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PRECEDENT ANALYSIS IN LANDSCAPE ARCHITECTURE; IN SEARCH OF AN ANALYTICAL FRAMEWORK

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ABSTRACT

Precedent analysis is the systematic analysis of plans that enables comparison between plan types as well as within a plan type. The goal is generic design knowledge that can be of use in day-to-day practice and theory development. The core issue in this paper is how the successful approach of precedent analysis in architecture developed by Guney, can be reworked to make it also applicable for landscape architecture. One of the first issues to be addressed, is how the dynamics of landscape architectural form and design can be integrated into the approach of precedent analysis. Design in landscape architecture being process oriented and at different levels of intervention, was the basis for an analytical framework. This analytical framework relates perception, analysis and intervention. One of the conclusions is that precedent analysis can form the bases for theory development as a body of coherent, generic and explicit design knowledge.

Keywords:

landscape architecture; precedent analysis;
design theory; (precedential) knowledge-based
design

INTRODUCTION

Precedent analysis

Precedent analysis is already known and has been used in law and business administration for some

time. Tzonis (1992) coined the term in the context of design at a design conference at Delft. Before it was called 'plan analysis' (Klaasen & Witberg, 1993). Its main goal is learning from earlier experiences by means of an explicit analysis. In fact precedent analysis can also be considered as a form of what Schön (2009) calls 'reflective practice'. In precedent analysis the reflection is not immediate in action but afterwards and based on an explicit analytical framework. The concept is getting more and more known and used in design disciplines like industrial design (Pasman, 2003), architecture (Guney, 2008). In this paper we want to develop an analytical framework for precedent analysis in landscape architecture that comprises the characteristics of the domain.

Precedent analysis in different domains remains in principle the same; explicit learning from earlier experiences. The contents are domain dependent. Roozenburg & Eekels (1996) distinguish between the design of products and of environments; in the design methodology this comes back in the form of design of objects or the design of processes. Landscape architecture fits very well in this last category. Design in landscape architecture is the organisation of space and time of a program at a given site (Motloch, 2001). Dynamics of landscape form and design are the main characteristic. In landscape architecture there are still relatively few studies on this subject. In Holland, an example of precedent analysis is the research Baljon did for

his dissertation (Baljon, 1992). He did an analysis of the entries of the competition for Parc de la Villette. Another example is the study of Goossens et al. (1995) on urban parks; they did a comparative analysis on plans for contemporary parks in Rotterdam.

Like in architecture (Voordt et al., 2007), 'plan analysis' in landscape architecture is rather common (Blerck, 1995; Ekkers et al., 1990; Hoog, 1980; Jong, 1998; Meyer, 2002; Zeeuw et al., 1987). What is lacking in these examples is an analytical framework that makes these studies explicit and comparable. Most design education makes – either implicitly or explicitly – use of plan analysis in some or another form. A lot of learning to design takes place by study of earlier examples; mostly in an implicit way. By means of precedent analysis you follow that same principle but you do it as systematic and explicit as possible by making use of an 'analytical framework' as a basis for the analysis. So far the term 'analytical framework' can be very differently interpreted, that means there is not one archetypical example of such an analytical framework yet. Guney (2008) uses four existing approaches as a basis for precedent analysis in architecture. He then, organises the results in, what he calls, a 'semantic network' to give an overview and to be able to assess the use, performance of the plan in relation to the design process; F(M)–O–P.

Why is precedent analysis so important for design disciplines in general and for landscape architecture in particular? In the last century an enormous increase in production of plans has taken place. It comes to the point where there is no longer any innovation in plan development, it tends to become repetitive some people even say 'we are running around in circles'. The development from 'profession' to 'discipline' needs more generic design knowledge in order to be able to focus on innovations. This design knowledge, or as Cross (1982; 2006) refers to as 'designerly ways of knowing' is the core of design disciplines and is a specific way of solving the problem of giving form to future development of products, objects and environments. Design

knowledge is for a large part 'hidden' in realised projects and in the minds of designers. Precedent analysis, the study of precedents, is one way of making this implicit design knowledge explicit. Only if the analysis is done on the basis of an analytical framework you are able to compare plans and their use after realisation, the design means used and how these design means have resulted in the realised plan.

