should be, that language and logic are imaginable by the suppositions of sets and many more suppositions. And, mathematics supposes logic with even more suppositions.

Mathematics

Mathematics is the science of equalities.
Counting as such supposes equality of the units to count. A unit supposes equality of category. But, if anything differs, then any categorisation is an idealistic supposition.
The '=' sign and its derivates are clear examples too. These are only useful if the formula at both sides of the '=' sign in an equation differ. Mathematics suppose logic and logic supposes generalisation or categorisation (the very core of language and set theory).
But, what is the foundation of categorisation? Set theory starts defining 'sets', but a 'definition' replaces the problem to the categories used in the definition.
Which terms are appropriate and how to define them in their turn to avoid circular definitions?
Here, conditional analysis looks for an answer. It still does not define anything, it looks for hidden suppositions in any concept, showing preceding concepts at least necessary to define an object.

Physics

Space and time are burdened by suppositions
For example, could you imagine time without space? I can't. The reverse I can. But I doubt, because in a second order (imagining imagination), imagination takes time. I may not imagine imagination without time. However, it took me a long time to realise that 'space' and 'time' are commonly shared concepts with many hidden suppositions themselves, amongst which the more directly observable and basic concepts of 'difference' or 'change'. There we started as a child before imagining abstract concepts such as 'space' or 'time'. To specify the steps between 'difference' and an imagination of 'space' is still a task for ongoing conditional analysis.

Change supposes difference
So, I reduced the question into "Could you imagine change without difference?". Now I definitely can't, but the reverse I can. Change supposes a difference between before and after (whatever that may mean). So, change supposes difference, not the reverse. That supposition clarifies why I do not agree with philosophers starting with 'time' as a primary condition. It is indeed at least a 'fourth dimension' supposing the other ones. Verbal language restricts our imagination to one dimension taking the rest for granted.

Future does not necessarily suppose time
Then the question remains why I have to take 'futures' into account to give 'imaginable', 'possible' and 'probable' a comprehensive meaning. Do'nt futures suppose time? I am inclined to say "No!", because 'future' as imagined *after* present supposes a choice from different 'futures' imagined as alternatives *next to* each other. So, the imagination of one 'future' supposes an environment of different imaginable possible futures, only observable as an expectation, a possibility or a desire in the present and consequently part of a present full of differences.

Physics looses suppositions of location, moment, sequence and direction
Quantum mechanics shows uncertainties about place, moment and consequently about movement. The truth of place and moment has become a probability. Currents in superconducting flux qubits seem to flow in opposite directions simutaneously keeping a measurable voltage. It shows, that location, moment, sequence and direction are nothing more than suppositions. Which concepts

support these suppositions of imagination?

Biology

Life differentiates within physical conditions
Life is supposed to obey the boundary conditions of physics.
We primarily try then to simulate these phenomena by causal simulation as usual in physics.
After all, we can not imagine living systems (B) without abiotic phenomena (A), as we can not imagine conceptual systems (C) without living phenomena (B); see *Fig. 21*, an extension of *Fig. 5* at page 7.[a]
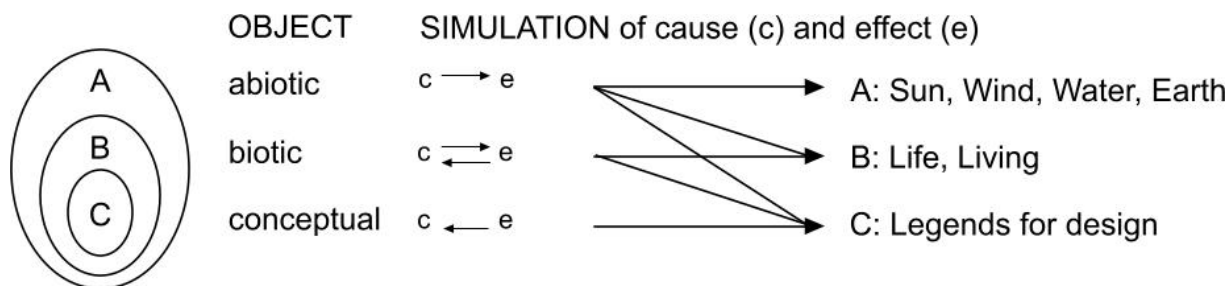

Fig. 21 Simulating reality by different approaches according to an 'ABC-model'

The causal cycle of biology is too long to imagine
Biology meets many kinds of repetition supposed to be caused by the reproduction of genetic codes. These are supposed to be developed in a long evolution by selection. Some actual biotic phenomena (including humans) and some human artefacts seem to take the effects of earlier behaviour into account, adapting the next behaviour (an 'empirical cycle'[b] in adaptive, 'learning' systems).
A one way causal simulation of such a phenomenon should contain its history from second to second including the evolutionary history of its ancestors from the very beginning. It should not neglect details that might have been crucial. That seems impossible, the more so because 'past' is only observable in the present, from what is 'left' in present. That long description to predict behaviour would require too many gradually changing cycles finally solving chicken-and-egg questions typical in biology.
But, you can 'understand' the pattern and process of an egg in a shorter way if you suppose what will come out as a hypothesis (just for time-saving convenience and without additional teleological assumptions). In that approach the effect also 'precedes' the cause (see *Fig. 21*).
The main 'experience' of a species is stored in its genes and in other chemical substancies initiating and steering action, completed by increasing 'experiences' of a specimen born and developing in a specific environment.

A systems approach reduces feed back loops to be imagined
We still do not understand all feed-back loops in any organism. But, we can simplify the description of its behaviour by drawing a black box (eventually nested) and looking what is going in (input) and what is coming out (output) in a determined period. It neglects what is goin on. That is called 'systems approach'.[c] By a systems approach you design a model with the same input and output as observed to predict its behaviour. In the algorithm of such a model many 'if … then …' statements will appear connecting the possible branches of causal behaviour in different circumstances.
If the behaviour of the model is much the same as observed we are inclined to suppose the model represents 'reality', which is not the case[d]. It is different.

Suppositions of man

Humans can imagine a larger range of actions than other animals
For our purpose, the most satisfying description of the difference between humans compared to other

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[a] That may have some relation to the work of Hartmann, Plessner and Dooyeweerd.
[b] Groot, A.D. de (1970) *Methodologie. Grondslagen van onderzoek en denken in de gedragswetenschappen* ('s-Gravenhage) Mouton & Co
[c] Emery, F.E. [ed.] (1969) *Systems thinking* (Hammondsworth) Penguin Books Ltd,
[d] Klaasen, I.T. (2002) *Modelling reality* **in** *Ways to study and research urban, architectural and technical design*. T. M. d. Jong and D. J. M. v. d. Voordt (Delft) Delft University Press

animals is their ability to represent a larger range of activities beforehand[a] (see page 8). It is the very basis of making artifacts serving further purposes (if I will do this first, then I can do that later) and the very basis of task division (if you do this, then I can do that).

So, humans are supposed to simulate internally a longer range of actions ('causes') and results ('effects') than more routinous animals before they come into external action ('look before you leap'). As soon as an action and utilising its effect are connected by a chain of intermediate (interfunctional) actions (such as making a tool) the whole range of serial and eventually parallel actions can be noted as an algorithm (a series of subsequent operations).

Designing is an intermediate action with many routines and some exceptions
Designing is such an intermediate activity in a range of activities 'planned' beforehand.
That kind of 'conceptual' behaviour completes many unconscious components of behaviour stored in an organism as biotic routines. That is why we leave out a supposed 'cognitive' part of human behaviour as long as we can, to simulate ('understand') it sufficiently by a black box of routines[b].
But, there comes a time these biotic simulations do not fit reality any more in the time or space available. Then, we have to add new suppositions about a 'plan' humans have in mind before they act.
Many 'plans' (earning a living, finding a partner, getting children) look the same. But, the question remains if these are really 'plans' or simply the 'conceptualisation' of predictable biological inclinations afterwards to justify them socially.
What I can simulate by less suppositions I will do ('razor of Ockham').

The core of design is to find unexpected possibilities
Interpreting humans as mainly routinuous animals recently has clarified an increasing amount of behaviour[c]. But, there are still unpredictable behaviours left apparently following a hidden 'plan' or shared (social) values. The question is, if we ever could predict that kind of behaviour. And, *if* we could predict human behaviour, then we have to give up our supposition of free will (for example supposed in democracy). In this thesis I will not do so, because it is the core of design to find unexpected possibilities (required in an ecological crisis). And, if these possibilities could be expected these would be predictions, not designs.
However, *Fig. 21* expresses that a conceptual projection with an effect 'preceding' the realising cause can not be used to simulate preceding abiotic and biotic phenomena. Even creationism supposing a 'plan' does not pretend to know the plan fully. Fundamentalists may do, ignoring the free will of others.

The human difference is dual imagination
I assumed it is a typically human capacity to imagine different actions of which only the first is directly executable (cited further as 'the human difference'). And, the least number of different actions for such a human capacity is two: imagining the case and its change. That dual imagination or simulation may be solved or unified into a resulting second case as a starting point to imagine a next change.

Imagining a third supposes unifying a dual imagination y(x)
The synthesis of these two imaginations into a result for further processing is nothing else than imagining a starting case x by some action changing into a resulting case y. That synthesis of a dual imagination is usually expressed in a full sentence y(x) with an active subject (x) and an object y.
And that sentence is the starting point for a next sentence.
Change supposes difference. The 'change' f(x) from x into y supposes a difference between x and y.

> For example: you see an apple tree, you want an apple and you pick an apple from the tree. If you analyse that occurrence into dual imaginations it would be a sequence supposing each other:
>
> The first dual imagination is a starting case:
> 1 You (Y) see = f(Y) an apple (a): a(Y). And,
> 2 you see = f(Y) a tree T: T(Y).
> Then, you conclude the third imagination and you add a fourth as the second:
> 3 The apple is part of (or connected to) = f(a) the tree: T(a). And,
> 4 you want = f(Y) an apple: a(Y).
> That results (perhaps via many intermediate suppositions) in the next imagination:
> 5 You pick = f(Y) an apple: a(Y). If so, then
> 6 you have = f(Y) an apple: a(Y).

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[a] Proposed by Harrison, G. A., Weiner, J. S., et al. (1964) *Human Biology* (Oxford) The Clarendon Press.
[b] Minsky(1988, 1985) *The Society Of Mind* (New York) Simon Schuster, calls them 'agents'.
[c] Waal (2000) *Chimpanzee Politics: Power and Sex among Apes.* (Baltimore) Johns Hopkins University Press

> That results in the next imagination:
> 7 You can eat = f(Y) an apple: a(Y). If so, then
> 8 you probably eat = f(Y) an apple.
>
> An animal may not 'realise' these steps. They execute them immediately. They may replace the imaginations 2-7 by innate routines. But, for you 1-8 is still an imagined plan, expressed in a range of pro-positions. These propositions represent actions (operations) to be checked against many other hidden suppositions crossing this line of inference in an other direction (the plain of the plan, its context). The tree may be the property of your neighbour. You then fastly follow a side road of the consequences. The apples may hang so high that you need a staircase. That may fall at this kind of soil if you climb it. It may take too much time to get one in the context of other plans. And so on.

