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ARCHITECTURAL

CONCEPT FORMATION

TRANSMISSION OF KNOWLEDGE
IN THE DESIGN STUDIO
IN RELATION TO TEACHING METHODS

BY

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ABSTRACT

This Thesis explores learning within the context of architectural studio teaching. It focuses on the way in which teaching and learning takes place in discussions on architectural design among tutors, students and visiting critics in the context of the presentation of student work in interim and final reviews. As reviews are based on an oral presentation and discussion of students' work (feedback), their verbal content can be analysed to reveal the structure of architectural learning in the design studio.

Research was undertaken at two separate locations over two consecutive time periods: first, in the late 1980's at the Bartlett School of Architecture, U.C.L. and then in the early 1990's at the School of Architecture and Landscape at the University of Greenwich. The Thesis therefore examines the shift in architectural education that took place in London during the late 1980's and early 1990's . The research involved recording and transcribing into the form of a text, the content of architectural design reviews which took place at both schools. The text was then analysed in terms of its content, form and structure. At the Bartlett, recordings were made of twenty seven reviews from the first, the third,and the diploma year (nine each); at Greenwich, a comparative sample was recorded of nine first year and nine third year reviews. The aim was twofold: a) to examine how the dialogue in reviews and the students' designs progressively matured over the years ; and b) to identify the extent to which the new pedagogy changed the structure of the learning interaction in the design studio.

It was found that reviews at the Bartlett operated mainly at an intellectual/conceptual level, were analytical and focused on the final building design. The participants drew on background knowledge in the form of theory, technology and precedents. These aspects were found to be used implicitly in the design studio. Reviews at Greenwich, which represent the current London educational scene, were found to be more intuitive and experiential. They operated mainly at a visual level and focused on the design process through explicit teaching methods. The creative activity of constructing new design rules in formal/visual architectural terms ('foregrounding') was dominant.

Both educational systems revealed that architectural concepts are formed at the visual and intellectual level simultaneously, by the interaction of the two, despite their different balance (visual/ intellectual) in each pedagogic mode. The clarity of the discussion during the reviews was influenced only by the extent to which the visual/intellectual interaction was explicitly acknowledged as a key component of the teaching method. The Thesis therefore argues that 2-D and 3-D representations are active in initiating architectural cognition, and perhaps it is only these visual representations that are able to initiate 'foregrounding'. At both schools, at all educational levels, the design students decision making was found to remain stable, and architectural concepts progressed from simple to complex, not in a predictable and linear fashion ,but in a circular, iterative process.

Finally, the Thesis questions the existence of the concept of a 'central idea' or 'parti' that brings all the design rules together. Among students this was found to be more of an ideal than a reality, as these rules seem to come together in the form of a 'collage' rather than as a rational structure.

ΓΙΑ ΤΟΝ ΗΛΙΑ

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CHAPTER 1

INTRODUCTION

1. 1 THE DESIGN STUDIO AS A TOPIC FOR RESEARCH

The design studio constitutes the main part of the educational programme in most schools of architecture today. The purpose of the studio in architectural education is to teach architectural design. The students are expected to bring to the design studio a relevant body of theoretical knowledge about their subject, 'architecture', that they acquire in their lecture courses. They are expected to begin using this knowledge to discover a way or a method, by which they can begin to understand and reproduce it. What they learn in the studio is how to 'practice' architecture.

The architectural design studio is organised around briefs, tutorials and reviews. The written brief introduces the project. It usually includes a specific programme for a building or an open question about formulating a brief for a specific site, together with the educational objectives of the project, criteria for assessment, relevant information about the site, timetables, name of tutors, acceptable forms of submission etc.

After the distribution of the brief, tutorials usually follow. During the tutorials, the tutor may demonstrate by drawing some part of the process the students need to learn, in which case he/she gives the students something to imitate. Or he/she may teach the students something about 'practising' architecture, give them specific instructions, offer them criticism and suggest that the students should try various design solutions. In all cases the student is expected to listen, to respond to the suggestions and criticisms and to clarify issues by asking questions.

Apart from attending tutorials, students are also expected to learn by participating in reviews (crit or juries). During reviews students present their projects to a number of tutors and specialists in the presence of their peers. Intermediate reviews take place before the project finishes and provide an input to the design process, whilst final reviews are about the students' finished projects. The tutors and specialists criticise the work presented. The review is intended to be a learning experience. By participating in reviews, students learn how to improve their design concepts and how to present them verbally. They also improve their ability to critically evaluate design work.

Observing the review and tutorial process in several schools of architecture it became apparent, that for most of the time a mismatch exists between what the tutors are saying and what the students understand; and between what the students state as their design objectives during the presentations of their projects and what they actually present. It seems as if only a fraction of the communication that takes place in the studio is articulated explicitly. It was further observed that, most of the time, teaching does not take place in an organised way, nor with the use of an explicit methodology. Things that are not talked about in the studio create an unclear learning environment and may become sources of ambiguity, leaving the students confused. The thesis suggests that the above is due to a paradox that characterises studio teaching.

1.1.1 THE PARADOX OF STUDIO TEACHING

In education it is generally perceived that learning should precede doing, i.e. people have to be taught how to read, before they read, engineers must learn about 'structure', before they resolve their specific structural problems. etc. Students need to acquire theoretical knowledge about their 'subject' first, in order to run experiments or test different hypotheses. Within this educational framework, teaching is primarily theoretical and objective. As a result, teaching content can be analysed into parts and these parts can be transmitted sequentially. Knowledge is obtained primarily in lecture halls and later on tested in laboratories and workshops.

Architectural schools[1] tend to follow the same educational framework .Their courses are split along the polarity of theoretical knowledge, on the one hand, and applied knowledge, on the other. Students follow lectures, and in parallel they have to practice what they learn in the design studio[2] . The rationalistic programme of the lectures seeks to apply the methodology of science to the analysis of architecture. In the lectures, it is assumed, students will first learn the general principles and fundamental bodies of architectural knowledge, which guide and inform all aspects

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1. A research conducted in schools of architecture in USA is very revealing on that front. The basic premise of the model used in the schools of architecture is to view the designer as a regulator and a balance of a dichotomous system of practical and scientific concerns.
see: Kent, F., Spreckelmeyer, C., Domer, E. D., Carswell, W., "Measuring curricular orientation in architectural education", *Journal of Architectural and Planning Research,* 1985, No 2, pp. 99-114

2. Theory and practice split is expressed in professional education as well. On the one hand we have schools that adhere a core of systematic, preferably scientific knowledge which they teach in an orderly progression. On the other hand, there are the studios of the visual arts where students learn to make or perform.
see: Desparats, G., "Knowledge and credibility in architectural education", *JAE,* Vol 29, No 3, February 1976

of design activity. In the design studios, the students are expected to apply this universal information, in order to solve a particular design problem in an intuitive and practical way. So, for example, once the lectures have provided the universal facts and concepts about structural statics and dynamics which hold true for all structural systems, the students in the studios can then invent a particular structural system, which, although perhaps entirely unprecedented, still obeys the universal principles. The lectures provide the basic knowledge, without which design would be random and arbitrary. Theories presented in the lectures are more often 'normative'[3] : they tell the students what to do in order to achieve the best results. Design studios apply this knowledge creatively and make it concrete[4].

The problem with the curriculum organisation outlined above, is that it perceives architecture as primarily scientific, conceptual and objective. What is more, it implicitly assumes that the mind works in two quite distinct and sequential modes. First, the mind is stocked with general knowledge; then, that knowledge is applied in an intuitive way to solve practical problems. In the above curriculum organisation, the production of the mind is what constitutes architecture, while behind this assumption lies the belief, that one must both conceive in order to draw and, conversely, that one cannot conceive by drawing. So visual operation, i.e. 2-D and 3-D representation, is in architecture the result of intellectual operation. This mode of design curriculum perceives learning architecture by 'doing' as an inferior teaching process to 'thinking' about architecture[5].

In reality, however, students very rarely bring to the studio knowledge acquired in lectures, and even more rarely do they use it to design. Students end up learning in the studio how to 'think architecturally' and how to 'practice architecture' simultaneously. In the context of the design studio, 'thinking architecturally' operates primarily at an intellectual level and 'doing' architecture operates primarily at a visual level. Both operations ,'thinking' and 'doing', are expressed in two ways; verbally by texts or by oral presentations, and visually by 2-D and 3-D representations.

If we perceive 'thinking' and 'doing' as two different and antithetical ways of tackling

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3. Rowe, P., Design Thinking, MIT Press, Massah. London, 1987, Chapter 3, 'Normative Positions That Guide Design Thinking'

4. see Gelenter, M., "Reconciling Lectures and Studios", *JAE*, Vol. 41, No 2, Winter 1988, pp. 46-52.

5. Non scientific mode of thinking was always regarded as inferior to making or 'imagining' which was not even allowed as a teaching method inside the walls of the academy. The lowly regarded language which we possess to discuss design/or objects has led to the lack of discursive power of design.
see: Dilnot, C., "Design as a socially significant activity: an introduction", *Design Studies*, Vol. 3, No 3, July 1982, pp. 13-146

architectural learning, then we find ourselves in the middle of a teaching paradox. The problem is not resolved, even if we break 'thinking' about architecture into a set of independently learnable components. The students cannot understand each component individually, until they have experienced each component in the context of the whole by making a model or by producing a drawing. In other words, if the tutor talks about a supporting column, the student has to experience the structure of the whole space in order to understand what the tutor is talking about. The paradox of the architectural studio lies in the fact that the students have to represent a space visually, or use the representation of an already existing space, in order to analyse its parts, and at the same time simultaneously to know the parts of a space in order to represent it visually. Thus, on the one hand, the students cannot initially understand what they need to learn, yet, on the other hand, they can only learn it by beginning to do it.

It appears to be the case, that two very contrasting learning processes exist within the design studio . In the first one 'thinking', precedes 'doing'. In the second one 'doing' i.e. the production of visual representations, precedes 'thinking'. The paradox gives rise to communication difficulties in design studio, and will probably continue to do so, as long as we view 'thinking' and 'doing' as two distinctively different and oppositie modes of architectural expression, and 'thinking' as the only valuable mode for learning architecture.

1.1.2 THE INTERACTIVE MODEL

The teaching process as an interactive activity is described in a systematic way by Schon (1975)[6]. In order to make sense of what the designers actually do, he gives a description of the design process ,which he calls 'reflection-in-action'. Schon argues that the transmission in a design studio does indeed take place in two distinct ways : by telling and listening (verbal) and by demonstrating and imitating (visual). In his view, this results from the fact that architecture has been primarily a craft. It was learned through the apprenticeship system and possessed no systematic theory of its own. One of the most important characteristics of craft knowledge, according to Schon, is transmission by demonstration, and the major part of the design studio paradox which was referred to earlier, can only be understood against the background of this craft knowledge.

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6. Schon, D., *The Design Studio An Exploration of its Traditions and Potentials*, RIBA Publications LTD, London 1975.
Schon, D. "The Architectural Studio as an Exemplar of Education for Reflection - In- Action", *JAE*, Vol. 38, No 1, Fall 1984
Schon, D., "Problems, Frames, and Perspectives on Designing", *Design Studies*, Vol. 5, Num. 3, July 1984

Yet, is it really the case that the design studio paradox is so inflexible, i.e. are the two different modes of approaching architectural learning, 'thinking' and 'doing', actually operating in distinctively different and oppositional modes? In what follows, it will be argued that intellectual and visual operations i.e. 'thinking' and 'doing' may, under well-defined circumstances, take place in parallel in the design studio. As a consequence, we have in the studio a number of parallel knowledge inputs, each of which has its own structure that may stand in a closed relationship with the others, but which results in the transmission of a design approach through the production of 2-D and 3-D representations in a day-to-day interaction. This mode of teaching and learning does not require that intellectual and visual operations be contrasted with one another, but looks at them as two parallel and equally valid ways of acquiring architectural knowledge.

This approach does not require that intellectual and visual operations be seen respectively as major and minor contributors to learning about architecture, but rather that they seem to function in equally valuable but different ways. On the one hand 'doing', i.e. producing models and drawings, is a kind of 'bricolage'[7]. The process of learning is pre-structured by an already existing set made up of tools and materials, which the student is invited to re-structure to solve a problem. The student engages in a sort of dialogue with them, and tries to explore the possible answers that the whole set can offer to the problem. The student experiences 'doing' through drawing and modelling by fitting together already existing techniques of representation, and by creating new ones. At the same time he/she begins to 'think' architecturally by making classifications, analysing parts to offer a new interpretation, or explaining the problem in hand. Architecture creates its means and results in the form of 2-D and 3-D representations, due to the structures that it is constantly elaborating and which are its hypothesis and theories.

When we re-consider architecture in this new light, it becomes clear, that making a division between 'thinking' and 'doing' in the architectural studio fails to recognise the role of 'doing' in architectural thought and the role of 'thinking' in visual operations.

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7. The words 'bricoleur' and 'bricollage' are borrowed from :
Levi-Strauss, C., *The Savage Mind*, Wedenfeld and Nicolson, London 1989, Chapter I, "The science of the concrete" pp. 1-35. There is an analogy between theory and praxis and between what Claud Levi-Strauss names scientific and magical or artistic thought. For Claude Levi-Strauss the difference between art created by experience and events and science, is that art postulates a complete and all-embracing determinism. Science, on the other hand, is based on a distinction between levels. The 'artist' is somebody that makes experience concrete, brings experience and events together by the technique of 'bricollage'. Thus he becomes a 'bricoleur' in opposition to the scientist that explains events by analysing them.

Both functions, 'thinking' and 'doing', can be seen as aspects of the design process[8]. We can hypothesise, that the architect 'scientist' creates drawings by means of ideas, and the architect 'bricoleur' creates ideas by means of drawings. The paradox of the design studio is resolved, if it is acknowledged that architectural learning occurs equally through intellectual and visual operations, and that the architect is simultaneously both a 'scientist' and a 'bricoleur'. The architect by his craftsmanship constructs a material object that is also an object of knowledge. This thesis therefore proposes an interactive model of learning that reconciles theory and praxis in the context of design studio teaching.

1. 2 RESEARCH QUESTION AND STRATEGY

From this starting point, the thesis sets out to explore how learning occurs and develops in the design studio; more specifically, it examines the structure of intellectual and visual operations and their role within the learning context of design studio. We have already stated, that for some, architectural 'thinking' functions mainly at an intellectual level, and 'doing' functions mainly at a visual level. Within design studio, evidence of thinking and doing is normally expressed both verbally and visually.

- According to Schon [9]., verbal and visual expressions are parallel ways of communicating design ideas in the studio, and together they make up the 'design language'[10]. Schon did not research the structure of the design language, nor its function in a learning environment. His presentation of the design language remains at a descriptive level.

To reveal how learning occurs in the design studio, this research will address the structure of the verbal expression of the design language i.e. the components, and contents of the verbal communication that takes place in the studio, and the way these relate to one other. The principal research task is to provide a clear record of how the verbal component of design language records communication, learning and understanding about architecture. This thesis will also address the teaching methods

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8. Colquhoun, A., "Rationalism: A philosophical Concept In Architecture", *Modernity and the Classical Tradition*, MIT Press, 1991 p.p.58 - 59. For Colquhoun the conflict between these functions form the base of the empiricism /rationalism or intuitive/scientific conflict. The conflict between rationalism and empiricism is expressed by the conflict of two different concepts of knowledge that define it as a priori or a posteriori. To the extend that knowledge is held to be a priori, empirical knowledge appears to be random, unfounded, and subject to contingency. A priori reason is confirmed by empirical experience and by sensation. To the extend that knowledge is held to be a posteriori, a priori (empirical) knowledge becomes unsure and dependent on authority, received ideas or habit.

9. op. cit. Schon, D., (1975)

10. op. cit. The model is borrowed by Donald Schon(1975).

through which learning occurs in the design studio, and the way that mental and visual operations are structured within that learning context.

It is worth mentioning here, that the study of the visual expression of the design language could be very enriching for the research, but would demand the use of a completely different set of analytical tools to the ones adopted here. To bring two completely different research methodologies together would make the analytical task very complex and laborious, and is beyond the scope of the present thesis. However, it is acknowledged that an analysis of the visual expression of the design language might prove an equally fruitful line of enquiry to further explore learning in the context of the design studio.

This research[11] will, however, focus on learning development as evidenced through the development of verbal expression, since this is perceived to be particularly important in the context of studio teaching, where the discussion of architectural ideas is a major contributor to an ongoing process of teaching and learning. An analysis of the language used to discuss ideas in the studio might, for example, clarify any learning similarities and differences that exist between the first year and diploma studios. One of the objectives of developmental research is to understand the cognitive processes that are involved in students' learning, as they gradually become more experienced designers. The research could therefore potentially have immediate educational implications on studio programmes, setting, teaching methods etc.

The developmental aspect of the research will take two forms:

1. A micro level, where we examine the development of the design language within a single architectural school at a particular time, the late 1980's, across its different educational levels, I. e. first year, to third year, to diploma. This will be referred to as the synchronic phase of the research.
2. A macro- level , where we examine the more general development and trends in architectural education over a period of time, from the late 1980's to the 1990's, between two different schools. This will be referred to as the diachronic phase of the research.

The field work is organised around case studies of architectural reviews, which were recorded in full as they actually took place. Reviews (interim, final) were chosen in preference to the tutorial situation because, in reviews, both tutors and students are

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11. For a complete description of research methods used in education see:
Cohen, L., Manlon, L., *Research Methods in Education*, Routledge, London 1989

forced to be verbally more explicit than in an ordinary tutorial , and to explain their initiatives verbally. The problem of 'missing data' therefore is less present in reviews than in tutorials, since a great deal of the visual material, about which conversation takes place, is required to be translated into words. Furthermore, the implicit design process that takes place, has also to be expressed during a review presentation. The study of a sequence of student cohorts, provides the opportunity of seeing, how the verbal part of the design language is transformed from the first year to the third year, and on to the diploma, in its content and in its structure. Thus, the aim is to reveal, how student communication is progressively structured and transformed, from the first year to the interim degree stage and finally to the diploma.

Each review, comprising the student presentation and the subsequent conversation that ensues amongst all the participants about the work, is perceived as a case study for analysis. The role of a non- participant observer is adopted during the reviews . The reviews were recorded and later on , transcribed at full length and transformed into a text. The purpose of such observation and transcription is to achieve a deeper understanding of the case study under examination. The collection of texts which result from transcribing the case studies will be subjected to a linguistic analysis, to identify the nature and substance of the knowledge, which is being communicated through the medium of the spoken word. The linguistic analysis takes place at a number of levels, looking first at the surface characteristics of the text, in order to classify it into its content or architectural domains, and then at a deeper level, examining how these domains are structured in relation to one another as the sequence of the text (i.e., the sequence of the verbal presentation) unfolds.

1.2.1 ADDITIONAL RESEARCH QUESTIONS RAISED BY THE FIELD WORK

Initially the Bartlett School of Architecture was chosen for the field work. It was the most accessible location in which to pursue the research and, in addition, it was one of the major architectural schools in London. The Bartlett field work was completed between the academic years 1987-1989. During the interval which ensued between gathering the primary data and completing a linguistic analysis of its contents, the scene of architectural education in London changed dramatically. The Bartlett itself was transformed not only in terms of its curriculum orientation, but also at the level of how the studio teaching was organised and conducted. A second, more recent field study was therefore undertaken at the Greenwich School of Architecture and Landscape, in the hope of shedding some light upon the way that this shift may have affected the forms in which knowledge was communicated in the design studio.

The Greenwich School belongs to the same contemporary educational scene that is shared by most London schools including the Bartlett. Being part of the teaching team at Greenwich, the author had the opportunity for more focused observation. The data from the Greenwich School were collected during the academic year 1993-94. There is therefore a five year gap between the two periods of field work.

The Bartlett field work was more extensive, covering both undergraduate and postgraduate education. It offered the opportunity to formulate and test the method of analysis in depth. The Greenwich field work concentrated on undergraduate education, whilst adding a comparative dimension to the research and affording insights into more recent developments in the London educational scene.

In the initial research phase at the Bartlett, tutorials and reviews (interim and final) within the Bartlett were treated as separate modes of learning in the context of the design studios. Students received regular individual or small group tutorials on their work, and came together for more formal and larger reviews at which the work was evaluated and assessed. Students were grouped by year, and sub-divided into tutorial groups, which rotated amongst a team of year tutors led by a year co-ordinator. Each academic year was divided into three terms. Each term was further sub-divided into a sequence of design projects of different intensitiy and duration, which presented a continuation of learning up to and including the diploma in architecture. Projects were highly individualistic, usually the product of one student. There was an explicit hierarchy of complexity in the programmes which were set. The first year programmes were more straightforward, more descriptive and smaller in scale than the second year ones, and so on, up to the diploma projects, which were deemed to be the most complex and demanding of all.

The educational assumption was that learning to design is a cumulative process which progresses from simple to complex tasks. The view was that different types and scales of project presented different levels of difficulty, offering to the students a hierarchy of simple to complex problems to resolve. There was an assumed linear development within the sequence of projects , and an assumed level of complexity of each task in relation to its 'thematic' and 'programmatic'[12] issues I.e. from an information stand in the first year to a housing complex in the third year. The educational approach might be considered rationalistic.

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12. 'Theme' in relation to the content of the brief and 'programme' in relation to the specific size, and functional requirements of the under design building.

The academic year at Greenwich University was divided in two semesters. The Greenwich field work also focused on reviews , but it related only to a specific thematic programme that ran in parallel in the first and third year studio in the second semester of the academic year 1993/94. Like the Bartlett, the large year cohorts at Greenwich were broken up into smaller tutorial groups, however, a major difference was that each group, led by one or two tutors, took a distinctive approach to the programme. Thus ,although each group tackled the same general brief, the teaching methods and the final outcomes were very different between tutorial groups. Reviews were used to highlight this diversity, to sensitise students to it, and to invite them to position themselves in relation to it. The division between teaching by tutorials and teaching by impromptu 'show and tell' type informal review, was also less marked, so that the more formal 'official' reviews were more a part of a continuous learning process.

The idea of introducing the same 'theme' to students at different educational levels , and sometimes even teaching them together within the structure of a 'unit', belongs to the new educational scene. It seems to be the result of a shift from a more 'realistic' approach to design, to a more 'open' and intuitive approach, where 'experiencing' takes the leading role. The teaching method aims to stimulate creativity by introducing into the studio projects, a range of non-architectural issues, such as film, sound, objects etc. for the students to explore and translate into an architectural space. The 'theme' of the project (not the programme) thus acquires an importance, not in terms of its assumed level of complexity, but at the level of metaphor. As a consequence, a theme may be introduced simultaneously at any educational level, and educationally it is intended to work in a cyclical, repetitive way.

It is envisaged that the comparison between the Bartlett and Greenwich data will afford insights into the transformations and changes that took place in the design studios, as the educational scene evolved in London during the period, when the research was being conducted. It will illustrate, how learning occurred and developed within design studios that belonged to two distinctively different educational milieus. Strong inferences can be drawn from any changes which are identified in the nature and content of the architectural conversations at reviews to the forms of architectural knowledge which lie at the heart of each teaching mode.

The presentation of the case studies from the Bartlett and Greenwich will first focus on how reviews are conducted in each institution through the sequence of academic years ,and a comparison will then be made between the forms of studio communication employed in the first and third years respectively at both schools . The

inclusion of the Bartlett diploma data will offer the opportunity for some additional observations on postgraduate architectural education.

1. 3 THE STRUCTURE OF THE THESIS

The thesis is organised in three parts.:

- The first part (Chapters 1 and 2) clarifies the research question, defines the field work and presents the different approaches that exist with respect to the 'nature' of architectural 'thinking', and teaching in the design studio.
- The second part (Chapters 3 to 8 inclusive) describes the method of analysis and presents the analysis of forty five case studies (27 from the Bartlett and 18 from Greenwich) in order to search for, identify and understand the structure of design language.
- The third part (chapter 9) summarises the research findings and draws general conclusions in relation to the function of the interactive learning model within the context of the design studio, and the role of visual operations within it.

<u>Summary of Chapters:</u>

The following paragraphs present a summary of the chapters in this thesis::

Chapter 1: INTRODUCTION

The design studio as a learning environment seems to be characterised by communication discrepancies, due to a teaching paradox: in order for the students to learn to design, on the one hand, they have to 'think' first and then 'do' whilst, on the other hand, they have to 'do' first and then 'think'. The paradox has created, and will continue to create, communication difficulties, as long as 'thinking' and 'doing' are perceived as oppositional modes of learning to design i.e. the students have to conceive to design and cannot design to conceive. The thesis puts forward an interactive learning model, within which intellectual (thinking) and visual (doing) operations are deemed to be equally valuable for design teaching. It is proposed that studio communication takes place at two levels, verbal and visual, and that together they make up the design language (D. Schon). In order to examine the way that learning occurs and develops in the design studio, the thesis sets out to explore the structure of the verbal part of design communication i.e. design language, its contents, its method of transmission and its acquisition. Research was undertaken over two consecutive periods: first at the Bartlett School of Architecture, U.C.L. and then at the School of Architecture and Landscape at the University of Greenwich. The thesis also examines the shift in architectural education that took place during the late 1980s

and the 1990s in London in the context of studio teaching. The research involved recording and transcribing in text form reviews (1st and 3rd year at both schools and diploma at the Bartlett)) which took place in both schools.

Chapter 2 : THE DESIGN PROCESS

The second chapter is split into three parts that cover : a) the nature of architectural 'thinking'and creativity; b) architectural cognition and finally c) a review of the teaching methods used within the context of design studio. The chapter establishes an understanding of the design process. Architectural 'thinking' and creativity are examined as two different modes of dealing with the design process. Two different learning approaches are then discussed relat6ed to architectural cognition,: i) the analysis-synthesis and ii) the concept-test models. It is suggested, that both these approaches operate within the 'scientific' paradigm, where conception precedes doing, without really taking into consideration the learning implications of 'doing' within the design studio. In parallel to the above approaches, a more interactive understanding of architectural cognition is presented. Teaching methods are then classified into predominantly 'intellectual' and 'visual' ones. The functionalistic approach of the modern movement, which introduces the 'form follows function' doctrine into the studios, is then examined and contrasted with the educational approach that seeks to use rules of composition, in an attempt to intellectualise the design process, by offering to the students formal rules of composition. However, a typological approach, in addition to proposing analytic rules, also offers students the possibility of 'doing' by imitation .It is proposed that all practical studio teaching methods ,at least the explicit ones, are about the interaction of intellectual and visual operations. It is suggested that the educational approaches of the Bauhaus 'Vorkurs' and of the Russian Constructivists seem to be precedents within design education, which equally value learning by 'doing' and learning by 'thinking'. The current situation of studio teaching is also characterised by a more interactive 'intellectual' and 'visual' learning approach, where "intellectual' and 'visual' operations are equally involved in the design process.

Chapter 3 : METHOD OF ANALYSIS

This chapter presents the method by which the case studies will be analysed and is split into two sections. The first section relates to the content analysis of the text; it presents the method by which the text is subdivided in smaller conceptual units (design domains); furthermore, it discusses, the main architectural categories used within the architectural discourse, i.e. function, form, space and meaning. These categories then form the background vocabulary upon which, the contents of the text are classified. The second section of the chapter concerns the structure of the

text. The research aims to uncover the structure of the studio communication with a structuralist, semiotic method .The chosen multi-layered text analysis is based partly on Hjemslev's model of expression and content, and partly on Benvenist's concepts of integration and dissociation that allow the interaction between the different levels of analysis to take place. The first analytical level deals with the materiality of design language, its expression form (intellectual/visual components) and its expression substance (complementary spatial relationships). The second level deals with architectural cognition, its content form (verbal expression i.e. conditional propositions that set up design rules) and its content substance (in relation to intellectual and visual learning operations). The form of the design language identifies its intellectual and visual elements, whilst the substance of the design language describes the function of the intellectual and visual components and their interface within architectural cognition.

Chapter 4 : THE CONTENT OF THE DISCOURSE.

The chapter describes the content of the design language. It deals with the classification of design domains and their quantitative presence in the case studies. Each case study is briefly discussed with regard to its content. Three broad categories are allocated to design domains; namely transmission domains, architectural domains and extra-architectural domains. Content analysis reveals that Process Representation and Extra-architectural Domains are much used in the new educational scene (Greenwich) in comparison to the old one (Bartlett). However, the content of the design language develops in the same way in both paradigms, from being simple and mainly formal in the first year, to becoming more complex and diverse in the third year. Domains exist that have a minimum presence in the discourse i.e. Criticism, Style, Building Type, and it is argued that this is indicative of a non-transmission, or of an implicit transmission, of these aspects of architecture.

Chapter 5: THE VISUAL AND INTELLECTUAL FORM OF THE DISCOURSE

The chapter presents the expression form (Hjemslev) of design language within the studio i.e. the form of design domains, in order to reveal the intellectual and visual components of the communication. Through this level of analysis, it becomes clear that all design domains have intellectual and visual qualities. The difference between design domains lies in the dominance of the intellectual quality over the visual, or vice-versa, in relation to their main characteristics and the way they are used and communicated. Visual or mainly visually used domains are the domains of Architectural Elements and Context. Intellectual, or mainly intellectually used, are the domains of Programme Use and Abstract Notions. The chapter concludes that, on a macro level, the expression form of the discourse remains the same in both schools,

across the years, i.e. the balance between the intellectual and verbal components of design language is quite stable throughout the discourse.

Chapter 6 : THE MATERIAL FUNCTION OF THE DISCOURSE

This chapter presents the complementary relationships of design domains, that is, the expression substance (Hjemslev) of design language . This analytical level deals with sequences and boundaries of the domains, it deals with the syntagmatic plane. Two types of complementary relationships are discovered through the text analysis; the spatial and the transmission relationships. The analysis indicates that the Greenwich discourse has more complementary relationships than the Bartlett discourse. The syntagmatic plane of the Greenwich discourse involves mainly the domain of space form , whilst that of the Bartlett involves mainly the domains of substance (function/programme). The juxtaposition of the intellectual/visual form and the material function of the discourse reveals, that the design domains that are transmitted for their visual qualities or through their visual qualities ,are the main participants of the syntagmatic plane. The syntagmatic plane appears to be mainly constituted by visual/spatial relationships of combination.

Chapter 7 : THE VERBAL EXPRESSION OF THE DISCOURSE

This chapter presents the content form, the means by which design domains are verbally expressed in the text. Design domains can be descriptive, factual, conditional, or relating to the process of designing. The chapter focuses on the conditional propositions and on the design process, which set up the 'themes' and the 'rules' and describe the development of each individual project. The analysis reveals that the discourse uses the same verbal expression at all educational levels and across the schools in relation to conditional propositions. This suggests that design choices and decisions are made equally at all educational levels by the students. The main difference between the two schools lies in the explicitness of the design process. At the Bartlett, the process remains implicit (diploma being the only exception), in contrast to Greenwich, where the design process becomes explicit and equally important as the design rules set out by the students. The chapter concludes with a comparative discussion between the visual/intellectual form, the material function and the verbal expression of the discourse. This comparison implies that the way design is communicated within the studio has almost the same intellectual and visual clarity across educational levels. Explicitness is not an issue that is acquired through developmental learning; iin other words, a priori first years express themselves more clearly and diploma less so, or vice versa, albeit through the use of a design process that takes on board the intellectual and visual interaction.