Plan analysis, plan comparison, precedent analysis have a similar background but differ. They all search to learn from earlier experiences that can be found in realised plans. Plan comparison is one of the most direct and rather easy to do ways of plan analysis; you only compare a limited number of plans sometimes even only two. Plan analysis is a more general term to analyse plans. Precedent analysis is a form of plan analysis that is both explicit and systematic; it makes use of an analytical framework as a theoretical base.

Scope and outline of the paper

In the paper we want to study how precedent analysis can be developed also for landscape architecture on the basis of an analytical framework. Content, role and approach of this analytical framework is the core of the research for this paper. The paper departs from the idea that learning from earlier experiences in design disciplines is important to enable innovation. The concept of 'design knowledge' is the core of all design disciplines and has similarities and differences for different design disciplines like industrial design, architecture and landscape architecture. So far most design knowledge is implicit and 'hidden' in realised projects and the minds of designers, precedent analysis is one way of making design knowledge explicit. The paper is built up in three parts. First a short overview of precedent analysis in architecture. In the second part we move to the situation in landscape architecture. The third part deals with the theoretical basis of precedent analysis; the analytical framework and the relation to research and practice.

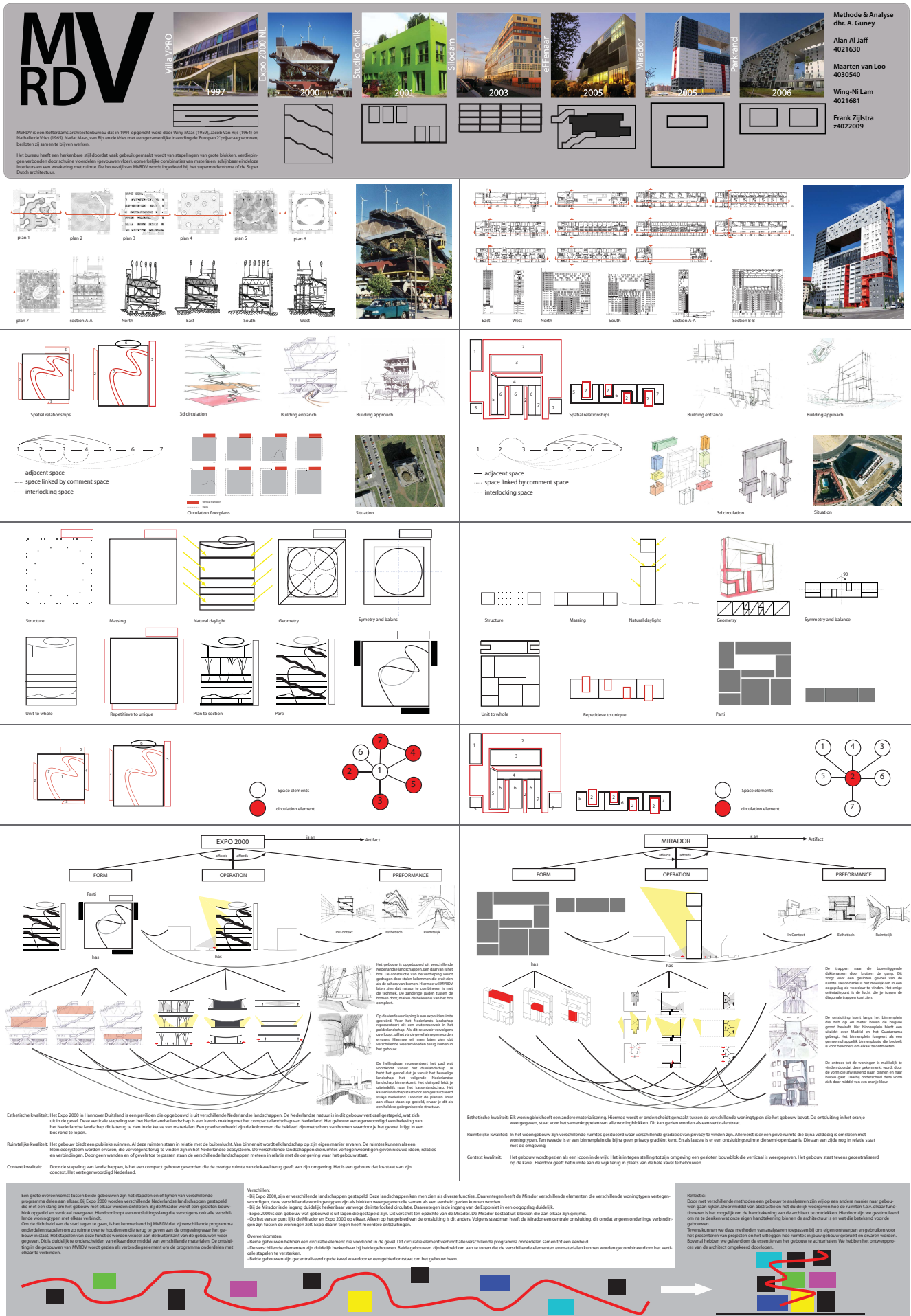


fig. 1

fig. 1. Example of precedent analysis by students in Guney's Course

PRECEDENT ANALYSIS IN DESIGN DISCIPLINES

Architecture