In this example, the pairs of imaginations 1-2, 3-4 and so on, seem to be connected by operators of proposition logic ($\land$ 'and', $\Rightarrow$ 'if p then q' and so on). Inside each proposition there are already dual imaginations y(x) involved. And, these include suppositions of operations explicit in set theory ($\cap$ 'overlapping', $\subset$ 'part of' and so on) or predicate logic ($\forall$ 'all of', $\exists$ 'at least one' and so on). However, even these suppositions do have their own hidden suppositions.
In proposition 3 there is even a technical substitution given for 'part of' ('connected to') with the potential of 'no longer part of' ('separated from').
That is a different supposition (of operation) probably also involved in propositions 5, 7 and 8.
Anyhow, there are many more suppositions involved than expressed in the propositions 1-8.
They do have a necessary sequence analogue to individual action (the actual case and its change).

Categories and tools are consequences of the human difference
Then, the complex concepts of 'language' or in general 'tools' as a usual distinction between animals and humans can be interpreted as a direct consequence of 'the human difference' of dual imagination mentioned. It avoids assuming more than one mutation in evolution such as many a priori categories[a] supposed to be suddenly implemented at once. Supposing more relevant mutations at once suggests a creationsts' view. That view is possible, but very improbable if you calculate the possible combinations in genetics.

Freedom of choice is a consequence of the human difference
I assume then that imagination is noting else than a (re)construction separated from a physical experience. And, both are 'real' be it not 'existent' (see page 8). In that case imagination also supposes no more than two human actions at once: experiencing and constructing. Freedom of choice, often indicated as typically human, supposes at least that 'transcending' separation as a preparation to the reverse: realising a constructed imagination.

Imagination can ignore space and time
Imagination allows you to change either an object or its environment[b], to go back and forward in time, to change its associated context (if …). But, that only adds more differences to be synthesized. Physical limitations force you to unify all of these experienced differences and to 'categorise' similar cases into one (a type) as if these cases were the same.

Induction precedes deduction
Reducing the differences between several particular cases to remember them as a constructed general one (a generalised category) is called induction. The other way round, you can use such a generalised category of cases in a special case (deduction) to determine your reaction in a similar situation based on experience. But then, any 'case' has to be reconstructed first into an object and its environment.

Object constancy supposes different environments
Piaget supposed that your first *attention* for an object is isolated from different cases by body movement producing different views ('object constancy'[c]). But, the object distinction already can be the result of detecting (see Fig. 34 at page 42) or constructing (see Fig. 35 at page 45) major differences instead of changes. The resulting object constancy in a sequence of cases makes attention and even

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[a] Kant (1781, 1976)*Critik der reinen Vernunft*(Frankfurt am Main)Suhrkamp page 69 in 1781, 110-111 in 1976.
There, Kant distinguishes 12 'a priori' categories.
[b] Hertzberger, H. (2000) *Space and the architect: Lessons in architecture 2* (Rotterdam) 010 Publishers, republished in Hertzberger, H. (2002) *Creating space of thought* in: *Ways to research and study urban, architectural and technological design* T. M. d. Jong and D. J. M. v. d. Voordt (Delft) Delft University Press page 392
[c] Piaget, J. and Inhelder, B. (1947) *La representation de l'espace chez l'enfant* (Paris) Presses universitaire de France

later re-cognition possible of what is similar (constant) in the experience of different (ever changing) cases.

Attention and awareness suppose a difference between object and environment
Imagination supposes giving specific 'attention' to an object against the background of the general 'impression' of its case to make the required difference possible. So, the difference between *attention* and *awareness* within an *impression* may represent the difference between *object* and *environment* in the *case*. However, there seems to be a paradox if you use the word 'model', caused by an inaccuracy of language.

Models 'from' and 'for' are different
You can imagine an object without environment, but not (imagining imagination) attention without a primary awareness. There may be a reversal comparable to the convex model and its concave mould. The question is, if the mould is a (negative) imprint of a model or the reverse.
The word 'model' then has two meanings: model 'for' and model 'from' the mould as different objects. Only the first I can imagine as an object without the mould as an environment.
The second, the model from a mould is a construction.

An impression supposes a case
There is primarily a 'state of affairs' (case) modelling an impression (mould) as a second case.
Closing your eyes, you catch a fastly fading first order impression of differences loosing colours.
It is a primitive example of a fading short term memory. So, there may be different orders of memory, fading or reinforced by different impressions left in a brain environment.

The impression from your senses is physically limited outwards and inwards
The impression from your senses is physically limited outward by its 'frame' and inward by its 'grain', together determining the 'resolution' of the impression. So, any impression is a reduction. The eyes are impressed by light, the ears by noise, the nose by chemicals, the touch by forces. The impressions are reductions into colour, sound, odour, pain (however, in its moderate forms not yet called 'pain').

Attention supposes an object
Between frame and grain differences may draw attention. By body movement or major differences, an object of attention may be distinguished from a 'rest' (object constancy). The rest is neglected by concentrating physical arousal into the object. However, the rest may not be forgotten leaving an impression somewhere in the brain. Loosing attention reactivates former impressions as the 'awareness' of an environment.

Awareness supposes an environment
Then the object is neglected, arising awareness of its undeterminded environment. It is only limited inward by the neglected object left as an impression somewhere else in the brain. That limit surrounding an emptyness may become the object of attention itself.
It allows choice: confirmation or denial of the object.

Denial supposes a limit
The duality of an inward limit of the environment or a complementary outward limit of the object may allow a construction by denial. The essential children's game peek-a-boo is a game of denial and confirmation. It is the very start of imagination, exercising it as a mental construction without an actual impression, eventually confirmed by the next impression.

Confirmation supposes denial
However, confirmation has no sense without a possible denial supposed as a difference.
The denial allows a (re)construction filling the gap ('question') to be confirmed or falsified by action (search or execution).

SUPPOSITIONS IN A DESIGN PRACTICE

This chapter describes some examples from urban design practice that may clarify the problems to be solved by conditional analysis in that field. And, that is not one problem, but a field of problems.

Direction

Different directions may produce contradictions
A road is supposed to connect. But, perpendicular to the direction of the connection it may separate. Planning an urban highway is primarily intended to connect parts of the city. The separation may be concerned as a minor 'side effect' of the connection at the level of districts. It is a secondary problem at a smaller level of scale to be solved next in the detailing process of design. Its solution may be, to make tunnels or viaducts to restore some connection between the districts at both sides of the road.
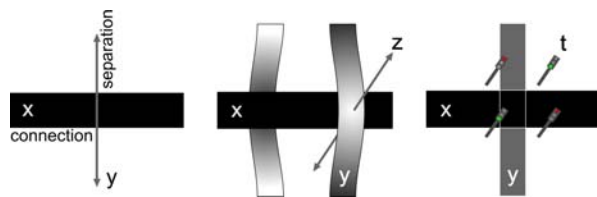
Fig. 22 Direction paradox

That is a vertical (z) separation to get connections in two other directions (x and y, see Fig. 22). However, that solution requires slopes at both sides which cannot easily be crossed. They cause serious separations and detours in the adjacent districts themselves. So, the designer can decide to separate in the fourth dimension (time) instead of the third: a crossing on the ground with traffic lights. It causes delays, but there is a periodic connection in both directions.

Verbal expressions suppose a direction
The sentence 'A road connects' then is direction-sensitive. The direction in which it connects is a hidden supposition in the verbal expression. The sentence 'A road connects and separates', sounds as a logical contradiction. A two-dimensional drawing allows that kind of contradictions: what is true in one direction (connection) may be false in an other direction (separation).
A drawing implicitly shows different directions. That supposes at least a plane. A drawing makes different inferences and conclusions possible at the same time, even if they are mutually contradictory. Verbal expressions are fundamentally one-dimensional and so is logic.
A verbal, logical or mathematical inference has a strict sequence in one dimension: time.
That sequence cannot always be changed without loosing its meaning.
Its 'side-roads' have to be neglected or distributed in footnotes, attachments, next chapters or other references. Otherwise the reader 'looses the thread'.
Links in a website allow that kind of branched verbal communication more easily. Different readers can choose their own route. But, the number of verbal routes to choose from are still more limited than in a drawing.

Weaving a picture by linear expressions is a weft without warp
A picture simulated in words has to be reconstructed line by line as a computerscreen does by pixels. A verbal text to describe an image completely with its sequences in any direction of its surface would fill many volumes with many notes, clarifying attachments or references. A drawing is easier to make and easier to understand than the verbal descriptions of many linear routes and their crossing relations. But, it allows different interpretations. At one point a verbal description may be divided in different inferences: 'In this direction the road connects and in that direction it separates'. But, that only mutiplies the verbal effort at every point in the inference and requires many explanations of the mutual contradictions. 'To explain' litterally means 'to make it plane'. A picture may tell more than a thousand words, but which words are these?

There are more directions than one line of inference in a drawing
The direction of reading a drawing is not prescribed. So, a drawing may be interpreted differently by different people. That is a substantial difference between the mainly linear, eventually branched verbal language of scientists and the mainly pictural language of designers. Designers do have (apart from the time dimension) at least two spatial dimensions available. But, a location-bound picture also does not generalise as words do. Nouns and verbs suppose general concepts applicable in different contexts. Their hidden suppositions of generalisation are not always explicit. The pixels of a photograph do not suppose anything else than a one-to one spectral relation with a supposed reality.

A legend next to a drawing is something inbetween: it is its vocabulary.
But, the generalised legend units are localised two-dimensionally in the drawing, showing many spatial relations in different directions at once to explore.

Defending a design verbally for an audience
To defend their design verbally, designers selectively crisscross their drawings. Their legend units connect the drawing to the more general categories probably shared with the audience by words. They choose only some of the essential routes in or between their drawings to get different inferences that may sound logical to the audience one by one. It is acceped that these inferences may be mutually contradictory because they represent different directions and possibilities of interpretation or use for different people.
The drawing shows connections *and* separations, vistas *and* eclosures, sun *and* shadow.
The defense of a drawing even contains contradictions as if just these are the very elements of quality and possibility for different people. However, these contradictions remain incomprehensible for the audience if they lack spatial imagination in more dimensions. And, the imagination of designers winning their clients by verbal and managerial abilities, may itself become dominated by linear thought in their spatial design. So, the most successful designers may be not the best. The city is not a tree.[a]

Individual action has one direction; parallel actions require at least two dimensions
The past million years, verbal and pictural language have been developed primarily to coordinate human actions. That is the consequence of the unique human ability to imagine a range of actions of which only the first is immediately executable[b]. Individual actions are necessarily sequential in time (serial). But, different humans may coordinate their actions in an organisation. Multiple serial actions ('If I do this today, then you can do that tomorrow.') can be appointed in verbal language. That makes conscious task division possible ('I hunt, you cook.'). But, parallel actions ('If you do that there, then I do this here.') require additional spatial imagination if it is verbally represented.
Such a verbal representation of parallel actions may be clarified by a flow scheme. A flow scheme usually has parallel bars representing the different activities distributed vertically. The horizontal axis then represents time.
So, time can be represented as space. The reverse is difficult to imagine. Perhaps you can say: "Time supposes space, not the reverse.".
Here you approach the very subject of this thesis: suppositions of imagination.

Scale

Expressions suppose a level of scale
So, inside an organisation there is a combination of parallel activities to be imagined as distributed in space. But looking from the outside, the organisation is again an object with an input and a resulting output, accessible for linear thought (for example accounting the profit).
At a larger level of scale there are - again often in parallel coordination - many organisations that can be located on a map. Then - anew looking from the outside - economists will generalise. They subtract the summarised input from the output as a gross regional product without concern about locations.
So, in successive levels of scale there may be an alternating one- and two-dimensional imagination.