Chapter 8 : THE COGNITIVE FUNCTION OF THE DISCOURSE

This chapter presents the relationships of functional contrast (opposition and similarity)that the different design domains enter into. It therefore addresses intellectual relationships, the systematic plane. It offers a deeper understanding of the operation of the design language at the level of cognition, and an insight into the design language development between the first and the third years. The chapter is split in two parts. The first part (micro level) focuses on the analysis of four case studies from each year and school. These form the basic framework for discussion. The second part deals with three different structural issues of the discourse. The first issue looks into the participation of design domains in intellectual relationships. The juxtaposition of the intellectual/visual qualities of design domains and their participation in forming visual or intellectual relationship reveals their operation within the process of 'back grounding' and 'fore grounding'. The second issue looks into the development of simple/complex and endostructural(intellectual)/ exostructural(visual) relationships in the design discourse; it looks into the development of architectural cognition. The analysis reveals that the design language advances from simple to complex relationships of similarity (first to third year). Endostructural (intellectual) relationships are found to be dominant in the Bartlett discourse and exostructural (visual) relationships are dominant in the Greenwich discourse. Finally, the third issue examines the initial design 'themes' and the structure of design 'rules' used in the case studies. The analysis indicates that exostructural (visual) rules are used in a transformational way and that endostructural rules in an analytical way. Exostructural (visual) and endostructural (intellectual) rules co-exist in a project and they do not relate or they relate in a complementary or oppositional way . This questions the existence of a 'central idea' or 'parti' within a project.

Chapter 9 : TOWARDS A THEORY OF COGNITION IN DESIGN STUDIO
DISCUSSION AND CONCLUSIONS

The last chapter offers an interpretation of architectural cognition based on the research results. The importance of visual operations and the role of representation within the studio learning environment is stressed. It is proposed that the intellectual and visual parts of the design language are equally important facets of learning, and through their interaction, architectural concept formation becomes possible. The research implies that architectural cognition develops from simple to complex concepts through the interaction of exostructural (visual) and endostructural (intellectual) rules. The development takes place in a spiral way, it is not linear. Background knowledge and 'foregrounding' are put forward as very important operations within architectural cognition. The use of visual inputs - i.e. 'primary' types - in a project is seen as crucial for the beginnings of architectural education. It is

proposed that the visual inputs are of a very different quality within the two educational paradigms . Precedents are mainly providing the visual stimulus at the Bartlett, but extra-architectural objects are used at Greenwich. Visual inputs are treated implicitly in the Bartlett, arguably due to its Modern Movement inheritance, and explicitly at Greenwich, possibly due to the experiential approach that stresses the design process. For the same reasons ,the studio communication at Greenwich is verbally more explicit than at the Bartlett. The presence or absence of a 'central idea' within a studio project is discussed. In conclusion, certain issues are outlined for further research.

CHAPTER 2

THE DESIGN PROCESS

2.1 INTRODUCTION

In design studio students learn how to design, how to produce a final product i.e. a building. They learn about the design process. The design process is considered as a learning process as, in the course of designing the student gains an understanding of the problem, its solution and their relationship. The design process includes all the mental and visual operations that lead to the design of a spatial proposition. In this chapter architectural 'thinking', architectural cognition and teaching methods will be examined as part of the design process. The explicit presentation of teaching methods in the design studio via textbooks and architectural treatises has a long history. The study of the design process as an operation in its own right and not necessarily as a teaching tool developed more intensely only in the past few decades.

In architecture, 'thinking' is generally perceived as more valid than 'doing' or 'experiencing'. But as we have already indicated, just the mere positioning of 'thinking' as superior against creative 'doing' generates unresolvable paradoxes (theory/practice, science/art) within the architectural discipline and within the studio environment. In the past few decades the paradox within the context of the design process has been expressed mainly as 'thinking' versus 'creativity'. Several attempts were and are made for the reconciliation of this split.

On the level of architectural cognition two different learning approaches will be discussed, these being the analysis-synthesis and the concept-test models. Both approaches operate under the scientific paradigm, where 'thinking' precedes 'doing', without really taking into consideration the learning implications of 'doing' within the design studio. Parallel to the above theories, we have the appearance of approaches that try to establish a different and more interactive understanding of architectural cognition.

Theories about the design process and architectural cognition differ from the teaching praxis. While in architectural theory visual operations and their contribution to the design process and architectural cognition are very rarely mentioned , in the history of

studio teaching methods visual operations are present most of the times. In what follows, teaching methods are classified into predominantly 'intellectual' and 'visual' ones. Explicit teaching methods are shown to be the ones that involve the interaction of intellectual and visual operations . It is argued that the functionalistic approach of the modern movement, being mainly intellectual, introduces the 'form follows function' doctrine into the studios. It is argued that rules of composition are an attempt to intellectualise the design process by offering the students formal design rules. Typology on the other hand in parallel with analytical rules, offers the choice of 'doing' by imitation. The educational approach of Bauhaus 'Vorkurs' along the Russians Constructivists is singled out as the only one to equally value learning by 'doing' and learning by 'thinking'. It is suggested that this approach has been largely ignored within architectural education as it was always perceived as relating mainly to 'art' and not to 'architectural' teaching. In conclusion, it is suggested that the current situation of studio teaching is characterised by both 'intellectual' and 'visual' learning approaches.

The chapter is split into the three following parts : the nature of architectural 'thinking'. and 'creativity'; architectural cognition; and a review of the teaching methods used within the context of the design studio. The chapter establishes an understanding of the position that visual operations achieved up to now within the context of the architectural studio.

2. 2 ARCHITECTURAL 'THINKING' VERSUS CREATIVITY

To 'think' about architecture, to intellectualise about it, was always perceived as very different to experiencing or 'doing' architecture. Sometimes 'thinking' was perceived as opposing experiencing. This basic dichotomy within architectural discourse was always expressed by several polarities I. e. theory- praxis, science- art, intellectual-creative. The first part of these polarities I.e. theory/science was always easy to define, explain and classify as it was by definition analytical. The second part was more difficult to describe as it was connected with social praxis, with the expression of the self, and with tacit operations[1].

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[1]. The above dichotomy is not characterising only architectural knowledge but other disciplines as well. For example Jamous, H., Peloille, B.,[1] introduced the indetermination /technicality (I/T) ratio for the transmission of medical knowledge. For them the (I/T) ratio expresses the possibility of transmitting, by means of apprenticeship the mastery of intellectual or material instruments used to achieve a given result. This makes it possible to appreciate limits of this transmissibility I.e. the part played in the production process by 'means' that can be mastered and communicated in the form of rules (T), in proportion to the 'means' that escape rules and at a given historical moment are attributed to virtualities of producers (I). It can in theory characterise any given process of production. Most of the times the attempt at rationality and

In his classic treatise on the human mind Ryle G., [2] observes that 'thinking' is a polymorpous concept. 'Thinking' can embrace many different kinds of activity which may have little in common. The most well used division is that between 'reasoning' and 'imagining'. When 'reasoning' the individual is said to carry out mental operation within some coherent symbolic system. When 'imagining' the individual is said to draw from his own experience, combining material in a relatively unstructured and perhaps aimless way. Scientific thought is normally perceived as intellectual. Artistic and creative thought are normally considered imaginative. The two modes of architectural expression i.e. intellectual and creative are closely connected with two different approaches to the design process. The 'intellectual' approach is perceived as explicit thinking, while the alternative 'creative' approach is perceived as tacit and not identifiable.

2. 2. 1 ARCHITECTURAL 'THINKING'

Architectural 'thinking' relates to intellectual processes. In architectural 'thinking' the object comes before the subject and one must conceive in order to make. Architectural 'thinking' is then perceived as superior to intuition because it is analytical. Under this rational approach architecture as a discipline needs to be intellectualised. For Dilnot C.[3] the real separation is not between 'thinking' and 'intuition', but between literacy and numeracy accepted as academic disciplines or areas of research of social and above all, cultural value, and the world of making or 'imagining' which is given a non cultural status. The thin and lowly regarded language which we possess to discuss design process or complex cognitive practical activities involved in design, has led to an absence of discursive power of design. In order for architecture to claim an intellectual status within academia it needs its own 'theory'. This has never been an easy task as architectural 'thinking' has an obstacle to overcome; the craft tradition of architecture.

In architectural practice there has always been a fundamental absence of a theoretical tradition. Mainly as a result of this absence architecture has been incapable not only of sustaining any unity between theory and practice but also in

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the emphasising of indetermination are in opposition to each other. Jamous, H., Peloille, B. "Changes in the French University Hospital System", in *Professions and Professionalisation*, ed. by Jackson, A. J. , Cambridge University Press, Cambridge 1970, pp. 112-117

2. Ryle, G., *The Concept of Mind*, publ. by Penguin Books, London 1986, first published by Hutchinson in 1949.

3. Dilnot, C., "Design as a socially significant activity: an introduction", *Design Studies*, Vol. 3, No 3, July 1982, pp. 13-146

recognising this incapability[4]. One of the most important characteristics of craft knowledge is transmission by demonstration. This carries with it an inability for its knowledge to be recognised as an organised autonomous system. For Heath, T.,[5] craft knowledge is operative knowledge (knowing how rather than knowing what). A feature of all operative thought is that the thinker is a prisoner of the system of behaviour, unable to stand outside it, to take an overview, to make it figurative, and thus to analyse it into its parts and distinguish their systematic connections. Because of this inability architecture was forced to borrow theoretical concepts from other disciplines.

Under this frame of thinking two directions exist in relation to the intellectualisation of the design process. The first refers to the direct use of scientific models . In this mode of thought it is usually argued that the social sciences to which architecture belong , can only be put upon a proper footing by drawing upon the natural sciences and towards mathematisation. This leads to an instrumental problem-solving and to a 'rationalisation' of the design process. The values of 'design' science are deemed to be rooted in the notions of objectivity, rationality and universalism that are believed to constitute the 'scientific' ways of seeing the world. The use of computing, analytical mathematical models,and epistemological paradigms for the design process are indicative outcomes of this 'rationalisation'. Simon H. A.[6] outlines a series of elements - that would embody the science of design, a body of 'intellectually tough, analytic teachable doctrine about the design process' . The 'rational' approach to the design process characterised mainly the so called 'first generation'[7] of design methods. These methods were mainly analytical and failed to recognise that design is not only an analytical but a constructive activity as well. Having come under attack from their own leading figures Alexander, C.[8] and Jones, C[9]. in the early seventies,. they entered

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4. Hirst, P., distingulshes two forms of knowledge; (1) the distinct disciplines or forms of knowledge I. e. mathematics, physical sciences etc. (2) the fields of knowledge, theoretical or practical. These fields are formed by building together round specific objects or phenomena knowledge that is characteristically rooted elsewhere in more than one discipline. see: Hirst, H. P., "Liberal education and the nature of knowledge" publ. in *Philosophical Analysis and Education*, edit by Archambault, R. D., Routledge and Kegan Paul, London 1965

5. Heath, T., *Method in Architecture*, publ. John Wiley and Sons, London 1984, p.29

6. Simon, H.A., *The Sciences of the Artificial*, MIT Press, Cambridge, MA, USA 1969

7. For the history of design methods see:
Broadbent, G., "The development of design methods - A review", In *Design Methods @ Theories*, No 1, Jan-March 1979, p.p. 41-45
Cross, N., "The coming of post-industrial design", In *Design Methods*, Vol. 2, No 1 p.p. 3-8
Nasar, L. J., "Third generation design methods" In *Design Method and Theories*, Vol. 14, No 2, Apr/Jun 1980, p.p.90-92

8. Alexander, C., "The state of the art in design methods" In *Design Research and Methods*, Vol. &, No 2, pp. 133-135, "I have dissociated myself from the field...there so little in what is called 'design methods' that has nothing useful to say about how to design buildings that was not said before".

9. Jones, J. C. "How thoughts about design methods changed during the years" In *Design Methods and Theories*, Vol. 11, No1, pp.48-62, " In the seventies I reacted against design methods, I disliked the machine language, the behaviourism, the continual attempt to fix the

into a phase that was named the 'second generation design methods'. For Cross, N.[10] second generation methods were characterised as assuming a more equal distribution of knowledge about the problem, embodying an argumentative process and casting the designer in a more participatory role. Clearly this generation of methods was strongly influenced by design participation which was prevalent in the seventies. But the changes were not strong enough to question the 'scientific' paradigm. As in all direct and uncritical borrowings, the whole enterprise of design methods can be interpreted as a formal technology transfer and in many cases nothing more than borrowing of a vocabulary. The problem lies in that the disciplines and sciences to which references are made would themselves need to be questioned; there is no guarantee that these 'external' aids possess the way out of architectural problems [11]. In order to argue this point Ocathain C.[12] uses the ideas of Feyerabent that claims that science has always been much more 'sloppy' and 'irrational' than its methodological image. For Ocathain to suppress architects and student's tacit skills by pointing to scientifical methods and modes of thought, is to refer the problem of design to criteria that have little basis even in science itself.

The second direction for the intellectualisation of the design process relates to the use of analogies. Within this realm, concept borrowing is not direct but metaphoric and it allows for a diversity of interpretations. In the history of twentieth century architecture, biological and mechanical analogies were followed by a linguistic analogy[13]. The aim of these analogies was as with the scientific paradigm to rationalise architectural activities. The biological and mechanical analogies are closely related to functionalism[14] and the linguistic analogy to more recent developments in critical theory i.e. post-modernism and deconstruction. Within the linguistic analogy the architectural object is perceived as a language and architecture as a manipulation of the grammar and the syntax of this language. Thus architecture, for example, in certain cases becomes a selected vocabulary of architectural elements unrelated to any exterior reference, with their oppositions, contrast and redistribution[15]. The link of the analogies to the design process is not as direct as the scientific one, but it is equally

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whole of life into a logical framework"

10. op. cit. Cross, N., " The coming....", p. 4.

11. Cross, N., Naughton, J., Walker, D., "Design Method and Scientific Method" in Design Method, Vol. 2, No4, October 1981, p.p. 125-201
In this article epistemology is criticised (Popper, Kuhn, Lacatos, Feyerabent) as facing internal validity problems.

12. Ocathain, S. C. "Why is design logically impossible?" in *Design Studies*, Vol. 2, No 3, July 1982, p.p. 123-125. Ocathain refers to Feyerabent's book *Against Method*, New Left Books, London 1975

13. Collins, P., *Changing Ideals in Modern Architecture 1750-1950*, publ. by Faber @ Faber, London 1965. Collins presents an overview of these three analogies.

14. De Zurko, E., *Origins of Functionalist Theory*, Columbia University Press, New York 1957

15. Eisenmann, P., is the main exponent of this trend. His influence in relation to design process is going to be discussed later.

influential and the mode that is most usually associated with studio teaching methods , as we will see later in this chapter.

2. 2. 2 CREATIVE 'THINKING'

Creative 'thinking' is perceived as being mainly tacit and subjective in opposition to the objective and intellectual thinking that we have just discussed. Polanyi, M.[16] , argues that we know more than we can tell. Most of our everyday knowledge cannot be put into words and this is true for our entire knowledge base. Also, he claims that the identification of tacit knowing with 'indwelling' i.e. experiencing, brings home to us that it is not by looking at things, but by dwelling in them, that we understand their joint meaning. For Hirst, P.[17], all knowledge involves the use of symbols and the making of judgements in ways that cannot be expressed in words and can only be learnt in a tradition. Acquiring knowledge of a form is therefore to a greater or lesser extent something that cannot be done simply by the solitary study of the symbolic expressions of knowledge, it must be learnt from the master on the job . Extreme proponent of this position, Abel, C.[18], totally rejects an explicit approach to the design process. For him complete explicit knowledge of design is neither attainable nor even desirable. On the contrary complete explicit knowledge is not a necessary criterion for either the learning or practice of architecture. Abel uses Polanyi's approach in justifying his stress on the non- explicit transmission of architectural knowledge. After all, he claims, although principles and rules of architectural design are very rarely made explicit, yet somehow the student usually emerges with sufficient knowledge and skill to produce a project.

The tacit design process is connected with the creative operations within design. Creativity[19] is understood as a dynamic process through time that leads to the transformation of established conventions and habitual ways of experience. For Schoon I., [20] creativity is generally viewed in three distinct ways; in the person-based approach creativity is considered as an ability that you either have or do not have, which can be identified through the use of standardised creativity tests; in the product based approach it is held that theoretical assumptions about creativity have to be

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16. Polanyi, M., *The Tacit Dimension*, Routledge And Kegan Paul Ltd, London 1967.
17. op. cit. p. Hirst, P., (1965) 129
18. Abel, Ch., "Function of tacit knowing in learning to design", in *Design Studies*, Vol. 2, No 4, October 1981, p.p. 209-214
19. Heath, T., "Creativity of design systems in architecture" in *AAQ*, Vol.3, No2, April-July 1971, p.p. 4-9. For Heath creativity is part of the Romantic movement and makes its first appearance in the beginning of the 19th century via poetry. Heath in his article tries to create a parallel between systematic design methods and creativity and prove their relevance.
20. Schoon, I., *Creative Achievement In Architecture*, Psychological studies, DSWO Press, Leiden 1992.

validated against 'real-life' achievements.; in the process oriented approach creativity is principally a dynamic process in time that should be studied by adopting a process oriented approach that accounts for the dynamic nature of creative activity. This third approach is the most interesting one in relation to the design process. Within this approach researchers usually split the creative process into several stages. For example Wallas, G.,[21] divides it into four stages: preparation, incubation, illumination and verification. Creativity is held to take place when conscious thought is suspended from the problem at hand and a new idea appears instantaneously and unexpected. This unexpected 'flash of insight' is understood to be the culmination of a successful train of association. Brainstorming (Osborn 1957)[22] and Synectics (Gordon 1961)[23] are two techniques based on the simple idea of using a group of minds acting in concert so as to avoid any individual mechanisation of thought. Participants are asked to generate as many ideas as possible. Many of design techniques used to promote creative thought[24] are based on the simple idea of shifting the designer's attention and changing the context within which he perceives the problem[25].

Further, the phenomenon of creative though cannot be comprehensibly explained by its division into separate, distinct stages; for it is not based on the concept of a single, flash-like event, but rather it is conceptualised as a growth process that enables the individual to adjust to an ever changing reality. Creativity can only be understood as a function of the whole person interacting in a situation, it can only be perceived as a wholesome experience. The idea of a wholesome experience comes from Gestalt psychology[26]., which defines the relatedness of sub-wholes to the whole-characteristics. Situations exist only as organised wholes, not as a mere collection of parts, or as a sequence of unconnected stages. Gestalt theory differentiates between blind, 'reproductive' combinations and sensible 'productive' thought processes. Productive thinking is characterised as the reorganisation, or restructuring of patterns into a newly organised whole. In restructuring events the underlying structure of a given situation is fully grasped and 'insight' occurs[27]. For Schoon, I.[28], different

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21. Wallas, G., *The Art of Thought*, publ. by Watts, London 1926.
22. Osborn, A. F. *Applied Imagination* (3rd edition), Charles Scriber, New York 1957
23. Gordon, W.J.J. *Synectics: the Development of Creative Capacity*, Harper and Row, New York, 1961 The central theme of the technique is the deliberate use of the analogy. Four types of analogy are used : personal, direct, symbolic and fantasy analogy.
24. For a presentation of the use of creative techniques in design see:
Broadbent, G. "Creativity" in The Design Method (Ed. S.A. Gregory) Butterworth, London, p.p.111-119
25. One of the clearest account of the displacement of concepts is the concept of metaphor used in poetics.
26. Lawson, B., How designers think, The design process demystified, The Architectural Press, L.t.d. London 1980, chapter 8, 'Types and Styles of Thinking' 95-105.
27. op. cit. Schoon, I., (1992), 'Productive Thinking' p.p. 19-21.
28. op. cit. Schoon, I., (1992) p.p. 34-35.

processes contribute to a common project; and any single process must be seen in conjunction with the rest. These processes are not linked in an additive manner but have to be understood as part components that are differentiated in accordance with an overall, more complex pattern. The creative process can be understood as a balanced dialogue between individual and context, between subjective wishes and desires and the demands imposed by outside reality.

Apart from the 'reproductive'and 'productive' division of thought processes, Guilford, Getzels and Jackson [29] have proposed two new types or categories of mental ability, "convergent" and "divergent" thinking. Convergent thinking relates to rational and logical processes and divergent thinking to intuitive and imaginative processes. The divergent task demands an open ended approach, seeking alternatives where there is no clearly correct answer,and is involved with productive thinking. Design seems to be primarily a divergent task although it can also be argued that it involves convergent tasks as well. For Lawson[30] creativity in design is not simply the ability for divergent thought but rather a balance of convergent and divergent productive thinking abilities appropriate to the situation. Creativity is not just a skill or talent but is also related to context; the situation within which the person perceives the problem and performs the process.

2.2.3 A RECONCILIATION OF THE SPLIT

Architectural 'thinking' is a system of specific concepts which articulates the intelligibility of the architectural reality. Architectural practice on the other hand is a process that produce well-defined products. Creativity is a dynamic process in time that relates to the activity of design. Architectural theories exist, are constantly revised, changed or abandoned in the course of, and through specific practices and activities, theoretical or otherwise. As such they do not necessarily exist 'before' or 'after' these processes. They are part of them at nearly all levels and stages. Thus theory and practice or architectural 'thinking' and creativity are two related concepts but of a different order. Theory specifies a system of concepts whereas practice specifies an activity. According to a number of researchers , architecture is seen as a practical activity in its own right. After all for them design is about practice, about doing and not about an abstract theory as such. Architectural praxis occurs within a social context , architecture is primarily a social activity and social experience within it acquires a very important role. For them the only way out of the intellectual - creative

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29.Guilford, J.P. *The Nature of Human Intelligence*, McGraw Hill, New York, 1967
Getzels, J.W. and Jackson, P.W. *Creativity and Intelligence: Explorations with gifted children*, John Willey, New York 1962
30. op. cit. Lawson, B.,(1980). 'Creativity in Design' p.p. 116- 118.

split is to view architecture in the context of this social praxis.

Gasparski, W. W.[31], through his theory of praxiology (the knowledge of practical activity) attempts to analyse and give substance to the tacit dimension of architectural design in a social context. For him two kinds of knowledge are needed for any practical situation, factual knowledge, which is related to phenomena involved in the specific fraction of reality, and knowledge of method which indicates how factual knowledge is used. Both of them are relative to the historical time. Factual knowledge is the abstract body or system of knowledge possessed by an ideal performer at a given time. Practical situations which might be dealt with by this abstract body of knowledge are termed 'absolutely standard situations'(analysable) while others will be termed 'absolutely non standard situations'(creative). Through his research Gasparski offers a kind of classification of the background knowledge that all architects possess and use. His theory attempts to offer the facts and the method by which we design.

On the other hand Hillier B.,[32] proposes two different types of architectural knowledge that combine technology and social praxis; 'The first is knowledge of how a vocabulary of physical items can be assembled in order to make a physical structure i.e.'technical knowledge'. The second is knowledge of how the arrangement of space relates to cultural patterns of living and working. This is called 'spatial knowledge'". For Hillier, B. and Leaman, A.[33] , in order for architecture to grow out of the impasse presented by the science/art, theory/practice paradoxes, it must develop or recognise its own theory, a theory that will relate to its own structure. By drawing on a linguistic analogy they claim that to understand and analyse architecture as a discipline we need the reconstitution of the environmental codes on a conceptual base by studies of people and their built environment which are oriented towards theory rather than results. This will offer us the base of 'spatial' knowledge.

The two approaches described above are mainly analytical as they give priority to 'knowing' and understanding the design activity in order to conceive and draw. For Nigel Cross[34] it is more fruitful to regard design as a technology, as both design and

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31. Gasparski, W. W. "Praxiological systemic approach to design studies", Design Methodology Unit, Department of Praxiology, Polish Academy of Sciences, Warsaw, Poland, in Design Studies, Vol 1, No 2, October 1979, pp. 101-105

32. Hillier, B., 'Notes for a Theory of Practice'

33. Hillier, B., Leaman, A., "Architecture as a discipline" publ. in *Journal of Architectural Research*, Vol. 5, No 1, March 1976

34. Cross, N., "Design Method and Scientific Method" in Design: Science: Method, Proceedings of the 1980 Design Research Society Conference, Edit. by Jacques R., Powell, J., Publ. by Westbury House, London 1981,p.p. 18-29, also published in Design Method, Vol 2, No 4, October 1981, p.p. 125-201

technology involve the application of types of knowledge other than the purely 'scientific' kind. Technology is the application of scientific and other organised knowledge to practical tasks. He differentiate himself from a purely analytic approach by admitting the importance of 'non-verbal thought'within technology i.e. the role of images, visualisations and skilled performance. Particularly skilled performance for him is a very important part of how we design, as a major part of the performance takes place implicitly. Cross concludes that knowledge of the explicit 'rules' of design, can actually inhibit practice I. e. creativity, as the focus of attention can be in the wrong domain, in the explicit procedures rather than the subtle details of performance. Thus Cross offers to the design process the alternative and the potential for an exploration at the level of technique and performance.

2. 3 ARCHITECTURAL COGNITION

The development of design methods touches upon the issue of architectural cognition. Two main approaches exist in relation to architectural cognition. Both approaches are based on the assumption that architectural cognition is primarily an 'intellectual' process . In the first 'scientific' approach, architectural cognition is based on the analysis of facts. This comes from the belief that the processes of designing are open to systematic examination . This belief characterises the design methods of the sixties and assumes that architectural knowledge is rational and quantifiable. The second comes from the belief that in order to design we pre construct a hypothesis or a concept that then we test on real grounds. The pre-construction of the concept stems from 'scientific' grounds and from the field of epistemology. So within the concept-test model, conceptualisation occurs through a continuous interaction (hypothesis - testing) with reality.

2. 3. 1 ANALYSIS - SYNTHESIS MODEL

Within the analysis - synthesis model the analysis of facts is held to precede the formulation of a solution. The architect or the student of architecture has to research the issues of the given brief , collect all the relevant information, classify it systematically, express it visually in bubble diagrams and progress from that point to his/her proposal. Design methods were in the beginning (in the sixties) strongly connected with the analysis-synthesis model as they offered scientific techniques of analysis for a wide range of design problems. For design methods solutions evolved logically from an appropriate stating of the problem, its analysis into parts and its

recombination into new propositions. The designer had to go into the rationalisation of the problem,and its analytical understanding in order to be able to act on it and offer solutions.

Within the above cognitive model, the problem for the practical use of the approach occurs in the transitional stage from analysis to synthesis. The model assumes that the transition will take place automatically i.e. that the analytical diagrams will turn mechanically into a building. This does not aways happen, and even when the diagramm offers a way forward to a proposal for a building, it may not be qualified subsequently as a desirable solution. In addition, the analytic and synthetic stages seem quite isolated from each other as they take place in a sequence and at different chronological periods. So no real communication exist between the analytical facts and the process of synthesis and the integration of the two is almost impossible.

2. 3. 2 CONCEPT -TEST MODEL

The recognition that design is foremost an interactive activity came with the appearance of the concept-test model. The breakthrough from the analysis-synthesis paradigm came with the publication of the article written by Hillier B, Musgrove J. and O'Sullivan P.[35]. They suggested that the earlier views of design methods were based on rationalist and empiricist philosophies of science. There had, however, been a 'slow but decisive shift in philosophy and scientific epistemology over the past half-century or so ' that had been overlooked by the design methodologists of the sixties. One of the results of this shift was a recognition that preconceptions are an unavoidable element of the scientific method. Their references to the new philosophy of science related to the three basic exponents of the new trends: Popper, Kuhn and Lacatos[36]. They introduced to design methodology the concepts of 'conjecture' and 'pre-structuring' the problem, two Poperian concepts. If scientists operate in a dialectic between their pre-structuring of the world and the real world, then designers by analogy operate in the same way either tacitly or explicitly.

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35. Hillier, B. Muscrove, J., O'Sullivan, P., "Knowledge and Design" in *Environmental Design: Research and Practice*

36. Ibid. p. 249, Popper has demonstrated that science could be contained within a hypothetico-deductive scheme. Kuhn suggests that science can operate as a puzzle solving activity until the next revolutionary paradigm switch. Lacatos reconstructs science as conflicting sets of interrelated theories, retaining the idea of a 'negative heuristic theoretical cole'and a 'positive heuristic' puzzle-solving area, each of which exhibits at any time either a 'progressing' or 'degenerating' problem shift according to whether or not it is able to predict new phenomena within its basic theories without having to add ad hoc hypotheses to account for newly discovered phenomena.

In the concept-test model the designer first conceives an architectural idea in his mind and then he/she tests it by representing it. A continuous interaction exists between the conception and the materialisation of the idea, that allows for modification and improvement of the proposed solution. The model raises one fundamental question in relation to how the design problem is pre-structured, that means which is the knowledge base that the designers had to turn to in order to make a conjecture. For Hillier and all this takes place either 'by knowledge of solution types or by knowledge of the instrumental set that will lead to solution types'[37]. For them, the research should aim at the progressive reconstitution of the codes on a conceptual base by studies of people and their built environment.

Broadbent, G.[38], amongst others[39] draws very heavily on Popper's method of conjectures and refutations, that clarifies a great many problems both in design and design education. For Broadbent, the ultimate objective in systematising design methods is to place at the disposal of the student the greatest variety of relevant techniques and to facilitate their convenient use, so that it is possible for the student to obtain the maximum profit from each one. He puts forward four types of design[40]: pragmatic design in which the materials of construction help determine the form by trial and error; typologic/iconic design in which the designer draws on an established type; analogic design in which the designer draws visual or other analogies; canonic/geometric design in which the designer uses two or three dimensional geometric systems in the generation of form[41]. Although for Broadbent the stage of initial conception takes place at an intellectual level, he recognises the importance of the visual operations[42] within the design process and their interactive character. Through the concept-test model ,design education becomes a matter of learning how to generate ideas and learning how to test them, thus answering questions as to the shape of the design process itself.

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37. Ibid. p.262

38. Broadbent, G., "Design Methods at the Portsmooth School of Architecture", Design Methods and Theories, Vol 13, No 1, P. 16

39. Anderson, S., "Architectural design as a system of research programmes", *Design Studies*, Vol 5, No 3 July 1984, pp. 146-150. For example Anderson works more with the model offered by Lacatos. He is very clear in his declarations, that he is not going to solve the problem of design method by using Lacatos, but he just wants to contribute to its clarification. The search for rationality in design for him is not a matter of eliminating that risk, but rather one of turning that gamble to our advantage.

40. Broadbent, G., *Design in Architecture*, Architecture and the Human Sciences, John Wiley and Sons, London, New York, 1973.

41. The four different design processes described here were used in Portsmouth School of Architecture in the studio teaching. See:
Broadbent, G., "Design Methods at the Portsmouth School of Architecture" in *Design Methods @ Theories*, Special Issue, Design Methods in UK schools of architecture, Vol. 13, No 1 Jan/Mar 1979, p.p.15-17

42. Visual operations are especially useful for the first year students as for example geometric design needs very little previous experience or understanding of architecture. Ibid. p. 17.

2. 3. 3 IN SEARCH OF AN ALTERNATIVE MODEL

The concept-test model of design has largely replaced the old analysis - synthesis model in recent years. The new model seemed to fit the design process better as it was more interactive and flexible, accepting the unpredictability and implicitness of design. But it still remained within the realm of a 'scientific' explanation, where one has to conceive in order to design. March [43]criticising the concept-test model claims that design is not only inductive and deductive but involves 'productive' reasoning as well. Induction involves the accumulation of habitual notions and established values, deduction the prediction of performance characteristics, and production the creation of a novel proposition. The concept test model according to March leaves out productive thinking.