Good old Vitruvius (1999) was the first architect to write down the experience from the classical architects. This is not an example of precedent analysis but the first step in the process of describing and naming (Jong & Voordt, 2002), a necessary step before analysis. At the Faculty of Architecture, Guney (2008) uses four existing but different approaches to describe and analyse designed form in architecture Clark & Pause (1979), Ching (1979), Steadman (1989), Tzonis (1992). All of these studies are examples of analysis of the architectural form, mainly on morphology. Only Tzonis (1992) introduces the concept of 'performance' in relation to function and operation: 'F(M)—O—P'. This is of major importance for design methodology since it lays the foundation for integrating experiences from former plans into contemporary design, design methodology. To be able to get an overview and insight into the results, Guney has elaborated on the work of Tzonis (1992) and developed a 'semantic network' that relates designed form to use and performance to form. Semantic networks are a way of representing the relationships between entities and concepts and are commonly used in artificial intelligence, computer programming and linguistics. He worked out two 'modes' for the semantic network; one for analysis (fig. 3), one for design (fig. 4). At the same time he has created possibilities for theoretical developments in design methods; to integrate generic and explicit design knowledge in contemporary design.

The semantic network technique is more than just an overview of relations; it is a comprehensive representation of the analysis of that analysed artefact, that comprises different scales from the abstract to concrete as a whole. Three terms define the structure: Form (Morphology), Operation and Performance 'F(M)—O—P'; it can be considered as a form of knowledge representation. The topological representation refers to access relations. It shows major units, sub-units and some partial divisions of a

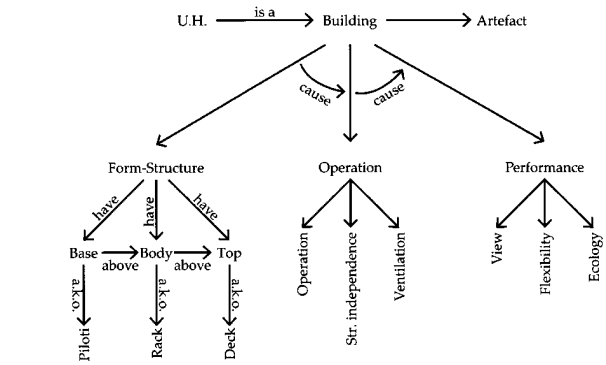


Figure 7.8: "The design frame, graphically expressed, looks like this:" (after Tzonis, 1992)

fig. 2. The semantic network, representing F (function), M (morphology) O (operation) and P (performance) based on Tzonis