A third dimension has to be constructed from different impressions
Looking at an object at one level of scale (for example the level of daily experience) there are always two opposite directions of view that may seem contradictory.
From the inside a ball is concave, from the outside it is convex.
And, there are more directions producing different imaginations than these fundamental two.
From one external viewpoint a cylinder is round, from another one it is rectangular.
Stereometry requires at least two different successive inferences to calculate its content: a planar one to determine the surface of a circle to be represented as a number (a word, a linear value neglecting form) and a linear one to be multiplied by that result.
More complex forms will require more words (variables, numbers) to describe them by linear inference.

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[a] Alexander, Christopher (1966) *A city is not a tree* (Architectural Forum) Whitney Publications
[b] Harrison, G.A., Weiner, J.S., et al. (1964) *Human Biology* (Oxford) The Clarendon Press
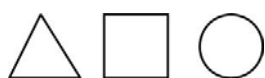
*Fig. 23 Triangle,
Rectangle and circle*

That is also why geometry with sequential linear proofs restricts itself primarily to combinations of simple closed forms with the least number of differences (see *Fig. 23*):

triangles (three different directions, three changes of direction),
rectangles (two different directions, four but equal changes of direction) and
circles (infinite different directions, infinite but equal changes of direction).

For more complex forms an *image* based on measurements in a supposed existent or possible reality is an efficient intermediate to derive a short verbal expression. From that image the form is translated into words: different distances and directions (vectors) in a linear sequence.
However, that kind of imagination tacitly supposes at least an origin, a standard direction and measures to differ from and a sequence.
It will be a long road to trace back the suppositions required to construct that level of imagination from the ground zero of difference: location, direction, angle, distance, sequence. Their self-evidence is treacherous as geometry teachers may have experienced with students not following their inference. They may still not share some tacit suppositions of the mental construction below the level of axioms.

Problems and solutions emerge from another direction or scale
The scale-sensitivity of imagination can be recognised in the road-crossing example as well.
After the rough sketch of the urban highway connecting parts of the city in a radius R=3km, a perpendicular separating effect is recognised in a radius R=1km.
Planning the cross-connections R=1km, again a separating effect R=300m appears.
The detailing may go on at other directions and levels of scale until the side-effects are neglegible.

Any expression hides suppositions of scale
So, in any phase of linear reasoning from an existing undesirable state of affairs (problem) into a desirable end (purpose) there is at least a hidden supposition about the level of scale. The solution within that radius produces a new kind of problems at another scale. In the example of an urban highway the undesirable state of affairs (problem) was separation and the solution was connection. But, that solution again produced separation in other directions at an other level of scale.
The same kind of alternating scale-sensitivity of reasoning appears in the example of organisation.

Integration supposes desintegration at an other level

Suppose that an organisation increases from 10 people into 100 people. A reorganisation follows. The coordination of 100 people requires an other task division to avoid double work in the different increased subgroups. These parts then are re-arranged and desintegrated in favour of the integration of the whole. Existing connections are broken and new connections are formed.

So, integration at one level of scale may cause desintegration at another level without contradiction.

Perception

Diversity may be perceived as homogeneous at an other level
A next example may clarify scale-sensitivity in a more fundamental way.

Suppose you have to design a new district for a municipality. The inhabitants complain about the boring districts recently built. You want to do it better. So, you make an urban design that is as diverse as possible with winding roads, different altitudes of the ground level, a mixture of different kinds of dwelllings, different street profiles, greenery, solar exposition, parking solutions, trees, kinds of plantation and inhabitants. So, everywere there are busy and quiet places, open and closes spaces, sun and shadow, young and elderly people, different views and different possibilities to choose. Suppose it is built like that and you proudly walk through the streets you designed. Now you ask the inhabitants what they think about their neigbourhood. They answer: "It is everywhere the same here.".

Any perception has hidden suppositions
That is approximately what happened to me around 1980 in the municipality of Zwolle.
It took me some time to realise the hidden supposition behind my primarily local perception of diversity.
There was too much diversity at one level of scale: the radius R=30m of little children playing around their home. I had realised all possible diversity within that radius causing a homogeneous mixture at R>30m. The adult inhabitants brought their children to school in the neigbourhood R=300m, shopped

in the centre of the district R=1km and worked somewhere in the city R=3km. So, they passed every 100m of their district the same chaos. Driving their car through the ever curving streets with slopes, changing profiles and plantation they concluded: "It is everywhere the same here.'

Frame and grain are hidden suppositions of perception
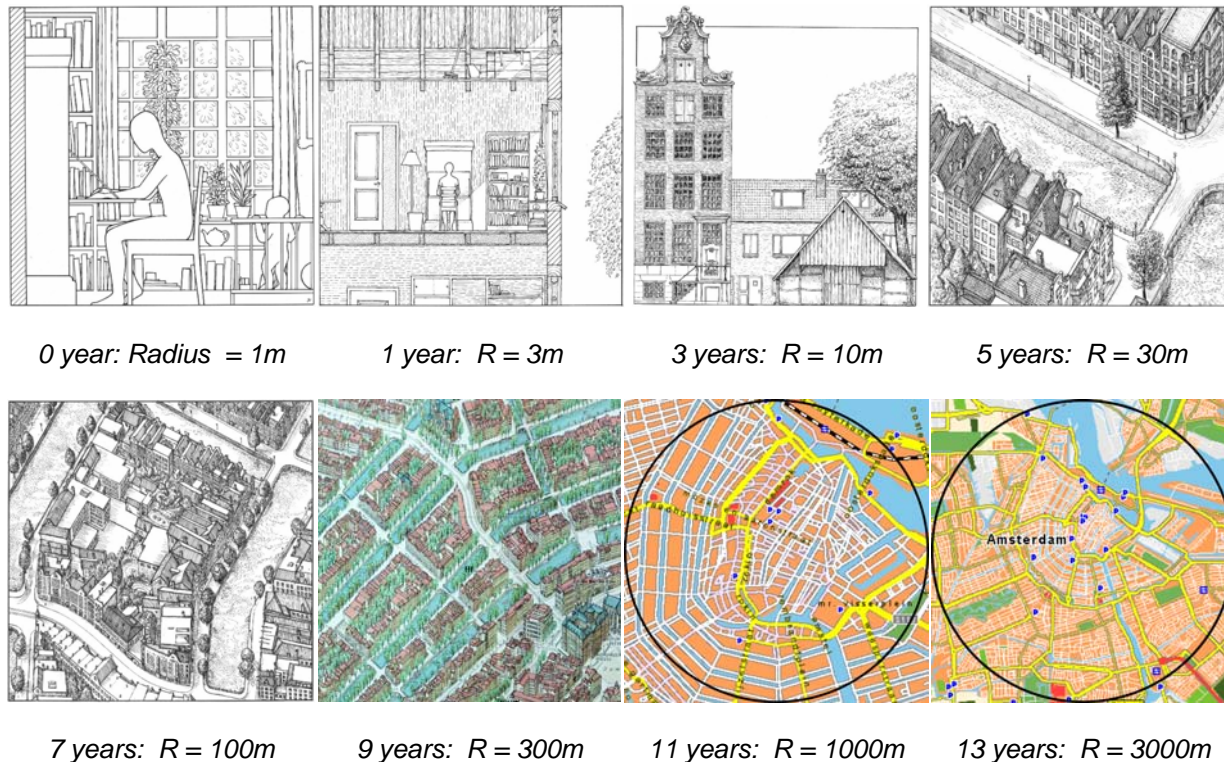Children do have an other perception of their environment than you may have as an adult. *Fig. 24* is a hypothesis how imaginable horizons (frames) may increase by age.

0 year: Radius = 1m	*1 year: R = 3m*	*3 years: R = 10m*	*5 years: R = 30m*

| *7 years: R = 100m* | *9 years: R = 300m* | *11 years: R = 1000m* | *13 years: R = 3000m* |

Fig. 24 A tentatively supposed horizon increasing by age[a]

Fig. 25 shows that hypothesis in an other form.

years old	m radius R	area of awareness
0	1	Action space
1	3	Room
3	10	House
5	30	Yard
7	100	Neighbours
9	300	Neighbourhood
11	1000	District
13	3000	Town
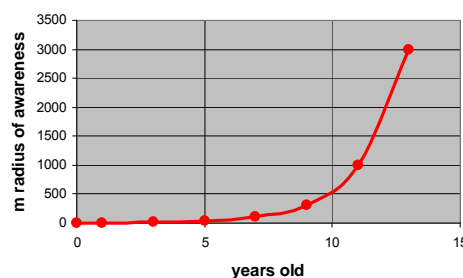
Fig. 25 Hypothetical nominal scales of awareness by age

As an adult you may repeat that experience every day.

> If you approach an object physically, then details may appear. Within the decreasing environment of the former object, any detail may become a next object of attention.
> The other way round moving away, the former object may become a detail and an increasing part of its environment becomes the actual object within a different environment.

So, changing the scale of observation (approaching, moving away or using instruments such as

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[a] Jong, T. M. d. (1978) *Milieudifferentiatie, een fundamenteel onderzoek* (Den Haag, Delft) Rijksplanologische Dienst, Technische Hogeschool PhD thesis; first 5 drawings by Jan Huffener

telescopes or microscopes) does not only change the frame. It also changes the smallest detail observed or imagined as an undeterminded 'inner environment' of the object (grain).
The difference of frame and grain determines the 'resolution' of imagination. So, any attention, observation or other action supposes least that reduction. If it is not yet part of your imagination, then it is forced by a physical limitation of your senses.
Changing the scale will also change the categories or legend units by which we ever may express an experience or plan in verbal language or in drawings.