For Daley, J.[44] if we want to understand design activity we must accept that imagination is fundamental to all experience of the world, and 'seeing' the world is a creative act. So imagination is a condition of all intelligible human experience.[45] Daley, J.argues that design processes are outside the bounds of verbal description and are a systematisation of our experience. That she suggests is why they appear inexplicable. For her, the capacity to visualise and to manipulate spatial relations lies at the fundamental level of cognitive ability and any explanation of this capacity, or the processes which it involves, must address those a priori structures which make any conceptual construction of the world possible. If design and artistic creativity are experimentation with our perceptual limits, then they are inevitably outside the realm of verbal description. In that way Daley opens up a new field for research, that of visual operations and their role in architectural cognition.

This field of research has already been opened in the sphere of the arts by Arnheim's influential book 'Visual Thinking' (1969). For Arnheim [46] there is much evidence that truly productive thinking in whatever area of cognition, takes place in the realm of

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43. March, 'The logic of design' publ. in N. Cross (ed.), *Developments in Design Methodology*, The Open University, John Wiley and Sons, 1984, p.p. 265-276.

44.Daley, J., "Design Creativity and the Understanding of Objects", in N. Cross (ed.), *Developments in Design Methodology*, The Open University, John Wiley and Sons, 1984, pp. 291 -302. (Originally published in Design Studies, vol. 3, no 3, 1982, pp. 133-137)

45. ibid. For her argument Daley J. uses the Kantian perception categories. For Kant the categories of a priori concepts and knowledge from experience were not mutually exclusive. Kant reconstructed the very notion of perception itself, seeing it not as a passive process with mind as pure receptor, but an active process in which the mind is an agent. The forms of our perception are determined by the limits of our a priori conceptual framework. The cognitive structuring of a world of objects is central to human knowledge and understanding and that such a structuring is an act of mind.

46. Arnheim, R., 'Visual Thinking' Publ. by University of California Press, Berkeley, Los Angeles, London, 1969.

imagery . Cognitive operations [47]called thinking are not the privilege of intellectual processes above and beyond perception, but the essential ingredients of perception itself. Theoretical concepts are not handled in empty space. No thought processes seem to exist that cannot be found to operate, at least in principle, in perception. According to Arnheim, visual operation is visual thinking as shapes are concepts. In the perception of shape lies the beginning of concept formation. The perception of shape is the grasping of structural features found in, or imposed upon the stimulus material. An object that is looked at can be said to be truly perceived only to the extent to which it is fitted to some organised shape. In order to be useful, perception must instruct about kinds of things; thus the visual world is organised around visual concepts or visual categories. Shape-building is a very active task that involves the exploration of shape and visual order which goes on when anybody looks at anything. Perception involves problem solving. For Arnheim visual abstraction is only possible when certain aspects of the particulars of an image are perceived as deviations from, or deformations of, an underlying structure that is visible within them. Distortion calls for abstraction. In space perception, not every projection fulfils this condition. The context of other situations may be needed to bring out the character of the particular one. This type of abstraction is a cognitive performance of high complexity. It requires a mind that, in perceiving a thing, is not limited to the view it receives at a given moment but is able to see the momentary as an integral part of a larger whole which unfolds in a sequence. Through his argument Arnheim offers recognition and insight to the complexity of visual operations and recognises their importance in the course of cognition.

The relationship of visual thinking to 'doing' is the issue that Guilford and Fox tried to tackle in different ways. For Guilford [48] problems of figural and structural types are likely to be important to the designer but what he discovered was that the ability of the designer to handle structure and order belonged to the production factors rather to the cognition factors I.e. the designers ability to handle figurative and structural factors while they are 'doing'. In opposition Fox, B.[49], instead of looking at cognition as separate from praxis, recognises that the interaction between 'doing' and cognition is

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47. Ibid. For Arnheim cognitive operations are all mental operations involved in the receiving, storing and processing of information: sensory perception, memory, thinking, learning. They include active exploration, selection, grasping of essentials, simplification, abstraction, completion, correction, comparison, problem solving, combining, separating, putting in context. p. 13.

48. Guilford, J.P. The Structure of the Intellect, Psychological Bulletin, no 53, p.p. 267-293, 1956 For Guilford the cognition factors of human thought have to do with becoming aware of and understanding classes of objects or ideas. There three ways of developing such a class system depending on whether the figural, structural, or conceptual content is used. Thus one might recognise a class by its figural properties.

49. Fox, B., "Design-based studies: an action based 'form of knowledge' for thinking, reasoning and operating" in *Design Studies*, Vol. 2, No 1, January 1981, p.p. 33-39.

a dynamic relationship. He claims that there must be a very close link between the development of formal operations, reasoning ability, and intensive experience in the field of design; experience of a structured nature must be present at an optimum point in the mental development. For Fox internalisation, the ability to take idea and meaning to external expression spontaneously, is clearly the key to design. In design both the notion of a thought medium and its associated medium of expression are more directly related to sensory images and direct imagery of action-based experiences than they are to verbal language imagery and structure. The implication of this argument is that an inner structure of 'doing and making thinking' is possible and this would substantiate claims that higher levels of thinking are an integral part of action problem-solving.

The alternative to an 'intellectual' approach to cognition seems to be a more interactive one. Foremost comes the recognition that design activity is not necessarily amenable to a systematic examination nor it is fully verbally expressed. Thus perception i.e. visual operations not belonging to verbal expression are given importance as they are perceived as a necessary precondition for cognition. Finally 'doing' i.e. acting is recognised as having the potential in initiating 'intellectual' thinking.

2. 4 TEACHING METHODS IN DESIGN STUDIO

This part of the chapter attempts to offer a classification of the different teaching methods used in architectural education by looking closely at the nature of these methods. Generally architectural teaching methods are based on one hand on 'intellectual' design rules, and on the other hand on design tools, that are mainly involved with the visual expression of design. In the history of studio teaching 'intellectual' and visual approaches co-exist, but usually we find the dominance of the former over the latter.

From the beginning of this century composition is offering the use of 'universal' rational rules, that can be used within every design project. Typology creates a methodological tradition where the use of type (precedent analysis) is present in teaching design. Within these approaches the formal elements of architecture are dominant and the whole idea of teaching methods is based on the combination of formal elements by following certain 'intellectual' rules or on the imitation of existing paradigms (visual). From the use of an explicit method of design in the Beaux Art tradition based on typology (Durand) and composition (Guadet) we move to the

rejection of explicit design teaching methods in the Modern Movement. This was the result of a shift from a desire to imitate types or to operate under the rules of composition to a belief that free intuition is a valid approach to design. The theoreticians of the modern movement rejected the idea of type and composition, as it was perceived as a set of restrictions imposed on the architect, who they beleived should act with complete freedom on the architectural object. The Modern Movement was in search for new forms and this could not be achieved through traditional operations. For the Modern Movement the approaches to teaching design inherited a contradiction. On the one hand the approach was intuitive, creative and abstract (Bauhaus) and on the other hand it was rational and deterministic (functionalism). Underlying the rational belief was an implied belief in biotechnical determinism. In both approaches the design process was implicit, the difference being that within the first one formal rules were dominant and the approach was mainly visual, and within the second one the 'form follows function' doctrine was dominant and the approach was mainly rational. The current situation is a hybrid which has inherited both traditions from the modern movement but it seems to draw more heavilly on the Bauhaus visual tradition.

Teaching methods are presented according to the dominance of 'intellectual' or 'visual' approaches. We start with the presentation of the most rational and implicit approach, that of functionalism. This is followed by the rules of composition (including formal analysis) through which an attempt to rationalise design rules is made. The use of type, which functions predominantly at a visual level, is described and its contemporary use in design studios is discussed. The most interactive teaching method of all, the transformational formal approach of the Bauhaus and of the Russian Constructivists concludes the review of our inheritance in the forefront of teaching methods . The contemporary situation is considered and analysed in the light of this inheritance. Some conclusions are drawn in relation to the status of visual operations within the studio environment.

2. 5 THE IMPLICIT DESIGN RULE OF THE FUNCTIONALIST DOCTRINE

The Modern movement introduced the absence of a visible teaching method in design studios. In 'functional' architecture, there must be no interference, in the design or evaluation of a building, from preconceived notions about what 'architecture' is. Architecture should be defined solely in terms of elements interacting with each other within the system, which, in turn can only be defined as the sum of

these elements. Within the modern movement paradigm we can observe the relation of form to a purely mathematical definition of function, that creates implicit functionalistic rules to design.

Functionalism was not the product of any single philosophy or cultural movement. It applied biological and mechanical standards to architecture. The way that architectural form and function were defined in functionalism was by a direct analogy to the living organism and machine. "The concept of function applies to planning in general, but there is also a functional approach to structure..... functionalist trends are those which stress the importance of fitness and utility. Functionalist theories of architecture are those which make strict adaptation of form to purpose the basic guiding principle of design and the principal yardstick by which to measure the excellence or the beauty of architecture."[50]

On one hand the biological analogy[51] is based on a belief in the beauty and perfection of nature. In the biological analogy, the relationship between form and function is considered as necessary to life[52] and as a result this belief introduces functional determinism to design; It removed the designer ; it encouraged an exclusive attention to utilitarian functions, and it suggested that designed objects were the product of 'selection' exercised by their 'functional environments'; According to Steadman[53] the forms of designed objects are conceived as being wholly the product of their 'environment', the functional context in which testing or 'selection' acts. The phrase 'Form follows function' from being an aesthetic prescription that form should follow (i.e. express and not conceal) function, becomes a scientific assertion of causality: i.e. that form emerges as a necessary and unique consequence of function.

On the other hand the mechanical analogy is based on the conviction that beauty, or at least a kind of formal perfection, results automatically from the most perfect mechanical efficiency, or that perfectly engineered creations achieve beauty without a conscious search for it. Perfected machines are therefore a great source of

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50. Edward Robert De Zurko, "Origins of Functionalist Theory", Columbia University Press, New York 1957 p. 4

51. Peter Collins, "Changing Ideals in Modern Architecture 1750-1950", publ. by Faber & Faber London 1965, ch. 14 'The Biological Analogy'

52. Edward Robert De Zurko, "Origins of Functionalist Theory", Columbia University Press, New York 1957 p. 6 For De Zurco, the terms 'organic' architecture and 'functional' architecture may be taken as synonymous. The term 'organic' is a kind of poetic metaphor or analogy. Functional architecture is identified with plant or animal life. The obvious truth of the matter is that buildings are not plants or animals, though they may be created by the application of the principle of adaptation of forms to functions, a principle which, it is believed, has governed the development of biological types.

53. Steadman, P., *The Evolution of Design,* Cambridge University Press, Cambridge 1979, p.p. 205-206

inspiration for architects. Architects should design their buildings in the spirit of the engineers of industrial production. There is no doubt that Le Corbusier's slogan: 'a house is a machine for living in' exercised a powerful influence on the twentieth century's natural desire to adopt mechanical analogies. The more precise a machine's destination, the more beautiful it is, as can easily be seen by comparing a machine which has some single overriding purpose with a machine which manipulates objects in a sequence of complex operations. The machine's function is its ultimate goal and its beauty.

The 'intellectualisation' of the design process is strongly connected with the functionalistic doctrine. For modernists function was subsectible to analysis and could be quantifiable. Functionalism is generally associated with the practical, material needs of the occupants of a building and the expression of structure although some of the most radical functionalists take a broader view of function[54]. The analysis-synthesis model represents the functionalist doctrine at the level of cognition. Someone has to analyse first the functional and technical requirements, create bubble diagrams and then jump to the synthesis generating new forms mechanically in a 'visual' void. The doctrine was mainly responsible for the disappearance of the use of form and of visual operations from the repertoire of teaching methods. It almost created a void of method. But after all function may be objective or subjective as it remains obscure[55] in its definition. For at the moment that function stops being interpreted in a rational and 'mechanical' way the functionalist doctrine looses its power.

2. 6 RULES OF COMPOSITION

Composition as a term, according to Colin Rowe[56], makes its first English appearance with Robert Morris's Lectures on Architecture in 1734. Composition was the French academic system's term for what it considered as the essential act of architectural

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54. For example Bruno Taut stressed the social function of architecture in "Modern Architecture" and Le Corbusier's statement that "the business of Architecture is to establish emotional relationships by means of raw materials" (see Towards a New Architecture), implies a psychological interpretation of function not revealed by his mechanistic dictum, "the house is a machine for living in" . See Zurko p. 7.

55. Roger Scruton, "The Aesthetics of Architecture", publ. by Methuen & Co LTD London, 1979. What for example, is meant by the term 'function'? are we referring to the function of the building, or to the function of its parts? If only to the latter, does it suffice that a building should simply display all its functional details, like the tubes and wires which deck out the Centre Pompidou? ....Such examples show that the idea of 'the function' of a building is far from clear, nor is it clear how any particular 'function' is to be translated into architectural 'form'. All we can say is that buildings have uses, and should not be understood as though they did not.

56. Rowe, C., "Character and Composition; or some vicissitudes of architectural vocabulary in the nineteenth century" in *The Mathematics of the Ideal Villa and other Essays*, MIT Press, Mass. 1983

design. What composition signified was not so much the design of ornaments or facades, but of whole buildings conceived as three-dimensional entities and seen assembled in plan, section and elevation.[57] Composition has to do with the presentation of architectural ideas, that are 'partis', generic choices. The parti is the dominant idea of the building which embodies the salient characteristics of this building I.e. the interrelation of the whole and its parts, as well as the hierarchical scale of importance and power by which some structural features are dominant, others subordinate. The process of composition involved the extreme development of certain codes, which intervened between the conception of a work and its execution.

TheBeaux-Arts School stressed the importance of rational principles of composition, and its theoretical underpinning emphasised that good architecture is exemplified by a beauty of form based on fixed principles of taste[58]. At the same time, the notion of character[59], related to the type of building, becomes important, combining explicitly composition with a specific type of meaning. Character is seldom, if ever, defined, but it is generally implied that it may be at one at the same time the impression of artistic individuality and the expression, either symbolic or functional, of the purpose for which the building is constructed[60]. Beaux-Art rules of composition were usually combined with the use of typology. The two together, combined in treatises like Durand's "Precis des Lecons d'Architecture"and Guadet's "Elements et Theorie de l'Architecture"[61], offered a method of designing to architectural education.

Composition, in the sense of specifying a set of abstract rules in order to direct somebody to design, was popular in the first thirty years of the present century. Several books[62] appeared with this pedagogical aim, being preoccupied with the survival of

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57. Zanten, V. D., "Architectural Composition at the Ecole des Beaux-Art from Charles Percier to charles Garnier III" In Dextler, A., *The Architecture of the Ecole des Beaux-Art*, Cambridge Mass. and London, 1977, pp. 112-115

58. For a extensive presentation of the educational structure of Beaux Art and the role of composition within it see:
Egbert, D. D. The Beaux- Arts Tradition In French Architecture, Princeton University Press, 1980

59. The notion of character arose from certain lack of cosistancy in the classical tradition, cause by a conflict between two fundamental beliefs. One of these is the belief in the abstract 'laws' of beauty, a Platonic concept. The other is the point of view which stressed the individual and the characteristic in art, what was later to be known as romantic. see:
Marda, N., A "Architecture Theory as Social Product Considered in Relation to Beaux-Art and Bauhaus", M. Sc. Thesis, Bartlett School of Architecture, U.C.L. 1985, p. 28.

60. Rowe, C., "Character and Composition; or some Vicissitudes of Architectural Vocabulary in the 19th Century", In *The Mathematics of the Ideal Villa and Other Essays*, MIT Press, 1982

61. Guadet, J., *Elements et Theorie de l' Architecture. Cours professionel de l' Ecole National et Speciale des Beaux-Art*, 4 Vols. and additions, Paris, 1904
Durand, J.N.L., *Precis des lecons d'architecture donnees a l' Ecole Royale Polytechnique*, , Paris 1819.

62. A sample of these books would be:
Robinson, J. B., *Architectural Composition*, New York, 1902
Curtis, N. C., *Architectural Composition*, New York, 1923
Robertson, H. *Principles of Architectural Composition*, The Architectural Press, London 1924

certain standards of urbanity and order, certain received ideas which for them were identifiable with tradition. But above all these treatises were anxious to extract from historical and current precedents a formal common denominator - the quality which they recognised as correct composition. The theory of composition offers the rules or ordering principles that become the tools that the architect uses in order to compose.

Robertson (1924)in his treatise on architectural composition attempts to formulate some of the guiding principles of architectural design. For him composition is susceptible to an analysis, through which certain main factors can be isolated and used for the production of a successful design. These main factors are the consideration of unity I.e. the presence of a dominant element in the composition, the composition of masses, scale, the relationship of plan to elevation, and the element of contrast in form and mass. Character is perceived as the individual expression of the building and is the result of the combination of the rules of composition. Throughout his book he presents visual examples of successful and unsuccessful compositions and he also specifies those design rules that should be avoided I.e. duality, the use of square that is almost a square etc. In the appendix of his book he offers hints to students on the architectural programme and a working method. The instructions are very specific and are worth mentioning. The student, after reading the programme, has to make a 'mental' note of the principal and secondary elements of the requirements of the accommodation. Then the student can start by drafting the plan, where the main elements should be placed in their most logical positions, it being probable that the most important element will occupy the climax or focal point of the plan. The secondary elements will then fill in the blank spaces remaining in the plan. Elevations will follow.

Composition is addressed in a similar way, by theoreticians such as Curtis , or Robinson. Emphasis is placed on the fundamental rules of composition, mainly formal rules I.e. proportion, scale, which exist independent of styles. Curtis (1926) in the final section of his book, where he describes the parti (the main element of the building that bonds all the others together) offers specific diagrams as guidelines, presenting a variety of axial combinations and elementary forms. According to him their combination can produce different kinds of compositions I.e. linear, open, closed and can be used by the student.

R. Krier's [63] (1988) like the previous theoreticians, aims to uncover a set of ground rules that will guide architectural composition. Aiming at a global architectural theory, he

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63. Krier, R. *Architectural Composition* , Academy Editions, London 1988

deals not only with form but also with function, structure and design. Krier sees the design process as taking place from general functional considerations related to the programme and choice of structure and materials, to decisions on the geometric pattern of the layout. The general layout is worked out at the level of elements i.e. point, line, plane, solid, interior/exterior. Then the elements are treated, distorted or manipulated by bending, breaking, partial representation, addition, penetration, perspective representation and deformation. The proportions of the composite elements in determining the whole follows. Scale or geometric ratio are the last and most dominant factors in the architectural design process. Once fixed, the geometric ratio acts like an umbrella with every part of the building depending upon it. In retracing the architectural design process, Krier starts by primary building types and proceeds to identify the operations (bending, dividing, fragmentation etc.) by which these types are transformed into more complex ones. He proceeds to identify the elements of architecture, such as interior spaces, ceilings and floors, columns and piers, doors, windows, staircases, facades, entrances and portals, arcades, railings, roof and attic storey, as well as theories of proportions like geometrical rules and divisions, proportions of the human body and the proportional analysis of buildings.

The old and 'new' approaches to composition are fundamentaly similar. They all start from the organisation of the plan and the programme and proceed toward specified geometrical patterns and forms. The difference lies in the formal rules of composition. Robertson and Curtis offer a combination of axis and elementary forms, where symmetry plays the principal role, while Krier is offering a variety of formal transformational rules that allow for a variety of forms. Under the rules of composition the teaching method is interactive; the student moves between mental and visual operations in a strictly prescribed method following a set of given formal rules .

2. 6. 1 THE USE OF GEOMETRY AND FORMAL ANALYSIS IN DESIGN

Rules of composition in their major part are formal and they derive from geometrical rules. We have seen already how Robertson (1924), Curtis (1923) and Krier (1988) have used formal analysis to structure their method of design. Form includes the central notions of both formal aesthetics and mathematics. In a formal analysis the building is seen as structure open to geometrical analysis .

The use of proportion and mathematical analogy in architectural design was always

very popular throughout architectural history [64]. The classical theory of proportion consists of an attempt to transfer to architecture the notion of an 'harmonious order', by giving specific rules and principles for the proportionate combination of parts. Since the only conceivable rules of proportion must be geometrical, the essence of proportion must lie in mathematical relationships.[65] For example Colin Rowe uses the mathematics and logic to naturalise architectural form. His approach is mainly analytic. In his Article "The Mathematics of the Ideal Villa"[66] Rowe analyses two buildings, Palladio's Villa Foscari, the Malcontenta of c. 1550-60 and the house which Le Corbusier built in 1927 for Mr. and Mrs. Michael Stein at Garches. As he states, these are two buildings which, in their forms and evocations, are superficially so entirely unlike that to bring them together would seem absurd. The comparison and parallelism is done through their geometrical analysis and the use of proportions[67].

For R. Evans [68]architecture and geometry have become tightly entwined within the design process. Geometry generally is understood to be a constitutive part of design, offering scientific value to architecture. R. Evans demonstrates that geometry as a design tool can be used in a non-scientific and unpredictable way within architecture . For him the search for geometrical forms through the analysis of the final architectural products i.e. buildings or drawings, misses the point that geometry can be used in a much more explorative and interactive way[69] in the design process. For R. Evans three kinds of geometry exist within architecture[70] ; the compositional geometry trapped in the crystalline forms of composition; the early modern projective geometry embedded in architectural drawing; and finally the elusive new geometry that belongs to the

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64. For example for Christopher Wren in Parentalia comments: "There are two causes of beauty -natural and customary. Natural is from geometry consisting uniformity, that is equality and proportion..... Geometrical figure are naturally more beautiful than irregular ones: the square, the circle are the most beautiful, next the parallelogram and the oval. There are only two beautiful position of straight lines, perpendicular and horizontal; this is from Nature and consequently necessity, no other than upright being firm'. See Colin Rowe "The Mathematics of the Ideal Villa & Other Essays", The MIT Press, 1983 p.2.

65. for a more analytical presentation see: Roger Scruton "The Aesthetics of Architecture" p.p. 58-69.

66. See Colin Rowe "The Mathematics of the Ideal Villa & Other Essays", The MIT Press, 1983

67. Le Corbusier 'belonged' to the functionalistic area. For functionalism results can be measured in terms of process and use, proportions are apparently accidental and gratuitous; and it is in contradiction to this theory that Le Corbusier imposes mathematical patterns upon his buildings. Ibid. p. 9.

68Robin Evans, *The Projective Cast, Architecture and Its Three Geometries*, The MIT Press, Cambridge, Mass. London, 1995.

69. Ibid. Starting from the parallel projections, R. Evans discusses the use of perspective in art and architecture placing emphasis to Piero's sophisticated technique of perspective construcion for heads. The easy and straightforward techniques of orthogonal projections and simple perspective are promoting desired properties such as symmetry and orthogonal orientation and are conspiring together to fullfil the need for a certain, definite, recognizable order. The technique of stereotomy used primarily for the stone cutting on the other hand produces a differently constituted architecture. The introduction of the use of ruled geometries in architectured allowed for the construction of more complex forms like Le Corbusier's Ronchamp.

70. Ibid. p.p. 348-349

realm of higher mathematics . The last one changes the relationship between geometry and architecture as it no longer confines to the space of ordinary human experience. Thus the aspects of modern geometry that can capture the imagination of modern architects can only be metaphorically present in architecture. Architects cannot use the fourth dimension or hyperbolic space in the same instrumental way in which they used triangles or projections but they could allude to them. The geometry itself becomes symbolised or represented and thus it becomes the subject matter instead of being a simple tool.

Formal i.e. geometrical rules are used both as analytical and design tools within architecture. Apart from the use of specific mathematical rules as design tools i.e. proportion, golden section, algorithmic relationships etc. formal analysis is used to define spatial order. The aim of formal analysis is similar to that of the precedent analysis . They both attempt to construct a formal vocabulary that can be used as a design tool.[71]

In the realms of mathematical analogy fall all the recent "formal" approaches that use primarily geometry as a tool to analyse architectural form and space and through that architecture itself. For I. Ching[72] his book is a morphological study of the essential elements of form and space and those principles that control their organisation in the built environment. With the concept of form comes the concept of space as 'enclosure'. While utilitarian concerns of function and use can be relatively short-lived and symbolic interpretations can vary from age to age, the primary elements of form and space comprise the timeless and fundamental vocabulary of the architectural designer[73] He proposes a classification of formal and spatial analysis using as primary elements the point, line, plane and volume. He proceeds with the analysis of form, to form and space, to organisations, to circulation, proportion and scale and finally to organisational principles such as axis, symmetry, hierarchy, datum, rhythm, repetition and transformation. The systems and architectural elements should be interrelated, interdependent, and mutually reinforcing to form an integrated whole. We have the existence of an architectural conceptual order only when the relationships between the elements become visible as contributing to the singular nature of the whole.

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71. The older analysis of spatial order of Frankl in the different historical phases of the last five centuries, and the most recent analysis of spatial and formal themes of Loos and Le Corbusier undertaken for an exhibition for the two architects deal with space from a formal point of view. See:
Frankl, P., *Principles of Architectural History. The Four Phases of Architectural Style, 1420-1900* (transl. and ed. by J.F. O'Gorman), The MIT Press, Cambridge Mass., and London England, 1968
Risselada, M., (ed.), *Raumplan versus Plan Libre, Adolf Loos and Le Corbusier, 1919 - 1930*, Delft University Press, 1988.
72. Ching, F., Architecture: Form, Space & Order, Van Nostrand Reinhold Co, New York, 1979
73. Ibid. Preface.

For G. Baker[74] formal analysis is a matter of choice. In his analysis emphasis is given to the analysis of architectural form, and only issues central to this intention are considered.[75]His analytical methodology seeks to discover those primary organisational factors which operate in a building or project, and in so doing to reveal the preoccupation of the designer. He investigates design principles by means of dissection, intending to discuss design in an ordered way. This is done by a mainly formal analysis starting from the generic form on which subsequent developments are based. Analysis attempts to show how various factors concerning the site and the programme have led to a series of transformations of this form, while 'elemental relationships' are seen in terms of their context, with special attention given to movement. He starts by looking into the existence of factors like site, programme, and prevailing culture. Next he presents aspects of form, and proceeds to a more detailed presentation of the method of analysis by discussing volumetric disposition (geometrical patterns), circulation pattern, and structural system. These factors are analysed with reference to the purpose which the building is intended to serve, and to the kind of symbolic imagery which the building seeks to express.

All the approaches described above are analytical and operate mainly at a visual level. Their teaching aim is to offer to the students a tool of formal analysis that will become their knowledge base for creating their own proposal. Oxman, R. [76] advances further by attempting to offer a simultaneous analytical and synthetic method. To achieve this he attempts the study of architectural forms as a language. Issues of knowledge acquisition are very important in his approach. He tries to produce a knowledge base for architectural students that will consist of the syntactic rule systems of form and organisation in architecture. Formal types are the canonical expression of formal languages. They are the archetypes of spatial configuration. More than merely offering a formal description this knowledge base can become an explicit part of the design process and provide the constituents of competence[77]. He argues that competence implies knowledge of design languages as well as of processes of transformation and application. The method used in teaching design in the studios stresses the inductive method in which knowledge is built by the accumulation of formal fragments. The process is both analytical and generative. Each fragment represents some aspect of formal language. Ultimately the fragments coming together

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74. Baker, H. G. Design Strategies in Architecture, An approach to the analysis of form, publ. Van Nostrand Reinhold, 1989, Hong Kong.
75. Ibid. p. 64, analysis.
76. Oxman, R., "Towards a New Pedagogy", JAE, Vol 39, No 4, Summer 1986, p.p.22-28
77. Ibid. p. 22. Competence for Naom Chomsky is the ability to manipulate the syntactic rules of a language while performance indicates the applicative ability (Chomsky, N., "the Goals of Linguistic Theory" in Chomsky: Selected Readings, Oxford University Press, London 1971, p.7.)

start generating the whole. This can take place in four ways; canonic (parti), metaphoric (gestalt), systematic (geometric) and syntactic (structural spatial patterns)[78]. These alternatives can work simultaneously. Behind the method lies the belief that comprehensive design ideas are actually collages of multiple formal systems.

2. 7 THE USE OF TYPE AS A METHOD OF TRANSMISSION

In the Beaux-Arts, rules of composition were usually connected with the use of typology. The two together combined in treatises like Durand's "Precis des Lecons d' Architecture" and Guadet's "Elements et Theorie de l'Architecture"[79] ,offered methods of teaching design in architectural education. Rules of architectural composition and typology stress design method. They try to formalise architectural knowledge and to make it generic and explicit by defining methods for creating buildings. Architectural knowledge is thought not to be embedded in the buildings themselves, but rather to in the procedures used to create them. According to the rules of composition conceptual precedes visual, as the starting point is usually the programme. The plan and formal consideration follow. In the typological approach, type as a figural entity usually precedes the programme. , in practice this is not always the case, as sometimes we have the simultaneous use of both typology and rules of composition in the design process (I. e. Durand).

The use of architectural type or precedent was always present in architectural history offering a plurality of mental models and a closed (tradition) and open (history) range of past-rooted possibility for creative action. Type first posed a question of choice and classification (content) and secondly a question of design method. Quatremere de Quincy and Durand were amongst the first to study 'type' as a tool for building classification and as a design method .

For Quatremere de Quincy[80] the eternal type of architecture was the primitive hut and its perfect achievement the Greek temple. The world 'type' presented less the image of a thing to copy or imitate, than the idea of an element which ought to serve as a rule for the 'model'. For Quatremere de Quincy the use of 'type' as a design method

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78. Ibid. p. 24.
79. op. cit. Durand, J.N.L.
Guadet, J., *Elements et Theorie de l'Architecture. Cours professionel de l' Ecole National et Speciale des Beaux-Art, 4* Vols. and additions, Paris 1904.
80. Quatremere de Quincy "Type" with an Introduction by Antony Vidler In Opposition 8, p.p. 146-157.

was truly transformational and metaphorical[81]. He attacked those who would mechanistically imitate the type, thereby turning it into a literal 'model' (the mechanical reproduction of a type).

For Durand, the first aim of architecture was no longer the imitation of nature but composition[82]. Where he differs in relation to the already examined treatises on architectural composition is in the introduction of type as a methodological tool, which was accomplished[83] at the beginning of the nineteenth century. To study architecture for Durand was to study first the elements[84] of the buildings i.e. walls, columns , openings, second the combination of these elements and third the assembly of these combinations in the composition of a particular building. Type was selected to be the locus of relevant similarities and differences, and served at the same time as the classificatory tool of all architectural genres. Thus 'type' was designated by the structure or by the syntax of the building's organisation.

Durand was trying to discover the generic principles that are implicit in the works of architecture by using a system of classification of mainly historical and functional types . Durand believed that architectural education should be based on the study of these general principles and not on the study of particular buildings or styles. In a very interesting critique of Durands classification Madrazo L.[85] claims that in reality Durand's typology is mainly formal, based on one hand on simple geometrical forms and on the other hand on complex and more architectural ones. For Durand graphic representations played a crucial role in the systematisation of architectural knowledge, since the examples he used were placed in a specific historical context. He wanted his method to be independent of stylistic considerations. That is why his teaching method did not consists of a selection and a recombination of architectural elements, which would carry their historical meaning with them. Durand was forced to turn to rules of composition, to geometry as an analytical and synthetical tool to define abstraction[86]. The process began with the layout of the main axes of composition, walls were laid out along the axes, columns were placed within areas bounded by

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81. All is precise and given in the model, all is more or less vague in the type. Apart from this very abstract idea of type other kinds of type existed as well, like the type based on need, on use or custom.
82. Moneo, R., "On Typology", Oppositions 13, Summer 1978, p.p. 28-29
83. Durand, J.N.L., Precis des lecons d'architecture donnees a l' Ecole Royale Polytechnique, , Paris 1819.
84. For Durand the elements of architecture were without style. They were considered from two points of view: first in regard to materials and construction, and secondly in regard to form and proportions.
85. Madrazo, L., "Durand and the science of Architecture" JAE, Vol 48, No 1, September 1994, p.p. 12-23.
86. Vidler, A., "The Idea of Type: The Transformation of the Academic Ideal, 1750-1830" Oppositions, Spring 1977:78, p.p. 95-115

walls, other architectural elements compiled the plan and finally elevations and sections were generated from the plan.