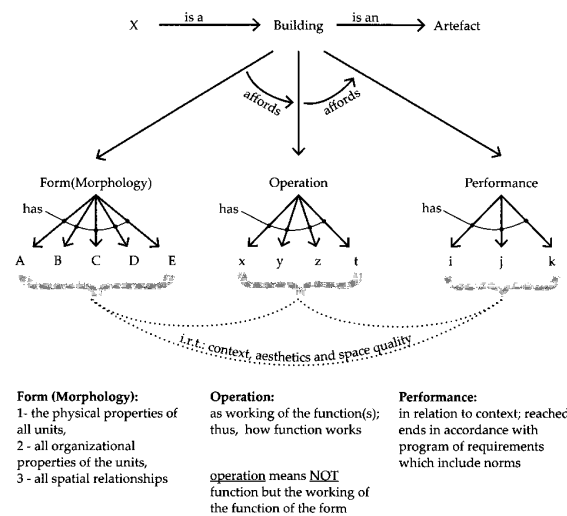


Figure 7.9: A possible cognitive structure of (architectural) precedent analysis, compare with figure 7.11

fig. 3. The semantic network, representing F (function), M (morphology) O (operation) and P (performance) as developed by Guney (2007) to be used in analysis.

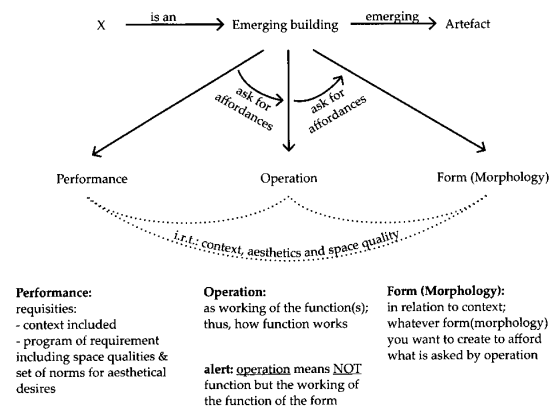


Figure 11: A possible cognitive structure of (architectural) design mechanism, compare with figure 5.9

fig. 4. The semantic network, representing F (function), M (morphology) O (operation) and P (performance) as developed by Guney (2007) to be used in design

building or of a building complex with their spatial relations, topological access relations and the relations with its physical context. In fig. 1 an example done by one of Guney's students.

Industrial design

Pasman (2003) followed a different approach; he did not focus on precedent analysis as such but on the use of it by designers. He interviewed a number of designers about the use of precedents in their practice. One of the outcomes was that precedents were used extensively but in sometimes anecdotal ways. In his study precedents are classified and organised along different principles; thus providing an easier access by creation of a visual overview and comparison. The study continues in developing a visual database in digital form that is well organised and accessible for use during the design process.

Architecture and landscape architecture; similarities and differences

The principles Guney (2008) developed are partly applicable in landscape architecture. The only problem is that architecture and landscape architecture have a different practical and thus theoretical basis. In landscape architecture there is always a context, there is no possibility for starting with a white sheet of paper or nowadays an empty screen. Furthermore, design in landscape architecture is dominated by time and process, the different time-scales are always part of any design project in landscape architecture. These time scales also give rise to the need to distinguish different levels of intervention, each with their own design means (Motloch, 2001).

- **Theoretical basis of landscape architecture**

Design of life-forms and structures distinguishes landscape architecture from all other design disciplines in ways that only few recognize immediately as intimately melded into natural systems. Cycles of seasons, growth, moisture and drought, changes in climate, in light and dark, not only mark the durations of time in which life prospers, matures, and dies, but do also have an

impact on the daily environment directly. This fundamental aspect forms the foundation of theory in landscape architecture. Like theories in other disciplines, also theory in landscape architecture departs from some presumptions. There are three presuppositions that underpin all planning and design in landscape architecture.

> Process, development, change and interventions form the core of design. This dynamics of landscape form and design makes a distinct difference between landscape architecture and architecture (Halprin, 1973; Bell, 1991; Motloch, 2001; Murphy, 2005). Buildings exist over time, but the creations of landscape architecture live through time. We distinguish three different types of processes that all influence landscape form and design because they represent the forces behind landscape form: natural processes, socio-economic processes and cultural processes. Note that these processes are sometimes taking place independently from each other. In the experience of landscape form it is important to realise that nearly all landscape perception is dynamic; we experience the landscape mostly by moving around at different speeds. Secondly, our experience of the landscape is also determined by history and cultural context. Nowadays we consider history as 'the good old times', apparently we have no confidence in new developments that we still don't know.

