Abstractions as a Means of Interacting with the Environment

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The employment of digital tools in architecture is based on a new approach to design that acknowledges the value of research and feedback from the environment. Abstractions are a means of minimising the complexity of information that surrounds a designed object. They are seen as focused interest on certain aspects of a field that are exaggerated on the cost of others. The use of abstractions and diagrammatic representations is discussed within the context of a computerised design studio.

Keywords*: Abstractions; Diagrams; Design Processes; Interaction.*

Background: Abstractions of Information and Design Practice

During the last decades new design tools and methods, based on information and communication technologies, were introduced which put forward new means of intervention of urban space. They rely on time-based processes and offer a means of measurement, modelling and visualization of urban conditions. Aiming at adaptive and flexible designs, they acknowledge the value of research and continuous feed back from the environment.

The employment of these tools requires familiarity with new technologies but, more importantly, the adoption of a new approach to design that is not anchored in authoritative attitudes which are related to definite master plans and absolute truths. This approach depends on learning from the environment and its inhabitants. It recognises that there is not a linear and direct relation between design and result, and identifies design presence as small-scale interventions based on dynamic systems of interaction.

In practice this new approach to design is realised through two distinctive, yet no exclusive, ways of thinking. The first is connected to formal composition and advances through innovative interpretations of the information of the environment. The other relates mainly to materiality and structure and focuses on new methods and techniques to manipulate the designed object. The first is concerned more with representation while the latter more with process (Steele, 2005).

Contemporary pioneers of the use of computers in design demonstrate a fascination with processes and emphasise the importance of structural forces over visual features. However, if we think through the matter more closely it becomes apparent that any notion of process always initiates from conceptualisations of certain aspects of the artefact. In this context, conceptualisations could be thought of as 'representations in designer's mind' (Vergopoulos, 1992). Similarly, the use of representations in design is always based on a way of advancing from one level to the other. Consequently, a notion of process

is brought into account. Despite the theoretical importance of underlining the characteristics of each of these two ways of thinking, it is equally important to realise that in practice process always folds into representation and vice versa (Leach et al., 2004).

This article takes the view that abstractions and diagrammatic thinking connect the spatial conceptualisations of a field of information to the processes that act upon them. Abstractions are seen as focused interest on certain aspects of a field that are exaggerated on the cost of others (Sevaldson, 2001). To this extent, they offer a means of minimising irrelevant information so that interpretations are allowed that connect various aspects to each other and topological relations become apparent. The configuration of such relations is the structure upon which processes are applied.

Diagrammatic Thinking within the context of a Computerised Design Studio

In order to familiarise with such an approach, a design studio is held each year with the attendance of 3rd, 4th and 5th year university students. The studio is developed in a fully computerised environment that employs a wide variety of image and video processing, 2D drawing, 3D modelling, and animation tools. A problematic is introduced in reference to personal and even idiosyncratic behaviour that appears in urban space alongside more profound and established social activity. The studio aims at developing new conceptualisations and design intentions by inducing participants to seek obscure or even hidden information. Participants are asked to concentrate on context. This refers to the environment that although surrounds a project it is not immediately adjacent to it; an environment that is not the product of a clear demarcation and framing but is formed as the constellation of effects and affects that surround the project. This notion of context informs the narrative of the project.

Students are asked to define their area of operation and work with a series of documentation techniques and representational tools in this specific area of study. Through processes of abstraction, the metric, geometric, tectonic, constructional, organisational, material, technological data is deduced. Students are asked to process the information in increasing levels of complexity that inform performance. The project, finally, is created through sequences of actions. Form, images, representations are developed simultaneously within that process. This allows the project to acquire the necessary operative functions in order to enter into real space.