The contemporary theory of precedents offers similar possibilities for classifications to those of Durand, for choice of precedents (classifications) and method (knowledge based activity) are again seen to be the essential issues. Three kinds of precedents exists for Hancock E. J.[87] these of place, type and principle. With 'place' he means the historic continuity of settings, whilst 'type' is the culturally rooted form-function analogues and 'principle' is the accumulated insights and effective techniques that collectively form the established ways in which the language of the disciplines operates. For Hancock the principle and its continuing capacity to attract a consensus , are more important than the individual precedents themselves[88].

A contemporary classification of buildings according to precedents is offered by Roger H. Clark and Michael Pause[89]. For them a formative idea is understood to be a concept that a designer can use to influence or give form to a design. The graphic study of precedent offers a valuable analysis from which a classification of formative ideas is drawn. They offer nine different formative ideas based on geometrical rules; plan to section or elevation, unit to whole, repetitive to unique, additive and subtractive, symmetry and balance, geometry and grid, configuration of patterns (i.e. central, linear), progressions (i.e. hierarchy, transition, transformation) and reduction (part of the whole, large to small). The parti of the building is defined as the dominant idea of the building. It encapsulates the essential minimum of the design, without which the scheme would not exist, but from which the form can be generated. Their approach is formal and spatial, as they do not investigate concepts like cultural influences or meaning at all. Their analytic method offers a combination of typology and rules of composition.

2. 7. 1 PRECEDENTS IN THE DESIGN STUDIOS

The use of precedent as a teaching method was popular in the late seventies alongside the revival of the use of historical references in architectural design[90]. A

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87. Hancock, E. J., "Between History and tradition: Notes Toward a theory of Precedent" in *Precedent and Invention*, The Harvard Architecture Review 5, Publ. Rizzoli International Publications, New York 1986, p.p. 65-77

88. ibid. p. 71.

89. Roger H. Clark, Michael Pause, "Precedents in Architecture", publ. Van Norstrand Reinhold Company, New York 1985.

90. A publication of R. Crier "Rationale Architecture" in the seventies claimed the importance of the use of historical type in an urban scale. A lot of publications followed in the post-modern era around the use of type mainly in an historical sence.
op. cit. Moneo, R., on his interpretation on Aldo Rossi's typology Moneo claims that for Rossi

JAE[91] publication in the Winter of 1982 was entirely devoted to the "Typology in Design Education". Most of the articles included in the publication described studio teaching methods within different universities involving the use of typology . The use of precedent was introduced into the architectural studio mainly as an analytical tool that offered to the students an insight into the internal rules of architecture. Precedents were used as conceptual tools for design in the studio in three main ways[92]: by accumulation, where prior work constitutes the necessary background in a line of continuing development, and to which new work is attached in direct proximity (within this approach the analysis of the precedent was stressed); by analogy where prior work reveals the previous solutions for similar problems, to which new work resembles in overall organisation (within this approach the transformation of the precedent was stressed);and by application where the student borrows rules techniques and ideas from prior work and adapts them to create something entirely new(within this approach creativity and intuition were stressed).

The applications of precedent by accumulation or analogy being the most popular ones are used in combination with historical type. Within that trend type as a historical building and not as architectural element is primarily analysed. For Gulgonen, A., and Laisney, F., [93] the use of historical precedent constitute a necessary part of the student's intellectual and creative development and it represents a conceptual instrument of design. For Harms M. [94]through a process of analysing historical precedents and abstracting them, the student may discover in them formal possibilities which can inspire the design problem at hand. Precedents are thus used to generate significant design concepts. The concept of transformation is inherent in the use of type in design. For Abbey, B., and Dripps, R.,[95] what allows this transformation to take place is the clash between the ideal issues of order and composition and the circumstantial issues of programme and context.

Morris, H.,[96] offers a more detailed and rigid process for the transformation of the historical type into a design proposal. She identifies six transformational stages using

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primary type based on memory and reason is indeferent of function. p.36. On the other hand for Ventury, type is reduced to image, in the belief that through images communication is achieved. As such, the type-image is more concerned with recognition than with structure. p. 39.

91. JAE, Issue Typology In Design Education, Vol. XXXV, No 2, Winter 1982.

92. op. cit. Hancock, 1986. p. 72.

93. Ibid. p.p. 26-28.
Gulgonen, A., Laisney, F., "Contextual Approaches to Typology at the Ecole des Beaux-Arts"

94. Ibid. p.p. 29-33
Harms, M., "Historic Precedent in the Studio: Projects for Venice"

95. Ibid.p.p. 14-16
Abbey, B., Dripps, R., " Analysing Organisational Schemes"

96. Ibid. p.p. 17-25
Morris, K. E., "Architectural Type and the Institutional Programme"

historical precedent that the students go through in her studio. In the beginning students use their design preconceptions (visual memory of the type under analysis) and proceed to historical analysis (graphic analysis according to circulation, geometry, function, lighting) and historical synthesis (based on the analytical work). The 'idealisation' of the type includes the generic architectural possibilities inherent in the programme and allows a first individual interpretation. The subsequent transformation of the ideal type which is the really creative part, forces the students to respond to specific site considerations and inform the general with the specific. The outcome is the final design project. The studio process adopts the implicit belief that a typological approach to design teaching is not necessarily intuitive but offers to the students the ability to design within a disciplined tradition. The analysis of precedent is a very important part of the process. The transformation that takes part in the analysed type is not radical and is forced mainly by external constraints of the brief i.e. site, given programme. The tutor welcomes the existence of historical traces in the final project.

Williams, T. and Scofidio, R. [97] use type in a different way. They expose architectural students to basic design principals via the consideration of abstracted architectonic elements. This approach while it uses precedent by application (i.e. the outcome is entirely new), is a-historical and relates the use of type to the use of architectural elements i.e. walls, columns, windows etc. rather than building types. The notion of the "typological model" is introduced, and the notions of a "passage" of "room" etc. are explored. The belief behind this programme is that when we teach someone to speak, we begin with the words and build up to a larger structure of the sentence, only after demonstrating the power and potential of the words themselves and their interrelations. For the final projects only the materials of construction and overall requirements are specified and their importance is stressed. Context and function are to be determined by the student. In that way the primary elemental approach allows the students to give priority to architectonic issues (form and materials) rather than being trapped by complex site and programme requirements.

Waldman, P.,[98] approaches the use of architectural elements 'primary pieces' in a more intuitive and poetic and less abstract and rational way. The exercises start from the use of the 'primer' i.e. the cave, and tend to proceed to a spatial investigation through the addition of architectural elements like a door, a window, a roof etc. to the 'primer'. What is very interesting in this process is the importance of the 'actor'(monks,

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97. Ibid. p.p.8-9
Williams, T., and Scofidio, R., "Typology and primary Elements"
98. Ibid. p.p. 10-13
Waldman, P., "A Primer of Easy Pieces: Teaching through Typological Narrative"

musicians, mayors , maidens) that can inhabit or be a guest of the transformed primer. The narrative informs the 'type' by making the students experience another reality and express it.

To conclude the first group of examples (the use of type by accumulation or analogy) use mainly analytical methods that aim at the rational comprehension of the building's abstract organisation: space, volume, geometry, facade composition. The techniques used are principally diagrammatic. Such diagrams present rationalised, dimensionally-accurate graphic representations of the arrangement of parts, their shapes and proportions, and their controlled relationships. The second group of examples (the use of type by application) use mainly experiential methods of approach that aim at the qualitative description of the building's sensual and meaningful presence, the effects of texture, material and atmosphere. The techniques used are principally pictorial and literary, in that they involve the evocative representation of qualitative responses. Such contents are determined by the formal articulation and materiality of the objects.

Most criticism of the use of precedent in teaching architecture relates to " projects set in the Manner of...". In order for this type of project to be successful, one has to be aware of that similarity in this kind of projects concerns the process rather than the object itself. The "project in the manner of", holds as a principle that lessons cannot be drawn from objects but from processes. Furthermore it positions the student in a situation of 'semiotic distance'[99], even if the precedent is just copied and reproduced, by engaging in the activity itself the student ends up transforming the object under imitation.

2. 8 'FORMAL TRANSFORMATIONS' THE INTERACTIVE VISUAL APPROACH

Within the history of teaching methods only the educators of the Bauhaus and the Russian Constructivists tried deliberately to overcome the 'intellectual' and creative split within design process, teaching consciously in an interactive way and giving priority to visual transformations. These efforts offered an avant-garde alternative to the functionalist doctrine within the Modern Movement.

This avant-garde shared the belief that architecture would unite all the arts and would 'express' the new society. Taut and Behne[100] imposed on architecture two dominant

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99. Boudon Philippe "Project in the Manner of... Notes on a Pedagogic Concept", Daidalos, Vol. 8, p.p.66-74. Presentation of projects in the manner of....

100. Francisconо, M., *Walter Gropius and the Creation of the Bauhaus In Weimar*, University of Illinois Press, 1974, p.91

themes that had strongly marked German artistic thinking throughout nineteenth century, that the work of art should be the medium for the expression of a superpersonal, transcendent content, and that it was the historical mission of the artists, to lead mankind to the rattainment of social and spiritual harmony.

The belief that all the arts should join in a common constructive goal was expressed by the notion of the artist-craftsman in the Bauhaus. The Bauhaus educational programme stressed creativity. For Gropius[101] the training provided by the Bauhaus openned the way for the creative powers of the individual, establishing a basis on which different individuals could cooperate without losing their artistic independence. The above task was fulfilled by preparatory instruction (Vorkurs)[102]. The first task of the workshops was to liberate the student's individuality from the dead weight of conventions and allow him/her to acquire that personal experience and self-taught knowledge which are the only means of realising the natural limitations of the creative powers. Subjective and objective observation, and the laws of representational and abstract design, were taught in the 'vorkurs' through the exploration of 'basic properties' in materials, colours, textures, structures and compositions. The 'vorkurs' or basic course was the most educationally influential part of the Bauhaus school. Through this course the Bauhaus attempted to break away from the intellectual/ creative split. The initiator of the course was Johannes Itten who was followed later by Klee, Kandinsky, Moholy Nagy and others[103]. Those artists became very influential educators as each one in his own way dealt thoroughly and explicitly with the process of teaching and drawing.[104]

Itten, J., [105] preferred to keep the relationship between the theoretical and practical aspects of the course freely interacting whilst attempting to design pedagogical exercises for a systematic exploration of this interaction[106]. Explorations of concrete and abstract forms offered methodical exercises that intended to improve thinking and to present new media for representation of that thought. Students were encouraged to experience abstract form as bodily movement. Geometric analysis

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101. Gropius, W., *The New Architecture and the Bauhaus*, MIT Press, 1965, In "The Theory and Organisation of the Bauhaus"
102. Ibid. Gropius, W., (1965), In 'Preparatory Instructions' pp. 68-72
103. Whitford, F., *Bauhaus*, Thames and Handson, Ltd, London 1984, Chapter 9 'New Arrivals'pp. 80-100
104. Although architecture was never taught in Bauhaus the teaching used in the 'Vorkurs' are perceived as very relevant to the research topic.
105. Itten J., *Design and Form, The Basic Course at the Bauhaus*, publ. by Thames and Hudson, London 1963
106. In a very interesting article Cross, A., tries to define Itten's sources of influence for the creation of his educational methods. For her these have been educators like Dewey, J., the Dalton laboratory plan and Montessori method. see:
Cross, A., "The educational background to the Bauhaus", publ. in *Design Studies*, Vol 4, No 1, January 1983, pp. 43-52

was based upon a different set or kind of observations which were subsequent developments from these primary bodily experiences. The design process implied exploration at several levels involving a variety of representational media including: reality and experience involving sensory perception, verbal language and bodily movement; sensory perception involving abstract notions of measurement, comparison, proportion, ratio, to encourage logical thought; transfer of essential characteristics into three dimensional models, involving manipulation of the material acting as medium; transfer from three-dimensional forms into a two dimensional graphic, into a symbolic picture. At each stage the student was involved in methodological exercise of his perceptions, requiring concentrated attention, observation and judgement in independent inquiry and manipulative skills. Itten's teaching process was simply a formal transformational process where the use of different media of representation allowed for the transformation to occur.

Klee and Kandinsky [107]were also involved in the basic courseof Bauhaus and their main contribution to it was their critical approach to fundamental problems of image-making. Their teaching was centred on a consideration of the elemental forms from which, they believed, all natural things derive. Their aim was to set up exercises that would allow the students to experiment with different representation techniques, form and imagery. They both tried to establish a vocabulary that would connect the visual with the verbal i.e. active and passive lines for Klee etc. Klee's teaching techniques were empirical, derived from everyday experience (representation of moving figure, of earth, water and air) , Kandinsky's were prescriptive and detailed. He began by examining the point, moving systematically to the exploration of the line and later to the plane. They both offered a method for formal abstraction. Klee explicitly believed that only practice would help the students to grasp the essential theoretical principles that he aimed to impart (learning by doing). He often stressed the affinities between building and picture-construction.

Bauhaus teaching methods mainly influenced art foundation courses. As these teaching methods were not immediately related to architectural production, they were held as irrelevant for architectural studio teaching. But the real connection between the expressive figurative methods of teaching and architecture was offered by the Russian Constructivists[108]. Constructivists refused to leave the methodological problems to the mercy of 'intuition'. In order to guarantee that an integration of the

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107. Klee, P., *Pedagogical Sketchbook*, Introduction and Translation by Moholy-Nagy, S., publ. Faber and Faber Ltd. London 1953.
Kandinsky, W., *Point and Line to Plane*, publ. by Dover Publications, Inc., New York, 1979.
108. Cooke, K., "The Development of the Constructivist Architects Design Method" in *Deconstruction*, Academy Editions, London 1989.

material and cognitive aspects of the world was preserved in design work, the Constructivists formalised their 'method of functional creativity'. Background knowledge would be gained by 'laboratory' experimental work in generating new spatial organisms. These 'laboratory investigations' operated within a rather extended framework, moving from building science, to social aspects, to visual psychology and so on. Construction and material experimentation found themselves in the heart of formal investigations. Rothenko[109] believed that the designer must be 'constrained to assemble forms 'types of transformations' according to structural laws. The designer must be able to make all possible combinations through understanding the fundamentals of formal 'construction'. For Ginzburg[110] form is an unknown 'x' never fixed. Therefore the elements of architecture and the methods of their transformation must be studied in order for us to understand how programmatic changes must affect form. The transformation process is never just an aesthetic one, but involves a reorganisation of the working, constructive elements of the building; what is changed through the transformation is the material object itself.

Chernikov, I.,[111] pursued the problem of 'the method of formal transformations' and the possible organisation of the building's constructive elements. For him the fundamental elements of Constructivism consisted of all the various possible unions of elements which could make up a structure i.e. insertion, clamping, twisting, embracing, mounting, bending, coupling, piercing etc. [112]. Knowledge of the fundamentals of formal construction greatly helps, but it is not enough for someone to be familiar with the forms themselves. Complete familiarity with the principles underlying the forms is essential. One must study the insertion of one element into another with all the possible variations and combinations. "With the help of so-called non-objective elements we have the possibility for creating a series of the most fantastic formal constructions which are not initially constrained by any direct practical applications, but in return possess properties which make them available for real and direct application in the future"[113].

The Bauhaus and the Russian Constructivists shared the same interactive (in relation to mental and visual operations) teaching method of 'formal transformations' at a different level (art-architecture) but with the same aim, the production of new forms. Within the design prosses they both gave priority to visual operations as someone did

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109.Ibid. p. 31-32
110.Ibid. p. 31
111.Cook, K., "Iakov Chernikov", *A.D.* No 54, 1984, p.p. 27-29
112.For an interesting contemporary use of Chernikovs transformation rules in design studio see: Reno, J., "Constructing Beginnings: A role for building technology in architectural design education" In JAE, Vol 45, No 3, May 1992, p.p. 161-170
113.op cit. Cook, K., (1989), p. 32

not need to think in order to design but needed to 'do' instead. The Bauhaus stopped at the level of design production but the Constructivists advanced to the systematisation of architectural elements and their structural possibilities.

2. 9 A CONTEMPORARY DISCUSSION

Over the last few years things have started to change in architectural education. A visual survey of the recent products of architectural education might leave one unclear as to the relationship of these practices to the design of buildings. Looking at an influential publication of the Cooper Union 'The Education of the Architect'[114](1988) New York, and in parallel at the year books (1985-95) of the Architectural Association in London, the educational transformation is apparent. In these publications we can find drawings and models which are clearly intended to be read as proposals for buildings. These occupy the same space as objects which must be mistaken as something else. But in any of these cases the emphasis seems to have switched from the end product of the students work to the process, irrespectible of the fact that the process might or might not lead to an architectural product.[115] Precedents whenever used are re-created by means of different techniques [116]i.e. by overlaying transparencies, by their juxtapositions, reversal, shifting rotation, decompositions into parts and recomposition. Objects are not necessarily architectural, and they are used in a metaphoric way to be investigated for their spatial qualities or to be transformed into a spatial proposal i.e. music and musical instruments, paintings, medicine, machines etc[117]. The processes involve mappings of body movements,and transformational devices along the use of films and photographs. They are about displacement, simultaneous reading, multiple reading, and re-framing for re-viewing the already seen, towards new imaginative possibilities. As early as 1981 Evans, R.[118], traces a 'recognisable possibility' that the new explorative attitudes towards the means of representation might forge a new role for them as they could allow the perception of the designer to flow in different channels.

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114. The Irwin S. Chanin School Of Architecture Of The Cooper Union, *The Education of an Architect*, by Rizzoly, New York 1988.
115. see: Dimensions, *Process(es): A Promblematization of Method and Moment in Architecture*, Journal of the College of Architecture and Urban Planning at the University of Michigan, The University of Michigan 1993. The issue includes articles, student projects focusing on studio process(es).
116. op.cit. *Education of an Architect*, 'Third Year Design".
117. Two pamphlets of Princeton University have a very indicative content:
Pamphlet Architecture 16, *Buildings: Machines*, Princeton Architectural Press, 1987, New York.
Pamphlet Architecture 16, *Architecture as a Translation of Music*, Princeton Architectural Press, 1994, New York.
118. Evans, R., "From Axes to Violins" in *AA Files*, Vol 1, No 1 Winter 1981-82, p.p. 116-120

To be able to understand this change one has to take into account the influence of deconstruction[119] in the architectural discourse of the'80s. Advocates of deconstruction have argued that it represents a "different sensibility", that it is different because it offers a radical alternative to more limited views of architecture. For Groat, L.[120], the current Aglo-American fascination with deconstruction exemplifies the continuing need to marry an apparently acceptable 'empirical' method to an epistemological stance that affirms the value of the creative self. Within Derrida's work, it is the deconstructive method in particular that becomes the focus of attention[121] as deconstruction is mainly seen as a 'way of working' and not as a style, and it is mainly in that form that invades and transforms architectural education. Eisenmann and Tsumi are certainly two of the most influential theoreticians that, through their writings , explorations of process and studio teaching have acted as leading figures in the studio teaching metamorphosis. Eisenmann, from his transformations, moves into decomposition as method of designing. Decomposition as a process was to free the architect from the empirical conditions imposed by the process of composition. Tshumi decomposes the programme in relation to form, allowing for different new architectural readings and introduces to the studio extra-architectural tactics like texts , cinema and cinematic reading[122].

Eisenman[123] is known for his conception of architectural form as autonomous, especially for his efforts to pursue an architectural "essence". For Eisenman the process of design is a process of research into formal structures and shapes which do not exist prior to the design. For him a design idea exists at the beginning that is both formal and conceptual , but at a second stage the design becomes an obsessive search for the corresponding shape. The aim of the process is to find a law, a general rule that will combine each of the partial moves or stages into a continuous uninterrupted sequence, explanatory of the process from simple beginning to a complex end. In that way he focuses on formal abstraction and conceptualisation as a method of designing. His formal and spatial relationships exist regardless of the style

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119. Term introduced by the French philosopher Derida in the field of Literary Criticism.
120.Groat, N.L., "Rescuing Architecture from the Cul-de-Sac", In *JAE*, Vol.45, No 3, May 1992, p.p. 138-146
121.Ibid. p. 142. For the French postructuralists, the rejection of the systemic unity of the signifier/signified is part and parcel of a deterministic epistemology alien to the concept of a creative self. In the Aglo-American context, however, the metaphoric 'space' between the signified/signifier is the locus for asserting the quest for liberated self.
122. Tshumi as early as 1983 published a text documenting the works of Diploma Unit 10 at the A.A. In this text he was referring to the use of literary texts in the studio programmes and the free juxtapositions of these texts to images. See:
Tshumi, B., "Spaces and Events" in Questions of Space, A.A. Publications, London 1990, p.p. 88-95.
123. For a review of his work and method see:
Eisenman, P., *House X*, Rizzoli, New York, 1882, Particularly the Introduction of Gandelsolas, M., "From Structure to Subject: The Formation of an Architectural Language" p.p. 7-30.

or shape. They are understood as juxtapositions of solids and voids. Eisenman[124] focuses explicitly on composition. He understands composition as the classical process, suggesting that the ends are as stable as the origins. On the other hand, transformation, the modernist process, concerns the idea of process in time. While in composition the idea originated in an order outside man, in transformation the significance of the final form resided , in part, in the process itself. However the two constant ideas, the capacity of meaning to inhere in a form, and the grounding of the processes of composition or transformation in the idea of a type, bring together for Eisenman both the classical and the modern view. He attempts then to sketch aspects of 'negative' of classical composition, such as the pre compositional, the composite, the process of succession and decomposition as a form of autonomous making.

In his later work Eisenmann[125] rather than seeing the transformation as a logical process of discovery, he sees it as a process of invention, fiction, constructed in an attempt to dislocate the work from the tradition of presence in the architectural object. Derrida's texts on the subject of "double writing" the paradigmatic reversal of hierarchy and subsequent displacement of systems within a text, also become important references for him. In his view, architects traditionally attempted to make the heterogeneous or the figurative a secondary event, while presupposing a homogeneous primary original event, the literal. Unity, sameness, the 'origin' were always preferred over diversity, difference, and what seemed to be supplementary. For him the new reading marks a parallel between visual development and verbal discourse.

Tschumi, B.[126], in the poscript of the 'Manhattan Transcripts' is very clear. "In architecture concepts can either precede or follow projects or buildings. In other words, a theoretical concept may be either applied to a project or derived from it. Quite often this distinction cannot be made clearly when, for example, a certain aspect of film theory may support an architectural intuition, and later through the arduous development of a project, this can be transformed into an operative concept for architecture in general". The transcripts sequences are intensified through the use of devices, or rules of transformation such as compression, insertion, transference etc. Any work on autonomous form requires the conscious use of devices. All transformational devices for Tschumi can apply equally and independently to spaces,

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124. Eisenman, P., "The Futility of Objects: Decomposition and the Processes of Difference", *The Harvart Architecture Review*, MIT Press, 1984, pp. 64 - 81
125. Patin, T., "From Deep Structure to an Architecture in Suspense: Peter Eisenman, Structuralism, and Deconstruction", in *JAE* 47/2, November 1993, p.p.88-100
126. Tshuml, B., *The Manhattan Transcripts*, Academy Editions, London 1994.
also published in:
Tshuml, B., Questions of Space, A.A. Publications, London 1990 p.98.

events and movements. Through his 'Transcripts' Tshumi creates an index of architecture[127] where spaces, movements and events are read as independent from each other and with the potential of creating new relationships between them. These relationships could be ones of indifference or independence, of reciprocity or interaction , of conflict or opposition. Parallel to the concept of devices , the concept of notation questions the modes of representation generally used by architects[128]. Notation is the process or method of representing numbers, quantities, movements and events by the means of photography. The events in the 'transcripts' are presented by the use of frames and sequences, two cinematic representational devices. A transformational sequence is for Tshumi[129] a device, a procedure. By drawing on a successive layers of transparent tracing paper, the reworking of the initial drawing leads to a transformational sequence. This then becomes its own theoretical object, insofar as the process becomes the result, while the sum of transformations counts at least as much as the outcome of the final transformation.

Eisenman and Tshumi,each in his own way, give priority to the design process that becomes explorative, open-ended and has mainly visual transformations as a starting point. But while Eisenman remains locked in geometrical transformations and architectonic elements, Tshumi explores the relationship of space to extra-architectural elements, these being objects, texts or events.

2. 10 CRITICISM AND CONCLUSIONS

We have seen how architectural education is trapped between intellectual thinking and creativity. The design methods approach of the 60's and 70's and cognitive models i.e. analysis-synthesis, concept-test, supported an intellectual and creative split by trying to explain the design process in scientific terms. The functionalist doctrine of the Modern Movement made it very difficult for educationalists to overcome this split. Functionalism presents a unique case of an 'invisible' design process. Under functionalism form appeared to be merely the result of a logical process by which operational needs and operational techniques were brought together. By insisting on the use of analytical and inductive methods of design, functionalism created a vacuum in the form-making process. The functional complex is translated into forms whose iconographic significance is nothing more than the rational structure of the

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127. op.cit. Tshumi, B., 1990, "Index of Architecture" p.p.98-107.
128. For example wiitnin the contemporary educationally scene Kevin Rhowbotham offers mapping and indexing as alternative representation techniques to the already existing ones. see: Rhowbotham, K., *Form to Programme,* publ. by Black Dog Publishing, London 1995.
129. Tshumi, B., " Sequences" In *Architecture and Disjunction* p.p.

functional complex itself. The biotechnical determinism of the Modern Movement was teleological, because it saw the aesthetic of architectural form as something which was achieved without the conscious interference of the designer but as something which was postulated as his ultimate purpose. It is clear that this doctrine contradicts any theory which would give priority to visual expression. Rules of composition and typology, so popular in the beginning of the century, were banned from the design studio. 'Visual transformations' used as a teaching method in the "Vorkurs' of Bauhaus and as an explorative design process by the Russian Constructivists, were largely ignored.

However the 'void' of a visual input in the design process due to the functionalistic doctrine [130] was almost impossible to sustain. The area of pure intuition is based on a knowledge of past solutions or on the field of mental imagery of the designer. After all, although the Modern Movement advocated the absence of a teaching method involving visual operations part of it, the avant-garde, drew upon visual transformations. In the seventies the educational scene changes and we have the re-introduction of composition and typology in studio teaching, this time not only as geometrical and formal rules but as part of an 'architectural language'. Under the linguistic analogy architecture is perceived as a language with its own structures and spatial rules and as a consequence typological elements become its visual fragments, and compositional rules its syntax.

In the beginning of the 80's things start slowly shifting in architectural education. Several publications appear on design methods that question the rationality of design and stress the role of 'non verbal thinking'[131] within it. During the same period Arnheim's "Visual Thinking"[132] explicitly places learning importance upon visual operations. Cooper Union of New York and the Architectural Association of London[133] were the Aglo-Saxon architectural schools to express the transformation that started taking place during the 80's and was generalised at the beginning of the 90's in design studio teaching. Two are the main characteristics to this shift. The first is a focus on the design process not as a rational or analysable activity but as a creative activity in its own right. The design process for the most part becomes more important than the end result. The second one is the recognition of visual operaticns as equally important contributors to the design process and architectural cognition as 'architectural

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130. Colquhoun, A., "Composition versus the Project", *Modernity and the Classical Tradition*, MIT Press, 1991 p.p.58 - 59

131 The most representative publications are included in :
Cross, N. (ed.)Developments in design Methodology, The Open University, John Wiley and sons, 1984

132 . op. cit.

133 . op. cit.

thinking'; visual operations can even precede architectural thinking. As a result formal transformations drawing from the precedents of the Bauhaus and the Constructivist's working methods, from being implicit become explicit. The means and different techniques of representation acquire a special importance as they become an explicit part of the design process. The main difference between the Bauhaus and the Constructivist's teaching methods and the current ones, is that at present, techniques of representation alien to architecture and transformations of extra -architectural objects are introduced in the design process.

CHAPTER 3

METHOD OF ANALYSIS

3. 1 INTRODUCTION

The field work of the thesis consists of architectural reviews. The reviews were attended, recorded and later transcribed at full length and transformed into a text. The collection of texts will be subjected to a linguistic analysis, in order for the nature and substance of the communication that takes place in the review to be identified. The linguistic analysis takes place on a number of levels, looking first at the surface characteristics of the text in order to classify it into its content of architectural domains, and then more deeply to see how these domains are structured in relation to one another as the sequence of the text unfolds.

The chapter offers a theoretical framework under which both the content classification of the text and its structural analysis operate.

The chapter is split in two sections. The first section relates to the content analysis of the text. The method by which the text is subdivided in smaller conceptual units (design domains) is presented. Then the main architectural categories used within the architectural discourse are placed in an extensive discursive context. These categories form the background vocabulary upon which, the contents of the text are classified. The second section of the chapter concerns the structure of the text. A multilayered model of analysis is presented which is then linked to the specific design language analysis. Finally the presentation of the analytical chapters and their content concludes the chapter.

3. 2 THE CONTENT OF DESIGN LANGUAGE : DESIGN DOMAINS

Before we begin the analysis of the structure of the text, we have to define the content of what is transmitted during 'reviews' i.e. the content of the design language and the character of its design domains. To be able to make a classification of the design domains within the text, we have to find the 'significant units' of the text. The size of each 'significant unit' is quite important for our classification. Tmashevsky

discusses it apropos of the "theme"[1] "The work as a whole can have its theme and at the same time each part of the work possesses its theme.... with the help of the decomposition of the work into thematic units, we finally reach the un decomposable parts, the smallest particles of the thematic material....". It is clear, that the "theme" or the 'significant unit' can be analysed according to its constituents, but these no longer belong to the connotative code as they cannot articulate a meaning and, in our case, an architectural concept; for example, if we have the following 'significant unit', 'I think that you need to define the concept of travelling' and divide it in several parts like 'I think that you need'... grammatically the sentence is valid but does not convey any architectural concept. As a result the subdivision of our text should stop at the level of 'significants units'or of architectural concepts.

Further more Tynianov notes[2] that the 'significant units' enter simultaneously into a relation with the series of similar units belonging to other systems or works, even to other series (auto-function), and further with the other units of the same system (syn-function). For example a window is similar to other elements like a door, a wall, a balcony which make up a series of similar elements, that can be grouped under the category of architectural elements (auto-function). A window is also similar to all the other windows in the sense of being an opening that allows communication between an internal and an external space (syn-function).

In addition to their use within the analysis of language, auto-function and syn-function constitute the classification system that is used in Ethnomethodology. For ethnomethodologists cultural communication is not a random collection of terms; instead it is an organised system and its basic unit of organisation is called a cultural domain[3]. A cultural domain is any large category of meaning that includes smaller categories inside it. One way to identify domains in a cultural scene is to locate cover terms, the names for large categories (auto-function), included terms (syn-function), and their semantic relationship.