> Distinct levels of intervention, each with their own design means

Apart from size and scale, in any project in landscape architecture, you can distinguish three levels of intervention. We have named them as 'element', 'structure' and 'process'.

> The conceptual approach; in order to integrate space and time, intervention and existing, site and program, you develop from the very beginning of the design process a concept. That concept is used throughout the design process as guiding principle.

Precedent analysis in landscape architecture

In precedent analysis the plan is the core of the analysis, but both the context of the plan and the

use and performance of the plan after realisation are also taken into account.

The plan can be viewed in different perspectives:

> Context of the plan and design process

Research question: what has been the context of the plan?

Assignment, problem statement and analysis, approach, Characteristics of the site

> The plan as a product and a process

Research question: how was it designed at different levels of intervention, what have been the design means?

Problem definition, goal, design means

What design principles have been used?

What design typologies have been used?

Which design materials have been used?

> Use and performance of the plan after realisation

Research question: how does it work?

What are the characteristics of the design form, how does it work? (physical form, perceived form, experienced form)

How does the designed form function, how is it used?

What is the meaning of the form, besides functional?

• Technique of precedent analysis

The technique of precedent analysis is based on the distinction between different levels of intervention and the different phases in the design process.

In the design process we have – for pragmatic reasons – distinguished three phases; perception analysis and synthesis. As different levels of intervention we have distinguished:

'element' (materialisation of form),

'structure' (organising space, use and access) and 'process' (strategy for the landscape development) as metaphors for interventions that take place in any design project.

We distinguish between different types of information in the technique of analysis:

> Description; factual information

> Analysis on the basis of the distinction between different levels of intervention and phases in the design process

> Interpretation of results of the analysis

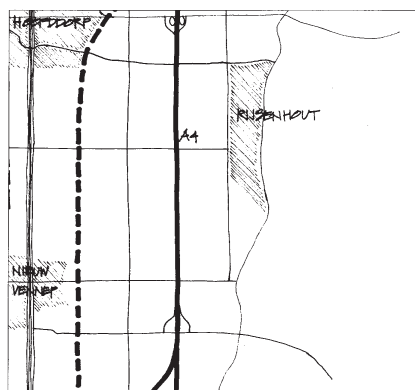
AN ANALYTICAL FRAMEWORK AS A BASIS FOR PRECEDENT ANALYSIS IN LANDSCAPE ARCHITECTURE

Analysis of plans is the opposite of design; so the relations between the two is a first step in the development of an analytical framework. In design you develop the plan on the basis of a program, a site and design concept. In the analysis you try to derive this sequence and interpret the use of design means in the given situation; how the plan is realised, how it is used, how it performs and how the design interventions have contributed to use, performance and meaning.

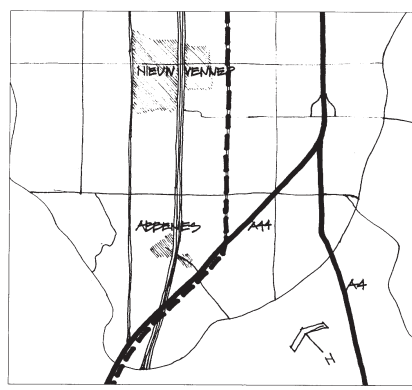
It also means that we can use the same presuppositions in the analysis as in the design approach.

