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Demystifying the Two Different Design Approaches of Architect Paul Stallan, Descriptive and Comparative Analysis of His Conventional and Iconic Design Approaches

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ABSTRACT The design process is a mysterious problem solving activity which is full of hidden cognitive processes. Investigating the design behaviour of expert architects may demystify the hidden aspects

in the design cognition. Accordingly, the paper emphasizes that more thinking aloud sessions with expert architects can give the opportunity to investigate the design behaviour towards the design briefs and constraints. Therefore, the protocol analysis is used as the research method to investigate the two architectural design approaches of the pioneering Scottish Architect Paul Stallan. The analysis of the two design processes presents significant differences in the design methodology of the two different design approaches.

KEYWORDS: design methodology, design behaviour, Paul Stallan, protocol analysis, problem structuring, design methodology/methods, design practice, design process, decision making, design research, practice based research

Introduction



The paper aims to demystify two different design approaches of the pioneering Scottish Architect Paul Stallan who won the award of Royal Scottish Academy Gold Medal for Architecture in 1999 and 2005. In this regard, the paper also attempts to understand how an expert architect approaches two different architectural design briefs. Accordingly, the experiment is structured by two different architectural design briefs; the iconic building design (IBD) brief and the conventional building design (CBD) brief. The CBD brief seeks a cancer care centre which should consider the context; functions and appearance of its surrounding. It demands a harmonic building with the city and pleasant spaces that motivate the visitors. The IBD brief seeks a cancer care centre which should be original and unique in order to symbolize and lighten the public awareness of cancer. The IBD brief also emphasizes that the building design should step forward in the area and stand out in the city to become an icon.

In this structure, the paper aims to investigate design processes of the two different architectural briefs. Comparison of the two processes may reveal the similarities and differences between the design methodology of the IBD and CBD. In this regard, protocol analysis is used as the main research method by the approach of concurrent verbalization (Anders and Simon 1999). The two design processes are video recorded, transcribed, codified and analysed by the author. The codification is done in two different techniques as descriptive and statistical analysis. In the light of the findings, the paper attempts to answer the below listed questions;

1. How does the expert architect Paul Stallan design?
2. Does the design methodology of an architect change in different architecture brief formations?
3. If yes, what are the differences between the two design processes?

Method Development

Protocol Analysis is a research method in design research which is universally accepted. A protocol is the recorded behaviour of the problem solver. The objective of protocol analysis is to transmit external representations such as audio and video collected data and re-represent it into a taxonomy for analysis purposes. It is a technique which studies information-processing mechanisms. It is usually in the form of sketches, notes, video or audio recordings (Akin 1986, p. 181). After the 1960s crisis in design research, protocol analysis was adopted to investigate design cognition. During the early 1970s four empirical studies dealing with design were published (Eastman 1970; Foz 1973; Henrion 1974; Krauss and Myer 1970). A second set of studies dealing with the theoretical issues in the area also became available around the same time (Freeman and Newel 1971; Reitman 1964; Simon 1996). A third set of texts intended for education and based on current findings in this area emerged (Broadbent 1973; Wade 1977). The 1980s and early '90s have seen a large increase in the use of protocol analysis to study cognitive processes in cognitive science and design. In the book 'Psychology of Architectural Design', Akin (1986) presents '*Design Information Processing System*' and its *Appendix A1* offers a criticism on design protocol analysis. One of the main contributions to this area came from the book *Analysing Design Activity* (1996), which contains the proceedings of the second Delft Workshop, 'Research in Design Thinking II – Analysing Design Activity'. The workshop focussed on protocol analysis and a substantial amount of original knowledge was created. Of all the empirical, observational research methods for the analysis of design activity, protocol analysis is the one which has received the most use and attention in recent years (Dorst 2003, p. 1). It has become an accepted method to investigate cognitive abilities of designers.

Therefore, the paper adopts protocol analysis to investigate the cognitive actions of Paul Stallan in order to understand how an expert architect approaches two different architectural design briefs. He was invited to the protocol studio in the Mackintosh School of Architecture, which was prepared with the necessary protocol documents and equipment. The protocol design tasks are well structured according to the research questions. The duration of the protocol is well planned which is long enough to allow Stallan to create considerable ideas to complete the design task. As a result, the applied protocols give the desired information in the mode of sketches and verbalization which are transcribed, codified and analysed by the author. However, the paper is aware of the two main disadvantages of protocol analysis: difficulties of thinking aloud in the design activity, and silent design activities which may appear in the protocol. In order to minimize these disadvantages, small warming up verbalization practices are given to the architect before the main protocol study. Secondly, three different type of recordings; facial/behavioural,

sketching and verbalization are used in the codification process. In periods of silence, these three different media are used to codify Stallan's design cognition.

Architectural Design Process and Design Drivers

Studies of the 1960s in design research can be distinguished by the authors' attitude that prescribes a systematic pattern to a designer or to a specific project. They believe that architecture is a product and prescribes a production model. Examples are Ackoff (1962), Jones (1963), Asimov (1963) and Alexander (1964). In the 1980s, the Design Research Society's conference on 'Design:Science:Method', Jacques and Powel (1981) came out with the idea that it was time to move on from making simplistic comparisons and distinctions between science and design. The new movement accepts design as a rational problem solving process. There is much stress on the rigour of the analysis of design processes, objective observation and direct generalizable ability of the findings. Logical analysis and contemplation of design are the main ways of producing knowledge about the design process. Simon quotes optimization theory as a prime example of what he believes a science of design could and should be (Simon 1996).

After the acceptance of Design as the third research field, there has been a growing acceptance of design on its own terms, a growing acknowledgement and articulation of design as a discipline. The pioneers of the field have come to realize that they do not have to turn design into an imitation of science; neither do they have to treat design as a mysterious art. In this regard, Buchanan (1992), Simon (1996), Cross (2006), Roth (1999), Friedman (2000), Nelson and Stolterman (2003) and Fallman (2008) are some of the leading publications on design research. Their research presents a theoretical framework of the design knowledge, the design resources and the design research methodology.