Distinguished qualities change by level of scale
If you realise the differences experienced at different levels of scale, then there are many differences not available in many urban environments (see *Fig. 26*). They are seldom recognised as possible legends for design. And, they are necessary to learn substantial imaginations of survival.

	years old	0	1	3	5	7	9	11	13	
	m Radius of frame	1	3	10	30	100	300	1000	3000	learning
differences to experience:										
hard-soft		x								danger
movable|non-movable		x								operational abilities
color		x								recognition
windows|doors			x							orientation
light|dark			x							imagination
shelter|corners			x							to escape adult movements
function|time			x							every time having its own place
visibility			x							hide-and-seek
accessibility				x						rules
control				x						other people
noise				x						context
temperature				x						kinds of clothes
wetness					x					hygiene
ceiling|shelter					x					in-betweens to hesitate, to decide
plantation					x					living nature
sun					x					physical nature
formal-informal					x					different behavior
recognition|suprise					x					initiative
run|compete						x				ambition
watch, learn						x				to learn
possibility to buy							x			expensiveness
possibility to walk							x			interest
possibility to ride a bike							x			ride
urban functions								x		exploration
meet|retire									x	projection|identification
atmosphers|cultures									x	identity

Fig. 26 Legends for design

Difference is scale-sensitive
So, even difference is scale-sensitive. And, if 'difference as such' is scale sensitive, then any distinction may be scale sensitive. If you take a pattern of black spots surrounded by six white spots (see Fig. 27) then every spot has a different spot in its direct environment. So, you can conclude difference at any spot. But, that is at the level of the spots. If you repeat that pattern of seven spots, then these patterns do not differ mutually.
So, Fig. 27 proves that already at a 3 times larger radius your conclusion may turn into the opposite. That is an important discovery. It bans any scientific conclusion if the level of scale is not specified. Between a grain of sand and the Earth there are 10 decimals. That means approximately 21 factors 3. So, a conclusion at one of these levels of scale *may be* opposite to those of other levels of scale. 'May be', because the example of Fig. 27 does not mean that any scientific discipline concerning phenomena between a grain of sand and the Earth has to be divided in 21 disciplines to avoid scale fallacy.
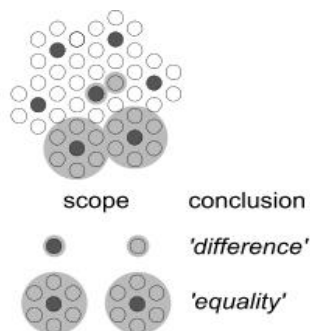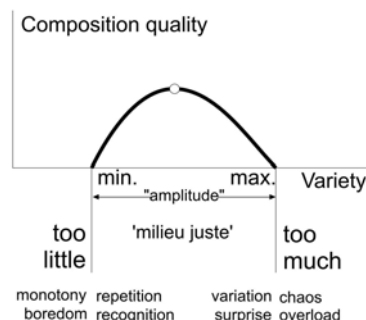
Fig. 27 The scale paradox

Fig. 28 Perceptual quality

There may be validity ranges larger than a factor 3 such as Newtonian physics and thermodynamics. Ecology has more specialisms according to scale[a]. And, humanities should be careful to project conclusions about individual behaviour into groups or conclusions about small groups into larger ones. Compared to ecology their subdivision into psychology, social psychology and sociology is poor. The only sociologist articulating his discipline more precise in spatial and temporal levels of scale I know is Gurvitch[b], originally a geologist.

Any perception has a two-sided tolerance

>The larger distance per hour you travel, the faster you move, the more different impressions you get per second, until it is perceived as a homogeneous mixture, as chaos.
>So, looking as a car driver, a low diversity of the environment is not a problem.

There is a two sided tolerance for stimuli, already mentioned by Birkhoff (1933)[c] and Bense (1954)[d].
It is adapted and visualised in Fig. 28.
Too little stimuli (monotony) causes boredom, but too much stimuli causes overload, chaos.
The quality of a composition depends on a balance between these limits.
That balance may fluctuate between recognition and surprise.

Mi-lieu is the right middle
Such a 'mi-lieu' between too little and too much is known in ecology as the 'amplitude' of ecological tolerance. The vertical axis of ecological tolerance then represents the probability of survival and the horizontal axis represents any environmental variable. For example: if that environmental variable is the availability of water, then a plant species may survive between its boundaries of drying out and drowning.
And, the optimum of ecological tolerance (its 'mi-lieu') is different for different species. That is why a slope with a gradual decrease of available moisture into the top has so many milieus, occupied by more species than a plane with equally distributed moisture. Any species may choose its own altitude line as its specific optimum for its specialisation.

Perception has fluctuating balances
Something similar may count for different people regarding the appreciation of diversity.

>Busy people with much variation in their daily life may like an easy to clean, simple and tight interior in their homes. But if you work at an assembly line with an endless repeat of actions, you will like ornamented furniture, baubles at the mantelpiece, many plants in the windowsill and a garden full of gnomes or other peculiar objects if you come home.
>At a larger scale in time and space, architecture in turbulent times became simple such as the Romanesque style in the early Middle Ages. In the more quiet later Middle Ages people chose for flamboyant Gotic styles. However, as soon as a money economy developed and America was discovered, Renaissance architecture became a recognisable, more simple or predictable alternative. That became boring for the new rich, quietly spending money in their castles. They chose Baroque and Roccoco. But, the turbulence of Enlightenment, new technologies and the

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[a] Jong, Taeke M. de (2007) *Urban ecology, scale and structure* **In:** Jong; Dekker; Posthoorn (eds.) Landscape ecology in the Dutch Context (Zeist) KNNV-uitgeverij .
[b] Gurvitch, Georges(1969)*Traité de Sociologie* (Paris)Presses Universitaires de France
[c] Birkhoff, George D. (1933) *Aesthetic measure* (Cambridge, Mass.) Harvard University Press
[d] Bense, M. (1954) *Aesthetica* (Stuttgart) Deutsche Verlags-Anstalt

French revolution resulted in Classicism as a compensation. Once these storms were over, people again started to like the diversity of ornamented Eclecticism, Art noveau or Jugendstil. The First World War shaked the world introducing Modernism, while at the end of the 20th Century Postmodernism allowed a new eclecticism for those that had never experienced a war in their life.

In music you can recognise the balance of repeating themes and variations. However a theme in music is seldom repeated more than three times at once. In architecture endless horizontal rows of the same windows are accepted because it can vary vertically also or contrast with busy traffic around the building. Music, as well as literature and poetry have one direction for variation only: time. And, both monotony and chaos are less appreciated there than in architecture.

A balance of perception may alternate by scale

Birkhoff and Bense did not take levels of scale into account. Their hidden supposition was perhaps a radius of R=3m. But at an urban scale outside our buildings, our senses get impressions from larger environments at many levels of scale. So, a balance between recognition and surprise may be reached by alternating difference and equality at different levels of scale.

If you look at the Amsterdam canal houses, there are repetitions and equalities at a level of R=30m. All houses do have a peak roof and approximately the same width, mainly filled with brickwork. At a level of 10m any façade is different, but at the level of 3m there are many recognisable 17th century details. The diversity of facades is compensated by equalities at the other levels of scale and the continuity of the canals.

A composition requires unique and repeating components

It would be a nice design rule to provide remarkable crucial details at every 10, 30, 100, 300, 1000 and 3000m with an increasing impact and size in this order. Of course, these measures are not meant as precise measures. They are names for orders of size (nominal measures) with a tolerance reaching until their neigbouring measures. However, in the Netherlands residential streets, neighbourhood roads, district roads and so on, fit well in this range as their global average mesh widths. So, at average you will cross every 100m a residential road, every 300m a wider neigbourhood road, every 1km an even wider district road and so on. That hierachy of roads already provides a hierachy of crucial details at the crossings, a contribution of the network to both diversity and repetition of any urban lay-out. The hierarchy of waterways has a similar hierarchy. It interferes with the road system, causing bridges at crucial spots to be utilised as points of surprise and recognition.

Diversity may alternate by scale in accords

You may formulate the style of the Amsterdam canal zone as Equalities at R=30m, Differences at 10m, and again Equalities at 3m or with a short formula: $E_{30m}D_{10m}E_{3m}$.

Such a formula I named a 'diversity accord'. However, the industrial era introduced larger components such as windows or other prefabricated elements in large series. And, people nowadays have got many more spending alternatives than buildings to show their identity (such as cars, sports, human networks, mobile phones and other gadgets). Moreover, they move more often into another house (in the Netherlands approximately once in the seven years). So, the pre-industrial diversity at 10m transformed into a cheaper equality. But, people still able and wanting to spend a substantial part of their money for their house may like a compensation at the other levels of scale. At 30m, they like a villa different from the house of their neighbour and walking around their house they like some remarkable details every 3m.
So, their diversity accord may be the opposite of pre-industrial housing: $D_{30m}E_{10m}D_{3m}$.
The remarkable details of the urban scene are no longer dispersed every 10m, but every 3 and 30m.

We want it different and equal in the same time

Suppose you are asked to make an quality plan for a district (R=1km) of Amsterdam (R=10km) to improve its crumbling spatial image. That district has had always a specific identity until now, because it was built between 1920 and 1940 in a style specific for these years. But, new buidings were built, roads and plantation were adapted, shops destroyed the original facades with their uniform large display windows and advertising texts. The district became more and more equal to the newer districts loosing identity. So, the municipality suggests the image of the district should be restored by building rules as a typical part of the '20-'40 belt (R=3km) of

the city. Within that belt it should keep and restore its own identity, but it should also remain a typical Amsterdam district to be distinguished from such districts in other cities.

However, within the district there are also neigbourhoods (R=300m) recognisably different from eachother by architecture and lay-out. So, these neigbourhoods should remain typical Amsterdam in a Dutch environment, typical '20-'40 in an Amsterdam environment, typically belonging to the district, but also show their own identity within that district.

Now, the formula does not only stress the difference from any larger scale $D_{100km}D_{10km}D_{3km}D_{1km}$, but also recognisable equalities $D_{100km}E_{10km}E_{3km}E_{1km}$.

The formulas end by 1km, because the difference of a neigbourhood (R=300m) can be recognised only within the context of the rest of the district (R=1km) as the difference of the district to the belt can be recognised only in the context of the rest of the belt (R=3km) and so on.

Differences can be different

That is approximately the assignment I got in 1995 from the Amsterdam district De Baarsjes. How to solve this paradox of equality and difference? For example: De Baarsjes should be different from the other districts of the belt '20-'40, but in the same time they have to share essential characteristics. The solution was to answer the question 'Which characteristics?'.

> So, I looked for characteristics that any neighbourhood of De Baarsjes shares with Amsterdam (for example a sculptural use of brick), with the belt '20-'40 (for example the building style) and with the district (for example the kind of plantation in the streets). The paradox is, that the internal *equalities* I found at one level of scale (for example the belt) in the same time supposed external *differences* with the larger environment (for example Amsterdam).

It may seem now that you cannot imagine difference without supposing some internal equality, but it is the other way round. The word 'internal' betrays that you already supposed an object different from its environment, before you could suppose an 'inside' and consequently any homogeneity (less difference) inside that object.

Drawings

A drawing supposes quantified qualities (content)

Any drawing contains legend units, even if they are not specified in a legend. Surfaces are coloured or hatched, mainly indicating functions (not necessarily human functions), the lines mainly indicate connections or separations (structure). Their content (quality) is explained in the legend and both are dispersed in different quantities over the surface of de drawing taking 'form'. If we take quality and quantity together as the 'content' of the drawing, then content is a basic kind of difference that can take 'form' in an expression.

> Even if we draw a line without a legend it supposes a property different from anything else in the drawing. If we draw a closed line without a legend it still implicitly supposes a quantified property 'inside' different from 'outside'. It has a 'content'.

Form is not imaginable without a content.

Form supposes content

'Form' can be represented as a dispersion in space of some content.