The state of the art

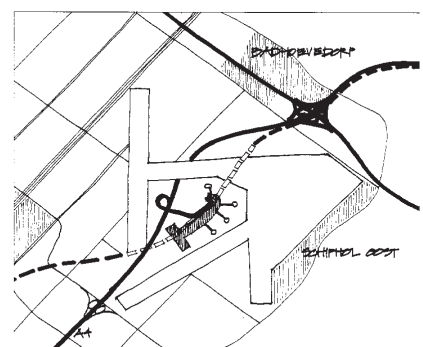
Although authors do mention an analytical framework (Jarvis, 1980; Unwin, 2009; Ekkers et al.,



Nieuwe ingreep ingepast in bestaande structuur: de A4 tussen Hoofddorp



Ingreep door middel van aanpassing bestaande structuur: de A4 tussen Abbenees en de splitsing A4/A44. © Tekening: Martin van den Toorn



Ingreep brengt een geheel nieuwe structuur met zich mee: de A4 ten hoogte van Schiphol. Een voorbeeld van een infralandschap bij uitstak. © Tekening: Martin van den Toorn

fig. 4. The A4 motorway in the Haarlemmermeerpolder; different relations between existing landscape structure and designed structure in this case the motorway in relation to the structure of the polder. Insertion, adaptation and total change.

1990), so far we have not found any reference to content of such an analytical framework. In many cases you could derive the analytical framework from the results of the analysis, like for instance in the case of Ching (1979). From his analytical drawings, you can conclude that he focusses almost exclusively on morphology and sometimes on context. In the case of the study of Voordt et al. (2007), the criteria have been made explicit but simply adding up the results of the criteria will not give a coherent representation. There is also no hierarchy indicated in the criteria, but in fact there is a hierarchy if you look at the descriptions. So, there is no coherent representation of the results and the analytical framework, from which the criteria are derived, is not explicit.

We have chosen three cases as examples of precedent analysis in landscape architecture that can serve as starting point and give an idea of what the content should be. First the study of Baljon (1992) who did a study on the entries of the competition for La Villette. The study was done for his PhD research in Wageningen. His research method is based on a comparative design analysis of entries for the International competition of La Villette in Paris. The interesting point in analysing entries of a competition is that the assignment is described explicitly and that every participant has to deal with the same assignment. Much of the analysis is done and recorded in drawings. The analysis comprises four stages, from graphic abstraction via spatial reality towards compositional concepts and themes; from reaction to location and program to traditions of form.

He concludes that representation, approach and innovation in park design show an intricate relationship. A number of aspects relating to the landscape architectural principles of park design are dealt with (the effects and meanings of the interplay between components) under the headings spatial illusion, order, unity, line patterns, literary figures, musical compositional figures.

By means of such a type of systematic analysis, design approaches, design means can be compared in

their spatial and visual effects and the overall functioning of such a park. Secondly, that composition in park design got a new dimension reflected in the results of the competition.

Composition is still a key issue in park design but no longer based on a predefined style but on the program in combination with a new vision on urban green space as part of urban culture.

A second example we want to put forward is the study of Goossens et al. (1995) of a series of plans for contemporary Rotterdam parks. In this study a number of recent plans were analysed by means of redrawing the plans to the same scale and the same legend. This results in a visual overview of each plan and the possibility of visual comparison between the plans. In the text additional information is given, sometimes also comments to use, design approach but this is not done according to fixed format.

The third is the study of Mann (1993), who follows the same principle of redrawing plans to the same scale and legend but adds to that a timeline. This timeline provides a cultural context for all plans. Boult & Sullivan (2010) follow a similar approach based on a timeline.

The three studies represent techniques of analysis that are basic for precedent analysis. Only Baljon (1992) refers to the role of drawing as research technique in this types of analysis; the role of visual thinking, of relating thinking and drawing (Toorn & Have, 2010). Guney (2008) does apply this principle of visual thinking, drawing as research also in his teaching and research.