In this regard, Bryan Lawson (1994) observes the design process of architects at their work. Leading architects like Richard Burton, Santiago Calatrava, Herman Hertzberger, Eva Jiricna, Richard MacCormac, John Outram, Ian Ritchie, Robert Venturi and Denise Scott Brown, Micheal Wilford and Ken Yeang are observed and their design processes analysed. The outcome presents the ideas and conceptual design processes of the architects. Observing designers at work is one of the accepted design research methods but it has never been a popular technique because of its time consuming process. On the other hand, a designer's physical behaviour does not particularly reveal his mental processes in the observation technique. The architectural drawings produced during the design process are often made specifically to examine particular issues, and it may be quite difficult to define the mental activities without the designer's verbal explanation. Accordingly, Lawson's conducted observations

are notoriously difficult to devise and control without resorting to protocol analysis (talk loud method).

Architectural design is a problem solving activity that involves huge intellectual commitment on the part of the architect. Cross (2006) defines that design problems are ill-defined. Therefore, designers restructure the problem(s) in the process.

Secondly, Schön (1983) describes that the problem solving activity is also a learning cycle for designers. The loops on the design process create a learning cycle which can be defined as design experience. Thirdly, Darke (1978) suggests that there may be primary generators before the analysis stage when designers are investigating the problem. Lawson's final attempt (2005, p. 49) out of all his empirical investigations is an important visual description of the design process which sums up the three important ideas together. Lawson's map of the design process demonstrates the negotiation between problem and solution as a reflection. Lawson suggests that the activities of analysis, synthesis and evaluation are certainly involved in this negotiation but the map does not indicate any starting/finishing points and any specific direction of flow. Therefore, this paper finds it significant and attempts to understand how the flow and characteristics of architectural design activities change with different design approaches. Accordingly, Stellan (2009a) defines his design activities as 'design drivers'. The six staged listed design drivers (Figure 1) create a structure which defines the flow of his design process.

According to Stellan's design drivers and his definitions, 'Aspiration' is the primary objective and is defined as the vision of a client. 'Place' is related to the climate, culture, typology and morphology of the country. 'Site' contains the general site analysis such as special features, orientation and topography. 'Rooms' are related to architectural planning. 'Machines and Systems' are related to the structural systems and other special requirements which affect the architectural planning. The last point is 'Design' which is the 'intuitive and rational' part of the process. The design drivers of Stellan (Figure 1) are used to compare the sequence of the two analysed design processes.

Initial analysis of the CBD and IBD processes in the frame of 'design drivers' reveals that the CBD process follows the listed sequence of design drivers (1→2→3→4→5→6). On the other hand, the IBD is not as linear as the CBD. 'Aspiration' comes first, 'Place' is the second, 'Design' is the third, 'Rooms' is the fourth, 'Site' is the third and 'Machines and Systems' are the last (1→2→6→4→3→5). This sequence indicates that 'Design' as a driver comes forward in the IBD process after understanding expectation of the brief (Aspiration and Place). This is a preliminary finding that intuition process is advanced in the IBD process. As Stellan (2009a) expresses, *'There is always large part of the process which intuitively comes out during the design.'*

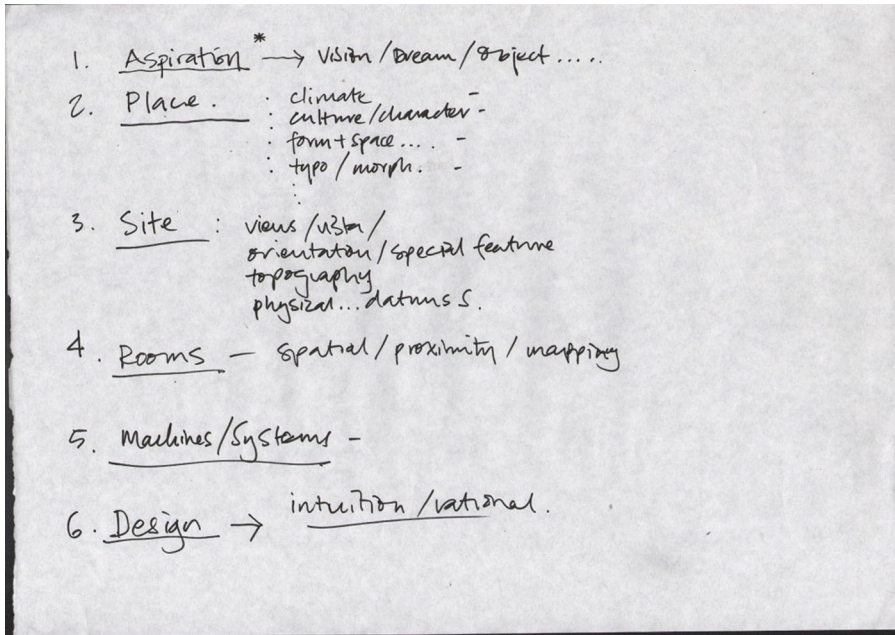


Figure 1.

Design drivers of Paul Stallan (Source: Stallan 2009a).

Stallan explains that intuition plays a major role in the iconic building process and creates more artistic and sculptural responses. However, he emphasizes that this process does not make the building any less valid than the other building types but the building is created by a different type of brief. In his explanation, he expands the discussion further; *'The client comes here and says... look I don't want a building which is just contextual. I want a building which announces itself and makes a statement'* (Stallan 2009c). Client satisfaction is one of the important challenges faced by an architect so the design brief may have an influence on the designer's design approach. It may influence the problem structuring process and herewith the rest of the design process activities. This initial finding is the main investigation in the paper. In this regard, the paper analyses design activities of the two empirically recorded design processes. In the first section, the paper explains the descriptive analyses of the two design processes, which gives a general understanding. The comparative findings are the second section which represents statistical analysis on analysis, synthesis and evaluation design activities.

Descriptive Analysis of Conventional Building Design

In this empirical investigation, architect Stallan started to design with the Conventional building design (CBD). One hour is given to the architect but the architect completes the design in forty-four minutes and twenty seconds. First of all, the paper divides this process into

Table 1. Descriptive analysis of conventional building design
(Source: Author).