The whole activity moves forward through the use of software tools that are chosen in respect to the interest and intentions of each participant. There are no instructions of the methodologies and the technicalities that specific programs require, yet there are extensive discussions on the digital methods and techniques that are generally applicable to the objectives of the projects. As a result, a wide range of software is used even within the context of each particular project. In addition, to place a great emphasis on process and the idea of advancing through sequences of actions, very frequent critics are introduced (once every week).

To demonstrate the implications of this view, some examples are discussed. As it will become evident, in these examples varied emphasis on the two initial ways of thinking - process and representation - is placed.

Case 1: Organisation of Visual Information

In design it is quite often necessary to develop ways of organising our perception of space. Such is the case of grid that brings a notion of scale and proportion in design. Graphic diagrams could be used as a new means of organising the visual information of the environment in relation to intrinsic qualities that the designer discovers. Diagrammatic representations that are not entirely depictive but retain a degree of complexity are more helpful as they allow the designer to deduce information according to the designed object.

In our first example (Figure 1) the initial source

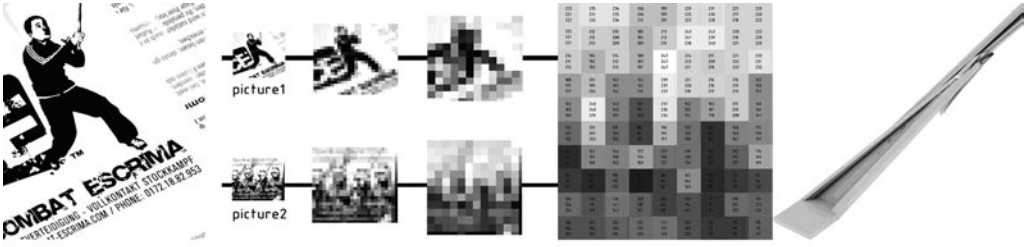
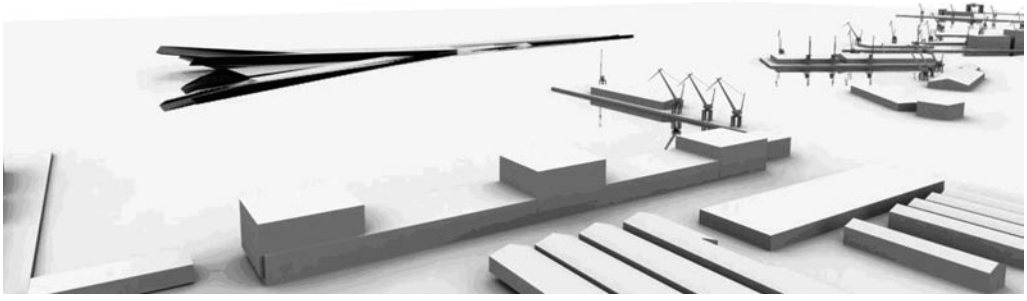


Figure 1
Fotis Sagonas: Un-Architecture, Visual qualities of photographs and their use in three dimensional diagrams



are black and white photographs from political posters showing instances of conflict. The photographs are not used in respect to their content. Instead parts of the photographs are isolated, magnified and processed through the use of filters so that certain visual qualities, such as intensity, contrast and edge sharpness, are distinguished. Through successive abstractions a graphic diagram is produced which could be used as a map of organisation of two dimensional space. Its picture elements (pixels) are evaluated according to their percentage of Red, Green, and Blue colour in a RGB model. Subsequently, this information is transfigured to three dimensional space. The values of colour intensity are mapped to corresponding values of surface extrusion in a NURBS system. The process produced a model that is used as a starting point for the design of a new seawall for the port of Thessaloniki (Figure 2).

Case 2: The Structure of Motion

Our next example shows an emphasis on structural relations within the context of kinaesthetic attitudes in a dense urban environment on behalf of social, symbolic and psychological interpretations of such attitudes. This emphasis is placed in order to minimise pre-existent views about public behaviour.