The core of an analytical framework

As we have seen before, the presumptions lead to the distinction of different levels of intervention and phases in the design process. These relations can be represented in a matrix (fig. 3) that gives a general overview of the content of the analytical framework. On the basis of the matrix a set of criteria can be derived that structure the process of analysing design projects. In the entire process the distinction between facts, analysis on the basis of explicit criteria and interpretation of the results is strictly

<i>analytical framework for landscape architecture</i> relations between the steps in the design process and levels of intervention	perception of the form of the landscape; but what is the 'form of the landscape'? starting point: image -> form	analysis of the form of the landscape; what are the forces behind the form? starting point: form -> formation	synthesis; how is the form of the landscape designed? starting point: form -> formation -> concept (giving form)
level of element; building, parcel, lot materialisation of form	<i>form of the landscape as elements; parcels, buildings, plants, bridges, landmarks etc.</i> <i>General categories:</i> - points - lines - planes	<i>form of the landscape as construction, as materialisation of form</i> - ground - water - plantation	<i>how to materialise form at the level of element:</i> - design principles - types - design materials <i>form concept</i>
level of structure; water system & traffic, circulation organisation and access for different types of land use	<i>form of the landscape as networks; water systems, road systems</i> - cross-sections - longitudinal sections - interchanges	<i>form of the landscape as spatial organisation;</i> - structure as system - structure as pattern, form - structure as organisation, hierarchy	<i>based on three types of relating the intervention to the existing landscape structure:</i> - insert - adapt - complete change <i>structural concept</i>
level of process; context and long term strategy for landscape development	<i>form of the landscape as types of visible processes</i> - dynamics of perception - landscape processes - history	<i>forces behind the form;</i> - natural forces - socio-economic forces - cultural forces	<i>strategy for landscape development;</i> - direction of development - main types of land use - densities of use <i>strategic concept</i>

fig. 5. The content of the analytical framework as used in landscape architecture; levels of intervention and phases in the design process. Naming and describing of perception, analysis, synthesis in the context of design in landscape architecture.

kept to ensure the range from fact to interpretation.

The criteria also follow a necessary sequence:

1. Facts

Surface:

start and realisation of the project:

designer(s):

commissioner:

2. Defining levels of intervention

- Contour of plan area (-> level of structure)
- Context of plan area (-> level of process, strategy)
- Details, parts within the plan area (-> level of element, materialisation of form)

This step in the analysis will result into a distinction between the different levels of intervention in the project at hand.

3. Analysis of design means at each level

4The levels of intervention form the basis for the next step in the analysis; the analysis of design

means at each level.

At the level of materialisation of form we define the design means by: the choice of design principles, the types used and the design materials. In landscape architecture we consider ground, water, plantation as the 'classic' design materials. Other than in architecture, they have not changed in the last age. At the level structure the design means are defined by the relation between existing landscape structure and designed structure; insertion, adaptation and total change (fig. 4).

At the level of process, we focus on the strategy for landscape development in the long run. It comprises: the direction of development, the main types of land use and the density.

4. Use, performance and meaning

Use, function and performance are intricately

related. Use is the way the land is used by man. Function also refers to the landscape as a system; how it works. Performance is the way how the plan performs in terms of results both quantitative and qualitative. In this study we distinguish three different types of performance; for users, for designers and for society at large.

5. Interpretation and discussion

object

methodology

viewpoints

definitions

In the discussion, the way how goals, design means and performance are related in terms of efficiency and effectiveness, is dealt with.

Precedent analysis, practice and theory development

The analytical framework forms the theoretical base for precedent analysis; techniques of analysis and criteria are derived from it. It departs from a series of presuppositions that is translated into an analytical framework. From that, criteria and techniques of analysis can be derived and worked out.

- The use of precedent analysis in practice

Precedent analysis can be a major source of gaining new design knowledge even if it is done inside one office. Over time the office can evaluate its projects and draw conclusions for future approach, methodology. Even better is, if offices publish results of their precedent analysis in journals. In that case it can also be a source of learning for others.

- Precedent analysis as part of research & design; development design methodology

Design methods form the core of a design theory that can form a basis for daily practice. The development of design methods requires a series of precedent analysis, first of all within one plan type and later extended to other plan types. Contemporary design methods should include 'loops' in which results of research can be integrated immediately; feedback

and loops improve the quality of the design process to a great degree.

- Precedent analysis as contribution to theory development

Eventually the results of precedent analysis and development of design methods should be integrated into design theory, an explicit and coherent body of design knowledge that underpins the design approach in a discipline.