<i>Node time (minutes)</i>	<i>Node no.</i>	<i>Node name</i>
00:00:00 – 00:02:30	Node 1	Analysis of the Brief/Functional Requirements
00:02:30 – 00:03:46	Node 2	Architectural Planning (Stage 1: Bubble Diagram)
00:03:46 – 00:04:11	Node 3	Experiences
00:04:11 – 00:08:36	Node 4	Architectural Planning (Stage1: Bubble Diagram)
00:08:36 – 00:11:14	Node 5	Architectural Planning (Stage 2: Diagram)
00:11:14 – 00:12:12	Node 6	Calculations/square metres
00:12:12 – 00:14:15	Node 7	Architectural Planning (Stage 2: Diagram)
00:14:15 – 00:18:31	Node 8	Architectural Planning (Stage 3: Diagram)
00:18:31 – 00:23:56	Node 9	Architectural Planning (Stage 4: Planning on site)
00:23:56 – 00:26:03	Node 10	Evaluation of Architectural Planning
00:26:03 – 00:28:48	Node 11	Architectural Planning (Stage 5: Planning)
00:28:48 – 00:29:28	Node 12	Evaluation of Architectural Planning
00:29:28 – 00:33:13	Node 13	Form Creation (Stage 1)
00:33:13 – 00:34:58	Node 14	Evaluation of the form
00:34:58 – 00:38:28	Node 15	Form Creation (Stage 2)
00:38:28 – 00:38:52	Node 16	Sketching/Physical Modelling
00:38:52 – 00:42:43	Node 17	Form Creation (Stage 3)
00:42:43 – 00:43:48	Node 18	Evaluation of the form
00:43:48 – 00:44:20	Node 19	Final Evaluation

nodes. Each node is a discussion of an individual design idea. In the CBD, nineteen nodes are defined in total (Table 1).

As seen on Table 1, the architect starts the CBD process by analysing the brief. On the Node 1, the architect analyses the functional requirements and the square metres. He sketches the approximate square metre of the spaces to study the space requirements. After investigating the functional requirements, the architect starts the architectural planning. In the first stage, he starts with a bubble diagram which is named as ‘the spatial plan’ (Figure 2: Sketch B). In the first twelve nodes, the architect only explores functional relationships of the project. He works on the architectural planning and improves it gradually. Continuous sketching activities develop the functional relationships. The paper detects five stages on the architectural planning, which are continuous flow of information (Figure 2: Sketch B, C, D, E and F). At each stage of sketching, the architect improves, develops and details the architectural plan until he is satisfied (Figure 2). In total, he spends 29 minutes and 28 seconds on the architectural planning and functional relationships.

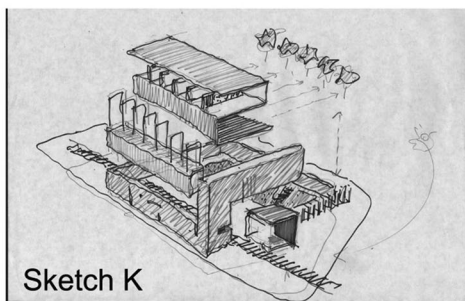
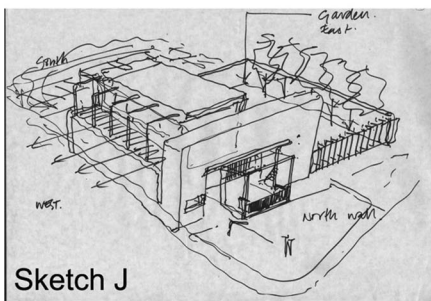
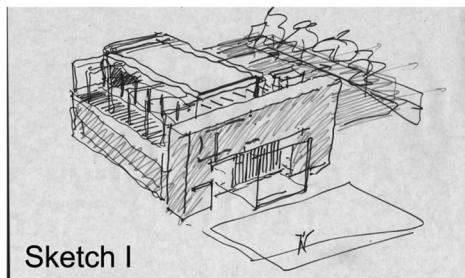
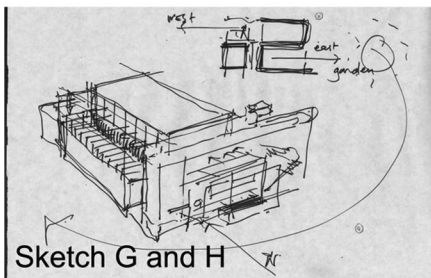
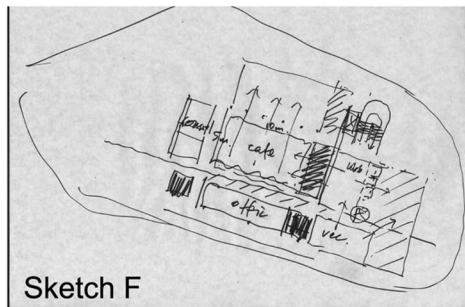
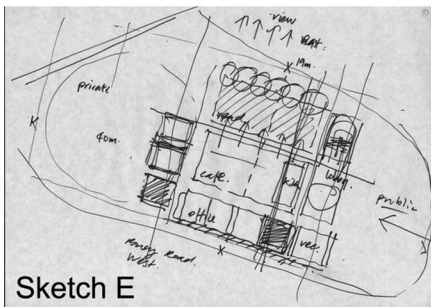
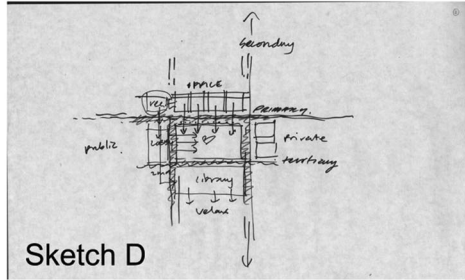
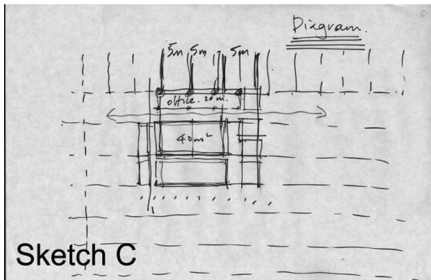
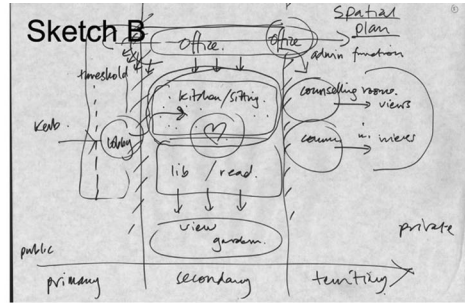
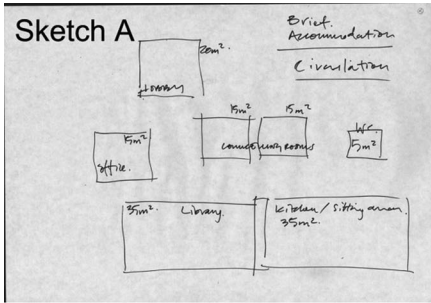


Figure 2. Sketches of Paul Stallan in CBD process (Source: Stallan 2009b).