> Assume you have to compare many regional designs adding living space for one million people in an urban area R=30km. Any design has different legend units such as 'living', traffic, 'labour', 'facilities', 'recreation' and 'nature' in different specifications, densities and life styles. You know that each inhabitant in a contemporary city uses approximately 300m^2 urban surface for these functions altogether. How to make these designs comparable at costs, profits, living quality and other impacts?
>
> That was approximately the assignment I got in 1996 for 25 designs concerning Randstad Holland. I had to redraw the designs in a uniform legend to be able to compare them and to conclude the impacts for traffic and other aspects of living. I chose the average urban space used by 1 inhabitant (300m^2) as quantified legend (content) of the drawing. I made circles of 100 000 and 1 000 000 inhabitants according to that surface and redrew the designs as done in *Fig. 29* for three metropoles.
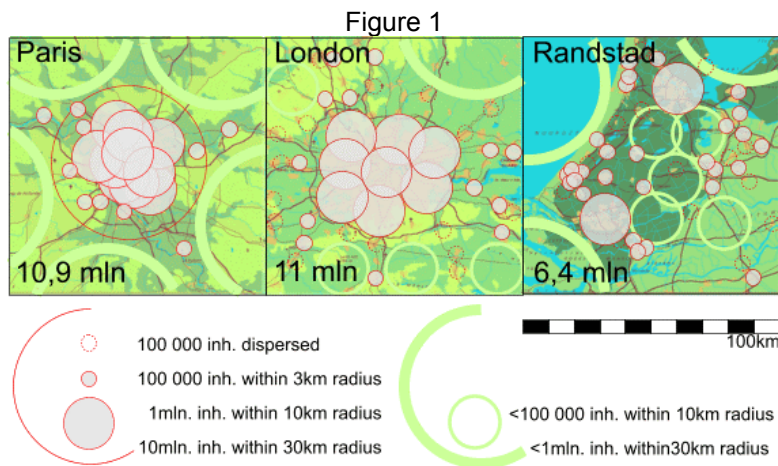
Figure 1

Peter Struycken 1981

Fig. 29 The form of urban areas as a dispersion of built-up surface in space

Fig. 30 A pointillistic representation of form

By doing so, I got a dispersion of 'urban area' and 'open area' in space you may call 'form' in a low resolution. Any disk can be subdivided in 10 smaller disks to get a higher resolution, approaching what you usually call 'form' at a human scale (pointillistic representation, see *Fig. 30*). This representation enabled me to estimate the impacts of different proposals for the Randstad in a uniform way, for example the impacts on traffic as a required network of connections and separations (structure).

Let us then call 'form' any dispersion in space. It can be represented in a pointillistic way, but that is not its essence. The words 'dispersion' and 'space' are premature. They still have to be traced back, but they may evoke an imagination comparable to Fig. 35 at page 45 and we make bigger steps now. You still do not have to suppose boundaries giving that 'form' a 'shape'. Shape supposes a form with a contour. You still do not have to suppose a composition with components as limited objects dispersed in space. Even if the dispersion is represented as points, there is still no supposition of groups you may call components. You solely have to suppose a dispersed quantity (supposing a quality). However, if there is a dispersion, then there should be something 'taking form': content.

For example, a galaxy has a form, (not yet a shape or a composition with components). Its content is primarily 'light' in different hues (not yet the set of stars, planets and even smaller particles until gases you may imagine later, supported by many other suppositions). You can draw a map with legend units and a programme of their required surfaces as 'content'. You disperse these surfaces over the map. By doing so, you give them a shape (a limited form or a limited dispersion in space). You can not imagine a dispersion in space without something to be distributed: a content, even if that is not explicit.

Without content (a quantity with some quality) you cannot imagine a form.

Structure supposes form
Let us call a set of separations and connections 'structure'. Separations and connections still have to be traced back. 'Separation' may allow an imagination of more objects next to more differences. But, the suppositions of imagination related to structure we leave aside here.

The legend units of your drawing are separated by boundaries, their mutual distance and intermediate legend units. To connect them, you draw connections, for example roads. You cannot imagine a structure without a form. A structure has to be dispersed in space, otherwise it can not separate or connect anything. Even if you think that you can imagine a theoretical structure without a form, you still can not express it without giving it a form in words extending in one direction or schemes extending in more directions.

Structure as a set of separations and connections supposes a form, a distribution in space. If you would like to express some regularity (equality) in the form, then 'pattern' is a better word instead of 'structure'. A structure can *cause* a pattern, a form where regularities appear such as regularities *along* the connections and separations, but these connections and separations still have a dispersion in

space themselves. They still *suppose* a form.

Function supposes structure
In the same way you cannot imagine a function without a structure.

> If somebody would tell you that (s)he has a function as a 'director', then it still can be the director of a company or the director of a one person family.
> If you attach specialised 'functions' to your legend units, you suppose a wider structure or network within which they can 'function'.

The structure within which a function operates determines its working.
Structure and function do have an implicit difference of scale.

> A physical construction such as a building may count many parts with a function in that whole.
> But, the building itself may have a function in a largher neighbourhood, the district or the city.

Any structure$_1$ may have many internal functions$_1$, but the structure$_1$ itself may have a function$_{2+}$ in a larger structure$_2$. However, that larger structure$_2$ may also have an inward function$_{2-}$ for the smaller structure These 'functions$_{+-}$' are different. In sociology they were properly distinguished by Geiger as anascopic (from inside outwards) and catascopic (from outward inwards) functions.

Function as a verb can be ambivalent
But, the word 'function' still has an other ambivalence as a noun (a function) or as a verb (functioning). As a verb it is a reflexive term that may cause contradictions. It expresses an operation f of an active subject x, f(x). But, on what? In which context? Any verb supposes an operation on something, even if that is not mentioned ("He laughs", see page 23). It is mainly clarified by adding an object y(x) and further restrictions (".. at me" or "…about me") in the sentence. And, that context is supposed in any understanding of a verb, even if it is not explicit. So far, there is no difference from a function as a noun. But, if that context is not explicit as a structure, it reports at least also an effect on the speaker, speaking about what s(he) experienced. That experience is the hidden effect and the speaker is object of the operation. But, as a speaker s(he) is also a subject silently supposing "I observed that …". By doing so, the speaker reports as an active subject about an operation in which s(he) is also a passive object. The other way round, the laugher becomes an object and may stop laughing as an effect of the operation of speaking if s(he) hears the speaker. And, that could be intended.
As a noun 'a function' is not an operation reporting a change, but an effective component in a composition. It is its effect *in* and *from* a structure in different diections. And, its effect is not a *change*, but an imagined *difference* between its absence and presence. As such it can be depicted in a map with other functions, related to each other in a composition.

Functioning supposes change in structure
Function supposes a change in a structure. If there is no imaginable change, then the function apparently does not function in any structure, but it still 'has a function' in a composition.

> However, a storehouse may be closed after people have stored their products waiting for use. In the mean time there seems no change in the building. Does it not function until people retrieve their products from the storehouse for use?
> Firstly it may keep the stock dry if it rains or keep it cool if the sun shines. And, it prevents the stock for theft. That is the very purpose of the building serving further intentions and aims. 'Keeping' may be a change close to zero, but it is still an existing or imagined change. It resists actions by reactions even if they are at rest by equilibrium. If potential workings equalise eachother, they still can be imagined as active but opposite workings.
> Secondly, the connected owners or users are a part of the structure to be taken into account. Without their function you even could not call the building 'a storehouse'. They are functions in that stucture, even if there are no people in the storehouse. The owners and users obtain goods to store, and they use or sell what they have withdrawn. But, what if they don't? Does it not have a function (changes in the structure) in their periods of free time? Which kind of 'change' is then supposed in the structure? Only then, you can imagine an enduring function.

Since this thesis studies suppositions of imagination it is all about *imaginable* difference or change. And, possible change supposes imaginable change (see *Fig. 8* at page 8). The change may be not probable or even existent, but it is still possible. This thesis restricts itself to imaginations of realistic, possible worlds, but not to probable or even existent ones. Time and space are constructions

supposing a continuity and a sequence not binding for imagination.

Intention supposes a function
Any intention also supposes 'functions', but not the reverse. You can not imagine an intention without any function, but the reverse you can. Physics and biology show functions without imaginable intentions. If you are a religious person, you may suppose intentions behind any phenomenon. But even then, you may still not pretend to be able to *imagine* all of these intentions. Animals may have short term intentions, humans do have also longer term intentions according to their capacity assumed at page 31, but eternal intentions should refer to something not imaginable beyond eternity. Let us then restrict ourselves here to human intentions. They suppose human functions within an ecological structure based on a dispersion of matter in space.

Intention, function, structure, form and content suppose eachother in this sequence
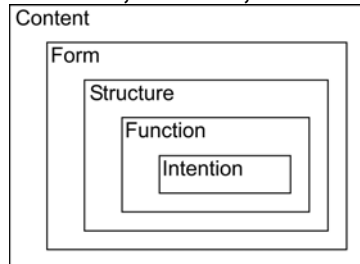
Fig. 31 Kinds of difference supposing each other

The kinds of difference$_5$ you then may roughly distinguish are different intentions, functions, structures, forms or contents. They suppose each other in this sequence (see Fig. 31).

That *conditional* sequence assumed here, leaves open the possibilty that within these boundary conditions an intention can *cause* a function, structure, form or a different content in the reverse direction (see *Fig. 12* at page 13) different from what is most probable. Conditions refer to possibility (see *Fig. 6 - Fig. 9* at page 8, elaborated from page 15 onwards). Within these limits there are still many possibilities branching as a tree of many imaginable causes and effects. The distance from its central axis of most possibilities determines their probability.

Within that range of possibilities (see *Fig. 12* at page 13) emerging intentions (such as political programmes after elections) can cause a deviation from that central axis of probability.

Form supposes a legend
I cannot imagine a *representation* or *drawing* without indicated differences, an (eventually tacitly presupposed) vocabulary or *legend* (key to symbols). The legend is the vocabulary of the drawing. Only by drawing differences one can make *forms* and only by making different forms one can make *structures*. *Function* presupposes a structure within which the function operates.
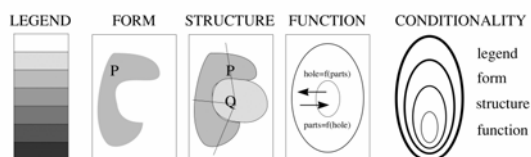

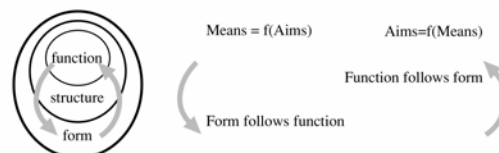Fig. 32 *The legend and its relation to form, structure and function*

Fig. 33 *Function, form, aims and means*

The same form allows different structures
Nevertheless, within one set of forms (for example a box of blocks) you can imagine different ways of connecting them (structures) and within different structures you can imagine different functions. In the reverse the same function often chooses different structures and the same structure is often built in different forms or materials. So where the design process lays the initiative is free. It can be either a causal, *aim-directed* (purposive) process starting with the function (*funcionalist* position) or a conditional, *means-directed* process (*formalist* or *structuralist* position).

In design, aims can follow means
When the number of *aims* is smaller than the number of *means* you better can use aims as *independent variable* with the means as *dependent variable*. In architecture and certainly urban planning the number of means is smaller than the number of aims. In that case you better can variate the means to see what gives the greatest amount of possibilities for future generations.

ABIOTIC SUPPOSITIONS OF IMAGINATION

A conditional sequence of suppositions

Suppositions are conditions

If you suppose conditions in an existing reality outside (unreachable beyond your senses), then you still can try to understand what you observe. Under-standing is a reconstruction upon sup-positions (hypo-theses) to be checked by new observations.[a] By such a feed-back a 'supposition' may become a preceding 'condition' able to change your behaviour according to the feed-back (empirical cycle). There is not much difference then between the materialistic term 'condition' and the psychological or philosophical term 'supposition'. Only its function (working) may be different in different environments (inside or outside the brain, a body or even a society sharing many suppositions in its culture). If we suppose a neural or social system with many feed-back connections, 'supposition' might be the better term. But I doubt.