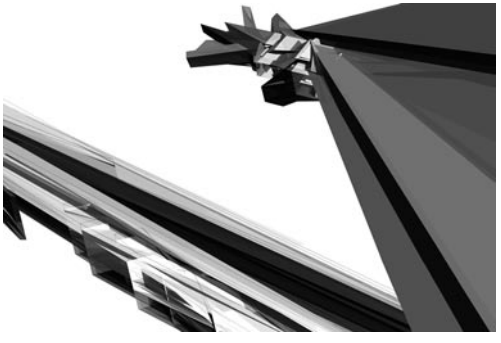
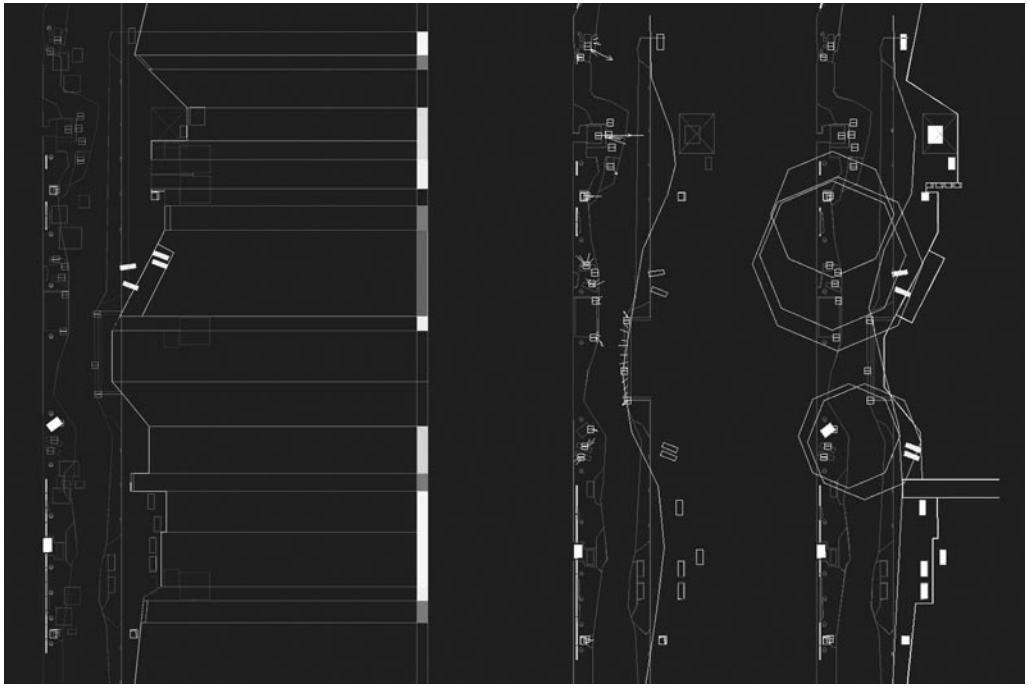


Figure 2
Fotis Sagonas: Un-Architecture, Three dimensional forms from transformations of black and white photographs

Figure 3
George Anastasiades, Kostas Panopoulos, Chrisanthi Tsatsou: Side Walk, Diagrams of flow and density of pedestrian motion; obstacles and rest areas in Tsimiski str. Thessaloniki



The example (Figure 3) initiates from observations of pedestrians' motion in the busy high street of Thessaloniki. Video recording techniques are used in order to focus on specific parameters of motion such as speed, flow, and change in direction. These are combined with digital photography and vectorial graphics in order to extract formulations of motion. Obstacles, points of rest, and areas of dense motion are isolated. These could not be established otherwise as they extend in a very wide period of time.

The formulations of motion are used as generative diagrams according to which the pavement of the street is re-designed. The proposal introduces zones of rest, slow motion, and dense motion which are differentiated with mild elevations of the pavement surface (Figure 4).