The form creation started on Node 13 that the architect starts investigating the aesthetical appearance of his design in 3D sketching. He emphasizes that, form of the building is created by extruding the architectural plan. In the form creation process, the paper also detects three stages. On every stage, architect details the architectural form and improves it further. The architect finishes the design by evaluating the form and sketching the important elements of the building (Sketch J: pergola on the west, east garden, north wall, and private south).

This descriptive discovery of the CBD reveals that the architect starts the design with architectural planning. Continuous exploration of the architectural plan continues until he is satisfied. The form of the building is influenced from the architectural planning. Extrusion of the ground floor is the approach to the building's 3D geometry. Three stages on the form creation improves the building's aesthetical qualities. It is clear that functional properties of the design are the priority in the process. The form is the secondary step, which is created according to the building's functional layout.

Descriptive Analysis of Iconic Building Design

Stallan prefers to perform the Iconic Building Design (IBD) as the second design task. An hour is given for this task but the architect completes the task in twenty-nine minutes and seventeen seconds. In the IBD, sixteen nodes are defined (Table 2).

Table 2. Descriptive analysis of conventional building design
(Source: Author).

<i>Node time (minutes)</i>	<i>Node no.</i>	<i>Node name</i>
00:00:00 – 00:00:28	Node 0	Preparation and Silence
00:00:28 – 00:01:52	Node 1	Brief Analysis – Definition of Iconic Building
00:01:52 – 00:03:30	Node 2	Brief Analysis – Emotional Aspects
00:03:30 – 00:04:29	Node 3	A different Brief – Influence of a brief
00:04:29 – 00:06:50	Node 4	Poetic response to the brief- architect's artistic work
00:06:50 – 00:09:26	Node 5	Metaphor 1 – ship / submarine
00:09:26 – 00:11:17	Node 6	Form Creation Stage 1
00:11:17 – 00:13:18	Node 7	An example/Metaphor 2 – Picasso
00:13:18 – 00:15:46	Node 8	Form Creation Stage 2
00:15:46 – 00:17:37	Node 9	Architectural Planning
00:17:37 – 00:19:39	Node 10	Form Creation Stage 3
00:19:39 – 00:21:30	Node 11	Section (Form/Function related)
00:21:30 – 00:22:51	Node 12	Elevation (Form related)
00:22:51 – 00:24:04	Node 13	Form Creation Stage 4
00:24:04 – 00:25:17	Node 14	Evaluation – Importance of Metaphors/Image
00:25:17 – 00:27:06	Node 15	Form Creation Stage 5
00:27:06 – 00:29:17	Node 16	Evaluation – Working with Frank Gehry

The architect starts the process by analysing the IBD brief. He clearly emphasizes that he would take a different approach on this design task and then starts the process by defining the characteristic of iconic buildings. 'More attention seeking', 'not modest', 'challenging' and 'provocative' are some of the adjectives that the architect uses to define the term. The mode of the brief analysis is different than the conventional design process. The architect focuses on emotional aspects of the brief such as the sickness (cancer) and his personal experiences about cancer. Stallan mentions that personal investment is necessary and important in order to create a more artistic response.

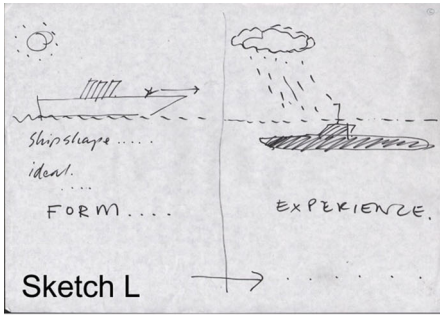
The importance of the brief is also discussed and the architect emphasizes how a brief can influence a design process. He explains that he has faced with several briefs and clients who asked for attention seeking buildings which make a statement. He also explains that there are different ways to achieve this kind of buildings and it does not have to be crust, wicked and dump. As the next step, Stallan synthesizes his ideas with poetic responses and this drives him to create a metaphor. On this stage, the metaphoric idea of 'the submarine' is created and the architect tries to transform it into an architectural form (Node 5). He creates the second metaphor, 'Picasso' on Node 6 (Figure 3: Sketch N2). He clearly mentions that this stage of the design process is where 'all the logic goes out the window and you start thinking about shapes' (Stallan 2009c).

In Node 7, Stallan (2009c) expresses that 'let's not worry about articulating the parts of the brief (functionality). It is more about how we can begin to make a form which has something greater'. Stallan's definitions of the term 'iconic', his metaphoric design ideas and his form creation activities dominate the first eight nodes. On Node 9, he creates a basic linear spatial plan (Sketch P4) which is influenced by the metaphor of submarine. The metaphoric idea directs the architect to focus on form and design a building which resembles a submarine.

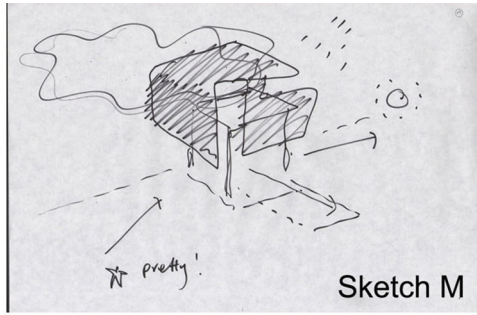
During the rest of the design process, the architect works on the architectural form and details it by three dimensional sketches. He also draws an elevation (Sketch T) to investigate the image of the building. As an evaluation tool, he emphasizes the importance of metaphors in the communication with clients, 'you use metaphors to indicate what you are trying to achieve' (Stallan 2009c). He also mentions the importance of the created image by saying 'it will be a building which is saying not designed entirely thinking about function' (Stallan 2009c). In the final, the architect evaluates his design by his experiences of working with Architect Frank Gehry (Wurman 2008).