Could you imagine conditions without suppositions? I am inclined to say 'Yes!", referring to 'difference' as an actually observable condition without the need of underlaying suppositions (understanding). Could you imagine suppositions without conditions? I am inclined to say 'No!', because 'supposition' supposes that first condition of difference. So, let us speak about 'conditional analysis' since 'difference' is part of it. The rest (different differences) are suppositions indeed, be it as a special kind of conditions for imagination.

Imagination is a reality

Because I can not determine the boundaries of imagination as argued before, I will restrict myself to imaginations of 'possibility' (see *Fig. 7* at page 8) the core of technical design. Conditional analysis is particularly useful in that area.

Moreover, I restrict myself as much as possible to terms with a meaning in the observable 'real world', supposing that individual 'imaginations' are part of it, even before they are expressed.

'Difference' is the best example: we can indicate it everywhere in the outside *and* inside world.

So, this is not a Cartesian dualistic treatise separating thought and body (as often still present in cognitive science). It is a primarily materialistic treatise probably integrating psychology and neurology.

Imagination is not bounded in language

To clarify the suppositions of some concepts important for design, I have to use verbal language and some drawings. However, I suppose these are poor vehicles of thought, full of hidden suppositions, often capturing imagination in the requirements of communication and culture. From biology we learn there are many other vehicles of information such as body language or even chemical exchange. Imagination goes beyond verbal or pictural models used in communication. Many designers are dyslectic and struggle to express their thoughts. So, imaginations have to exist before they are expressed, even if they develop by expressing them in drawings as a feed back into imagination. That forces me into introspection.

Introspective can become intersubjective

So, conditional analysis is primarily introspective. But (as in mathematics) it can be checked by other persons. So, it could become intersubjective (not 'objective' if objectivity exists at all).

For example, one of my conclusions in this treatise will be: 'I can not imagine structure without form, but the reverse I can' (structure then supposes form, see page 38). In other words, if you should define structure, a preceding notion of form is involved. However, I met many people stating they could imagine structure without form. Then I asked to give an example and they started to draw a structure with some dispersion of elements in space (form), which is supposed in any drawing.

So, I concluded that even they could not imagine structure without form. You can agree or not, because representation is still no proof of the possibility of imagination, but the debate anyhow resulted in a better understanding of each others suppositions about these concepts.

If this treatise could raise that kind of debates and clarification, then it already did an important job.

Creativity is leaving out at least one supposition

Anyhow, imagination should contain more than what we can express. I want to free it, clarifying and replacing its (hidden) suppositions ans short-cuts. Creativity is always leaving out or change at least

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[a] The Latin root of sub-positio, could be related to Old Greek hypo-thesis or English under-standing.

one commonly shared supposition (like jokes do during the joke). So, this treatise does not intend to stop at the boundaries of language as many philosophers have done. Perhaps we will invent more vehicles of imagination in the future. The first step is, to clarify our hidden but commonly shared suppositions built up in communication and languages until now.

Impressions

An object is different from its environment by 'more' difference in any direction

From Fig. 34 you may imagine an object with gradual differences inside. Outside there are the same differences in opposite direction. Vertically there are only differences, but horizontally there are equalities, except at the boundary.
You may imagine a concave or convex form of the object based on past experiences of touch. But, there are some questions preceding that 3D association. Why do you distinguish a circular object at all, even if its limit itself is different in any direction and there are as many differences inside as there are outside? What are the equalities of its limit that allow us to generalise them into a concept you usually call a 'boundary' or even a closed 'circle'?

Fig. 34 An object

An accepted source of object distinction is movement. It causes a difference of background movement compared to the object (parallax) by which you can distinguish the object (object-constancy[a]).
But, parallax is excluded in Fig. 34. Movement would only help you to distinguish the object if there would be a third dimension perpendicular to the drawing, if the object would be in front of its environment (back-ground) and if you would move vertically to see the parallax (moving horizontally would not produce any difference).
Without that movement the object is apparently distinguished from its environment by the *major* differences (contrasts). Gradual differences are apparently minor differences compared to sharper contrast. Otherwise you cannot perceive the object as substantially different from an external context.
Is there then a preceding (a priori) imagination of 'more' and 'less' supposed in our imagination, a distinction of major and minor differences? I do not think so. That distinction is primarily delivered by the senses and reconstruced afterwards (a posteriori) into an imagination of 'more' and 'less'.
But, how do you reconstruct 'more' and 'less' based on difference only?
That is an unexpectedly difficult question.

Any impression or imagination starts with difference
The basic assumption of this thesis is (see page 8), that imagination (following the impressions you receive from different senses) does not have anything else in common with an existing reality than differences (including 'change': differences in a supposed dimension of time). Hearing, taste, smell, thermoception or pain register mutually different differences (qualities). Separately they signall their own kind of difference. From any quality (different differences) the different intensity (quantity) is registered simultaneously (loudness, heat, painfullness). That introduces a second dimension you normally take for granted as a total impression of quality. But, how to *reconstruct* that quality and quantity in a useful imagination is an other question.

> Without a difference called 'change' you may become used to a sound, taste, smell or even pain not registering it anymore as soon as the change you once experienced is 'forgotten'. Then, there is also no longer an impression of 'more' and 'less'.

These quantitative impressions from our senses left in our brain are not spatial by itself. They are primarily one dimensional in time. But, simultaneous differences reported by different senses may be processed parallel in a synaesthetic experience of impressions next to each other.

Spatial distinctions are primarily flat
Spatial differences have to be reconstructed afterwards by movement in coördination with vision or touch. Vision and touch on itself deliver a flat impression of many points in parallel processing. For example: your eyes project a selection of reality at the *surface* of your retina. A new born baby may receive that already strongly reduced image as a flat 'tableau mouvent' of coloured surfaces (spatial differences). The two slightly different flat images of both eyes cannot be enough to imagine a perspective immediatley. Without the contribution of other simultaneous impressions the views remain only different.
The colourless impressions of touch and movement may be required to add an understanding of depth

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[a] Piaget, J. and Inhelder, B. (1947) *La representation de l'espace chez l'enfant* (Paris) Presses Universitaire de France

in what we primarily see as two flat images. A cat without that experience falls walking from a table not aware of the depth next to the table.[a]
After that experience we may learn to imagine space without touch or movement by stereoscopy. That experience was at least supposed if you eventually imagined depth in Fig. 34.

Synaesthesia is typically human
The very different impressions at the same time stemming from different senses (such as vision and touch) apparently have to be reconstructed by the brain into a useful synthesis of existing reality. That simulation serves any *planning* for action. That is typical for humans: imagining a range of actions of which only the first is immediately executable (earlier mentioned at page 31). Part of that capacity is the action to combine different impressions next to each other in a construction called imagination.

> The musquito is famous by its use of smell to find humans for a blood meal.[b] You can imagine how an increasing concentration of human odour immediately steers the direction of its flight without a necessary coordination with the simultaneous impressions of the many eyes it has as an insect. Visual impressions probably warn for appoaching predators causing an immediate routineous change of direction not necessarily with a total image of the situation. That visual impression then may overdo the smell stimulus by a dominant routine.

But, if different impressions from different senses do not seem to have any quality in common, how then do they fit together in imagination? A simultaneous *difference* may connect them as 'truth'.

Reconstructing quality and quantity of impressions

Imagination is a construction of different differences
Any imagination is a construction built up parallel to a supposed 'existing reality' full of differences. That epistemologically external, 'existent' rest of reality is different from your internal, imagined reality. Your imagination shares at most *some* of the many differences observed and already reduced by your senses. But, whereas your physical senses directly filter 'more' from 'less' difference to get an object of attention (see Fig. 34 at page 42), your imagination has to reconstruct them from ground zero. How to construct 'more' or 'less' from the very beginning of 'difference' to reach the level of what the senses deliver directly as an impression?

A quantitative difference has at least two suppositions
There are at least two underlying suppositions required to construct a quantity of difference. Firstly, something has to be different from its environment at all. Without such an object distinction there cannot be a question what kind or how much difference it is. Secondly, to imagine how much it differs you suppose a quality to be quantified. There can be different kinds of difference as you may have experienced by view and touch. Each impression may have its own intensity of colour or roughness. But, even if that quantitative difference is *experienced*, then it is not yet *reconstructed* as an imagination.[c] To reconstruct quality and quantity, you have to imagine differing$_3$ different$_2$ differences$_1$. The subscripts 1, 2 and 3 indicate the conditional order of suppositions our everyday language does not always represent properly. Let us explore in more detail how that construction could develop.

Without difference$_1$ there is no object
Firstly you *make* a distinction$_1$ between an object and its environment parallel to what you may *observe* as different in any direction. That distinction still can be made without any qualification or quantity compared to an environment. It simply differs$_1$.

> Your parents may have helped you to make such distinctions showing pictures with homogeneous colours and clearer distinctions[d] than photographs or pictures such as Fig. 34. You can draw something without a legend. In that picture you even can change the colours you observed (as impressionists did, see page 9). If you keep the 'same difference' of intensity

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[a] Held, R. and Hein, A. (1963) *Movement-producer stimulation in the development of visually guided behaviour* (J. Comp. Phys. Psych.) 56, 872-876

[b] Knols (2010) *Mug* (Amsterdam) NieuwAmsterdam

[c] Piaget was the first to recognise it as not self-evident that you combine these completely different impressions, even if they are experienced in the same time. That combination apparently has to be constructed. Piaget determined an age on which a child can combine both impressions into the syneasthetic concept of one and the same object. But I doubt if you can only imagine that there are different differences (qualitative differences) as soon as both impressions are attributed to (combined in) the same object.

[d] The drawings of Dick Bruna are prototypical.

in between (or even exaggerate and modify them as expressionists did), then the same thing can be imagined from the drawing. You can even change the form or composition to challenge your imagination.
De Baarsjes (mentioned at page 36) is also different from its environment and you can distinguish and name it because it is simply different from the rest. Even if you cannot answer the question what *kind* or how *much* of difference it is, it still differs in any direction.

You still do not have to suppose different qualities, quantities, directions or locations to imagine an object as different from an environment ('object difference$_1$'). It is rather the other way round. You cannot start to imagine different$_2$ colours, their intensity, succession, direction and position if there is no difference$_1$.
That difference$_1$ may be different$_2$ in different directions as Fig. 34 showed. That different$_2$ differences$_1$ may be imagined later as 'kinds' of difference$_1$ (quality differences$_2$).[a] But, if a substantial distinction$_1$ can be reconstructed in *any* direction, then the quality difference$_2$ in any *specific* direction and its different quantities does not have to play a role to distinguish$_1$ the object and its environment as such. 'Inside' and 'outside' then may be the very first *positional* differences$_x$ you can imagine.[b]
But, the distinction between 'inside' and 'outside' still *supposes* a distinction$_1$ between an object and its environment, not the reverse.

Without different$_2$ differences$_1$ you cannot qualify
Secondly, as already mentioned, differences$_1$ may differ$_2$.

Comparing De Baarsjes to its environment, I distinguished different differences in the use of brick, building style or plantation.

These second order 'kinds' of difference are qualitative differences$_2$.
The primary object difference$_1$ between an object and its environment may be differentiated into different kinds of difference: colour, texture, smell. These qualitative differences may be offered simultaneously by other senses, but they are only 'understood' by reconstructing such different$_2$ differences$_1$ as distinctions$_2$.

Without differentiating$_3$ different$_2$ differences$_1$ you cannot quantify
Thirdly, within any distinguished quality there are still differences of intensity to be reconstructed (understood) as they are received directly from the senses.