Case 3: Proximity and Balance

The last example is an investigation of the conditions of proximity and stability within a network that is controlled by an external tracking force. The example progresses through the development of an algorithm that generates primitive particles which act as knots of the network (Figure 5). These are joined with neighbouring knots when certain parameters of proximity are satisfied. When this structure of connected knots becomes strong enough to resist against the external force, further knots and joints are introduced. Otherwise it collapses. The whole system is never static but continuously finds balance between external force and internal joints by re-structuring itself.

This abstract structure can be applied in a number of real life situations. The case of a load bearing construction ruled by gravity is further explored by the project. This takes the form of a self supporting shelter (Figure 6). Further spatial constraints, such as magnitude, scale and direction, are imposed which

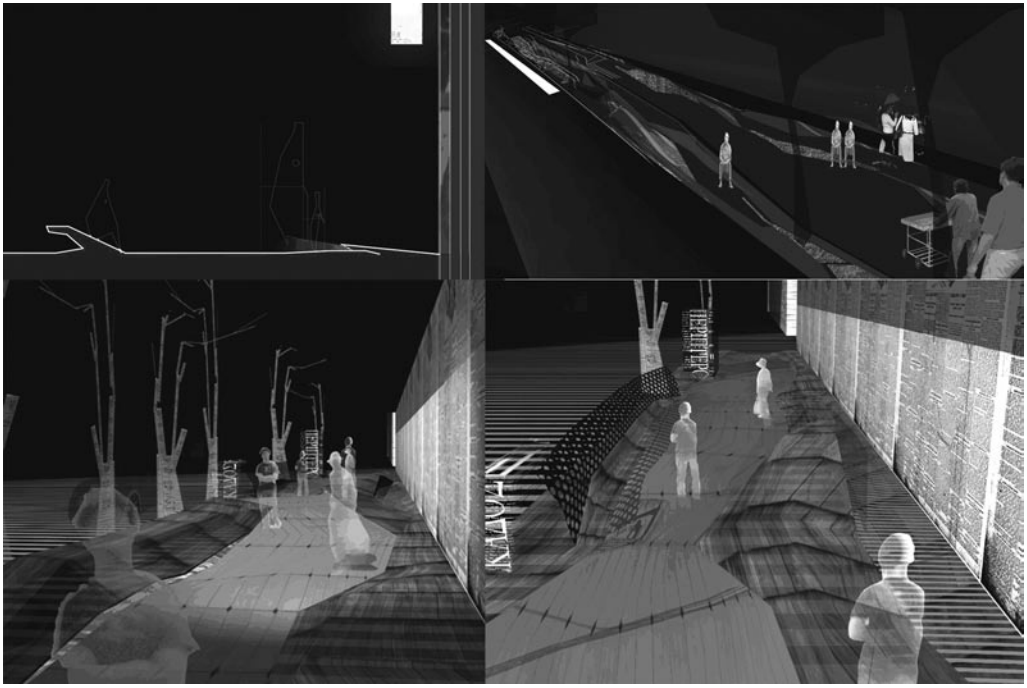


Figure 4
George Anastasiades, Kostas Panopoulos, Chrisanthi Tsatsou: Side Walk, Redesigning of the pavement surface relief based on motion diagrams

bring context into the matter. The algorithm produces unexpected results with dynamic ever changing forms. Yet, for every specific instance these unanticipated forms are stable and well balanced.

Discussion

As it should be clear from the discussion of the examples, our notion of abstraction is not based on inaccurate and vague descriptions of a field of information but instead on focused interest on certain aspects of the field that are relevant to the intentions of the designer as these arise from her/his interaction with the environment. Abstraction is understood as an attempt to reject all recognisable imagery in favour of what cannot be viewed, of the esoteric qualities of an object. Working with abstractions involves of course of de-contextualisation when certain aspects of the field are extracted, the application of a process when these aspects are explored and elaborated, and a course of re-contextualisation when the resulting transformations of the initial aspects are reinstated. Diagrammatic representations are a key element as they are actually the means by which this progression is implemented and advances.