General Comparison and Discussion of Descriptive Analysis

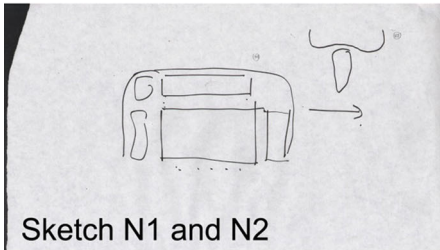
This general comparison section presents a discussion on the architectural design products and their design processes. It aims to



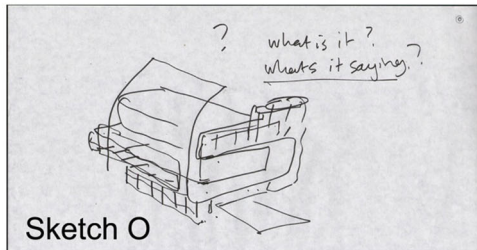
Sketch L



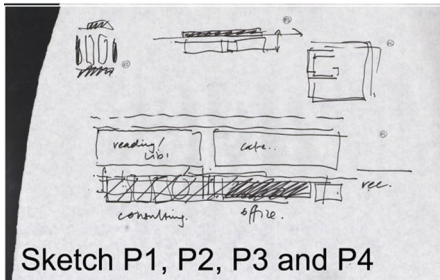
Sketch M



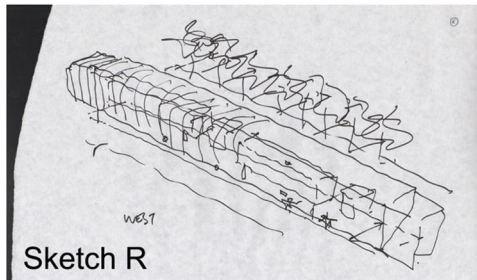
Sketch N1 and N2



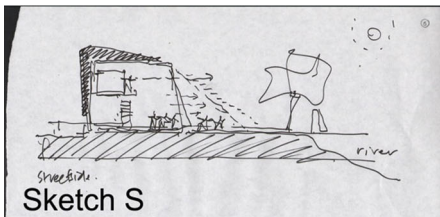
Sketch O



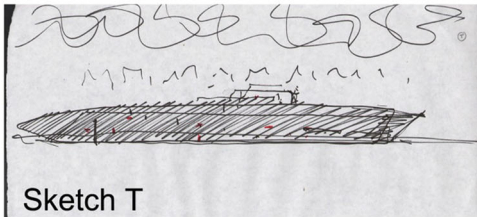
Sketch P1, P2, P3 and P4



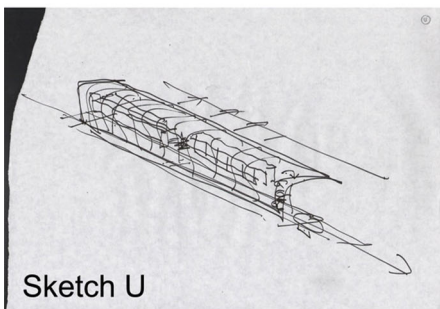
Sketch R



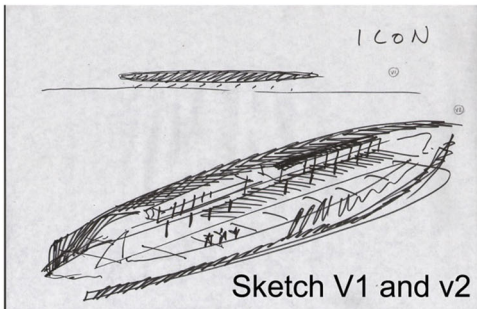
Sketch S



Sketch T



Sketch U



Sketch V1 and v2

Figure 3. Sketches of Paul Stallan in the IBD process.

Table 3. General characteristics of CBD and IBD processes
(Source: Author).

<i>General characteristics of the CBD process</i>	<i>General characteristics of the IBD process</i>
Completed in 44 minutes & 20 seconds	Completed in 29 minutes & 17 seconds
19 Nodes	16 Nodes
Focussed on architectural planning	Focussed on form making/ image creation
Started with programme analysis	Started with the definition of iconic buildings
Concept: functionality and extruded form	Concept: Form of experience
No metaphor creation	2 Metaphors are created
Form follows function	Form follows experience/metaphor
11 Sketches (84.6%)	15 Sketches (56.9%)

represent the general differences by defining the main characteristics of the two designs (Table 3).

When the geometrical differences are compared, it is seen that the CBD building (Figure 2: Sketch K) is created by extruding the ground floor plan. The building form is created by seven different architectural geometries; the wall which surrounds the entire building, the entrance, the office blocks + pergolas, 'S' shaped library + café block, the garden and the garden fence. On the other hand, the IBD form (Figure 3: Sketch V1 and V2) is created by the metaphoric idea of submarine. The building form is one object which is created by two elements; the curved skin (superstructure) and the curved curtain wall. This comparison may also maintain that the IBD form is more image focussed which is entirely inspired by a metaphoric idea. The form is one single object which is created as a superstructure. The form accommodates the function inside as an open space and it presents non-ordinary interior space design. 'It is not about the experience of forms but rather forms of experience' (Stallan 2009c).

The IBD process is shorter than the CBD process. One could think that the sequence of the protocols may cause the time and the other differences. These raise the question of 'What would happen if IBD was the first design activity?' However, the findings of the architect's cognition process demonstrate that the characteristics of the structured design problems affect the duration of the protocols. The architect restructures the given design problems with different aims and objectives. In CBD process, the architect is focussed on the contextual and functional qualities. This aim consumes more time because the architect is worried about arranging the floor plans and responding to the contextual qualities. To create a satisfactory solution on functional aspects consumes more time because it involves more practical issues and mathematical calculations. In the IBD, the architect is focussed on the image creation and he is less worried

about the site and the architectural programme. When he achieves a satisfactory image, he finishes the design task without any further design investigation. Nevertheless, he has enough time to improve the architectural planning solutions but he believes that the created image answers the expectation of the design brief and he concludes the design process on the 29th minute. 'I think the key to sell this to the client is just to get a very striking image ... less worry about articulating the part of the brief because we got a fix on how things are related but it is more about how we can begin to make a form which has something greater' (Stallan 2009c).