RESULTS, CONCLUSIONS AND DISCUSSION

- Precedent analysis and the relation with practice and theory

Precedent analysis getting more common in design disciplines, can be seen as a development towards 'knowledge-based design'. At the moment in landscape architecture we are mostly in the stage of 'program-based design'. Learning from earlier experiences is not new in design disciplines, on the contrary. For the largest part this is done implicitly and on an individual basis, we need to make this design knowledge explicit. This is first of all needed for daily practice otherwise we will be 'running around in circles'; keeping to repeat ourselves without any innovation. In design disciplines it is practice that directs the main developments of a discipline. New assignments, new viewpoints and approaches are developed in practice. Theory is following but at the same time a necessary support for daily practice. First of all in the form of an explicit and coherent body of generic design knowledge that can be used in practice. Secondly theory is a necessary basis for design critique. Explicit design knowledge is also needed as a basis for theory development. Precedent analysis is directly related to theory development in design disciplines. An analytical framework is the theoretical component of precedent analysis on the other hand design theory is based on precedent analysis, research on evidence, post occupancy evaluation (POE), design critique. Research forms the 'bridge' between practice and theory; for the development of design knowledge

and theory it leads to the viewpoint of 'no design without research, no research without design'. For design schools and education it is important to stop the separation between 'design' and 'research' and to change this attitude towards an integration of the two (Milburn & Brown, 2003).

- Precedent analysis in different design disciplines

Pasman (2003) uses precedents as source of inspiration during the design process. He organises the precedents in typological order; creating an overview. It is unclear whether the precedents are also organised in different typological categories like archetypical, prototypical or just as source of inspiration. In the case of archetypical cases, it would lead to almost copying since archetype have proven qualities. In prototypical cases some more variation would be required and possible. In case of use as source of inspiration, there would be an even larger range of solutions possible. Note that precedents are mainly used here in visual sense. Guney (2007) developed a different approach towards use of precedents; precedents are systematically analysed in search of design principles used. Abstraction and reflection are the key concepts behind this approach. The viewpoint is that copying in architecture is not possible since social and cultural contexts change over time but that you can apply design principles in a contemporary context. This is equally important for precedent analysis in landscape architecture. So far, the techniques and methods used for precedent analysis are quite diverse. This is first of all based on the difference in theoretical foundations of each discipline like industrial design, architecture and landscape architecture. Dealing with the design of objects versus the design of environments, ensembles in space and time. This is one of the most important and distinct differences, resulting in special attention for process, dynamics and time in precedent analysis in landscape architecture. Another aspect is the distinction between different levels of intervention.

- Critical views of precedent analysis

A well-known critique of precedent analysis is that as soon as design knowledge will be explicit, design will become a 'mechanised' or 'scientific' activity leaving no space for intuition, new inventions and innovation in design. First of all we state that explicit design knowledge leaves more time and space in daily practice for innovation. Real 'new' developments in design are not so frequent as the design magazines and advertisements sometimes make us believe; there is a lot of so-called new developments that are in fact small stylistic changes that are needed for marketing or in landscape architecture to make us believe that 'green is better'. But design is more than just creation of small stylistic changes for marketing or appealing to the common belief nowadays that 'green is better'. Landscape architects should be able to explain why 'green is better' in the way they have dealt with the natural system in the long run. This should be done on the basis of explicit design knowledge and on a long term view. Especially landscape architecture is concerned with taking into account the time scales, including the long term. Another critical point in precedent analysis is the way the different viewpoints that underpin different approaches are taken into account. What Rowe (1987) refers to as 'normative positions'.

- The role of drawing

Guney (2007) emphasises the fundamental role of drawing in precedent analysis. Not computer drawing but hand drawing with its direct link between hand and brain, between drawing and thinking which we call 'visual thinking' (Toorn & Have, 2010). Unwin (2009) even states that '(...) drawing for architects is non-negotiable essential skill (...)'. Unwin states also that learning to be an architect develops only by drawing. The same could be said for precedent analysis; to really come to grips with the plan, it is necessary to draw by hand. If necessary, later on these hand drawings can be transferred into computer drawing if precision or repetition is needed.

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