Thus design language, being part of a cultural communication, is divided into different categories (classes) of meaning 'significant units'(design domains) i.e. included terms

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1. See Todorov T., *The poetics of Prose*, Basil Blackwell, Oxford 1977, appentix: The Methodological Heritage of Formalism, p. 254
2. Ibid. p. 251
3. The term cultural domain is borrowed by a method called Ethnomethodology, or Semantic Ethnography that has as its aims the study of both explicit and tacit cultural knowledge. See: Spradley/McCurdy, *Anthropology, The cultural Perspective*, 1980, Appentix: "How to do a Fieldwork Project".
Spardley J., *Participant Observation*. Holt, Rinehart and Winston, U.S.A. 1980
Spardley J., *The Ethnographic Interview*. Holt, Rinehart and Winston, U.S.A.1979.

and cover terms. This division is operating according to the general principles of inclusion. Its function is to define included terms by placing them inside the cultural domain. The semantic relationship that is chosen, to distinguish cover from included domains, is that of strict inclusion: x is a kind of y. i.e. the relationship of similarity. The categorisation is taking place in both directions simultaneously; from cover terms to included terms and vice versa. Thus the design domains[4] (significant units) is the outcome of this interchange.

The classification of the text into design domains is not, however, taking place in a void. We have inherited conceptual categories used within the architectural discourse that have been transformed and enriched through time. These categories have always been or are part of our architectural vocabulary and,for that reason, they are outlined and discussed in what follows.

3. 2.1 ARCHITECTURAL CATEGORIES

Any consideration of categories in architecture inevitably involves the three Vitruvian categories expressed by Sir Henry Wotton in "The Elements of Architecture":[5] 'Well building hath three conditions: Firmness, Commodity and Delight'. It is surprising that these three categories have undergone so little modification since Roman times. One straightforward interpretation of the Vitruvian categories would give us structure for Firmness, function for Commodity and form for Delight. It is not valuable though to start looking at any conceptual category in isolation as it is always a part of a whole. It belongs to a current theoretical framework and to a current way of perceiving things. So if one relates the Vitruvian categories to the philosophical ones that existed at the time and then follow the change that these philosophical categories have undergone throughout history, the interpretation of the three Vitruvian categories can be seen in a different light.

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4. See Donald Schon, *The Design Studio, An Exploration of its Traditions & Potential,* RIBA Publ. Limited, London 1985. Figure 3.2, page 45.
Donald Schon has already made a classification of "Normative Design Domains" offering a possible model for an analysis of a "non-scientific" activity in a systematic way. For him design domains represent different categories of relevant design elements like programme/use, siting, building elements, organization of space, form, structure/technology, scale, cost, building character, presedent representation and explanation. Schon did not offer any distinction of these domains in reference to cover and included terms[4] i.e. if ' use' is one of our cover terms then 'sitting' would be an included term etc.

5. Wotton, H. *The Elements of Architecture,* a Facsimile Reprint of the First Edition (Lon. 1624), publ. by the Folger Shakespeare Library 1968. The University Press of Virginia. Part I.

D. Capon[6] takes up this process. He relates the Vitruvian categories to Plato's three kinds of art, 'One which makes, one which uses and one which imitates', and to Aristotle's three kinds of knowledge, ' Productive, Practical and Theoretical' where Productive is Firmness, Practical is Commodity and Theoretical is Delight[7]. For Capon the substitution of the aesthetic category for the productive category follows on from the Greek idea of production being a rather 'arts and crafts' kind of affair, but it also introduces the possibility of a fundamental division between a category that contains aesthetics (firmness) and a category that contains theory (delight).[8] Delight becomes connected with what the building looks like and what associations it recalls i.e. with architectural meaning. Capon relates form to Vitruvian Firmness, function to Vitruvian Commodity, and meaning to Vitruvian Delight. What Capon is doing is exploring the way the Vitruvian categories changed through time in relation to their contemporary theoretical framework. That means that his interpretation is relative, since his analytic tool is not architecture itself but philosophy in general. He offers a list[9] of how different people interpret the primary Vitruvian categories. This shows the relativity of his interpretation and the existing diversity in relation to the definition of different architectural concepts.

Structure, function, form/space and meaning are the architectural categories that are most often used and discussed today. Out of these the simplest one to define is the category of structure since it connects with the physical and rational side of architecture, its materiality and the straightforward fact that a building has to stand and to protect its inhabitants from various different weather conditions. The concepts of function, form and meaning are by far much more complex and have been and are amenable to changes and transformations. They are therefore the ones that are more extensively discussed below.

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6. David S Capon, "Categories in architectural theory and design: derivation and precedent", publ. in *Design Studies*, vol.4, num.4, October 1983, p.p. 215-226.

7. For the Romans at that time, delight in architecture lay very much in imitation, particularly of the style of the Greeks and theory of the Greeks was very much a speculation on the ways real world imitated an ideal one.

8. see Ibid. p.216.

9. In his article David S Capon presents a list of concepts taken from philosophy and architecture related to the primary categories, e.i.
FORM: Disjunction (Kant), Contiguity (Hume), Coexistence (Compte), to make (Plato), Aesthetic (Kant), Syntax (Morris), Perception (Canter), Topological (Hillier & Leaman), Space/proportion (Scruton)
FUNCTION: Causality (Kant), Cause and effect (Hume), Succession (Compte), To Use (Plato), Practical(Aristotle/Kant), Activity (Peirce/Canter), Kinetic (Hillier & Leaman), Functionalism (Scruton)
MEANING: Inherence (Kant), Resemblance (Hume/Compte), Knowing (Augustine), To imitate (Plato), Theoretical (Aristotle/Kant), Semantics (morris), Concept (Canter), Classification (Hillier & Leaman), Historicism (Scruton)

3.2.1.1 FUNCTION

Functionalism[10] offered a dogmatic interpretation of the concept of function. Function being the central key concept of functionalism was taken as the practical, material needs of the occupants of a building. But this tackled only one of the aspects of function and created a very deterministic model. For A. Colquhoun[11] the word "function", when used in connection with architecture, has two senses. First, it simply means the way in which a building satisfies a set of pragmatically determined uses. Secondly, it means a certain relation held to exist between human society and the mechanical and material basis of its culture. Therefore, any discussion of function entails a constant oscillation between two different levels of logical thought, the practical and the cultural. The idea of function was always a complex one[12]. Various interrelated types of functions have always existed[13]. Two approaches that take a broader social view of function than the simple pragmatic one are discussed next.

For J. Mukarovsky[14] function, means that we commonly use the object which is a vehicle for a purpose. The object not only performs but also signifies its function. An object, however, does not have inevitably only one function, but it can perform instead a whole range of them, i.e., it can function in a number of different functional horizons. All possible subject-object interactions, according to Mukarovsky can be subsumed under four main general functions: the practical, theoretical, symbolic and aesthetic. Architecture is a complex, multifunctional system, and to understand the function of the building one has to consider all the different functional horizons of the system.

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10. discusssed in previous chapter under teaching methods 'The implisit design rule of the funcionalist doctrine"

11. Alan Colquhoun, "*Essays In Architectural Criticism*, 'Plateau Beaubourg', The MIT Press 1981, p.118.

12. Roger Scruton, *The Aesthetics of Architecture*, publ. by Methuen & Co LTD London, 1979."What for example, is meant by the term 'function'? are we referring to the function of the building, or to the function of its parts? If only to the latter, does it suffice that a building should simply display all its functional details, like the tubes and wires which deck out the Centre Pompidou? ....Such examples show that the idea of 'the function' of a building is far from clear, nor is it clear how any particular 'function' is to be translated into architectural 'form'. All we can say is that buildings have uses, and should not be understood as though they did not. p. 237

13. Even within functionalism were function was generally associated with the practical, material needs of the occupants of a building and the expression of structure, some of the most radical functionalists took a broader view of functionFor example Bruno Taut stressed the social function of architecture in "Modern Architecture" and Le Corbusier's statement that "the business of Architecture is to establish emotional relationships by means of raw materials" (see Towards a New Architecture), implies a psychological interpretation of function not revealed by his mechanistic dictum, "the house is a machine for living in" .

14. Jan Mukarovsky, *Structure, Sign and Function, Selected Essays*, translated and edited by John Burbank and Peter Steiner, publ. by Yale University Press, 1977.

More specifically in architecture, Mukarovsky identifies five functional horizons[15]. First, the immediate purpose, or basic usage of the building; second, the historical purpose, which defines the fixed canons and norms for the building type. A third horizon is created by the organisation of the social grouping to which the architect and the client belong. A fourth horizon is given by the individual, designer or user. Those four horizons are in a state of constant hierarchical interrelation[16] which means that usually one of them prevails. For example, at the beginning of the Modern Movement, the immediate usage of the building received greater emphasis, while later social functionality was also stressed. A fifth functional horizon is given by the aesthetic function, which, as the "dialectic negation of functionality", tends to hinder the practical use of the building. For Mukarovsky in all 'practical' functions i.e. use, precedent, social, individual , the telos lies outside the object which is the vehicle of the function, either in the subject whose particular need is to be satisfied or in the surrounding context which is to be changed. In contrast to this, the telos of an object dominated by the aesthetic function lies in the object itself".[17]

Hillier and Leaman[18] have also identified four different functions that the building performs. They understood the building as a modifier of climatic, behavioural, economic, and symbolic conditions, and synthesised those aspects of the building into a four-function model. They understand the symbolic function as the operation of the building as a social language, as reflecting ideas of social groups, or as representing a social statement. They believed that the relation of people and environment is an elaborate structure of relations which has the nature of a code. Designers must use code structures in order to design buildings and people have to understand codes in order to experience them. The concept of function is important because it expresses exactly such relationships. The 'four-function model' gives a structure of these. Like the relation between man and nature, and the mediation between man and man which exist in all forms of the artificial environment, the building function both in a visible, tangible way (building as thing) and in a less obvious but pervasive way as a cultural language (buildings as sign).

In a later paper[19] Hillier and all suggest that function is the distinguishing mark of space that sets the work of architecture apart from other artefacts. Social meaning is

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15. Ibid. p. 237.
16. Ibid. p. 242.
17. Ibid. p. 244. Mukarovsky considered the aesthetic norm the weakest of all norms, constantly being violated and revealing its existence only through this violation.
18. Hillier, B., and Leaman, A., "Architecture as a Discipline", publ. in *Journal of Architectural Research*, vol. 5, num. 1, March 1976
19. Hillier, B., Hanson, J., Peponis, J., "What do we mean by building function?" in ed. Powell et al., *Designing for Building Utilisation*, Spon, London pp. 61-72

an intristic aspect of the building's physical form. Buildings they suggest are organisations of space[20] and this becomes the most general statement of function. 'Global function' means then something like the overall figure that characterises different 'types' of building: in effect the link between spatial form and building function. Function thus becomes overpowering embracing all the expressions of the building.

In all three definitions of function discussed (Colquhoun, Mukarovsky, Hillier/Leaman) there is the conviction that the concept of function represents more than the simple practical use of a space. Function is definitely part of the architectural system and takes on board the system of social interaction.

3.2.1.2 FORM AND SPACE

Behind the notion of form or figure there always existed and exists the notion of geometry and proportion[21] A building can be seen as pure form, or as a structure open to geometrical analysis. Vesely, D.[22] claims that throughout most of the history of the visual arts, form, as a critical notion, was hardly used at all. The attempt to reduce the diversity and richness of the visual world into 'pure visual form' took place only in the late eighteenth century. Until then the whole spectrum of terms such as paradigma, typos, symbol, allegory, emblem, impresa, schema, figura, were used to grasp the meaning that was later given to the simple notion of 'form' itself.

For A. Colquhoun[23] the notion of form as an abstract concept was not incorporated into the architectural discourse until the late 19th century, when it was first used by H. Muthesius in presenting arts and crafts artefacts. H. Wolflin[24] was one of the first historian critics to use the concepts of form and space in an abstract way, in his discussion of painting and architecture in terms of stylistic grammars. The notion of 'pure' form was also stressed in the non-figurative abstract paintings of the beginning

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20. Ibid. A descriptive theory of space has, to be built at three levels:
-the identification and representation of spatial elements: boundaries, convex, axial.
-the categorisation and analysis of spatial relations: intergration value (global), control value (local)
-the modelling of common, or 'genotypical' themes and patterns.
21. see: previous chapter under teaching methods "The use of geometry and formal analysis in design" and
R. Scruton, *The Aesthetics of Architecture*, publ. by Methuen @ Co L.t.d., London 1979, "Proportion" p.p.58-70
22. Vesely, D. "Architecture and the conflict of representation" in *A.A. Files* 8. Ibid. p. 22.
23. A. Colquhoun, "Form and Figure" in *Essays in Architectural Criticism*, Opposition Books, The MIT Press, Cambridge Massachusetts, 1985, p.p. 190-199
24. H. Wolfflin, *Renaissance and Baroque*, Translated by Kathrin Simon. Ithaka, New York: Cornell University Press, 1966.

of the 20th century. The objective of the paintings was to reveal through form, the laws which underlie the appearance of things. For A. Colquhoun[25] the concept of 'pure form' holds that architectural forms can be reduced to an a-historical "degree zero". For him this is the result of the gap that the development of technology created between means and ends i.e. between production techniques and meaning. The development of the notion of form responded to this separation by seeking to express the universal laws of aesthetics, independent of technological or historical change. By contrast, the concept of figure, was and is bringing with it conventional and associative meaning and assumes that architecture is a language with a limited set of elements which already exist in their historic specificity.

The use of the notion of space in architecture parallels that of the use of the notion of form, as it is abstract and of a very recent origin as well. Generally in the history of philosophy, mathematics and physics space was characterised as something subjective with which the mind categorises things. Space was generally accepted as an all embracing concept with subsets like literary space, cybernetic space, psychoanalytical space. In architecture space was rarely discussed before the beginning of the 20th century . For B. Tshuml [26]by 1923 the idea of felt space had merged with the idea of composition and the history of architecture became the history of spatial concepts. Space became a three dimensional continuum capable of metrical subdivisions, geometrical analysis that could be related to academic rules. It became a concept that belonged only to architecture.

Architecturally, to define space literary means to define its boundaries. For P. Von Meiss[27] architectural space is born from the relationship between objects or boundaries and from planes which do not themselves have the character of objects, but which define limits. Spaces are characterised by their depth defined by the superimposition of layers and by their density. Spatial relationships work on the level of juxtaposition, autonomy and interpenetration, that is the degree to which spaces are linked to other spaces. In the words of B. Zevi [28]space is the essence of architecture; this essence is not only about limitation and boundaries but it is about the way space is organised into a meaningful form through this process of limitation. In his work

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25. op. cit. Colquhoun p. 197

26. B. Tschumi "The architectural paradox" publ. in *Architecture and Disjunction,* The MIT Press, Cambridge Massachusetts,1996, p.p.30-31

27. Pierre von Meiss, *Elements of Architecture, From form to Place,* publ. by E & FN SPON, London 1991, First Interlude "From object to space" p.p. 91-96, and Chapter 6 "Space" p.p. 99-110.

28. B. Zevi, *Architecture as Space,* trans. by M. Gendel, ed. by J.A. Barry, New York 1957.

"Space Time and Architecture" Giedeon[29] uses the concept of space to relate Einstein's theory of relativity to cubist painting, and cubist planes to architecture.

For some architectural critics and theorists, the concept of space becomes as abstract as the concept of form[30], being part of the discussion on architectural aesthetics, void of any cultural and social meaning. But different approaches exist that take on board the connection of social praxis to space.

For B. Hillier and J. Hanson[31] architecture structures the system of space in which we live and move, by giving space and form to our material world. Their 'social logic of space' establishes a descriptive theory of how spatial patterns can and do, in themselves carry social information and content. For them the ordering of space in buildings is really about the ordering of relations between people and they set out to understand these connections. The formal properties of inside/between, symmetry/assymetry, open/closed cells, form the basic elements of the spatial language they are investigating.

B. Tshumi [32]comes from a different standpoint. He describes the act of experiencing space (the labyrinth) as an act of experiencing the extention of our body, where all sensations, all feeings are enhanced, but where no overview is present to provide a clue about how to get out. He claims that an architectural paradox exists about the impossibility of questioning the nature of space and at the same time making or experiencing a real space. For him the only way out of this paradox is to see space as a product of social praxis with all its subjectivity. While B. Hillier and J. Hanson create an analytical tool that will help us to understand the social function of space B. Tshumi stresses the subjectivity of experiencing space[33]. The concept of architectural space

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29. S. Gledeon, *Space Time and Architecture*, 5th ed. publ. by MIT Press, Cambridge, Mass. 1968.

30. for a critique on the use of concept of space see "Space", in R. Scruton 1979, op. cit. p.p. 43-52

31. B. Hillier, J. Hanson, *The Social Logic of Space*, publ. by Cambrige University Press, Cambridge 1984. For them the requirements of a theory of space are:
1. It must establish a descriptive autonomy of the space
2. It must account for wide and fundamental variations in morphological type, from very closed to open patterns, from hierarchical to non-hierarchical and so-on.
3. It must acount for basic differences in the ways in which space fits into the rest of the social system.

32. op. cit. 'The Architectural Paradox' For Tschumi the pyramid is a metaphor for thinking about architecture and the labyrinth is a metaphor for experiencing architecture. The two terms pyramid and labirinth are mutually exclusive.

33. For C. Norberg-Schulz the use of the concept of space in architectural theory can be divided in two classes: those which are based on Euclidian space and study its 'grammar' and those which try to develop a theory of space on the basis of perception psycology. The latter deal with existential space taking after the works of Heidegger, Merleau-Ponty, Bachelar etc. The main convinction under this approach lies in the fact that you cannot divorse man and space. Space is neither an external object nor an internal experience. See:

is a very difficult one to define. Insofar it has become the essence of architecture, space as a concept has inherited all the contradictions that architecture as a discipline now faces.

3.2.1.3 MEANING

Meaning as an architectural concept has only recently been introduced into the architectural discourse mainly by the use of the linguistic analogy'[34] which stresses the concept of meaning and its relationship to form. In using the language analogy in architecture, two assumptions are generally made; on the one hand that an exact similarity of structure and function between architectural signs and the signs of 'natural' language exist; and on the other hand that in some significant respects, architecture is like a language. Architecture and language are therefore assumed to have at least some important attributes in common, but, by no means all. In both cases the difficulty here, of course, lies in agreeing upon the nature of an architectural sign and of architectural meaning. Two kinds of architectural meaning appear to exist within the architectural discourse. 'Semantic' where architecture is perceived as language which communicates with other systems and 'syntactic' where architectural meaning is derived from the structure of the system itself.

The semantic approach perceives architecture as a language and places it within the family of semiological systems all of which are said to be analysable through their structural comparability with language. It begins with the Saussurian definition[35] of the sign as 'signifier-signified' and is preoccupied with the analysis of the 'architecture' of such 'signs'. This approach deals with the traditional semantic issue of how architectural language communicates and how architectural signs are sent and received[36]. Meaning is identified in relation to the object (building) and to the

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C. Norberg-Schulz, *Existance, Space & Architecture*, publ. by Studio Vista London Ltd., London 1971, p.p. 9-14

34. Analogies did not only introduced architectural categories but influenced the relationship between categories as well i.e. between form and meaning or between function and form. For a criticism of the analogy see:
Scruton, R., *The Aesthetics of Architecture*, Chapter 7 "The Language of Architecture", publ. by Methuen & Co, London, 1979. For R. Scruton artistic enterprises are very far away from normal linguistic activity. It is doubtful that 'aesthetic' values and significances can be described in semantic terms. The creation of aesthetic significance depends, in the last analysis, on the discovery of 'correct' and 'appropriate' details and we cannot assimilate this idea of correctness to a semantic rule.
Colquhoun, A., "Historicism and the Limits of Semiology", in *Essays in Architectural Criticism*, MIT Press, 1985, p.p. 129-138. For him in language the value of the sign is neutral but in architecture it never appears as a neutral combinatory system.

35. Ferdinand De Saussure, "*Course in General Linguistics*", trans. Wade Baskin, Fontana, London 1974.

36. For a representative example of this type of approach see:
Bonta, P. J., *Architecture and its Interpretation, a study of expressive systems in architecture*, publ. by Lund Humphries, London 1979 & "Notes for a Theory of Meaning in Design" in *Signs,*

conceptual referent(observer). One has to examine how the sign is perceived, i.e. to define the communication channel, the relationship between the object and the receiver and the interpretation of the receiver. For semiotic approaches the built environment is itself a cultural system that can be interpreted as a combination of different kinds of codes[37].

The syntactic approach provides a model of an organised system of signification. It refers not so much to the range of what kinds of meanings are possible and how they are communicated, but mainly to how and why meaning attribution is possible in the first place. It perceives architecture as a language and defines it in relation to its own structure. 'Meaning' in this case is derived from the structure of the system. Within the syntactic approach we can distinguish two different tendencies. The first is based on form and relationships between shapes, and eliminates any consideration about semantic information or the meaning of the form. The form becomes 'empty' of meaning[38]. The second identifies the units that carry signification and analyses the way they are organised into a system. It defines the signification of the building through the understanding of its structure.

The validity of the second approach lies in the fact that concepts are defined in terms of architecture itself. Architecture is perceived as unique in the sense of spatial and formal configuration and its meaning is tackled at that level. In relation to architectural meaning Bill Hillier[39] is explicit. He places it within the genotypes, genotypes being like languages, virtual fields of information on which the spatial

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Symbols and Architecture Edited by Broadbent, Bunt and Jencks by John Wiley and sons, 1980 p. 275.
For Bonta, indicators show an objective reality, while signals communicate states of consciousness for the emitter. The meaning of the signal is usually a cultural product. What defines the object as an indicator, or as a signal, is not its nature, but the role the object plays within the significative process.

37. At the early stage of the semantic approach the built environment is seen as part of the cultural organization and it is not examined as a system of signification in itself. Later on, the paradigm of language is established for the study of the built environment, which is itself analyzed through codification as a cultural system of signification. Eco is one of the main representatives of this phase.
see Umberto Eco, "Function and Sign: The Semiotics of Architecture" in "*Signs, Symbols and Architecture* edited by Broadbent, Bunt and Jencks by John Wiley and sons, 1980 pp. 11-70.

38. Alan Colquhoun makes the following distinction between form and figure, "By form I mean a configuration that is held to have either a natural meaning or no meaning. By figure I mean a configuration whose meaning is given by culture, whether or not it is assumed that this meaning ultimately has a basis in nature' What Colquhoun ends up doing is actually talking away the cultural meaning from form and place it to a new entity that of the figure leaving form void of meaning. see:
Alan Colquhoun 'Form and Figure' in *Essays in Architectural Criticism* publ. MIT Press, 1985
For Peter Eisenman as well architectural form can be meaningless. He perceives syntax as the pure manipulation of forms. see:
Candelsolas, M., 'From Structure to Subject: The Formation of an Architectural Language' in *Oppositions 17*, Summer 1979 and 'On Reading Architecture' in Signs , Symbols and Architecture op. cit.

39. Hillier, B., Notes for the MSC in Advanced architectural Studies:1991-92.

temporal phenotypes we find in the spatial-temporal world depend. For him in 'morphic languages' (architecture being one) meaning is primarily syntactic (giving significance) rather than semantic (giving signification). "....meaning in morphic language is never so specific as in natural language. If it articulates meaning at all, then these seem to be of a rather broad, typological kind. We may surely suggest that in contrast to natural language where meaning is phenotypical i.e. specific (except for theoretical statements), in morphic language, meaning -and remember this is primarily syntactic- is not phenotypical but genotypical. ."

3.2.2 THE USE OF ARCHITECTURAL CATEGORIES IN THE ANALYSIS

In this brief presentation of the literature review on architectural categories we have commented on the relativity of their definition, and we have tried to locate them within the current discursive system of architecture. The approach which is adopted here is that design discourse is a system with its own structure and within it architectural categories claim their space. The categories of structure, function, form and space are used for general guidance in the text subdivision. The categories of function, form and space are subdivided, possibly into more that one design domain, as we intend to be as open as possible in their tracing and classification. Meaning as an architectural category is not used in our analysis as we believe that it is the outcome of the structure of the system and not part of it.

We know that 'pure' domains cannot exist i.e. form has a function and vice-versa. It is assumed for the purpose of the analysis that every element present in the work bears a signification which can be interpreted according to the whole. The systematic character of the relations among the elements stems from the very essence of architecture. These relations constitute the object of any rigorous design language investigation. To isolate one element in the course of the analysis is therefore merely a working method; its signification is eventually to be found in its relation with the other elements.

3. 3 THE STRUCTURE OF DESIGN LANGUAGE

After classifying the text into a series of architectural concepts our aim is to uncover the way that these concepts relate to one another, in order to form the structure of the discussion that takes place in a review. The task of the research is not to interpret sentences, not to tell us what they mean, but to make explicit the rules and the conventions which we have assimilated in learning to design, and which make it

possible for the sentences of our language to have the meanings they do. The main analytical difficulty comes from the heterogeneous and complex character of the design language itself. It is not only a signifying system in itself, but it is constructed basically with a prior signifying structure, that of architecture. Architecture, in broad terms is understood to include the built environment, and represents a cultural system, which operates among others in the domain of systems of signification.

As already stated, architectural discourse i.e. design language, is expressed by the acts of speaking and drawing. Our analytical data consists of the verbal expression of the design language, that is, a text[40]. It is therefore amenable through a language analogy, to a structuralist semiotic analysis, which attempts to identify the expressive signs in a system of discourse to reveal its structure. The structuralist-semiotic method of analysis is used on a basically qualitative base[41]. Before we become more explicit about the specific analytical model we are using, a brief presentation of what a structuralist-semiotic analysis consists of is given.

3.3.1 STRUCTURALISM AND SEMIOTICS

Structuralism is fundamentally a way of thinking about the world which is predominantly concerned with the perception and description of structures[42]. The nature of things may be said to lie not in things themselves, but in the relationship which we construct, and then perceive, between them. As Terence Hawkes in his introduction states[43]:"This new concept, that the world is made up of relationships rather than things, constitutes the first principle of the way of thinking which can be called 'structuralist'"

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40. The text of the transcribed recorded reviews.

41. The preference to a qualitative method is due to several reasons, the most important of which are:
a. The research is relatively less concerned with the content as such than with content as "reflection" of "deeper" phenomena.
b. The interpretations are part of the analytic process, rather than following the analytic procedure.

42. The notion of structure is basic to the understanding of structuralism. One of the most fruitful attempts at a definition has been made by Jean Piaget, in *"Structuralism"*, Kegan Paul, London, 1971. Structure, he argues, can be observed in an arrangement of entities which embodies the following fundamental ideas:
(a) the idea of wholeness; the constituent parts of the structure have no genuinely independent existence outside the structure in the same form that they have within it.
(b) the idea of transformation; the structure is not stAtic, the laws which govern it act so as to make it not only structured, but structuring.
(c) the idea of self-regulation; the structure makes no appeals beyond itself in order to validate its transformational procedures.

43. see Terence Hawkes, *Structuralism and Semiotics*, Methuen & Co. LTD, London 1977, intro. p.17.
and Michael Lane *Introduction to Structuralism*, New York: Basic Books, 1975, p. 23.

According to Barthes[44] what is new in structuralism is a mode of thought (or a 'poetics') which seeks less to assign complete meanings to the objects it discovers, than to know how meaning is possible. Exactly this particular aspect of meaning attribution and communication has become the fields of semiotics (or semiology)[45]. Semiotics[46] is the study of signs and their signification. Established as a science by de Saussure[47], it mainly explored, during its first steps, the linguistic sign, to extend, later on to the study of all systems of signification. Semiotics is concerned with the system as a functioning totality (synchronic analysis), not with the historical provenance of its various elements (diachronic analysis).

Within the structuralistic/semiotic analysis basic dichotomies such as syntagmatic-paradigmatic , language -speech form conceptual pairs [48] that are used to facilitate our deeper understanding of the cognitive function of the design language, as the analysis of any system will require one to specify paradigmatic and syntagmatic relations in order to discover both structure and meaning[49]. Saussure[50] very clearly describes relationships between the paradigmatic (he calls them 'associative') and syntagmatic dimensions. From the associative and syntagmatic point of view a linguistic unit is like a fixed part of a building, i.e. a column. On the one hand the column has a certain relation to the architrave that it supports (auto-function); the similarity or the arrangement of the two units in space suggests the syntagmatic relation . On the other hand, if the column is Doric, it suggests a mental comparison of this style with others(Ionic, Corinthian, etc.) (syn-function) although none of these

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44. see Roland Barthes, *The Structuralist Activity*, Critical Essays, Northwestern Univ. Press. p. 220

45. Semiology is the term introduced by de Saussure for the science of signs and pertains in European literature. In America the term semiotics, introduced by Peirce, is more common.It is important to understand that structuralism and semiotics (semantics and syntactics) as related sciences (or methods), are based epistemological on a general theory of cognition, as the innate structuring ability of man, and on the acceptance of the artifactual and autonomous of social consciousness. Their assumptions and paradigms are similar; where they differ is the particular focus of their interest.

46As in the case of structuralism, for semiotics also, language formed the basic paradigm, since it offered an easily accessible organised symbolic system. Based on an understanding of all cultural artefact systems of signification in an analogy to language, semiotic research attempted to examine the syntax and the semantics of semiotic systems, the structuring codes and the elementary units, and to reconstruct semiologies of those sign systems, within the (clear or not) understanding, that language is only one of the structures studied by semiology.

47. Ferdinand De Saussure, "*Course in General Linguistics*", trans. Wade Baskin, Fontana, London 1974.

48. see R. Barthes, *Elements of Semiology* publ. by Hill and Wang, New York 1967 In his book Barthes is offering the pairs of signifier/signified, syntagm/system, denotation/connotation and language/speech as the main elements of semiloogy.

49. See J. Culler, *Structuralist Poetics*, 1975.p.44. One compares syntagmatic sequences in order to construct paradigmatic classes and examines those classes so as to determine the pertinent oppositions between members of each paradigm. From the point of view of the analyst, a single syntagmatic chain is meaningless"

50. see Roland Barthes, '*Elements of Semiology*, p.59.

elements is present in space: the relation is associative[51].' Obviously the column/architrave relationship is a structural one and words are related in sentences by equivalent structural rules. The syntagmatic relationships are relationships of combination and their space is linear and irreversible. They act upon a horizontal dimension. Within paradigmatic relationships elements are united in absence through relationships of similarity and oposition. Paradigmatic relationships act upon a vertical dimension[52].

A system comprises syntagmatic(auto-function) and associative (syn-function) relationships. The associative (paradigmatic) plane has a very close connection with 'the language' as a system whilst the syntagmatic plane is more closely associated with 'speech'. The dichotomic concept of language/speech is central in Saussure. Language is at the same time a social institution and a system of values. Speech is essentially an individual act of selection and actualisation; it is made in the first place of the 'combination due to which the speaking subject can use the code of the language with a view to express his personal thought'[53]. By offering the dichotomies of syntagm/system and language/speech Saussure offers an insight into how language and in our case dessign language could be structured.

Semiotics as an analytical approach offers the tools for someone to make explicit the implicit knowledge which enables people within a given society to understand one another's behaviour. As Culler states[54]: "Often of course this implicit knowledge is a deeply rooted set of cultural norms and conventions which operate subconsciously and which members of a culture might angrily deny. In these cases, the description of a semiotic system becomes an act of demystification, of exposure"

3. 3.2 LEVELS OF ANALYSIS

The diversity of the design domains and the complexity of the design language imposes an analytical rule: design domains are linked with one another, according to a hierarchy of levels .