In the IBD process, the architect uses metaphors and poetic responses. The architect compares the meaning of the international modernism and he creates two metaphors which represent Architecture in sunny countries and Architecture in Scotland. The sunny countries are represented by a ship shape and Scotland by a submarine shape (Figure 3: Sketch L). Sketch L is the sketch that the architect decides to focus on the form of experience rather the experience of the form. The second metaphor is Picasso's Bicycle which creates an image of antelope's head. The architect is inspired by the simplicity of 'Picasso's Bicycle'. The two simple items (bicycle handles and a bicycle seat) come together and creates an icon (Sketch N2). He explains that such a process is 'one plus one equals three' (Stallan 2009c). His aim in the IBD process is to achieve a Picasso what could give him an icon.

When the design medium is analysed, the Sketching activities form 45% of the CBD. The architect creates thirty-eight sketching activities and eleven sketches in total. On the other hand, the sketching activities form 26.7% of the IBD. The architect creates seventeen sketching activities and seven sketches.

In the CBD, the architect creates 11 sketches (Figure 2; Sketches A, B, C, D, E, F, G, H, I, J and K). The first sketches A, B, C, D, E and F are related about functionality of the building. G, H, I, J and K are related about appearance of the building. On the other hand, in the IBD, the architect creates fifteen sketches (Figure 3; Sketches L, M, N, N2, O, P1, P2, P3, P4, R, S, T, U, V1 and V2). Opposite to the CBD, the first five sketches are related with the appearance, form and metaphors. Sketches P1, P2, P3 and P4 are related with the architectural planning. Sketches R, S, T, U, V1 and V2 are again related with the appearance of the building. The paper finds it significant that the CBD starts with the function related sketches. Opposite of this, in the IBD, the architect starts the process by drawing metaphoric ideas and this directs him to concentrate on the building's form.

In the CBD, during the sketching activities, the architect spends most of his time on developing Sketch E which is the ground plan of the building. To create a satisfactory ground floor plan is a continuous process which starts on Sketch A and develops till Sketch F. In every step, the architect details the programme and the ground floor

plan till he is satisfied. In the IBD sketching activities, the architect spends most of his time on Sketch L which is the main metaphor creation.

In addition to these, when the sketching percentages are compared, it shows that sketching is more frequently used in the CBD process. This also means that the architect uses more verbalization in the IBD process in order to explain his ideas. Stellan's artistic, poetic and form focussed responses in the IBD create more verbalization activities in order to express the complex ideas. [Table 3](#) briefly represents the general characteristics of the two design processes. The main initial outcome presents that CBD process can be defined as 'form follows function' but IBD process can be defined as 'form follows metaphors and form of experience'.

Comparative Findings

The findings demonstrate that the design behaviour towards the two design briefs have different design approaches. The architect proceeds different problem structuring methodologies towards the two different design briefs. Therefore, the paper finds it important to understand how the characteristics of design activities are influenced in this regard. In this section, statistical investigation on the analysis, synthesis and evaluation activities represents how the design methodology changes according to the structured design problem. The comparative findings on analysis, synthesis and evaluation activities are discussed under these three different titles.

Comparative Findings of Analysis Activities

The Analysis activities forms 10.3% of CBD process and Stellan creates six analysis activities in total. Two of these activities are higher than CBD DP Average Time (31 s) which creates two important Analysis Peaks. Average value is the calculated average duration of the total number of activities. On the other hand, the analysis activities form 22.1% of IBD process which is twice more than CBD Analysis. The architect creates 7 analysis activities in the IBD but only one of them is higher than IBD DP Average value (1 min 41 s). This analysis activity is the first activity which lasts for four minutes and nineteen seconds.

Investigation of the analysis activities reveals that modes of the analysis activities are completely different between the two design processes. Analysis activities in CBD are divided into two blocks. The first analysis block appears at the beginning of the process, which focuses on the architectural programme and the square metres. The second group is performed in the middle of the process between the 19th and 22nd minutes, which analyses the site context. In the first analysis activity, the architect restructures the design problem according to the architectural programme (square metres) and then he solves the restructured functional design problem. When

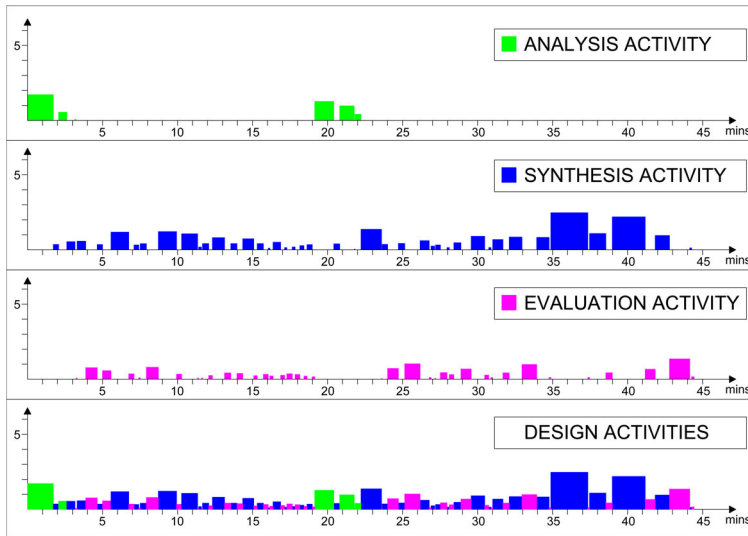


Figure 4. CBD – Design process activities map (Source: Author).

he is satisfied with the created solution, he structures another design problem (how the square metres sit on the site) and then solves it accordingly. 'The design is a sequence of activities. Logically it would seem that getting a brief and analysing the problem comes before the synthesis of solution. However, there can be no argument that designers must be skilled in finding and stating problems and understanding and exploring them – may be not all at the beginning of a project, but as recurring activity' (Lawson and Dorst 2009, p. 50). Accordingly, Figure 4 also demonstrates that Paul Stallan does not perform all the analysis activities at the beginning of the design process.