Within the distinguished quality of 'plantation' in a district there still may be a difference between 'little' or 'much' plantation.

This third order of difference$_3$ should be a quantitative difference.
How to reconstruct that as still another kind of difference?
To do so, at least two kinds of quantitative difference have to be distinguished: 'large' or 'small' and 'more' or 'less'.

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[a] The expression 'kinds of difference' sounds as a contradiction. It supposes 'equalities of difference'. But, 'kind' also expresses a supposed internal equality, at the same time externally different from other kinds. The apparent contradiction is based on different levels of scale as a starting point similar to contradictions based on mixing language and meta-language. The difficulty is, I use words not supposed and consequently useless in the primitive imagination that I try to imagine. Such a (parallel, reflexive) metalinguistic reconstruction is known to produce contradictions in linear language, for example the paradox of the Cretan liar. It can be simplified by the sentence 'I lie' (do I actually lie or do I speak the truth *about* my lies). Such contradictions are ex-plained in a picture with different directions.
[b] You could have learned that locational difference by birth (becoming ex-sistent yourself), but you could not have imagined anything else than a change (a difference) without other supporting suppositions such as an observing 'self' and its position. You first have to play with Russian Petrushka puppits or similar hollow blocks fitting in eachother in a determined sequence before you can imagine 'inside' and 'outside'. In the same time they may have teached you the distinction of 'larger' and 'smaller' or even sequence.

A distinction$_3$ of intensity supposes a limit
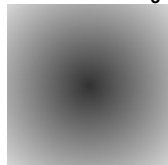

Fig. 35 A supposed object

Suppose that there is a dense fog and an object seems to loom up. There is no clear contrast given between an object and its environment by any of the senses. You may *suppose* then, that there is an object (see Fig. 35). To imagine an object within an environment you have to choose a boundary between light and dark (a supposed qualitative difference). Wherever you choose the boundary, there is only a small difference between the supposed object and its environment.

But, since imagination is not bound to space or distance as an impression is, you can distinguish a dark object in the centre and a light environment in the periphery. Then you neglect some distance between the centre and its periphery.

The act of imagination can exaggerate a difference. It produces the possibility to distinguish 'small' and 'large' differences$_3$ of intensity according to the distance chosen to neglect. The same act of imagination may reduce the differences that are left 'inside' and 'outside'. The gradual differences inside or outside are 'smaller' than the difference you created in between. Internal reduction may suppose external exaggeration.

> A design process often follows such a sequence from rough sketches into more precise drawings. The vagueness of a rough sketch still leaves open many possibilities to choose the precise boundaries. That is not very different from a slope where different plant species can choose their optimum location in the gradually changing availability of moist.
> The boundary between wet and dry is vague hosting more species than a sharp boundary. Any drawn boundary supposes different legend units at both sides, but they still do not have to be explicit. If these are not yet explicit, then they still can be chosen.

The awareness of 'large' and 'small' differences$_3$ is still different from the distinction of large and small objects.

Reduction allows you to construct many other imaginations.

According to your choice of the boundary between an object and its environment, you have distinguised a *part* from a *whole*. You implicitly have determined what you will call *inside* and *outside*. You implicitly choose the *location* of the limit producing a *size* of the object, the variable diameter of a cross-section. You have determined a *distance* between some *centre* and the limit, the radius of the object. That distance can differ according to its *direction,* producing a *shape*. You have distinguished a *line* and a *surface*. It allows you to associate the imagination of a large difference with that of a large distance. But by doing so, you still did not reach an understanding of 'more' and 'less' (superlative) difference$_4$ as directly experienced by the senses in Fig. 34 at page 42. And, the awareness of 'more' and 'less' differences$_4$ is still different from the distinction of more and less objects.

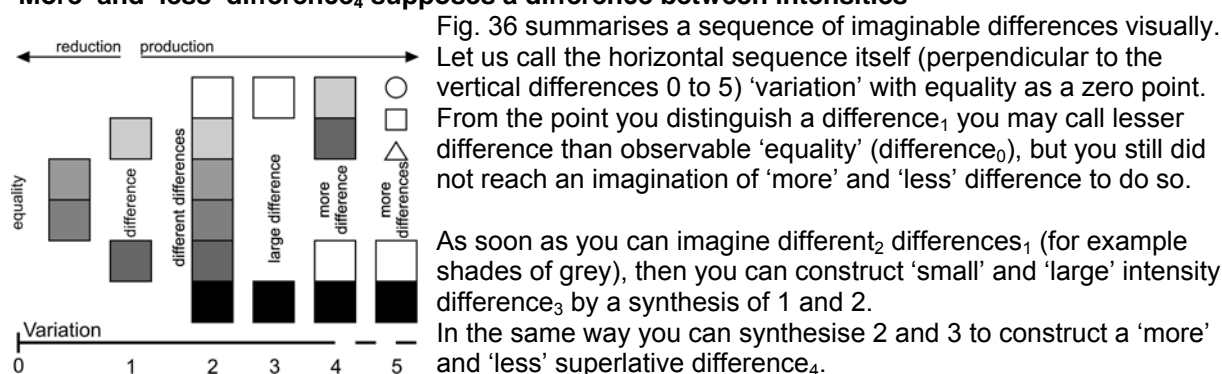### 'More' and 'less' difference$_4$ supposes a difference between intensities

Fig. 36 Variation: less and more difference

Fig. 36 summarises a sequence of imaginable differences visually. Let us call the horizontal sequence itself (perpendicular to the vertical differences 0 to 5) 'variation' with equality as a zero point. From the point you distinguish a difference$_1$ you may call lesser difference than observable 'equality' (difference$_0$), but you still did not reach an imagination of 'more' and 'less' difference to do so.

As soon as you can imagine different$_2$ differences$_1$ (for example shades of grey), then you can construct 'small' and 'large' intensity difference$_3$ by a synthesis of 1 and 2.

In the same way you can synthesise 2 and 3 to construct a 'more' and 'less' superlative difference$_4$.

The construction of suppositions required to *imagine* 'more' and 'less' difference at last has reached the level of distinction immediately *observed* by the senses in Fig. 34.

You now also can also 'understand' what you have observed.

That understanding allows you to construct 'equality', a non-observed zero-point of difference.

Equality is a construction supposing difference

As already mentioned at page 37: equality supposes difference, not the reverse.
You cannot imagine an equality before you have experienced any difference with an environment.

> If you pass the boundaries of your home district for the first time into something apparently

different, you can conclude that the streets of your own district did have something in common that is missing there (for example trees). You could not imagine that internal equality inside of your home-district before you ever left it. If you do not have a reference of something else, then the term 'equality' still has no meaning. You signall it in your own district by contrast. That is an experience you will repeat by holidays in another country with an other landscape, an other kind of food or language. Suddenly you realise that you usually live in a flat country eating brown bread using words not understood everywhere. Within any quality from that apparent equality at home you may differentiate the qualitative difference into a quantitative 'more' or 'less' (more or less trees, hills, brown bread, similarity of words) travelling into your destination.

It is a common mistake of teachers that their students will understand a distinction or a definition without any experience of an alternative. For the students, such a definition will sound as useless or self-evident if there is no contrasting 'rest'. To define a object there should be at least one similar, but different object available to be compared in dual imagination.

Equality supposes 'less' difference
You can always imagine more difference, but not always less. [a]
If you cannot imagine less difference, then you suppose 'equality'.

> 'No difference from a rest' means that there is nothing to be distinguished by view, touch, sound, taste, smell and there is no change by movement. 'Nothing to be distinguished' then simply means 'equality'. But the addition 'by the senses' still leaves open the possibility to distinguish something 'by radar' or 'by imagination'.

Equality can be constructed from difference, but you can not construct difference from equality.
'Equal equalities' cannot not produce any distinction (imagination of difference).
Equality is not necessarily a denial or the opposite of difference. If equality is 'less difference than you can distinguish', then it supposes the possibility to distinguish something anyhow. That non-existence of difference is only a special case of difference (no-thing, 'zero difference'). It is the difference between what you can imagine (construct) as a possibility, but what you do not observe.
That dual imagination (see page 27) is the source of Carthesian doubt.

> If there is a dense fog you may doubt if you see any object because there is nearly no difference from a rest.

Constructing space-time

Equality in difference constructs space, equality in change constructs time. You have to empty space and time to get the equality in difference called space-time.

Extension supposes difference in equality
If you cannot distinguish anything and you suppose equality, then the first milestone of autonomous imagination should be, that you *construct* a meta-physical difference.
That constructed difference you might call 'extension'. That is the beginning of an imagination of space.
Extension is a spatial difference that shows most clearly the difference between 'more' and 'large'.
There may be different extensions in different directions, and each of them can be large and small.

> If you make a drawing, then you start to distinguish nothing at the paper.
> Making a drawing is making differences, distinctions by coloured surfaces or lines.
> If you want to express a shape you have in mind, then you may draw a closed contour keeping a distance from a vaguely imagined centre of the shape. Otherwise the figure may not represent the surface of the imagined shape. That distance may vary to differentiate the contour of the shape keeping that surface. There may be different distances in different directions. The contour is closed if you have passed through all imaginable directions.

Distance supposes different extensions

Distance does not suppose more objects
The supposition of distance still does not necessarily require an imagination of two objects with a

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[a] Ross Ashby (1960) *Design for a brain* (New York) Wiley

'distance' between them. It is rather the reverse: even if two objects are equal in any other respect, then there is still a locational difference you may call distance. Otherwise it would be one object. But, to imagine more objects requires more suppositions apart from the mutual distances.

> A plural awareness of objects has still to be separated from the apparently changing size (internal distance) suggested by approaching an object.
> The plural form supposes a category of objects, mainly expressed in a noun.
> A category supposes an equality in different objects to remain distinct from an environment.
> That internal equality of different objects is required to differ from an external environment.
> But, a dispersed multiple 'internal' is different from 'internal' applied to one object.
> Which additional suppositions may be required to make that distinction?

Before you can imagine more objects you have to imagine more differences$_5$.

More differences$_5$ is something else than more difference$_4$
Previous examples tacily took colour as the carrier of difference, but there are more qualitative differences$_5$. There are other sensoric 'kinds of difference'$_5$ (view, touch and so on). They can be reconstructed as differences of content, form (see Fig. 36, number 5), structure, function or even intention.

> You can not imagine something as more red than round.

This example unveils again a preceding supposition of quality in any quantification.
But, a 'quality' is not yet a 'kind'. There are 'kinds of quality' (properties). There are separate properties of colour, form, structure, function and so on. And, these properties may be incomparable in a quantitative sense (redder than round). According to Vitruvius a piece of architecture has to be beautiful, sturdy and useful. That are desirable properties of form, structure and function.

More objects suppose more differences
Any distinction until here can be made in one case (object and its environment). Different cases are stored in a layered memory. A dual imagination of two cases has to reconstruct them into a new difference. If these cases have less difference between their environments than between their objects, the difference between the objects may get attention. That is at least their mutual distance (supposing difference in equality) as an object constructed between them. But, that forces to negelect the adjacent objects as 'environment'. There should be more differences to distinguish two objects. That may be differences of content, form, structure, function or even intention.

Equal equality distinguishes two objects.