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51 A different interpretation of that of Saussure on the column /architrave exampe could be offered. see:
Seigmann, K., "Architecture and language, notes on a metaphor". In *Jae*, vol XXX, no 4, April 1977 pp 23-27 For Seligmann[51] an architectural example might run as follows: a column is a member of an abstract class of supporting elements, here designated 'system'; a column within a particular building functions as part of an ensemble that is, as part of a 'syntagm'.
52. Ibid. p.p. 58-59
53. Ibid. pp.14-15.
54. see J. Culler, *The Pursuit of Signs,* Routledge & Kegan Paul, London and Henley, 1981.p. 32.

In semiotics the different levels are defined by the dimensions of their parts from the smallest unit to the largest. For Benveniste[55] the first analytic level is the one constituted by the words. The second level is the one constituted by propositions. The phrase constitutes a third 'higher' level ", un nouveau domaine"[56]. The phrase is the one that permits the text to enter in the world of meaning and communication. There is on the one side the language, with each constituent elements combined in specific structures and on the other side the language as a system of communication. For Benveniste, the properties of a multi-levelled text analysis is that each level can be seen as integrating the level that is above it. Each level of language integrates the next higher level in the sense that the lower unit enters and completes the higher level. He defines as form the capacity of the elements to belong to the inferior level, and substance the capacity of the elements to belong to the superior level. The dissociation leads us to the formal constitution. The integration leads us to signification.

In our case the analytical levels of the design language are more complex to define than the levels normally associated with an analysis of language, since what we are analysing is not a simple text but the system of design language as well. The progress from the word to the sentence would not have any meaning for our analysis since our smallest significant units (design domains) are already sentences that constitute architectural conceptual units . This forces us to use a different way to define our analytical levels than Benveniste's. Hjelmslev's model[57] proves to be a very useful one for our purposes since Hjelmslev places the emphasis on the formal nature of all languages[58] and sets himself the task of constructing a 'calculus' capable of providing the tools for describing or comprehending a given text and the language in which it is constructed.

For Louis Hjelmslev the sign is posited between two entities, that of expression and that of content[59]. The plane of the signifiers constitutes the plane of expression and that of the signifieds the plane of content. Expression consists of two entities: expression form, which refers to the spoken part of language, and expression substance which refers to the possibilities of speech as shaped by the phonetic zones of the speaker. Content, as that which needs to be expressed, is composed of two entities: first, one which

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55. see Benveniste E., "*Probleme de Linguistique Generale*, Gallimard, Paris 1966. Chapter 10 "Les niveaux de l'analyse linguistique".
56. Ibid. p. 129, " avec la phrase on quite le domaine de la langue comme systeme de signe, et l'on entre dans un autre univers, celui de la langue comme instrument de communication, dont l'expression est le discours".
57. For a description of the model see R. Barthes 1967, op.cit. 39-41.
58. ibid. p. 9.
59. Terms introduced by Luis Hjelmslev, In *Prolegomena to a Theory of Language*, University of Winconsin Press, Madison, Wisconsin, 1961. Hjelmslev's distinction between the planes of expression and content is a widely used one within the architectural discourse.

reflects the structure of the language as shaping thought, the content form, and second, one which will consist of the thought itself after being shaped by this structure, the content substance. By virtue of the sign function, there exist the content-form and the expression form; and by virtue of those two exist the content-substance and the expression-substance. Form in a linguistic sense is what can be described exhaustively, simply and coherently (epistemological criteria) by linguistics without resorting to any extra linguistic premise; substance is the whole set of aspects of linguistic phenomena which cannot be described without resorting to extra linguistic premises[60]. A diagrammatic presentation of the model would be:

LEVEL 1	EXPRESSION/MATERIAL FUNCTION
a. Form	b. Substance
LEVEL 2	CONTENT/COGNITIVE FUNCTION
a. Form	b. Substance

Hjemslev's model seems more appropriate for the analysis of the design language than Benveniste's. Not only does it explain the way content is tied to expression[61], an issue of particular relevance to design[62], but also, through the further subdivisions of form and substance, it offers a useful tool for the understanding of the operation of the levels of analysis and their interrelation. Benveniste's linguistic levels and Hjemslev's planes of expression and content operate in parallel. Levels and planes have both a form and a substance. We can claim also that planes of expression and content belong to two different analytical levels. Expression relates to the spoken part of language, to its material expression i.e. words , phonetic zones etc. and content to the cognition of language, i.e. proposition, sentences, to its meaning classification. It is the content and not the expression i.e. the cognition and not the materiality that allows language to enter into the system of communication. This division establishes an analytical hierarchy where expression form will be followed by expression substance

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60. See Barthes R. "*Elements of Semiology*, Hill and Wang, New York, 1964. Chapter two, form and substance, p. 39-41.

61. Hemjlev model is very popular within the architectural discourse. Several interpretations of the model try to define what falls into the category of expression and what into the category of content. For example, Eco in "A Componential Analysis of the Architectural Sign: Column", in "Signs, Symbols, and Architecture", edit. by Broadbent, Bunt, Jencks, John Wiley & Sons Ltd. 1980, suggests that on the basic level of content and expression we should have function and space accordingly.

62. See Barthes, op.cit. pp. 40-41, "for this very reason the subdivision form/substance can be made more useful and easier to handle in semiology in the following cases: I) when we deal with a system in which the signifieds are substantified in a substance other than that of their own system; II) when a system of objects includes a substance which is not immediatly and functionally significant, but can be, at a certain level, simply utilitarian: the function of a dish can be signify a situation and also to serve as food".

as this allows us to enter into the next analytical level, the level of content, and form content will be followed by content substance as this allows us to enter to the system of communication.

Within the two main planes or levels those of expression and content, we have four sub levels : level 1a expression form, level 1b expression substance (both of these relate to the material expression of language) level 2a content form and 2b content substance (both of these relate to the cognitive function of language).

3. 3. 3 THE ANALYTICAL LEVELS OF THE DESIGN LANGUAGE

The design language after its content classification is analysed in sequential levels . The first level of analysis takes place according to Benveniste at the level of the word and according to Hjelmslev on the plane of expression. The second level of analysis takes place according to Benveniste at the level of proposition and according to Hjelmslev on the plane of substance. We therefore have two main analytical levels of the design language. The first relates to the materiality of the design language, the form and substance of its visual operations (expression). The second relates to the cognition of the design language, the form and substance of its intellectual operation (substance) as well as the interaction of the intellectual to visual operation. This interaction is due to the integration that takes place between the previous analytical level that of material function and the level of cognition. The integration takes place according to Benveniste on the level of expression substance as this level has the capacity to become a part of the next analytical level, that of cognition.

More specifically at the first level of analysis the form of the domains, their relative size in relation to the number of words used, will give us the time that the domains need in order to be verbally expressed i.e. their visual or intellectual form. The substance (the possibilities of design language as shaped by design choices of the designer) of the domains will give us the way that the visual domains relate amongst themselves across classes i.e. the relationship between form and space, space and context, representation and method etc.

At the second level of analysis the verbal expression of the domains visual or intellectual, will show us the form of the design language in shaping thought i.e. verbal expression can be descriptive, when the student presents what we see in his drawings or can be conditional when the student presents his design intentions. The substance of the domains, the relationships of opposition and similarity between

domains (intellectual) and their interaction with the visual relationships will give us the cognitive function of the design language.

The diagram of the levels of analysis of design language is as follows:

CONTENT OF DESIGN LANGUAGE

LEVEL 1(EXPRESSION)
a. Visual/Intellectual domains

MATERIAL FUNCTION
b. Visual Interaction

LEVEL 2 (CONTENT)
a. Visual/Intellectual Expression

COGNITIVE FUNCTION
b.Visual/Intellectual interaction

FORM
EXPLICITNESS

SUBSTANCE
COMMUNICATION

The interaction of the levels of analysis will enable us to correlate the material function of the design language to its cognition, its visual and intellectual operations, thought and design activity. Within the design language we have two entities across levels, its form and its substance. The form of the design language indicates its explicitness, as by definition form is what can be described exhaustively with no external to the design language references. The substance[63] of the design language allows for the definition of its operation within a broader system of communications.

3. 4 CONCLUSIONS

The levels of analysis lead us from a descriptive observation to a more focused observation of the design language. That means, from a simple meaning classification, to a deeper understanding of the phenomena under research. They enable us to decompose the text and understand its hidden structures[64] and reveal the mechanism by which architectural cognition operates. The research and method

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63. Within substance each design domain will have a linear or 'horizontal' relationship with the domains that precede and succeed it, a spatial relationship (expression substance). But each design domain will also have a 'vertical' relationship with other domains, relationship of similarity or contrast, an intellectual relationship (content substance).
op. cit. de Saussure, F.,p. 122, Barthes, R. "Syntagm, System" p.p. 58, 88.

64. For a relevant structuralist-semiotic analysis that uses Benveniste concept of levels see:
Adam Jeff, *The conspiracy of the text. The place of narrative in the development of thought*, Routledge & Kegan Paul, London, New York, 1986.

of analysis aims to reveal the structure of the design language through its content classification (design domains) and their interrelation[65]. The analysis focuses on understanding the processes by which students design and acquire the capacity of architectural cognition.

According to the analytic diagram offered, the levels (chapters) of analysis are presented as follows:

A (4). THE CONTENT OF THE DISCOURSE.

This level is the level of the content of the design language. It deals with the classification of the design language in design domains and their quantitative presence in each case study.

B (5). THE VISUAL AND INTELLECTUAL FORM OF THE DISCOURSE

The expression form is the level of the 'form' in which communication takes place during reviews. In order to reveal which domains are operating on a visual or intellectual level the chapter investigates the relative size of design domains, size being measured of the real time each domain claims in verbal expression.

C(6). THE MATERIAL FUNCTION OF THE DISCOURSE

The expression substance is the level of the material function of the design language. The chapter investigates the visual, sequential, associative relationships that are formed between different design domains.

D (7). THE VISUAL AND INTELLECTUAL EXPRESSION OF THE DISCOURSE.

The content form is the level of the verbal expression of the design language. The chapter investigates the means by which design domains are verbally expressed in the text i.e. the focus of interest of the design domains on practice or on underlying principle. The chapter focuses on the conditional propositions and process, as these are the ones that set up the design rules and describe the development of each individual project.

E (8). THE COGNITIVE FUNCTION OF THE DISCOURSE

The substance content is the level of the cognitive function of design language. The chapter investigates the relationships of opposition and similarity that the different design domains enter into, the intellectual relationships. It offers a deeper

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65. We are very aware of the fact that a different type of field work would possibly need a different type of analysis and would offer an alternative approach to the investigation of architectural cognition.

understanding of the operation of the design language as it additionally reveals the interaction between its visual and the verbal operations. In this way it offers an insight into the formation of architectural concepts and into their development across the years of architectural studies .

At the beginning of every chapter the theoretical framework relating to the chapter and the method of analysis are discussed in parallel. The data results are presented in the form of tables and descriptions, first for the Bartlett Architectural School across all years and then for the Greenwich School of Architecture across years. A comparative discussion and interpretation of the empirical research findings, for the two schools concludes each chapter. Each analytical step integrates the previous one in its structure and findings. The last level of analysis, that of the cognitive function of the discourse attempts to synthesise the results from all the previous levels by offering a global interpretation on architectural cognition.

CHAPTER 4

THE CONTENT OF THE DISCOURSE

4.1 INTRODUCTION

This chapter defines the content of what is transmitted during the reviews and more precisely the content of design language. This analytical level deals with the classification of design language into design domains and their quantitative presence in each case study. As we have already stated in chapter 3, to be able to make this classification we have to find the 'significant units' within the text. A 'significant unit' is any large category of a concept that includes smaller categories inside it. These 'significant units' will constitute the design domains.

Going through the text of the Bartlett and Greenwich case studies the classification of included terms into categories presented a difficulty. This was due to the fact that although some included terms very clearly belonged to a specific architectural category, others had a level of complication that made it very difficult for us to locate them. They could even belong to two different categories at the same time. The simpler domains to define were the ones that relate to the transmission, representation, circulation, technology, immediate function and context (in relation to the environment). The more complicated and difficult ones to trace, were the formal and spatial domains, as well as the ones relating to function in a broader social sense. For example the concept "housing' refers to a building type but at the same time to the building as a physical presence.

One could say that maybe this was to be expected since the first group of domains are more concrete and physical in opposition to the second group of domains that are more abstract as they refer to the spatial and formal organisation of architecture and its style (social and cultural meaning).

4. 2 THE CLASSIFICATION OF DOMAINS

From a first reading of the text one can make three very obvious distinctions between:

1. The concepts that relate explicitly to the activity of transmission and learning.
TRANSMISSION DOMAINS
2. The concepts that relate to the content of design language.
ARCHITECTURAL DOMAINS
The first ones belong to the 'how' the transmission takes place, the second ones to the 'what' is transmitted.
3. Apart from the design language concepts that belong to the architectural 'world' we have as well the ones that do not belong to it, I.e. the extra-architectural concepts.
EXTRA-ARCHITECTURAL DOMAINS
Within the text we also find more general discussions about architecture and architectural education . These discussions take a critical position regarding design language as they are operating outside it. According to linguistics these discussions constitute a METALANGUAGE [1]. METALANGUAGE is a system whose plane of content is itself constituted by a signifying system in our case that of the design language.

When a domain has more included terms than one in a sequence, is subdivided in more than one units.
For example:
(IU) ...on the ground floor of the building I have shops and a pub.
(IU) At the upper three floors I have located the flats.
(IU) You can enter the flats ....
The size and the frequency of appearance of each domain in the text is of equal importance for the research.

The categories that follow constitute the mapping of all the concepts that exist in the text under a system of classification. To be able to allocate them, the text was read and concepts were traced and analysed several times.
A description of the design domains and their included terms follows starting from the transmission domains, which were the easiest ones to trace.

4. 2. 1 TRANSMISSION DOMAINS

These are the domains that explicitly relate to the activity of transmission, that means communication of ideas. At this point one must say that the transmission domains along with the design language domains are part of the structure of the transmission that is taking place during the reviews.

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1. see: Barthes, R., *Elements of Semiology*, publ. by Hill and Wang, New York 1986. p.p.90-94

With the concept of transmission one can relate the domains of:

1. REPRESENTATION (R)

Visual communication. It includes all the discussions about drawings, photographs, models etc. Sometimes elements of drawings like plans and sections are used as architectural elements per se and not just for visual communication. In cases like that they will be classified under the domain of Architectural Elements.

i.e. "we have an ad hoc relation between plans and elevations"

2. TRANSMISSION (TR)

Verbal communication. It includes all the discussions about understanding or not what is under presentation during the crit and all the clarifications or explanations given by the tutor or the student.

i.e. "something we can teach you"

"it is very difficult to talk about ideas"

"one wonders how conscious you are about the things you are talking about"

3. CRITICISM (CR)

Communication of beliefs. It includes all the judgements made in relation to the presented project i.e. good, bad, interesting, utopic, unclear.

i.e. "Your project has not come together as it should."

4. PROCESS (PR)

Communication of methodology. It includes all the descriptions of the process followed by the student or suggested by the tutor that allowed him or her to arrive to the final product.

i.e. "so two things could be brought together visually."

4. 2. 2 ARCHITECTURAL DOMAINS

Architectural domains are the domains that relate to the content of what is transmitted during the reviews. Architectural domains contain all the architectural concepts. At a basic level a building has structure, space, form, function, context, style, programme but these concepts exist in the text at different levels of complexity.

There is a need for an important clarification. The existing boundaries between different architectural domains are not so obvious and clear all the time. Most of the time these are blurred. In these cases the problem is tackled in the following ways according to each case:

1. The terms are classified under their dominant quality. i.e. a material has foremost a physical presence but formal and functional quality as well. For the sake of the

analysis, materials will be classified under the domain of structure stressing their physical and structural quality.

2. Sometimes the same included term is classified under different design domains as a result of the way it is used in the context of the text.

For example, lighting or light can be used in four different ways:

a. On one hand it can belong to a very straightforward functional or technical requirement

I.e. " I decided to have natural light in the studio",

b. or it can belong to a spatial and formal configuration

I.e. " The way that the light is coming into this room transforms the space formally".

c. it can also belong to the immediate function

I.e. "times exist when you want light in, and times when you do not"

the concept of layers and layering can be used in two different ways:

a. when it is used as a formal device, or when it is describing the form of a presentation, of a model or an object, it belongs to the domain of Geometry Form.

I.e. "Layering of different forms ....."

"I was looking at the vertical layering....."

"I translated that image into a 2d layered model...."

b. it can be used as a spatial concept,

I.e. " layering of space....."

" and the third one breaking through layers....."

3. When a space is characterised by its size I.e. big space, small space or by a geometrical specification I.e. in the middle of the space, it is still classified under the domain of Space Form. The same is not true for the Architectural Elements or the Building Types. In their case in an equivalent situation the domain is classified under the domain of Geometry Form I.e. small veranda GF, middle of Housing Scheme GF etc.

The architectural domains are the following:

1. STRUCTURE (SR)

In relation to all the terms that relate to the material, physical existence of a building. Anything to do with technology, structure, detailing, materials used, services, fire regulations, lighting is included in this domain.

2. IMMEDIATE FUNCTION (IU)

In relation to:

a. The function or use of a space I.e. cinema space, studio space, flexible space in relation to function etc.

b. A simple activity I.e. sleeping, walking, watching a film, movement, occupation and habitation in the sense of a presence in a place, etc.

3. The location of a space or an activity in the building.

4. The circulation of a space or a building, it's accessibility, entry, exit points, the approach and arrival from back side or front side etc. Circulation most of the times exist in combination with spatial attributes I.e. I am going into the space, I am stepping down etc.

3. CONTEXT (C)

In relation to the broader environment and the site. The context in which the building or the space is located . External environmental constraints. Orientation of the building or of its elements.

4. PROGRAM ME(PU)

Programme according to functional requirements. The organisation of the collective, symbolic, social function. Concepts like public, private. Social event. Economic and social constraints in relation to the function of the building.

The four above domains belong to the physical presence of a building and its use, to its substance. The domains that follow relate to form and style. They belong to what we can name as the essence of architecture, the self referential part of it. One can begin with a basic distinction between geometry, and space:

5. GEOMETRY FORM (GF)

Form is examined for its geometrical qualities. I.e. size, dimensions, shape and line plane, volume. It deals with the main geometrical formal configurations of a line, a plane and a volume like symmetry-asymmetry, organised-unorganised, syntactical-unsyntactical, grid, fragments. On the level of the shape and massing of volume with the cube, the pyramid, orthogonal etc.

Also the scale, the size of a building or a room, the dimensions of a room or of architectural elements belong to this domain.

At this level, the discussion is abstract without dealing with the issue of space and its organisation nor with the issue of any spatial context.

Some of the above formal qualities like symmetry-asymmetry, can be used to describe a space in which case they will be classified under the next category.

6. SPACE FORM (SF)

Space is examined for its three-dimensional geometrical and spatial qualities, their organisation and synthesis.

a. In relation to qualities: formal - informal, internal - external, light - dark, underground - overground

b. In relation to organisation: visibility, transparency, boundary condition, orientation, interface, threshold, depth, layering, void.

c. In relation to composition: Imposing, dominant, significant, important, distinctive, impressive, landmark, discreet, uniformal.

7. HISTORICAL TYPE (HT)

Type in relation to history , to an architect, precedent i.e. classical, modern, ancient columns etc.

8. STYLE (SY)

Style in relation to aesthetics and to character i.e. sensual, dynamic, elegant, monolithic, mechanical, heavy, solid, permanent, monument etc.

Apart from the above mentioned architectural domains which are used to describe and interpret the final architectural product, we have in the review the presence of the final product itself, or parts of it as a means of expression and transmission. In this case the architectural elements or buildings used as entities contain usually all their formal, functional and structural qualities . Usually this happens at a primary level where only fragments of a building are mentioned like balcony, wall, viewing gallery etc. and on a more complex level , where the building is mentioned in its totality, as a physical artefact with social function and style, like apartment block, office building etc.

9. ARCHITECTURAL ELEMENTS (EL)

Presentation and discussion of specific architectural elements that have a formal, a material and a functional presence. These are : Balcony, tower, elevation, roof(flat, sloping, pitched), walls, openings, platforms, levels, atrium, courtyard, square, galleries, dome, zoning, desert and garden (in relation to landscape) etc. When the elements have an attribute with them that stresses their formal, functional or material quality they are classified under that quality.

I.e. "open staircase" under Space Form, "metal windows" under Structure, "pitched roof" under Geometry Form, "viewing galleries" under Immediate Use .

10. BUILDING TYPE (BT)

A type of building that includes a certain type of human activity and a special spatial and formal organisation and physical presence I.e. prison, office building, harbour structure, factory etc. This domain is also used when the student's project is described as a building type. I.e. "My project consists of three blocks of flats".

4.2.3 EXTRA-ARCHITECTURAL DOMAINS

Sometimes during the reviews the discussion that is taking place or the concepts and artefacts that are used cannot be placed in the architectural realm. One can say that they belong to two different broader categories.

1. OBJECTS (O)

Relating to elements and objects mentioned during the review that are not architectural, i.e. cars, clouds, camera, machine, boat, archaeological , river, rocks, site etc. and they have a physical presence. Usually they form an analogue for an architectural space.

i.e. mechanism, film, camera etc.

Relating to non architectural different activities and conditions .

i.e. the conditions of tension and compression, of being trapped, the activities of bending.

The concept of shadow is something abstract and concrete at the same time. It is mainly classified under the domain of objects O.

i.e. "I did some sequences from the film investigating the shadows...."

"it was to frame the movement by using the shadow....."

In very few cases when it is relating to a space,

" through the shadow cast (viewing a space) ....."

then it is classified under the domain of space form (SF).

2. ABSTRACT NOTIONS (A)

Relating to broader categories like the concept of time, of movement , of mass-media, of society, of culture, of nature, of narrative and text . Any abstract category that is not immediately related to the programme of the building.

i.e. The idea of memory, of time, of authority etc.

4. 2. 4 PRESENTATION OF ANALYTICAL SYMBOLS AND TABLES

After defining the different categories of covered terms, the exhaustive list of included terms of design domains discovered in the reviews under analysis is the following:

A. TRANSMISSION DOMAINS

1. Representation	R
2. Understanding	TR
3. Criticism	CR
4. Process	PR

B. ARCHITECTURAL DOMAINS

1. Structure	SR
2. Immediate function (use)	IU
3. Context	C
4. Programme (use)	PU
5. Geometry/Form	GF
6. Space/Form	SF
7. Historical type	HT
8. Style	SY
9. Architectural elements	EL
10. Building type	BT

C. EXTRA - ARCHITECTURAL DOMAINS

1. Objects	O
2. Abstract Notions	A
D. METALANGUAGE	M

After defining the classification of design domains under different categories a brief summery of the Bartlett and Greenwich case studies follows in relation to content analysis.

THE READING OF THE TEXT ANALYSIS

Twenty three reviews (first, third year and diploma) are analysed from the Bartlett School of Architecture and eighteen (first, third year) from the University of Greenwich, School of Architecture and Landscape Architecture . The 41 reviews are presented in a text form and included in the attached floppy disk.

The case studies are initially analysed in a text form with three vertical analytical columns running on the left hand side of the text. Each case study is characterised by a letter A, B, C and by a number in front of the letter that indicates the academic year that the case study belongs to. 1A belongs to first year, 2A belongs to third year,

3A belongs to diploma. Greenwich case studies have a (') after the letter I.e. 1A' case study belongs to the first year of the Greenwich School of Architecture and Landscape Architecture. Each paragraph of the case study is characterised by ST when the student is presenting , by a STa,b when a different student than the one presenting is participating in the discussion and by a T when a tutor is commenting on the project. All the domains are numbered in a sequence. The final number of the first analytical column indicates the total number of the domains that the case study is subdivided into.

An example from case study A would be :

1. GF My project is about two squares that share the same diagonal.
2. GF The bigger square forms a cube.

Case study A has 66 domains.

THE READING OF CONTENT TABLES

The results of the content analysis were counted and will be presented in a table form. For the presentation and discussion that follows 'content tables' are used. In these tables there is a division between domains used by students and by tutors. There is a division between architectural, transmission and extra architectural domains. All the numbers of the different domains have been calculated in % percentages , to overcome the problem of the different length of the texts of each project.

The example that follows is taken from the first year Bartlett School of Architecture, case study A, (Table 4.1):

A 1ST YEA 1ST TE RM DESI GN DO ST UDE NT TU TOR TO TAL															
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							2			3	2			3
IU			13			20	2			3	15			23
C			1			1.5					1			1.5
PU			3			4.5	1			1.5	4			6
GF			12			18	17			26	29			44
SF			1			1.5	1			1.5	2			3
HT														
SY														
EL			1			1.5					1			1.5
BT														
M														
	R							4		6		4		6
	TR							6		9		6		9
	CR							2		3		2		3
	PR													
		O												
		A												
		NUM	31			31	23		12	35	54		12	66
		%	47			47	35		18	53	82		18	%

VERTICAL READING

This table is divided in four columns. The first one includes all the transmission, design and extra-architectural domains. The second column includes the domains used by the students , the third column includes the domains used by the tutors and the fourth column includes the total number of domains used during the crit. Within the second, third and fourth column, there is a sub column that gives the percentages of the participation of each domain within the crit. Adding up all the percentages we have the total participation of the student in the discourse (47%) of which all were design domains (second column)) and the total participation of the tutor in the discourse (53% of which 35% were design domains and 18% transmission domains (third column)). This reading also gives us the total participation of the design domains 82% and the transmission domains 18% in the discourse of the specific crit (fourth column).

HORIZONTAL READING

Each line relates to a different domain. I.e. first domain under examination second line is the domain of Structure etc. so we have only two domains of structure used within the crit by the tutors. This means a 3% of participation of the domain of Structure in the total discourse of the crit (final column). This reading gives us the participation of each domain within the discourse. In the above described case study we have a dominance in the participation of the domain of Geometry Form (44% presence) against all the other domains.

4. 3 BARTLETT SCHOOL OF ARCHITECTURE

The reviews which are presented and analysed from the Bartlett School of Architecture, belong to the first, second and third terms of the 1st and 3rd year of the Degree Course, and to the first, second and third term of the final Diploma year. Nine reviews are presented from each year, three from each term. These were chosen randomly with the intention to cover the broadest possible sample of data.

One must always keep in mind that third year in the degree and final year in the diploma mark two important turning points in the students development. In both cases by the end of the academic year the students have to demonstrate their abilities in front of a panel of external examiners, in order to be able to progress into the diploma school, or graduate from the school as qualified architects. The external examination at the Bartlett, at both Degree and Diploma levels, took the form of a portfolio review in the presence of the tutors and a panel of external examiners. Only a selection of students in each year was invited to present their work in person.

First year reviews were followed during the academic years of 1886-87 and 1987-88. Third year reviews were followed during the academic years of 1987-88 and 1988-89. Final year Diploma reviews were followed during the academic year 1988-89.

Each academic year in the degree consisted of 50 to 60 students. There was a year 'co-ordinator', a full time tutor responsible for organising the briefs, the timetable and the tutorials, and two to three part time tutors helping with the teaching. The year was subdivided into tutorial groups. The tutors rotated between groups. Two reviews took place in each term, an interim and a final one. For the reviews each year was subdivided into three smaller groups of approximately eighteen students each. Each sub-group had a crit panel of three to four critics, one to two internal tutors and one to two visiting critics. The student that was presenting had to pin up his work just before the presentation, to stand in front of the jury and to explain the project by using the drawings under presentation. The students that were not presenting could follow the reviews of their fellow students in any sub group and could take part in the discussion. In first year reviews students participation in the discussions was rare, and tended to progressively increase up through the academic years. Usually the student attendance in a review panel was lower in the morning and increased towards the end of the day.

There was a lack of a big studio space in the Bartlett that could accommodate all the students in parallel. The reviews of the sub-groups took place simultaneously usually in

three different studio spaces and were strictly timetabled to twenty minutes each, but very rarely was the timetable kept. Usually the reviews held in the morning tended to be longer than the ones held in the afternoon. The first year reviews as well tended to be shorter than the third year reviews. This happened because the student numbers dropped slightly from first to third year and in parallel the reviews became a more important and dense event. The attitude of the students as time progressed, changed towards the reviews as they were transformed from a simple act of performance to a more substantial input for the project under development.

The diploma school had a smaller number of students, only 35. It was co-ordinated by a full time tutor. Additionally a part time tutor helped with the tutorials. Three main reviews took place during the academic year 1988-89. The project started mainly as a group work and developed into 35 individual projects by the end of the year. The first review that took place in the first term was a group discussion. It was held in one studio space where every student had to pin up his/her project on the walls of the studio simultaneously. The discussion was co-ordinated by the full time tutor and there was one internal and one external invited critic. The students had to briefly present their projects in front of the year group and a discussion followed with the participation of everyone present in the room. The second and third term reviews were held on an individual basis like the degree ones. The year was split into two subgroups with a panel of three critics in each one of them. The reviews were held simultaneously in the same studio space. The timetable although set was not kept either. The final reviews were longer than the interim ones and had a more official character due to their importance.

The structure of the reviews under observation appears to be the same, with the exception of the first term diploma which includes a group presentation instead of individual projects . A sample of the final crits of each term of the degree and of the second and third term of the diploma was recorded and transcribed in full , together with the three hour long discussions of the first term diploma. Only the beginning of this transcript will be analysed. The briefs of the degree and the diploma projects will be presented in full with the analysis of the case studies in the appendix. The content of the specific project of each term in the degree and the diploma will be briefly presented in parallel to the content analysis of the case studies.

4. 3. 1 FIRST YEAR

The first nine case studies under presentation belong to the first year. In the description a profile of each project will be set, in relation to its idiosyncratic character (the 'parole' of each student). After the description of each project common trends and differences will be discussed.

FIRST TERM (Table 4.1)

PROGRAMME

INFORMATION STAND

The first term is the introduction to architecture. Along with the techniques of representation, the students are introduced to some basic architectural concepts. For that purpose a small scale structure is introduced as a brief. An information stand for a Cathedral. The function is primary, just a small exhibition space to provide information for the people visiting the Cathedral and to sell tickets for its events. It is to be a two-storey structure in timber and fit inside a volume of a 5.4 cube. The design must have a geometrical schema. Structure, circulation, function, context in relationship to the Cathedral are the issues that the students should tackle. Submission: A carefully made accurate model with properly scaled parts at a scale of 1:10, using only wood. Drawings plans, sections and elevations to scale and sketch drawings.