In the IBD, there is only one long analysis activity at the beginning of the process, which aims to define the term 'iconic building' and emotional aspects of the brief (Figure 5). The architect investigates meaning of the term 'iconic' and focuses on emotional aspects of the brief. Also, Stallan talks about his real life experiences about iconic buildings. These discussions create a big block of analysis activity at the beginning of IBD process. This type of analysis activity restructures a form focussed design problem which influences the following synthesis and evaluation activities.

The paper would like to emphasize that percentage of the analysis activities is higher in the IBD. This may be evidence that the architect restructures different type of design problems in the two processes. One could think that designing the same type of building in the two design processes may decrease the percentage of the analysis activities in the second design task because the architect gains experience in the first task. However, the findings demonstrate the opposite. The architect responds differently to the briefs and this creates different modes of analysis. Different modes of analysis activities

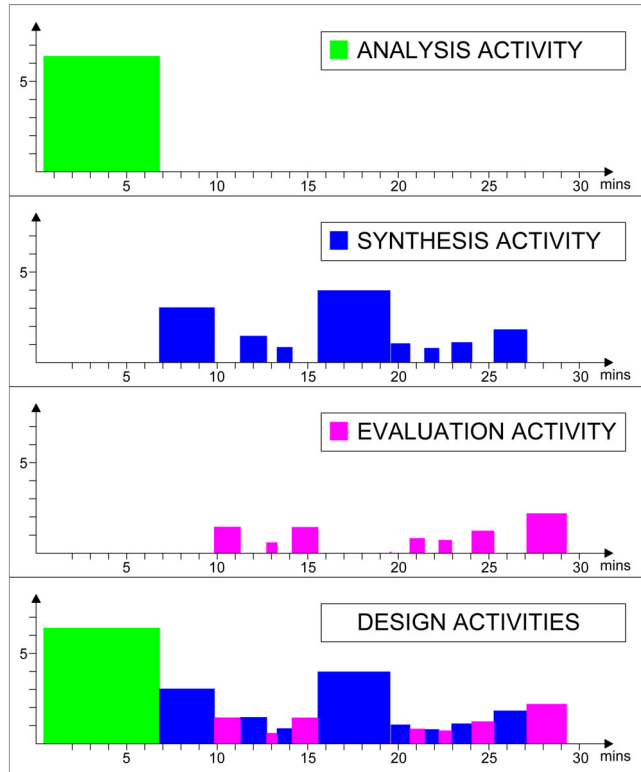


Figure 5.
IBD – Design process activities map (Source: Author).

influence the two processes accordingly and this creates two distinct design methodologies. This is also a good concept of proof to emphasize that the duration of the protocols was not affected the protocol sequence.

Comparative Findings of Synthesis Activities

The Synthesis activities form 57.4% of CBD and the architect creates forty-two synthesis activities in total. Seventeen of these activities are higher than the average value (31 s) and they create nine important CBD Synthesis Peaks. On the other hand, the synthesis activities form 48.7% of IBD. In total eight synthesis activities are created and three of them are higher than the average value (1 min 42 sec).

Synthesis is characterized by an attempt to move forward and create a respond to the problem – the generation of solutions (Lawson 2005, p. 37). The created problems in the CBD and IBD Analysis activities highly influence the characteristics of the synthesis activities. This means that modes of the synthesis activities are different between CBD and IBD. In the CBD, the architect starts the synthesis activities by creating a spatial plan (Figure 2; Sketch B) and then a diagram (Figure 2; Sketch C and D) which are basic

architectural planning attempts. He improves the architectural planning and then concentrates on the building's form. In the CBD process, there are two main moves; first of all architectural planning and then the form creation. Also, when it is considered that the form creation is highly influenced by the architectural planning, it can be defined as a sub-move of the architectural planning. 'Firstly and most obviously, a new move may be made which has not been seen before in this process. Secondly, a move may alter or develop the existing state of the solution' (Lawson and Dorst 2009, p. 54). In the IBD process, synthesis activities are started by metaphor creation (Figure 3; Sketch L) and then they are transformed into form creation. The architect is focussed on metaphoric, artistic and poetic responses which dominate the aesthetical aspects in the design.

In the CBD, the architect performs more but shorter synthesis activities because he is dealing with architectural planning which is broken down into sub problems; circulation, square metres, public space, private space, etc. On the other hand, in the IBD, the architect creates less but longer synthesis activities because he is only focussed on metaphors and building geometry. Therefore, the architect does not need to divide the design problem into sub problems. The metaphoric concept assists the architect to focus on one main problem, which creates more concentrated and longer synthesis activities.

Comparative Findings of Evaluation Activities

The Evaluation activities form 32.3% of the CBD and the architect creates thirty-one evaluation activities in total. Eight of these are higher than the CBD Average value (31 s). On the other hand, the evaluation activities form 29.2% of the IBD. In total eight evaluation activities are created and only one of them is higher than the ICB Average value (1 min 42 s).

The most important difference between the CBD and IBD evaluation activities is the Design process Average value (A). Average value of the IBD is significantly higher than the CBD. Accordingly, only one IBD evaluation activity is higher than the IBD Average value, which appears at the end of the design process. Like the analysis and synthesis activities of the IBD, the evaluation activities are also more artistic driven. 'Not only do designers generate alternatives between which choices must be made but also they must know, rather like an artist, when to stop' (Lawson and Dorst 2009, p. 56). So the mode of the evaluation activities in the IBD is also different than the CBD. The architect evaluates his ideas according to the Metaphoric ideas and supports his decision with examples of Star architects' designs. Therefore, the IBD activities are longer and less than the CBD because the architect is concentrated on less design issues. More concentrated synthesis activities create concentrated evaluation activities.

Table 4. Form function percentages of CBD and IBD (Source: Author).

	<i>Function</i>	<i>Form</i>
General CBD	66.5%	33.5%
General IBD	26.4%	73.6%
CDB – Analysis	100%	0%
IBD – Analysis	10.5%	89.5%
CBD – Synthesis	60.2%	39.8%
IBD – Synthesis	43.6%	56.4%
CBD – Evaluation	66.9%	33.1%
IBD – Evaluation	9.9%	90.1%
CBD – Sketching	65.5%	34.5%
IBD – Sketching	39.9%	60.1%
CBD – Verbalisation	71.6%	28.4%
IBD – Verbalisation	39.9%	92.6%

Discussion of the Findings

The comparative findings of the analysis, synthesis and evaluation activities reveal that the architect concentrates on aesthetical aspects of the building in the IBD. In the IBD, the architect only spends 26.4% of his time on functional aspects of the design and rest of the design is form oriented. The researcher believes that usage of the metaphors plays a big role on the form and function percentages. In the IBD, form and idea creation is highly influenced by the metaphoric and poetic ideas.