This notion of abstraction refers to a space that intentionally remains *unframed*. It reflects the ability to work on a project without having to rely on referential *grand*-narratives, such as typology, structuralism, semiotics, etc., that frame space through the construction of opposites. It has to do with *petit*-narratives that inform the construction of sequences through small judgments, local decisions and contextual references in relation to specific points of the project and not in its entirety. This process relies heavily on the ability to remain to the exterior of established conventions and pre-existent clichés that traditionally construct a project.

Figure 5
Yiannis Chatzikostantinou: Untopia, Algorithmic generation of particles that connect to each other with respect to spatial conditions

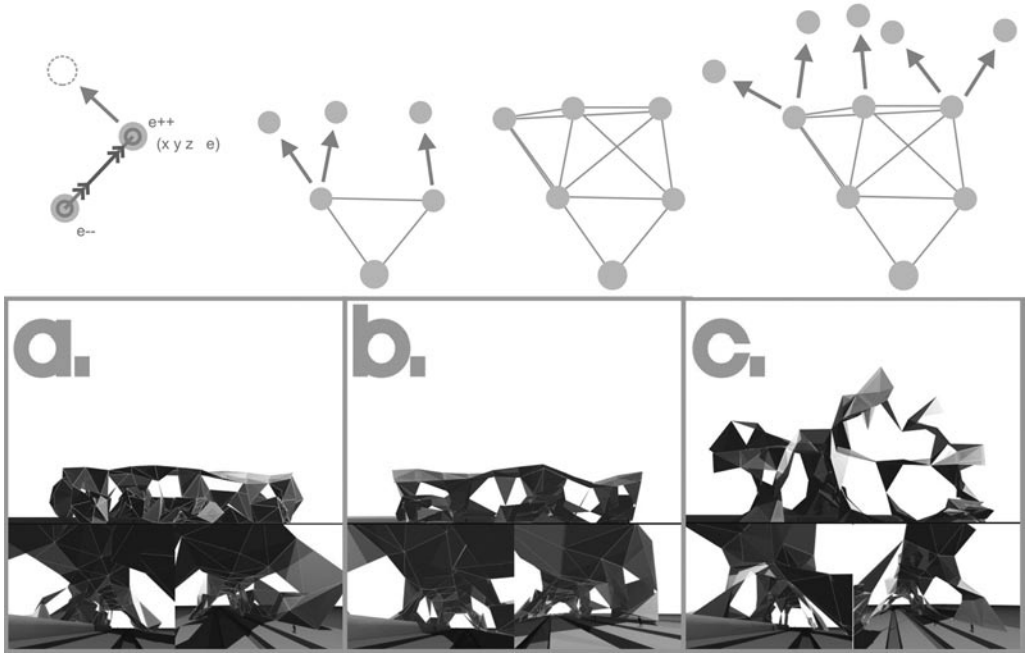
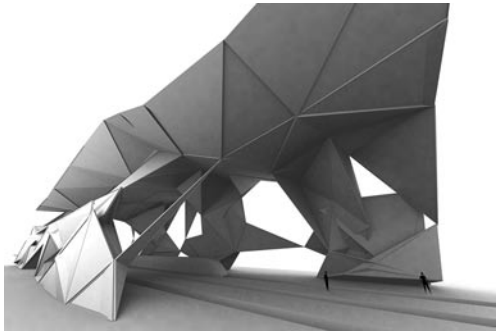


Figure 6
Yiannis Chatzikostantinou: Untopia, Form produced by structures of knots and joints



Diagrammatic representations, as realisations of abstraction, offer a potential for the use of computers at the first stages of design. Furthermore, this approach puts forward a perspective for flexible ways of interaction with the environment, which do not rely on conventional theories about urban space and established means of intervention. This perspective is based on the idea of design as a human reaction to information rather than as a problem solving activity.

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