A	1ST	YEAR		1ST	TE	RM								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO	TAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							2			3	2			3
IU			13			20	2			3	15			23
C			1			1.5					1			1.5
PU			3			4.5	1			1.5	4			6
GF			12			18	17			26	29			44
SF			1			1.5	1			1.5	2			3
HT														
SY														
EL			1			1.5					1			1.5
BT														
M														
	R							4		6		4		6
	TR							6		9		6		9
	CR							2		3		2		3
	PR													
		O												
		A												
		NUM	31			31	23	12		35	54	12		66
		%	47			47	35	18		53	82	18		%

B	1ST	YEAR		1ST	TE	RM								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO	TAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			11			12	6			6	17			18
IU			9			10	6			6	15			16
C			3			4	6			7	9			11
PU			2			2	2			2	4			4
GF			8			8	2			2	10			10
SF			4			4	16			17	20			21
HT														
SY			1			1					1			1
EL			3			3	3			3	6			6
BT			1			1	5			5	6			6
M							1			1	1			1
	R													
	TR							1		1		1		1
	CR			1		1		2		2		3		3
	PR							2		2		2		2
		O												
		A												
		NUM	42	1		43	47	5		52	89	6		95
		%	44	1		45	49	6		55	92	8		%

C	1ST	YEAR		1ST	TE	RM								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO	TAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			2								2			1.5
IU			7				7				14			10.5
C			2								2			1.5
PU			1				1				2			1.5
GF			4				33				37			28
SF			3				2				5			4
HT			1								1			1
SY														
EL			10				22				32			25
BT			2				8				10			7.5
M							1				1			1
	R							2				2		1.5
	TR							7				7		5
	CR			1				12				13		10
	PR							3				3		2
		O												
		A												
		NUM	32	1		33	74	24		98	106	25		131
		%	24	1		25	56	19		75	81	19		%

TABLE 4.1 : CONTENT OF FIRST YEAR FIRST TERM REVIEWS (BARTLETT)

PROJECT A

The stand consists of two squares sharing the same diagonal. The visitor is encouraged to go to the upper (SF 3%) floor where the exhibition (PU 6%) continues. The student mainly dealt with the geometry/form of the stand (GF 44%) and secondarily with the circulation and usage (IU 23%) of the stand. Geometry presents some inconsistencies in the way it is resolved. There is no reference to the structure of the stand (SR 3%) on the student's part, a fact that is criticised (CR 3%) by the tutors . Context (C 1.5%) as well i.e. relationship with the Cathedral is not mentioned. The domains of EL 1.5%, R 6% and TR 9% have a very small presence in the crit. The discourse is characterised by the use of the Geometry Form domain mainly.

PROJECT B

A prefabricated stand . The structure of the stand constitutes the starting point (SR 18%). A substantial part of the discourse deals with the circulation (IU 16%) within the stand and it's relationship to the Cathedral (C 11%). An important part of the discourse deals with issues of view organisation (SF 21%) and the elevations of the stand (GF 10%). The domains of PU 4%, SY 1%, EL 6%, BT 6%, M 1% TR 1%, CR 3%, PR 2% have a very small presence in the crit. A quite evenly distributed discourse.

PROJECT C

A stand composed by architectural elements, like a tower, a veranda, a staircase (EL 25%). A substantial part of the discourse deals with the way these elements are composed formally together (GF 28%), as well as the stand's roof organisation (BT 7.5%). The tutor questions the validity of designing by using a composition of architectural elements, in contradistinction to working with a spatial, a functional or a structural concept. That becomes the dominant theme. It seems like the student made a decision of how to proceed with his design. But because this was not conscious he ended up with a lot of discrepancies in the project. Hence the raised level of criticism (CR 10%). The domains of SR 1.5%, C 1.5%, PU 1.5%, SF 4%, HT 1%, M 1%, R 1.5%, TR 5% and PR 25% have a very small presence in the crit. A discourse dominated by the domains of Geometry Form and Architectural Elements.

D	1ST	YEAR		2ND	TE RM										
DESI	GN	DOM	ST	UDE	NT		TU	TOR			TO	TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR							3				3			5	
IU			4								4			8	
C															
PU															
GF			1				8				9			15	
SF			4				2				6			10	
HT			5				9				14			23	
SY															
EL			1				1				2			3	
BT			1				1				2			3	
M							2				2			3	
	R							2				2		3	
	TR							3				3		5	
	CR							7				7		12	
	PR							6				6		10	
		O													
		A													
		NUM	16			16	26	18		44	42	18		60	
		%	27			27	43	30		73	70	30		%	

E	1ST	YEAR		2ND	TE RM										
DESI	GN	DOM	ST	UDE	NT		TU	TOR			TO	TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR															
IU			3				2				5			7	
C															
PU															
GF			8				16				24			32	
SF			6				4				10			14	
HT															
SY															
EL			2				7				9			12	
BT			1								1			1	
M							1				1			1	
	R							9				9		12	
	TR			1				6				7		10	
	CR							6				6		8	
	PR							2				2		3	
		O													
		A													
		NUM	20	1		21	30	23		53	50	24		74	
		%	24	1		25	44	31		75	68	32		%	

F	1ST	YEAR		2ND	TE RM										
DESI	GN	DOM	ST	UDE	NT		TU	TOR			TO	TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR															
IU			4				5				9			14	
C															
PU															
GF			4				10				14			21	
SF			4				2				6			9	
HT															
SY															
EL							9				9			14	
BT							3				3			4	
M							1				1			2	
	R							11				11		16	
	TR			1				4				5		7	
	CR			1				5				6		9	
	PR							3				3		4	
		O													
		A													
		NUM	12	2		14	30	23		53	42	25		67	
		%	18	3		21	45	34		79	63	37		%	

TABLE 4.2 : CONTENT FIRST YEAR, SECOND TERM REVIEWS (BARTLETT)

SECOND TERM (Table 4.2)

PROGRAMME

ARTIST'S STUDIO

The project is a small scale studio space in the garden of a house, that belong to a couple of artists. The programme is very simple, in that the Artist Studio is a working space offering a possibility of a sleeping platform in it. The context is quite rigid with a very specific orientation. The studio is to be built of stock brick.

Submission: Plan, section and elevations to scale, 1:20, an axonometric or isometric of the studio on its site, a detail section scale 1:5.

PROJECT D

The student made a choice of a symmetrical building (GF 15%) along with the use of Tuscan Classical order (HT 23%) for his studio space (IU 8%). The approach taken by the student raised a lot of questions for its validity on the part of the tutors. Discrepancies between the outside and inside spatial organisation (SF 10%) were indicated on the part of the tutors. Possible ways of teaching (PR 10%) were discussed and a lot of criticism was raised (CR 10%). The domains of SR 5%, EL 3%, BT 3%, M 3%, R 3%, TR 5%, used in the discourse were of minor importance. One dominant domain was the domain of Historical Type.

PROJECT E

The student mainly dealt with the idea of a subdivided cube (GF 32%). The studio (IU 7%) space is a cube, with an external and internal (SF 14%) platform (EL 12%) on one side of it. The discussion took place around the inconsistencies of the project in relation to the initial geometrical idea. A lot was blamed (CR 8%) on the problematic representation (R 12%) of the project and the lack of clarity in the explanations of the student (TR 10%). The domains of BT 1%, M 1%, PR 3% have a very small participation in the discourse. The dominant domain was the domain of Geometry Form.

PROJECT F

The studio space is square and symmetrical (GF 21%). Symmetry is the key to this project in relation to the elements of the elevation i.e. door, windows (EL 14%). A discussion took place about the inconsistencies (TR 7%) that the project presented between its geometrical and spatial (SF 9%) configuration and its immediate use (IU 14%). Representation and its experimentational character (R 16%) was another issue criticised (CR 9%) by the tutors. The domains of BT 4%, M 2%, PR 4% are of minor importance for the discourse. The dominant domain was the domain of Geometry Form.

G	1ST	YEAR		3RD	TE	RM								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO	TAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR														
IU			6				3				9			10
C			4								4			4.5
PU			4				2				6			6.5
GF			10				9				19			21
SF			6				6				12			13
HT			1				1				2			2
SY														
EL			5				6				11			12
BT			3								3			3
M														
	R							9				9		10
	TR			1				5				6		6.5
	CR							4				4		4.5
	PR							5				5		6
		O												
		A												
		NUM	39	1		40	27	23		50	66	24		90
		%	43	1		44	30	26		56	73	27		%
H	1ST	YEAR		3RD	TE	RM								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO	TAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			6				4				10			13
IU			5				6				11			15
C			5				3				8			11
PU			7				2				9			12
GF			4				6				10			13
SF			6				7				13			18
HT														
SY														
EL			2				3				5			7
BT			2				3				5			7
M														
	R													
	TR													
	CR							1				1		1
	PR			2								2		3
		O												
		A												
		NUM	37	2		39	34	1		35	71	3		74
		%	50	3		53	46	1		47	96	4		%
I	1ST	YEAR		3RD	TE	RM								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO	TAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							2				2			3
IU			10				12				22			33
C			1				1				2			3
PU														
GF			7				5				12			18
SF			6				11				17			26
HT														
SY														
EL			1				5				6			9
BT			2				2				4			6
M														
	R													
	TR													
	CR							1				1		2
	PR													
		O												
		A												
		NUM	27			27	38	1		39	65	1		66
		%	41			41	57	2		59	98	2		%

TABLE 4.3 : CONTENT OF FIRST YEAR, THIRD TERM REVIEWS (BARTLETT)

THIRD TERM (Table 4.3)

PROGRAMME

AN OPEN PROPOSITION

The site is given. It is an urban site. But apart from that the project is 'open'. The students have to formulate their own brief in relation to a social function, that will offer services to the community. The programme has to be interactive. It provides the students with freedom of choice and a challenge. Submission: drawings to scale.

PROJECT G

Theatre workshop (PU 6.5%). A building (BT 3%) with a central open atrium, and an 'open' colonnade for a street elevation (SF 13%, EL 12%) where performances (IU 10%) take place. The student was interested in Palladian architecture (HT 2%), simple forms, symmetry, and adopting the street (C 4.5%) axiality into the scheme(GF 21%). This last point, and the way it was done, was criticised (CR 4.5%). Discussion took place on the level of expression (TR 6.5%) and representation(R 10%) and advice was given on how to proceed further (PR 6%). A quite evenly distributed discourse.

PROJECT H

Counselling centre for aged patients. The introduction of a grid (GF 13%) in relation to public and private use (PU 12%) and of an atrium (EL 7%) for lighting reasons (SR 13%) comprise the main ideas of the building (BT 7%). Transparency and solidity (SF 18%) is discussed in relation to the private use of the space at street level (C11%). The student is criticised (C1%) in giving much more attention to the grid and its orientation, than the function and circulation (IU 15%) of the building. The design of the two floors of the building separately (PR 3%) creates a lot of discrepancies in their planning. A quite evenly distributed discourse.

PROJECT I

Recreational building. Circulation (IU 33%) through a tube (GF 18%) is the main idea for the building. The main question raised is the relationship of the elevation (EL 9%) to the lighting (SR 3%) of the building, as well as the expression of a double high space (SF 26%) in that elevation. The tutor wonders if hiding the staircase in a cube, makes the circulation more functional for that type of building (BT 6%). The project is criticised (CR 2%) for not expressing it's function to it's context (C 4.5%) properly. A very focused discussion amongst three domains, that of Immediate Use, Geometry Form and Space Form.

1ST YEAR COMPARATIVE														
DESIGN DOM			1ST TERM				2ND TERM				3RD TERM			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			21			7.5	3			1.5	12			5.5
IU			44			15	18			9	42			18
C			12			4					14			6
PU			10			3.5					15			6.5
GF			76			26	47			24	41			18
SF			27			9	22			11	42			18
HT			1			0.5	14			7	2			1
SY			1			0.5								
EL			39			14	20			10	22			9.5
BT			16			5.5	6			3	12			5.5
M			2			0.5	4			2				
	R			6		2		22		11		9		4
	TR			14		5		15		7.5		6		2.5
	CR			18		6		19		9.5		6		2.5
	PR			4		1.5		11		5		7		3
		O												
		A												
		NUM	249	42		291	134	67		201	202	28		230
		%	86	14		%	67	33		%	88	12		%

TABLE 4.4 : COMPARATIVE CONTENT OF FIRST YEAR DISCOURSE (BARTLETT)

4. 3. 1. 1 SIMILARITIES AND DIFFERENCES IN THE FIRST YEAR DISCOURSE

Similarities and differences are going to be grouped (table 4.4):

A. <u>In relation to student-tutor participation.</u>

In five of the above analysed projects (A, B, G, H, I), there is an almost even participation in the discussion between the student that is presenting the project and the tutors that belong to the crit panel. In four of the case studies (C, D, E, F) there is a substantial difference, where mainly the tutors are doing all the talking. The students participation in the discussion in the 1st term reviews comes up to 39% , drops in the 2nd term reviews to 24% , and rises again in the final reviews to 46% . Overall students participate less in the discussion than their tutors.

The pace of student-tutor participation is given mainly by the use of the architectural domains. Transmission domains are very rarely discussed by the students. The main part of the discourse is handled by the tutors.

B. <u>In relation to transmission domains</u>

Transmission domains are not very much used in the first year reviews. Particularly in the 1st and 3rd terms only 14% and 12% of the discourse belongs to transmission domains. In the 2nd term the percentage is raised to 33%.. Overall one cannot distinguish the existence of a pattern for the different types of transmission domains. One can say maybe that the domain of Process (3% overall) is slightly less used than the domains of Representation (5%), of Transmission (5%), and of Criticism (6%).
Process, whenever used, is in the form of advice from the tutor to the student.
i.e. D44. "I am proposing a different strategy.'
Representation is usually descriptive i.e. A 46. ' When someone see this diagram' or critical i.e. E 40. 'Your drawings are not clear enough'. F 67. 'experimenting with representation is a useless luxury'.

C. <u>In relation to architectural domains</u>

Existing idiosyncratic differences of the projects under analysis have already been discussed. This of course can have an immediate impact on the use of a specific architectural domain. One of the most characteristic examples is project D. In this project the student is using the Tuscan Order for his design, so the history type domain is raised to 23%. This of course does not influence the overall outcome for the data set, where the history type domain drops to 2.5% , an insignificant percentage.

For each project, the student has his/her own departure (parole) or central 'theme' for his/her design. In the first two terms the formal approach is the dominant one (A, C, D, E, F) in five out of six projects. Only one project has structure as its central theme and this is mentioned by the tutors as an exception.
i.e. B47 : You have done the opposite of what the rest of the students have done, provided us first of all with a structural model.
In the third term the approaches appear to be more complex as along with the formal, the use and the spatial organisation appear to be of equal importance.

Looking at the comparative table of the 1st, 2nd and 3rd terms one can see there are four significant architectural domains within the first year discourse: immediate use, geometry form, space form and architectural element (Together they add up to 75% of the architectural discourse). Out of these four, the domain of Geometry Form is distinctively dominant in the first two terms (26%, 23.5%) , and achieving an equal position with the Immediate Use and Space Form domains in the 3rd term. Each of them have an 18% participation in the 3rd term's discourse. The domains of SR, C, PU, BT have a very small contribution in the discourse and the domains of HT, SY and M are non existent.

4. 3. 2 THIRD YEAR

The second nine case studies under presentation belong to the third year. In the description, a profile of each project will be set, in relation to its idiosyncratic character . Apart from the 'parole' of each student that influences each project, a lot of differences are due to the programmes that are given in each term.

An alteration has been made in the choice of the case studies under analysis. In the academic year 1988-89 the third term programme was a " Detailed Study" of the projects that the students had already designed during the year. The students had to take a part of their Housing Scheme or of the Arena and detail it in relation to materials, structure, services. That programme appeared too specific and too focused for the research, since the design domain of structure was substantially raised. Instead, this programme was substituted by the "Mary Rose Museum" programme that belonged to the previous academic year 19987-88. This was a programme with a different content than the Housing or the Arena programs. So the research could have a broader spectrum of case studies, less focused with more representatives results.

As a result substantial diversities exist between the three programmes under presentation. Each programme stresses a different aspect of architecture and this has an immediate impact on the design language used during the reviews. The first programme 'a housing project ' stresses contextual issues, the second 'an arena' stresses technological issues and the third 'a museum' stresses spatial issues (issues of visibility). After the description of each programme and each project, common trends and differences will be discussed.

FIRST TERM (Table 4.5)

PROGRAMME

<u>"Cornwall Road" HOUSING PROJECT</u>

The project is set in South London (near the Old Vic) and poses questions of scale, of quality of habitation, of relationship with the context. A series of flats that will accommodate families and shops that will service these flats are asked for. An addition to the programme that will allow the connection with the neighbourhood is left to each student. It could be any sociable space from restaurants , to piazzas or even street markets.

Submission: The students are asked to resolve their proposition up to its structure. Site plan, plans, sections, elevations 1:200, perspectives, axonometrics or models. Detailed design of a typical home, technical details of construction.

2A 3RD YEAR 1ST TE RM														
DESI GN DOM ST UDE NT							TU TOR				TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			15				5				20			17
IU			13								13			11
C			5				7				12			10
PU			4				13				17			14.5
GF			8								8			7
SF			9				3				12			10
HT														
SY			2				2				4			3.5
EL			7				2				9			7
BT			5				3				8			7
M														
	R							4				4		3.5
	TR							4				4		3.5
	CR							4				4		3.5
	PR							3				3		2.5
		O												
		A												
		NUM	68			68	35	15		50	103	15		118
		%	58			58	30	12		42	88	12		%

2B 3RD YEAR 1ST TE RM														
DESI GN DOM ST UDE NT							TU TOR				TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			10				6				16			10
IU			13				25				38			24.5
C			2				3				5			3.5
PU			3				3				6			4
GF			9				13				22			14
SF			10				13				23			15
HT							2				2			1.5
SY														
EL			11				7				18			11.5
BT			7								7			4.5
M														
	R			3				5				8		5
	TR							7				7		4.5
	CR													
	PR							3				3		2
		O												
		A												
		NUM	65	3		68	72	15		87	137	18		155
		%	42	2		44	46	10		56	88	12		%

2C 3RD YEAR 1ST TE RM														
DESI GN DOM ST UDE NT							TU TOR				TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR														
IU			5				6				11			10
C			7				14				21			19
PU			1				1				2			2
GF			4				10				15			13
SF			11				11				24			20
HT														
SY			2				1				3			2.5
EL			4				5				9			8
BT			3				3				6			5.5
M														
	R			2				6				8		7
	TR							6				6		5.5
	CR							6				6		5.5
	PR			2								2		2
		O												
		A												
		NUM	37	4		41	51	18		69	90	22		112
		%	33	4		37	47	16		63	80	20		%

TABLE 4.5 : CONTENT OF THIRD YEAR, FIRST TERM REVIEWS (BARTLETT)

PROJECT 2A

A housing scheme that consists of three blocks of flats (BT 7%). The student has resolved the flats in detail, in relation to their function and circulation (IU 11%). The appearance (SY 3.5%) of the housing complex is quite clear. It is divided distinctively between vertical (circulation) and horizontal (services) zones (GF 7%). The student is very clear about the materials and the detailing that he is using for the elevations (SR 17%) and for the roof (EL 7%) structure. A lot of emphasis is placed in resolving the context (C 10%), i.e. the relationship of internal and external (open) space (SF 10%), and the programme use of this open space (PU 14.5 %). An open market is proposed and the 'pros and cons' are discussed a lot (R 3.5%, TR 3.5%, CR 3.5%, PR 2.5%).
A quite evenly distributed discourse with an emphasis on the domain of Structure.

PROJECT 2B

A small scale housing scheme (BT 4.5%) with a central open courtyard (EL 11.5%)and strong individuality (PU 4%). Houses are attached to each other forming two very slight curves (GF 14%). The internal space (SF 15%) of each flat and its use (IU 24.5%) is discussed in great deal (TR 4.5%) in relation to it's modernity (HT 1.5%). The tutor offers to the student an alternative to the already existing proposal (PR 2%). The structure and the detailing of the complex doesn't seem to be clear enough (R 5%) on the part of the student (SR 10%) particularly the roof structure. Context (C 3.5%) and its use is not much discussed in this project.
The dominant design domain in the discourse the domain of Immediate Use.

PROJECT 2C

A big scale housing scheme (BT 5.5%), a linear volume with a piazza in the middle. The housing scheme creates a big external wall (EL 8%) towards the neighbourhood (C 19%) that becomes a monument (SY 2.5%) for the area. The visual relationship (SF 20%), and communication (IU 10%) between internal and external open space is one of the main preoccupation of the discussion (TR 5.5%). Is the complex going to be extroverted or introverted (private or public PU 2%) in relation to the context? The difficulties that the form of this volume (GF 13%) creates (CR 5.5%), in relation to resolving the interior spaces of the flats (PR 2%) is stressed by the tutor. The presentation of the project is not complete (R 7%). Technological issues are not raised. A discourse with an emphasis on contextual, spatial and formal issues. The domains of Context and Space Form are the dominant ones in the crit.

2D DESIGN	3RD DOM	YEAR EAD	2ND STUDENT	TERM			TUTOR				TOTAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			6				17				23			21
IU			12				8				20			18.5
C							3				3			3
PU			7				2				9			8
GF			6				17				23			21
SF			5				5				10			9
HT														
SY														
EL			5				4				9			8.5
BT							4				4			3.5
M														
	R							5				5		4.5
	TR													
	CR							2				2		2
	PR													
		O												
		A												
		NUM	41			41	60	7		67	101	7		108
		%	38			38	56	6			95	6		%

2E DESIGN	3RD DOM	YEAR EAD	2ND STUDENT	TERM			TUTOR				TOTAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			6				24				30			34
IU			8				1				9			10
C			3				5				8			9
PU			2								2			2
GF			4				5				9			10
SF			5				3				8			9
HT							1				1			1
SY							1				1			1
EL			1								1			1
BT			1				2				3			4
M														
	R							9				9		10
	TR							3				3		4
	CR							5				5		5
	PR													
		O												
		A												
		NUM	30				42	17		59	72	17		89
		%	34				47	19		66	81	19		%

2F DESIGN	3RD DOM	YEAR EAD	2ND STUDENT	TERM			TUTOR				TOTAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			1				14				15			15.5
IU			15				10				25			26
C			5				3				8			8.5
PU			3								3			3
GF			3				4				7			7.5
SF			15				6				21			22
HT														
SY														
EL			3				2				5			5
BT							1				1			1
M														
	R							2				2		2
	TR							1				1		1
	CR							7				7		7.5
	PR							1				1		1
		O												
		A												
		NUM	45				40	11		51	85	11		96
		%	47				41	12		53	88	12		%

TABLE 4.6 : CONTENT OF THIRD YEAR, SECOND TERM REVIEWS (BARTLETT)

SECOND TERM (Table 4.6)

PROGRAMME

ARENA

The project is about an arena mainly for sports facilities and secondarily for different kind of performances and concerts. It consists of an arena, a small theatre, the main foyer space, bars , restaurants. The programme because of its scale and the specific structural problems it presents, focuses on technology.

Submission: Drawings to scale. Detailed drawings.

PROJECT 2D

A big open foyer space (SF 9%) that encircles the arena (BT 3.5%) and the small theatre characterises this project. The roof is uniform and provides acoustic and lighting facilities (SR 21%). It comes up to the edges of an asymmetrical site (C 3%) creating with its form (GF 21%) conflicting geometry between the arena and the roof structure (CR 2%.). The arena enclosure is quite flexible (IU 18.5 %) in dimensions due to the incorporation of movable panels (EL 8.5 %). The acoustic problem is raised in relation to the simultaneous operation of the theatre and the arena (PU 8%). The tutors comments are positive for the presentation (R 4.5%).

The domains of Structure, Immediate Use and Geometry Form are the dominant ones in this crit.

PROJECT 2E

The roof of the arena (BT 4%) expands up to the underground station. It covers up quite an extensive part of the broader area (C 9%). This is under question from the tutors (CR 5%) because of the big scale that the roof is creating in a small scale Victorian part of the city. The arena itself is orthogonal (GF 10%) and multilevel (SF 9%). Different functions are located at each level (IU 10%). The structure is a combination of steel beam and column structure for the roof and concrete structure for the arena and its different levels (SR 34%). The project is not resolved enough (TR 4%) and that shows from the drawings (R 10%). The domains of PU 2%, HT 1%, SY 1%, EL 1% have a minor participation in the crit.

The dominant domain is the domain of Structure.

PROJECT 2 F

The arena is placed partly underground and a park is created on top of it. There is a wall (EL 5%) that extends up to the underground station, (C 8.5%) that informs and leads the visitors into the foyer space (IU 26%). The arena is elliptical (GF 7.5 %) and the foyer which acts as it's social space (PU 3%) encircles it. This foyer corridor probably needs more exits and entrance points from and to the park above. The

2G DESI	3RD GN	YEAR DON	ST	3RD UDE	TE NT		TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			1				1				2			2
IU			7				1				8			9
C			7				1				8			9
PU			3								3			3
GF							6				6			6.5
SF			15				7				22			24
HT							1				1			1
SY							1				1			1
EL			1				6				7			7.5
BT			1				1				2			2
M							5				5			5.5
	R							9				9		9.5
	TR							2				2		2
	CR							6				6		6.5
	PR			4				3				7		7.5
		O			2				2				4	4
		A												
		NUM	35	4	2	41	30	20	2	52	65	24	4	93
		%	38	4	2	44	32	22	2	56	70	26	4	%

2H DESI	3RD GN	YEAR DON	ST	3RD UDE	TE NT		TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			1				1				2			1.5
IU			15				18				33			23
C			4				7				11			8
PU			5				14				19			13.5
GF			2				7				9			6
SF			16				13				29			21
HT														
SY							3				3			2
EL			7				10				17			12
BT			1				5				6			4
M														
	R							2				2		1.5
	TR			1				3				4		3
	CR							4				4		3
	PR													
		O												
		A							2				2	1.5
		NUM	51	1		52	78	9	2	89	129	10	2	141
		%	36	1		37	55.5	6	1.5	63	91.5	7	1.5	%

21 DESI	3RD GN	YEAR DON	ST	3RD UDE	TE NT		TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			1				3				4			4
IU			13				4				17			18
C			1				1				2			2
PU			3				8				11			12
GF			8				16				24			26
SF			6				12				18			19.5
HT														
SY			1								1			1
EL			2				2				4			4
BT			1								1			1
M														
	R													
	TR							4				4		4
	CR							5				5		5.5
	PR			2								2		2
		O												
		A												
		NUM	36	2		38	46	9		55	82	11		93
		%	38	2		40	50	10		60	88	12		%

TABLE 4.7 : CONTENT OF THIRD YEAR THIRD TERM REVIEWS (BARTLETT)

arena, being underground (SF 22%), has as a lighting source, an opening in the middle of its concrete roof (SR 15.5%) something that is questionable for its validity and use by the tutor (CR 7.5%). The domains of BT 1%, R 2%, TR 1%, and PR 1% have a minor presence in the discourse.
The dominant domains are the domains of Immediate Use and Space Form.

THIRD TERM (Table 4.7)
PROGRAMME
MARY ROSE MUSEUM
The discovery of the ship 'Mary Rose' near Portsmouth is the inspiration of this project. The programme poses real issues for the relocation and the exhibition of Mary Rose. This Museum has the ship itself as it's main exhibit together with its contents, its history and its discovery. The museum can be conceived of as having three distinct parts: 1. a foyer, socialising space, 2. the exhibition space itself, 3. a conservation area. The students are free in choosing their own site, and in manipulating the given programme.
Submission: All the drawings needed for the best presentation of the project.

PROJECT 2G
The museum (BT 2%) is underground to create the feeling of an excavation site (O 4%). In that way it is also discreet and blends with the landscape (C 9%). The ship is placed in the middle (GF 6.5%) of the space surrounded by viewing galleries (IU 9%). The spatial organisation and the lighting in relation to viewing the ship is very important for the project (SF 24%). Elevations and their openings (EL 7.5%) are discussed in relation to the relationship of the interior and exterior space of the museum and the feeling of discovery (PU 3%). A problem is raised (CR 6.5%) in relation to the representation of the project (R 9.5%) by the tutor. The articulation of the plan to the section is very important for the continuation of the project (PR 7.5%). The consistency of an architectural language (M 5.5%) is missing from the project. The domains of SR 2%, HT 1%, SY 1%, TR 2% have a minor presence in the crit.
A discourse mainly focusing on the spatial organisation of the Museum. The dominant domain is the domain of Space Form.

PROJECT 2H
The museum (BT 4%) is placed over the water in Portsmouth Harbour, and the Mary Rose is suspended in the middle of it. The space organisation (SF 21%) that means viewing galleries, balconies (EL 12 %) is quite straightforward. The circulation (IU 23 %)

	3RD YEAR COMPARATIVE													
DESI	GN	DOM	1ST	TE	RM		2ND	TE	RM		3RD	TE	RM	
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			36			9	68			23	8			2.5
IU			62			16	54			19	58			18
C			38			10	19			6	21			6.5
PU			25			6.5	14			5	33			10
GF			45			12	39			13	39			12
SF			59			15	39			13	69			21
HT			2			0.5	1			0.5	1			0
SY			6			1.5	1			0.5	5			1.5
EL			36			9	15			5	28			8.5
BT			21			6	8			3	9			3
M											5			1.5
	R			20		5.5		16		5.5		11		3.5
	TR			17		4.5		4		1		10		3
	CR			10		2.5		14		5		15		4.5
	PR			8		2		1		0.5		9		3
		O											4	1
		A											2	0.5
		NUM	330	55		385	258	35		293	276	45	6	327
		%	86	14		%	88	12		%	84	14	2	%

TABLE 4.8 : COMPARATIVE CONTENT OF THIRD YEAR DISCOURSE (BARTLETT)

is done by ramps around (GF 6%) the exhibit. The formality and informality of the proposition
(PU 13.5%) is an important issue in relation to the use, geometrical configuration and placement in the context (C 8%) of the museum. This last is not resolved well enough according to the tutors (CR 3%, TR 3%). In addition there is an ambivalence between the way the Mary Rose is exhibited because that takes over from the importance of the ship itself.
A discourse mainly focusing on the use and spatial configuration of the museum. The dominant domains are the domains of Immediate Use and Space Form.

PROJECT 2I

The museum (BT 4%) is a combination of three boxes (buildings). Each box contains a different function (PU 12%). The middle one is for the exhibition of the Mary Rose. The ship is suspended in the middle of the space and discussion takes place in relation to the form (GF 26%) of the box and the way it relates to the other two at an angle. The circulation between the boxes (IU 18%) is resolved with a corridor (EL 4%) that connects them. What is missing from the project according to the tutors, (CR 5.5%, TR 4%) is an internal space organisation (SF 19.5%) that will allow the viewing of the ship from different points. The box is very small for the exhibition of a big object like the Mary Rose. The domains of C2%, SY 1%, BT 1%, PR 2% are of minor importance for the project.
A discourse mainly focusing on formal and functional issues and space organisation. The dominant domain is the domain of Geometry Form.

4. 3. 2. 1 SIMILARITIES AND DIFFERENCES IN THE THIRD YEAR DISCOURSE

Similarities and differences will be grouped (Table 4.8) :

A. In relation to student-tutor participation

In all the above analysed projects with one exception, project 2A, the participation of the tutors in the discussion varies in relation to the student's participation but is overall larger than the student's equivalent. It varies a lot from a 32% difference in project 2E, to 6% difference in project 2F. There is no indication of why this takes place, other than the more positive the tutors are towards a project, the more encouraged the student is to speak. For example in project 2A , in the unique case where a student does more talking than the tutors by 16%, he receives very positive criticism i.e. ` The virtue of the scheme is that one feel that you have everything under control".

The student's participation in the discussion in the 1st term reviews comes up to 49% and drops in the 2nd term reviews and third term reviews to 40% . Overall students participate less in the discussion than the tutors.

The use of architectural domains from tutors or students varies according to the case studies. Transmission domains are very rarely discussed by the students. The main part of the discourse is handled by the tutors.