Variation supposes more differences
Variation (see Fig. 36 at page 45) expresses a sequence of differentiating differences to be imagined. It allows to distinguish successive classes of ever more 'difference' starting at an imaginary 'zero-point' of difference called 'equality'. That was possible only after a construction of 'more' and 'less', primarily applied to difference itself. Our senses deliver that distinction directly and our language provides terms for it without account. Parallel to what we observed we have reconstructed it by a conditional construction of suppositions.

Imaginations to be constructed

DIFFERENCE	CHANGE	COHERENCE	SEPARATION	SELECTION
A1	A2	A3	A4	A5
	time	repetition	division	open
object	duration	synthesis	multitude	closed
environment	order	causation	counting	structure
quality	process	cohesion	multiplication	function
	movement	force	concentration	resistance
quantity	orientation	concentration	deconcentration	retention
	velocity	deconcentration	development	mechanism
	approaching		binding	

Abiotic suppositions of imagination   Imaginations to be constructed

form	receding	Freedom	integration	Mixing
shape	past	Substance	desintegration	Selecting
limit	future	Subject		Separating
denial		Other	Consistency	Connecting
direction	Present	World	Material	Selective material
sequence	Past	Fact	Transition	Separation
reductions	Future	The case	Border	Connection
frame	Representation	Not the case	Body	Dynamic separation
grain	Space	Full sentence	Cavity	Dynamic connection
levelsofscale	Time	Concept	Dividing	Static
distance	Period	Conception	Uniting	Selective structures
variable	Duration	Conceptualisation	Multitude	Wall
category	Theory	Induction	One	Column
set	Operation	Deduction	Part	Tube
pattern	Logic	Analysis	Unit	Tensile stave
	Realization	Holism	Zero	Selector
Position	Continuity	Cause	Numbering	Resistance
Case	Process	Synchronic	Counting	Retention
Object	Coincidence	Effect	Enclosure	Reservoir
Environment	Stage	Structure	Inclusion	Valve
Boundary	Increase	Function	Opennes	Sieve
Distance	Movement	Property	Looseness	Tap
Denial	Rest	Tool	Distribution	Inlet
Choice	Order	Rule	Accumulation	Outlet
Outside	Coordination	Device	Homogeneous	Metabolism
Inside	Synchronization	Force	Spread	Energy exchange
Space-time	Disorder	Attraction	Heterogeneous	Signal exchange
Confirmation	Flow	Repulstion	Subdivision	Mechanism
Experience	Rotation			Wheel
Variation	Concentration			Conduction
Equality	Deconcentration			Coupling
Equality	Orientation	Event	Occurrence	Apparatus
Grain	Approach	Probability	Adjacent	
Comparison	Into	Improbability	State	
Category	Moments		Side	
Type	Sequence		Edge	
Occasion	Straight		Serial	
Memory	Concentric		Stadium	
Experience	Parallel		Binding	
Intelligence	Direction		Unbinding	
Reason				
Reduction	Perpendicular			
Observation	Line			
Identification	Drawing			
Attribute				
Quality				
Quantity				
Distinction				
Label				
Expression				
Exact Expression				
Poetic Expression				

Language
Image
Contiguous
Diagram
Design
Criterion
Set
Sub-Set
Variable
Value
Verbal
Denumerable
Countable
Zero-value
Measurable
Legend
Legend unit
State of dispersion
Pattern
Form
Contour
Composition
Imagination
Frame
Resolution
Paradox
Modality

Propositions to be elaborated or inserted

20101102 after reading Deleuze

The probable is opened up by equalities, the possible by diversity, the imaginable by a balance of both.

Language limits imagination
Deleuze struggles with the one-dimensionalilty of verbal language.
He misses the imagination of the picture.
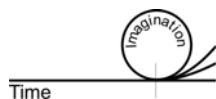
Deleuzes 'dogmatic image of thought' supposing linear time is refuted in a language that represents it. Any word already supposes a 'Same'. Language is the thread of Ariadne in a labyrinth of reality. It cannot describe the labyrinth. Movement is equal in one direction. Language chooses the direction of equalities in action. A line is equal in its direction, but perpendicular it is different.
Even if something is equal in one respect, that respect itself is still different from the other respects.

Direction supposes difference of extend
The first direction is up ⇔ below, the second vertical ⇔ horizontal. A notion of direction starts distinguishing horizontal and vertical. It has associations with sleep and action, death and life, obeying gravity and objecting it. The toys of a child are its horizontal realm, the parent is a vertical one: it lifts you up and brings you down. An event has a location and a direction.
Any moment adds a difference to time.
Extend is a quality (a different difference). Direction supposes difference of extend. Shape supposes

difference in direction. Removing extent until a direction is left.
Object difference ⇑ quality ⇑ quantity ⇑ plurality ⇑ direction?
The zero-point of any kind of difference is the same: equality. Equality has no direction, no quality, no quantity, no form.
Any number has a direction between other numbers except 'zero', because zero looses the quality to be measured.
If two related values are simultaneoulsy annihilated (made equal), then their relation still appears to be a direction. If a direction cannot be quantified you may call it a quality.
At a limit equality is perpendicular to difference.
Perpendicular to difference there is less difference or equality.
The question is, if the first difference in difference should not be direction.
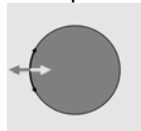
At the limit you discover difference and perpendicular equality as difference of direction.
At the limit of an object perpendicular directions show the difference between difference and equality.
It is remarkable that 'before' in space represents a position in front of the observer, while in time it may suppose both past and future.

Construction starts by the different, but division makes a difference
Division of an object makes more differences.
Division starts by a whole (object?). Construction (addition?) starts by the different (its boundary?).
The question is, if imagination starts with parts added to a whole (adapted by subtraction) or a whole divided into parts (generalised by multiplication). An alternative is starting by a part to be multiplied as an expectation (hypothesis) checked by renewed observation or division into parts supposed to be equal, differentiated by repeated observation.
To understand the tree from the leaves makes you forget that there are branches and a stem to support them and roots to provide stability, water and minerals.
The object has gaps of grain. What are gaps in the homogeneity of the object? Divisions?

There are different opposites, denials, negations or contradictions
Non object means environment. Negation is an equalizer. To deny is to equalize.
A≠A simply because you read the second A later.
The rejection of opposites as false alternatives is a recognition of the inbetween (mi-lieu).

Deleuze p 102
… absence … is the opposite of a negative.

Deleuze p.327
No one has gone further than Gabriel Tarde in a classification of multiple oppositions, valid in every domain:
formally, static oppositions (symmetries) as opposed to dynamic;
successive dynamic oppositions (rhythms) as opposed to simultaneous;
linear simultaneous oppositions (polarities) as opposed to radiating.
Materially, qualitative serial oppositions as opposed to quantitative;
quantitative oppositions of degree as opposed to force:
L'opposition universelle, Paris: Alcan, 1897.
Tarde seems to us to be the only one to discover the consequences of such a classification: far from being autonomous, far from being a maximum of difference, opposition is a minimal repetition in relation to difference itself. Hence the positing of difference as the reality of a multiple virtual field, and the determination of micro-processes in every domain, such that oppositions are only summary results or simplified and enlarged processes. For the application of this point of view to language and the principle of a micro-linguistics, d. *Les lois sociales,* Paris: AJcan, 1898, pp. 150 ff. transl. Howard C. Warren. (as *Social Laws: An Outline of Sociology,* New York: Arno Press, 1899). It seems that Georges Gurvitch rediscovers an inspiration in many respects close to that of Tarde in *Dialectique et Sociologie,* Paris: Flammarion, 1962.

Deleuze p.302
The Same and the Identical may be interpreted in many ways: in the sense of a perseveration (A is A), in the sense of an equality (A = A) or a resemblance (A # B), in the sense of an opposition (A = non-A),

or in the sense of an analogy (as is suggested by the excluded third term, which determines the conditions under which the third term is determinable only in a relation identical to the relation between two others: A = non-A(B) = C/non-C(D). But all these ways belong to representation, to which analogy brings a final touch, a specific closure or the last element. They are the development of the *erroneous sense* which betrays both the nature of difference and that of repetition. The long error begins here - all the longer since it occurs only once.

Reflexive applications disturb imagination
Deleuze p.155
perhaps Cogito is the name which has no sense and no object other than the power of reiteration in indefimte regress (I think that I think that I think ...).

Thinking about thinking, imagining imagination is a tricky undertaking if it is expressed in a meta-language mixed with language.

Discovering your hands. Look at your hands: is it me?

Memory is repetition around me
Repetition ⇔ reproduction
Deleuzes habits are Minsky's agents.
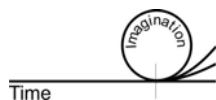
Deleuze p. 287
Memory is, nevertheless, the first form in which the opposing characteristics of the two repetitions appear.
One of these repetitions is of the same, having no difference but that which is subtracted or drawn off; the other is of the Different, and includes difference.
One has fixed terms and places; the other essentially includes displacement and disguise.
One is negative and by default; the other is positive and by excess.
One is of elements, extrinsic parts, cases and times; the other is of vanable internal totalities, degrees and levels.
One involves succession in fact, the other coexistence in principle.
One is static; the other dynamic.
One is extensive, the other intensive.
One is ordinary; the other distinctive and involving singularities.
One is horizontal; the other vertical.
One is developed and must be explicated; the other is enveloped and must be Interpreted.
One is a repetition of equality and symmetry *in the effect;* the other is a repetition of inequality as though it were a repetition of asymmetry *in the cause.*
One is repetition of mechanism and precision; the other repetition of selection and freedom.
One is bare repetition which can be masked only afterwards and in addition; the other is a clothed repetition of which the masks, the displacements and the disguises are the first, last and only elements.

Quality supposes an object
Delueze p.134
… qualification operates only given the supposition of the unspecified object.

Two objects of dual imagination: the affecting and the effected.

Deleuze p. 256
The more the difference on which the system depends is interiorised in the phenomenon, the more repetition finds itself interior, the less it depends upon external conditions which are supposed to ensure the reproduction of the 'same' differences.

Qualities differ per environment.

Pleasure is release into chaos
Deleuze p.321

Abiotic suppositions of imagination   Propositions to be elaborated or inserted

It is true that Heidegger retains the theme of a desire or a *philia,* of an analogy - or rather, a homology - between thought and that which is to be thought. The point is that he retains the primacy of the Same, even if this is supposed to include and comprehend difference as such - whence the metaphors of gift which are substituted for those of violence. In all these senses, Heidegger does not abandon what we called above the subjective presuppositions.

The rest
Storend bloemrijke taal en lay-out.

Difference can be the sole a priori category.

Eénachtste bol is een driehoek met rechte hoeken.

Policy determines what we have to do ourselves (liberal) and what we have to do together (socialist).

Waarom horen wij van fundamentalisten zo weinig protest tegen de anti-islambeweging? Fundamentalisten hebben deze polarisatie nodig voor hun derde wereldoorlog. Daarmee overtuigen en recruteren zij gemarginaliseerde islamieten om alsnog een plaatsje in hun hemel te veroveren. Wilders is voor hen een uitkomst, want mede dank zij zijn self fulfilling prophecy groeit de toeloop. De gemarginaliseerde kiezer (verliezers, werklozen, ouderen, aangepaste allochtonen) kiest een held die 'Den Haag' kan ontregelen. Dat zij voor de oorlog kiezen waarop fundamentalisten hopen ontgaat hun. Daarom horen wij van fundamentalisten zo weinig protest tegen de anti-islambeweging.

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