Also, [Table 4](#) supports the early discussion about analysis activities. The mode of the CBD and IBD Analysis activities are different. The CBD Analysis is 100% functional but the IBD Analysis is 10.5%. This difference influences the mode of the analysis and the design processes. In the IBD, the created problem is form based so the synthesis activities (56.4%) and evaluation activities (90.1%) are also form oriented.

The findings reveal that Paul Stallan's conventional design process has a very clear distinction between the function and form activities. The architect only performs function activities in the first thirty minutes and only performs form activities in the last fifteen minutes ([Figure 6](#)). These results strongly support that in the CBD process, form follows function. On the other hand, the IBD starts the process with form activities ([Figure 6](#)). Metaphors, poetic and artistic ideas assist the architect to concentrate on the form and then the function. Apart from the building, also the architectural plan is influenced by the metaphoric ideas. These findings support that in the iconic building design process; form follows metaphoric, artistic and poetic ideas ([Uluğ 2020](#)).

Conclusion

The analysis concludes that the design decisions in the design problem structuring stage influence the mode of the design.

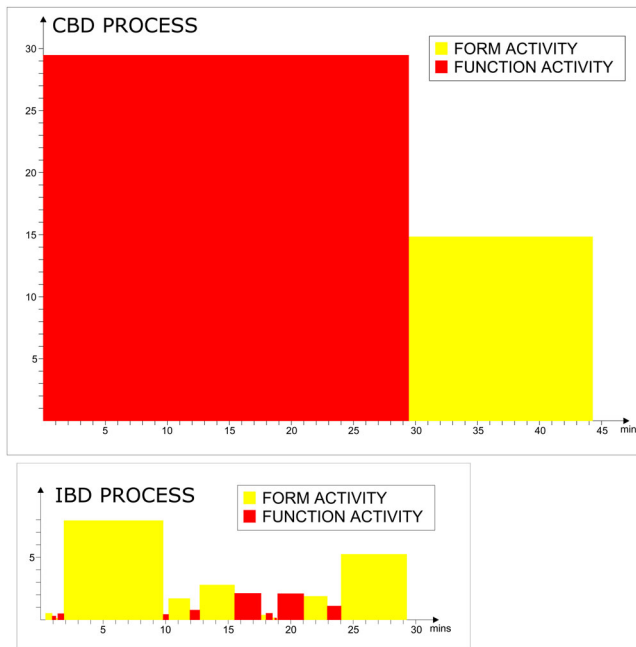


Figure 6.
CBD and IBD form & function activities maps (Source: Author).

Concentration of the performed design analysis activities influences the mode of the synthesis and then the evaluation activities. Comparing with the conventional building design, the iconic building design approach is a more form oriented process which is not constrained by technical and functional design problems. The form oriented design problem structuring has an effect on the Design Process Average value. This creates longer design activities and concentrated design problems. Therefore, synthesis and evaluation activities have higher average. This research emphasizes that design problems, design briefs and clients have a major influence on the mode of an architectural design. These variables may significantly affect the approach, design structuring and design decisions of an architect. As an example in the IBD process, Paul Stallan (2009c) emphasizes that the functionality loses its priority and aesthetical distinction dominates the process because of the form oriented design problem structuring. 'So this where all logic goes out the window and you start thinking about shapes and I just draw and see what happens'. This type of design decisions results a design process where architects do not constraint himself by technical, pragmatic and functional aspects and focus on the aesthetical exploration.

In addition to these, another important finding is that verbalization activities are higher in the form oriented design process. The paper can list four reasons behind the higher verbalization activities. The IBD brief directs the architect to create definitions for the term

'iconic' in the analysis stage. Discussions and definitions of the term increase verbalization activities. Secondly, the architect is more focussed on poetic responses in the form oriented design process and this causes higher verbalization activities. Thirdly, when the architect decides to create a distinctive design approach, the evaluation activities are supported by the real life examples and experiences. These are verbal clarifications in order to explain the complex ideas. The last and the most important reason is the complexity of the created building form. The sketching method becomes insufficient to represent very complex geometries and this causes more verbalization activities. In this regard, expressing ideas by metaphors becomes more dominant in order to explain the distinctive building form.

Metaphors as a design tool may lead architects into a distinctive and an innovative process. This kind of process may create an expressive building form. However, architects may hide this kind of design ideas and may use different metaphors to present the final product. This is a presentation technique in order to convince the client. At the end of this process, if an architect is successful to create an original building image, this may lead the society to create metaphoric responses for the building. These metaphors are not necessarily the same metaphors that the architect creates in the design process.

In a reflection on Paul Stallan's IBD process, the Submarine ship metaphor is used as a design tool which influences the rest of the design process and the product. It is a distinctive design process but Stallan (2009c) clearly emphasizes that he never shares this kind of thoughts with his clients; *'So these are kind of stupid ideas that I would never share with a client but you know at the back of mind, I play with the ideas of form, shape and sometimes I am working with paintings and collages. So that is a kind of language of how thinking and working and it is always at the background'*. This may explain why the design process is a mysterious problem solving activity which is full of hidden cognitive processes. In interviews, expert architects may not talk about his cognitive activities because they prefer expressing themselves by their final products (Lawson and Dorst 2009, pp. 101 – 154). This stresses the importance of empirical studies in the design methodology. This research emphasizes that more thinking aloud sessions with expert architects is needed to investigate these concept findings which give promising results.

Disclosure Statement

No potential conflict of interest was reported by the author.

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Biography

Ercim Uluğ is an architect and an academician who is based in Cyprus. After completing his bachelor degree in Eastern Mediterranean University, he completed his MArch degree in the Mackintosh School of Architecture and his PhD degree in Glasgow School of Art, Glasgow University. He is a lecturer in architecture in the European University of Lefke. In addition to the academy, he runs his own practice in Cyprus by contributing selected local designs and architectural competitions. He believes the strong intersection between architectural practice and architectural theory. Therefore, his research interests are architectural design process,

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