B. <u>In relation to transmission domains</u>

Transmission domains are not very much used in the third year reviews. There is an equal participation of the transmission domains in the discourse in all three terms. In the first term they constitute the 14% of the discourse, in the second term 12% and in the third term 15% of it. One can say that whenever the transmission domains are raised in percentage, we have a raised level of participation of the domain of Representation i.e. project 2C, R8%, TR.D. 20%, project 2G, R 9%, TR.D. 26%, project 2E, R 9%, TR.D. 19%. . Overall one cannot distinguish the existence of a pattern for the different use of the transmission domains. One can maybe say that the domain of process is slightly less used (2% overall) than the domains of Representation (4.5%), of Transmission (3%) and of Criticism (4%).

C. <u>In relation to architectural domains</u>

Architectural domains are the dominant ones in the third year discourse. For each project the student has his/her own departure (parole) for his/her design. The discourse at that level is more complex than the first year one. So the personal departure of the student is characterised by a greater diversity and by the involvement of a wider spectrum of architectural domains.

In the first term ," Housing Project" , all three projects address functional issues (IU 11, 24.5, 10%) issues of spatial organisation (SF 10, 15, 20%)and to a lesser extend formal (GF 7, 14, 13%) issues. Additionally the first two projects (2A, 2B) address structural issues (SR 17, 10%) and the first and third project (2A, 2C) contextual issues (C 10, 19%) as well.

In the second term , "Arena" , the projects are more focused addressing functional (IU 18.5, 10, 26%), formal (GF 21, 10, 7.5%) issues, issues of spatial organisation (SF 9, 9, 22%) and structural (SR 21, 34, 15.5%) issues. Additionally the first project (2D) addresses issues of Programme Use (PU 8%) and Architectural Elements (EL 8.5%) and the other two (2E, 2F) contextual issues (C 9, 8.5%). In the third term, "Mary Rose Museum" , in all three projects the focus lies on function(IU 9, 23, 18%) and the spatial organisation (SF 24, 21, 19.5%). Context (C 9%) and Architectural Elements (EL 7.5%) follow for project 2G, Context (C 8%) , Programme Use (PU 13.5%) and Architectural

Elements (EL 12%) follow for project 2H, Programme Use (PU 12%) and Geometry Form (GF 26%) follow for project 2I.

Looking at the comparative table, overall in the first and third term the domains of Immediate Use (IU 16%, 18%) and of Space Form (SF 15%, 21%) and in the second term the domains of Structure (SR 23%) and Immediate Use (IU 19%) are the dominant ones. The domains of Context, Programme Use, Geometry Form and Architectural Elements have an average presence in the discourse. The domains of Style, Building Type, and Metalanguage have a minor presence and the domain of Historical Type is non existent in the discourse.

4. 3. 3 DIPLOMA

PROGRAMME: KING'S CROSS REDEVELOPMENT

The third group of seven studies under presentation belongs to the final diploma year. The final diploma year is a unique year and the way of its operation is quite idiosyncratic. The whole year is set around one programme, that relates to the development of Kings Cross area[2]. The student group is quite a small one consisting of 35 students. That makes the organisation of the year more flexible. The students have a common start and slowly develop their own approach to the site. The context is the given, and the students have to locate themselves on the site and to organise their programmes. A model of the area is made, which constitutes the common ground for negotiations and discussions that take place amongst the group. Also for every stage of transformation of the general plan after negotiations, a drawing of the site is presented. The co-ordination was slow and it took up to February for the presentation of a common group approach. The existing site is totally transformed and the only point of reference is the railway lines of Kings Cross area. No central idea for the lay out exists. The proposition is fragmented. In the light of this perspective, forming the boundaries of the general site as well as each student's individual boundaries, proved to be very laborious for the group. The students propose a variety of programs . Housing, museum, school, theatre, transport, offices are the popular ones. There is also a library, a Jazz club, a media centre, a crematorium, a mental health institution.

The first term discussion is about the working process followed by the group. It focuses also partly on some individual projects. The second and third term reviews relate to individual projects that developed out of the general layout.

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2. For a detailed description of the diploma work see Dunster, D., "Collaboration In Education: The Diploma Project at the Bartlett School, 1988-89", *JAE*, Vol 43, No 2, Winter 1990.

3A DIPLOMA 1ST TERM															
DESIGN		DOMST		UDENT			TUTOR				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR															
IU			3				9				12			4	
C			16				23				39			13	
PU			17				16				33			11	
GF			17				13				30			10	
SF			12				10				22			7	
HT															
SY			3								3			1	
EL			12				12				24			8	
BT			4				8				12			4	
M							9				9			3	
	R							10				10		3	
	TR			1				3				4		1	
	CR			13				12				25		8	
	PR			28				60				88		28	
		O													
		A													
		NUM	84	42			100	85			184	127		311	
		%	27	14			32	27			59	41		%	

3B DIPLOMA 2ND TERM															
DESIGN		DOMST		UDENT			TUTOR				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			1								1			1	
IU			5								5			5.5	
C			4				5				9			10	
PU			32				12				44			49	
GF			1				1				2			2.5	
SF			1				3				4			4.5	
HT			1								1			1	
SY			4								4			4.5	
EL			6								6			6.5	
BT			4				2				6			6.5	
M															
	R			3				1				4		4.5	
	TR			1								1		1	
	CR			1								1		1	
	PR			1				1				2		2.5	
		O													
		A													
		NUM	59	6		65	23	2		25	82	8		90	
		%	66	6.5		72	26	2.5		28	91	9		%	

TABLE 4.9 : CONTENT OF DIPLOMA FIRST AND SECOND TERM REVIEWS (BARTLETT)

FIRST TERM (Table 4.9)

PROJECT 3A

The presentation is about a review of the group work. Group working processes (PR 28%) and approaches to the project are discussed. The discussion focuses at the beginning on formal issues (GF 10%) and on different architectural elements (EL 8%). that stand out in the model. A more specific review of two projects that are the most noticeable follows. The twin towers with the information screen, which appear as too massive for the area, are criticised for that and the student is asked to cut them down. The desert because of it's size creates an open void and a detachment for the area. The discussion which follows is focuses on contextual issues (C 12.5%), i.e. existing or non existing boundaries (SF 7%) between different projects (BT 4%) and their location and function (IU 4%). Different strategies are offered. Is the building going to develop out of the site, or is it going to be superimposed on the site? Financial and political questions follow. How are the programmes proposed by the students to be determined ?(PU 10.5%) Are they in any way real? Is the project real or surreal (M 3%) ? The tutors criticise (CR 8%) the absence of a general agreement, of a common group strategy. It looks like location and infrastructure (streets, canals, squares) (R 3%) play the important role for the group choices, but the result looks quite fragmented. The students claim that this was their intention. The domains of SY 1% and TR 1% have a minor presence in the discourse.

This is a discourse that deals mainly with the working processes followed by the group and secondarily with contextual, programmatic and formal issues. The dominant domain is the domain of Process.

SECOND TERM (Table 4.9, 4.10)

PROJECT 3B : A SOUND MUSEUM

This is a sound museum (BT 6.5%), that consists of two halves. One half is for the visitors and works like a museum. It is the public part. The other half is for the scientists, and works like a centre for experiments (IU 5.5%). It is the private part . According to the student, this division is expressed (SY 4.5%) in the elevations (EL 6.5%) and spatial articulation (SF 4.5%) of the building. But for the tutors the museum has failed on the formal front (GF 2.5%). The discussion of the crit mainly focuses on the programmatic use of the museum (PU 49%) and on the relationship of these two parts. Can the visitors part be used by deaf people? How is the museum working? The contextual issue (C 10%) of where this museum is located in the general lay out of the plan and with whom it is interrelating is a question that still needs an answer(PR 2.5%). The domains of SR 1%, HT 1%, TR 1% and CR 1%, have a minor presence in the discourse. The dominant domain is the domain of Programme Use.

3C DIPLOMA 2ND TERM															
DESIGN DOMESTIC							TUTORIAL				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			2				1				3			3	
IU			3				3				6			6	
C			2								2			2	
PU			8				13				21			22	
GF			7								7			7	
SF			8				2				10			11	
HT															
SY			2				1				3			3	
EL			4				5				9			9	
BT			5				4				9			9	
M															
	R			6				6				12		13	
	TR							5				5		5	
	CR							1				1		1	
	PR			6								6		6	
		O													
		A			2				2				4	4	
		NUM	41	12	2	55	29	12	2	43	70	24	4	98	
		%	42	12	2	56	30	12	2	44	72	24	4	%	

3D DIPLOMA 2ND TERM															
DESIGN DOMESTIC							TUTORIAL				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR															
IU			2				2				4			4	
C			4				6				10			10	
PU			19				11				30			29	
GF			5								5			5	
SF			4								4			4	
HT			3				9				12			12	
SY															
EL			2				1				3			3	
BT			6				8				14			14	
M							1				1			1	
	R							3				3		3	
	TR			2				4				6		6	
	CR							3				3		3	
	PR							6				6		6	
		O													
		A													
		NUM	45	2		47	38	16		54	83	18		101	
		%	44	2		46	38	16		54	82	18		%	

TABLE 4.10 : CONTENT OF DIPLOMA SECOND TERM REVIEWS (BARTLETT)

PROJECT 3C: A TRAVELLING CENTRE

The travelling centre (BT 9%) consists of a corridor behind an information screen made out of steel (SR 3%). The information screen is big enough (GF 7%) to operate as a landmark (SY 3%) for the area (C 2%) and the internal space (SF 10.5%) of the centre is organised around a corridor (EL 9%) that works like a travelling centre (PU 22%). It offers the opportunity for the travellers to relax (IU 6%) and prepare themselves for the act of travelling. The idea of movement (A 4%) is supposed to be expressed formally by the idea of flow, but according to the tutors (TR 5% , CR 1%) that is not successfully worked out in plans and in section (R 12.5%). The drawings need further co-ordination (PR 6%).

A discourse mainly focusing on programmatic issues , and secondarily on representation and spatial organisation. The dominant domain is the domain of Programme Use.

PROJECT 3D : HOUSING SCHEME

Restoration of a housing scheme. This consists of four blocks of flats forming a square (BT 14%), with four bigger (GF 5%) courtyards (EL 3%), one for each of them. It is a new programme for new inhabitants (PU 29%). The flats are more spacious (SF 4%) and luxurious. The influence of the scheme on the existing character of the area (C 10%) in relation to function (IU 4%) is discussed. The student claims that for his design he is influenced by Le Corbusier's 'Habitation' (HT 12%). The validity of the influence of European modern housing schemes is criticised (CR 3%) . English housing is perceived as something different and unique (M 1%, TR 6%). An influence from the already existing housing schemes of the area appear more valuable for the tutors (PR 6%). The interventions of the student in the existing housing scheme are not clear enough in the drawings (R 3%).

This is a discourse primarily focusing on programmatic issues and secondarily on contextual issues, and the use of historical examples . The dominant domain is the domain of Programme Use.

THIRD TERM (Table 4.11)

PROJECT 3E: MEDIA RESEARCH CENTRE

The centre is placed in King's Cross (C 3%) around the canal (EL 3%) and it consists of three separate buildings . The first one has to do with information, the second one with television and the third one has a cafe and a gallery in it (IU 10%). The discussion is based on the broader operation of the centre (PU 27.5%) in relation to political restrictions (A 7.5%). Can architecture be political? For the student architecture

3E DIPLOMA 3RD TERM															
DESIGN DOMAIN			STUDENT				TUTOR				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR															
IU			8				1				9			10	
C			3								3			3	
PU			17				9				26			27.5	
GF			5								5			5.5	
SF															
HT			3				4				7			7.5	
SY			6				3				9			10	
EL			3								3			3	
BT							1				1			1	
M			3				7				10			11	
	R														
	TR							1				1		1	
	CR			2				2				4		4.5	
	PR			6				2				8		8.5	
		O													
		A			4				3				7	7.5	
		NUM	48	8	4	60	25	5	3	33	73	13	7	93	
		%	52	8.5	4	64.5	26.5	5.5	3.5	35.5	78.5	14	7.5	%	

3F DIPLOMA 3RD TERM															
DESIGN DOMAIN			STUDENT				TUTOR				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR															
IU			2								2			2	
C			14								14			12	
PU			23				15				38			33	
GF			2								2			2	
SF			1				14				15			13	
HT			7								7			6	
SY															
EL			7				1				8			7	
BT			3				2				5			4	
M			4				1				5			4	
	R			1				1				2		2	
	TR			2				2				4		3.5	
	CR							4				4		3.5	
	PR			2								2		2	
		O													
		A			5				2				7	6	
		NUM	63	5	5	73	33	7	2	42	96	12	7	115	
		%	55	4	4	63	29	6	2	37	84	10	6	%	

3G DIPLOMA 3RD TERM															
DESIGN DOMAIN			STUDENT				TUTOR				TOTAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			6								6			6	
IU			8				5				13			12	
C			5				3				8			8	
PU			19				10				29			27	
GF			7				2				9			9	
SF			11				2				13			12	
HT															
SY			3				1				4			4	
EL			3				7				10			9	
BT			2				1				3			3	
M															
	R							2				2		2	
	TR							1				1		1	
	CR							2				2		2	
	PR														
		O													
		A			2				3				5	5	
		NUM	64		2	66	31	5	3	39	95	5	5	105	
		%	61		2	63	29	5	3	37	90	5	5	%	

TABLE 4. 11 : CONTENT OF DIPLOMA THIRD TERM REVIEWS (BARTLETT)

cannot influence at that level. But he is criticised (CR 4.5%) for the monumentality of his building and the Classical (HT 7.5%) style that he is using in his elevations. . Does that express neo-imperialism? Can you give any meaning to any form? (SY 10%). The task of accomplishing that can be very difficult (PR 8.5%). Two views exist in that review. Firstly, that form (GF 5.5%) and meaning are not arbitrary and as a consequence political convictions can be expressed through architecture. Secondly architecture cannot have a fixed ideological connotation. It can change through time (M 11%). The domains of BT 1% and TR 1% are not really used in this crit.
This is a discourse mainly focusing on programmatic issues and secondarily on issues of use, symbolism, and architectural connotation. The dominant domain is the domain of Programme Use. It is worth noticing that the domain of Space Form is totally absent from the discourse.

PROJECT 3F : COLONY FOR ACADEMICS

Modern architecture (HT 6%) is detached from a traditional urban context. This is the starting point for the student that completely detached his project from the city, situating it in the middle of a desert (EL 7%). He wanted to create a space which remains stable while the surrounding urban environment is changing. His desert forms a void in the middle of the city (C 12%). Roads and canals run underground. The underground building (BT 4%) is for the academics. The houses for the academics form a barrier (SF 13%) that contains information about knowledge and separates the domain of nature from the building. The classification of knowledge in a library (PU 33%) is perceived as a very interesting idea. The project is an allegory of the split between nature and sciences (A 6%). In that sense it is perceived by the tutor as a metaphor and a surreal proposition (TR 3.5%). The student is criticised for that (CR 3.5%). He defends himself claiming that architecture can be utopic and real at the same time (M 4%). The domains of IU 2%, GF 2%, R 2%, PR 2% have a minor presence in the crit. This is a discourse focusing mainly on programmatic issues, and secondarily on context and space organisation. Dominant domain the domain of Programme Use.

PROJECT 3G: NUCLEAR BOMB SHELTERS

The nuclear bomb shelters (BT 3%) are located within an urbanistic grid in the King's Cross area. The shelter on the surface is a cube (GF 9%) with a metal (SR 6%) clock tower (EL 9%) on top (SF 12%) that gives a sense of time (A 5%) and a sense of orientation (C 8%). There are some steps and a lift that lead you to the shelter itself (IU 12%) that exists 25m underground. A lot of shelters together form an underground city. The clocks act as reminders without function of the coming nuclear disaster. As soon as the war takes place there is no way out from this inferno , it offers the

DIPLOMA COMPARATIVE															
DESIGN DOM			1ST TERM				2ND TERM				3RD TERM				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR							4			1	6			2	
IU			12			4	15			5	24			8	
C			39			13	21			7	25			8	
PU			33			11	95			33	100			32	
GF			30			10	14			5	16			5	
SF			22			7	18			6	28			9	
HT							13			4.5	14			4	
SY			3			1	7			2.5	13			4	
EL			24			8	18			6	21			7	
BT			12			4	29			10	9			3	
M			9			3	1			1	15			5	
	R			10		3		19		7		4		1	
	TR			4		1		12		4		6		2	
	CR			25		8		5		2		10		3	
	PR			88		28		14		5		10		3	
		O													
		A							4	1			12	4	
		NUM	184	127		311	235	50	4	289	271	30	12	313	
		%	59	41		%	82	17	1	%	86	10	4	%	

TABLE 4.12 : COMPARATIVE CONTENT OF THE DIPLOMA DISCOURSE (BARTLETT)

alternative we should avoid (SF 12%). The role of these tower-clocks as reminders is criticised (CR 2%) by the tutor as in time they can become everyday objects and lose their terrifying connotation (SY 4%). This is an expressive representation (R 2%, TR 1%). This is a discourse focusing mainly on programmatic issues, and secondarily on use and spatial organisation. The dominant domain is the domain of Programme Use.

4.3.3.1 SIMILARITIES AND DIFFERENCES IN THE DIPLOMA DISCOURSE

Similarities and differences will be grouped (Table 4.12) :

A. <u>In relation to student-tutor participation</u>

Half of the case studies are characterised by an almost equal participation of students and tutors in the discussion. One has to notice that not only the student that is presenting, but other students as well , actively take part in the discussion. This is probably due to the fact that the students are more self-confident, as they reach the final stage of their studies and to the fact that they worked together as a group during the project. In projects 3A, 3C, 3D the student-tutor participation varies but is generally equal. In project 3B the students participation is substantially bigger 72%/28%.. The student's participation in the discussion in the 1st term reviews comes up to 41% , grows to 58% in the 2nd term reviews and in the last term projects the students participation in the discussion is overall 64% . Overall by the end of their studies the students do more talking than the tutors.

Architectural domains are used mainly by the students. Transmission domains are discussed by both tutors and students. The percentages vary a lot, but overall the tutors use transmission domains slightly more than the students. Extra-architectural domains, whenever present in the discourse, are used equally by students and tutors.

B. <u>In relation to transmission domains</u>

Transmission domains are more used in the diploma reviews than in the first and third year reviews. In the first term review the transmission domains constitute the 41% of the total discourse, of which the major part (28%) is constituted by the Process domain. In the second and third terms, the participation of transmission domains drops to 17% in the second term, with a slightly raised Representation domain of 10% in the third term. Overall, in the diploma reviews, transmission domains constitute 23% of the discourse, with the Process domain constituting 12%..

C. In relation to architectural domains

In the first term the discussion is more focused on the process and on the group decisions and criticism, so it is less indicative of the idiolects and general tendencies that diploma reviews present in the second and third terms. There is a general tendency for theoretical and programmatic discussions, that do not necessarily focus on the project itself, but question the project at a more general level.
In the first term we have a substantial presence of the domains of Criticism and of Process in the crit. The transmission domains cover 41% of the discourse. As a consequence, the percentage of architectural domains is dropped. Out of all the architectural domains, the domains of Context (12,5%), Programme Use (10,5%) and Geometry Form (10%) are discussed on an equal base.

In the second term the projects are much more individualistic. The programmes that the students are using are very diverse in content. The architectural domains that are used in each review differ as well. But there is a general tendency in all three of them. The Programme Use domain is distinctively the dominant one, covering 49% of the discourse in project 3B, 22% in project 3C, 29% in project 3D. That apart, project 3B concentrates on Context (C 10%), project 3C on Space Form (SF 10,5%), project 3D on Context (C 10%), on Historical Type (HT 12%) and on Building Type (BT 14 %). Overall the architectural domains most used in second term are the domains of Programme Use, Context and Building Type.

The third term has a very similar profile to the second term. The programmes that the students are using are very diverse in content. The architectural domains that are used in each review differ as well. But there is a general tendency in all three of them. The Programme Use domain is distinctively the dominant one, covering 35% of the discourse in project 3E, 33% in project 3F , and 27% in project 3G. That apart, project 3E concentrates on Immediate Use (IU 10%), Style (SY 10%) and discussion about Architecture (M 11%). Project 3F concentrates on Context (C 12%), and Space Form (13%). Project 3G on Immediate Use (12%) and Space Form (SF 12%).

Looking at the comparative table the domain of Context in the first term (C 12.5%) and the domain of Programme Use (PU 10.5%, 33%, 32%) in all three terms are the dominant ones, with a substantial difference in their participation in the discourse from the ones that follow. The domains of Immediate Use, Geometry Form, Space Form, Architectural Elements, and Building Type have an average participation in the discourse. It is worth noticing that the domain of Space Form does non exist in case study 3E. The domains of Structure, Historical Type, Style, Metalanguage, have a minor presence in the discourse. We have for the first time the appearance of the exta-architectural domain of Abstract Notions in three case studies (3C, 3F, 3G).

	1ST	YEAR		CONPAR	RAT	IVE								
DESI	GN	DOM	1ST	TE	RM		2ND	TE	RM		3RD	TE	RM	
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			21			7.5	3			1.5	12			5.5
IU			44			15	18			9	42			18
C			12			4					14			6
PU			10			3.5					15			6.5
GF			76			26	47			23.5	41			18
SF			27			9	22			11	42			18
HT			1			0.5	14			7	2			1
SY			1			0.5								
EL			39			13.5	20			10	22			9.5
BT			16			5.5	6			3	12			5.5
M			2			0.5	4			2				
	R			6		2		22		11		9		4
	TR			14		5		15		7.5		6		2.5
	CR			18		6		19		9.5		6		2.5
	PR			4		1.5		11		5		7		3
		O												
		A												
		NUM	249	42		291	134	67		201	202	28		230
		%	86	14		%	67	33		%	88	12		%

	3RD	YEAR		CONPAR	RAT	IVE								
DESI	GN	DOM	1ST	TE	RM		2ND	TE	RM		3RD	TE	RM	
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			36			9	68			23	8			2.5
IU			62			16	54			19	58			18
C			38			10	19			6	21			6.5
PU			25			6.5	14			5	33			10
GF			45			12	39			13	39			12
SF			59			15	39			13	69			21
HT			2			0.5	1			0.5	1			0
SY			6			1.5	1			0.5	5			1.5
EL			36			9	15			5	28			8.5
BT			21			6	8			3	9			3
M											5			1.5
	R			20		5.5		16		5.5		11		3.5
	TR			17		4.5		4		1		10		3
	CR			10		2.5		14		5		15		4.5
	PR			8		2		1		0.5		9		3
		O											4	1
		A											2	0.5
		NUM	330	55		385	258	35		293	276	45	6	327
		%	86	14		%	88	12		%	84	14	2	%

	DIPLOMA			CONPAR	RAT	IVE								
DESI	GN	DOM	1ST	TE	RM		2ND	TE	RM		3RD	TE	RM	
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							4			1	6			2
IU			12			4	15			5	24			8
C			39			12.5	21			7	25			8
PU			33			10.5	95			33	100			32
GF			30			10	14			5	16			5
SF			22			7	18			6	28			9
HT							13			4.5	14			4
SY			3			1	7			2.5	13			4
EL			24			8	18			6	21			7
BT			12			4	29			10	9			3
M			9			3	1			1	15			5
	R			10		3		19		7		4		1
	TR			4		1		12		4		6		2
	CR			25		8		5		2		10		3
	PR			88		28		14		5		10		3
		O												
		A							4	1			12	4
		NUM	184	127		311	235	50	4	289	271	30	12	313
		%	59	41		%	82	17	1	%	86	10	4	%

TABLE 4.13 : COMPARATIVE CONTENT OF FIRST YEAR, THIRD YEAR AND DIPLOMA DISCOURSE (BARTLETT)

4. 3. 4 DISCUSSION OF THE SIMILARITIES AND DIFFERENCES IN THE DISCOURSE ACROSS THE YEARS IN THE **BARTLETT SCHOOL OF ARCHITECTURE**

A. In relation to student-tutor participation (Table 4.13, 4.14)

The students participation is more substantial in the diploma than in the degree school, covering 64% of the discourse in the final term. In the first year and the third year it varies, going from an equal participation to a tutor dominant discourse. Out of 18 first year and third year reviews there is only one exception to the rule. In project 2A the student participates more in the discussion than the tutor, but that is not perceived as indicative by the research.

A specific rule does not exist that can be detected to underlie the variations of student-tutor participation in the reviews , other than maybe the variations are an indication of the consistency of the project under presentation.

The use of the architectural domains varies according to the student participation in the discourse. Transmission domains are discussed mainly by the tutors in the first and third year reviews, and by both tutors and students in the diploma reviews. Extra-architectural domains present only in the Diploma discourse are used equally by students and tutors.

B. In relation to transmission domains

Transmission domains are not very much used in the reviews. Generally they constitute 19% of the discourse of the total reviews, 19% of the first year reviews, 12.5% of the third year reviews and 23% of the diploma reviews.

Out of the 18 reviews under analysis from all the years, only in three terms is the percentage raised above 14%. In the second term of the first year (33%) where the domain of representation is 11% . In the first term of the diploma reviews (41%), where the domain of process is 28%. In the second term of the diploma reviews, (17%) where the domain of representation is 7%..

One cannot distinguish an overall pattern in the use of specific transmission domains. If one classifies the transmission domains in relation to their variability (variability indicates that at one point the domain under examination has a strong presence in the discourse) and presence in the discourse one can say:

1. REPRESENTATION (R)

Difference in variation reaches 10%. . The lowest percentage in third term diploma reviews is 1% . The highest percentage in the second term first year reviews is 11%. . The overall presence in the discourse is 4.5%.

BARTLETT COMPARATIVE															
DESIGN		DOM	1ST YEAR				3RD YEAR				DIPLOMA				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			36			5	112			11	10			1	
IU			104			15	174			17	51			5.5	
C			26			3.5	78			8	85			9	
PU			25			3.5	72			7	228			25	
GF			164			23	123			12	60			7	
SF			91			13	167			17	68			7	
HT			17			2.5	4			0.5	27			3	
SY			1			0	12			1	23			2.5	
EL			81			11	79			8	63			7	
BT			34			4.5	38			4	50			5.5	
M			6			1	5			0.5	25			3	
	R			37		5	47			4.5		33		4	
	TR			35		5	31			3		22		2.5	
	CR			43		6	39			4		40		4	
	PR			22		3	18			2		112		12	
		O							4	0.5					
		A							2	0			16	2	
		NUM	585	137		722	864	135	6	1005	690	207	16	913	
		%	81	19		%	87	13	0.5	%	76	23	1	%	

TABLE 4.14 : COMPARATIVE CONTENT OF THE BARTLETT DISCOURSE

2. TRANSMISSION (TR)

The difference in variation reaches 6.5% . The lowest percentage in the first term diploma reviews is 1%. The highest percentage in the second term first year reviews is 7.5%. . The overall presence in the discourse is 3.5%..

3. CRITICISM (CR)

The difference in variation reaches 7.5%.. The lowest percentage in the second term diploma reviews is 2% . The highest percentage in the second term first year reviews is 9.5% . The overall presence in the discourse is 4.5% .

4. PROCESS (PR)

The difference in variation is 27.5%.. The lowest percentage in the second term third year reviews is 0.5% . The highest percentage in the first term diploma reviews is 28%.. The overall presence in the discourse is 5.5% .

One can say that all the transmission domains have an almost equal presence in the discourse but not an equal variability. The most variable domain is the domain of Process followed by the domain of Representation.

C. In relation to architectural domains.

Architectural domains are the dominant ones in the reviews. Generally they constitute 81% of the discourse of the total reviews, 81% of first year reviews, 87% of third year reviews and 76% of the diploma reviews.

One can distinguish several patterns in the use of specific architectural domains. Looking at the comparative tables , we can distinguish two types of architectural domains in relation to their variability and presence in the discourse.

A. Some domains exist that have a quite a stable presence in the discourse throughout the years . These tend to be the ones that have a low participation in the discourse as well.

1. HISTORICAL TYPE (HT)

The difference in variation reaches 7%. The lowest percentage in the third term third year, and first term diploma reviews is 0% . The highest percentage in the second term first year reviews is 7% .The overall presence in the discourse is 2% .

2. STYLE (SY)

The difference of variation reaches 4%. The lowest percentage in the second and third term first year reviews is 0% . The highest percentage in the third term diploma reviews is 4% . The overall presence in the discourse is 1% .

3. BUILDING TYPE (BT)

The difference in variation reaches 7%. The lowest percentage in the second term first year reviews, in the second and third terms third year reviews and in the third term diploma reviews is 3%. The highest percentage in the second term diploma reviews is 10% . The overall presence in the discourse is 4.5% .

To conclude one can say that Historical Type is used in quite an idiosyncratic way since its presence is identified with very specific projects. Style is almost non existent. Building type presents a low equal participation over the years.

B. Other architectural domains present a great variability (going from low to high percentages) and in parallel a substantial presence in the discourse, and yet others present the one (variability) or the other (presence).

1. STRUCTURE (SR)

The difference in variation reaches 23% . The lowest percentage in the first term diploma reviews is 0% . The highest percentage in the second term third year reviews is 23% . The overall presence in the discourse is 5.5% .

2. IMMEDIATE USE (IU)

The difference in variation reaches 15% . The lowest percentage in the first term diploma reviews is 4% . The highest percentage in the second term third year reviews is 19% . The overall presence in the discourse is 12% .

3. CONTEXT (C)

The difference in variation reaches 12.5% . The lowest percentage in the second term first year reviews is 0% . The highest percentage in the first term diploma review is 12.5% . The overall presence in the discourse is 7% .

4. PROGRAM USE (PU)

The difference in variation reaches 33% . The lowest percentage in the second term first year reviews is 0% . The highest percentage in the second term diploma review is 33% . The overall presence in the discourse is 12% .

5. GEOMETRY / FORM (GF)

The difference in variation reaches 21%. . The lowest percentage in the second and third term diploma reviews is 5% . The highest percentage in the first term first year reviews is 26% . The overall presence in the discourse is 14% .

6. SPACE / FORM (SF)

The difference in variation reaches 15% . The lowest percentage in the second term diploma reviews is 6% . The highest percentage in the third term third year reviews is 21% . The overall presence in the discourse is 12% .

7. ARCHITECTURAL ELEMENTS (EL)

The difference in variation reaches 8.5%. The lowest percentage in the second term second year reviews is 5%. The highest percentage in the first term first year reviews is 13.5%. The overall presence in the reviews is 8.5%. .

To conclude one can say that architectural domains do not present a specific pattern in their use that could be statistically significant for the research. Immediate Use and Program Use together definitely have a tendency to increase from first year (14.5+3.5=18%), to third year (17+7=24%), to diploma (5.5+25=30.5%) reviews. Together they constitute 24% of the total discourse. Geometry Form and Space Form decrease from first year (23+12.5=35.5%), to third year (12+17=29%), to diploma (7+7=14%) reviews. Together they constitute 25% of the total discourse. The domain of architectural elements has an almost stable presence in the discourse.

If the research follows the classification of the architectural domains into the ones relating to architectural substance or physical presence (SR, IU, C, PU) and the ones relating to formal, spatial organisation and style (GF, SF, HT, SY) , then one could observe:

The first group of domains together constitute 26.5% of the first year discourse, 43% of the third year discourse and 40.5% of the diploma discourse. The second group of domains together constitute 38% of the first year discourse, 30.5% of the third year discourse and 19.5% of the third year discourse. So the first year discourse can be characterised as more 'formal' (GF 23% dominant) , and the diploma discourse as dealing mainly with architectural substance and physical presence (PU 25% dominant).

D. In relation to extra-architectural domains.

Their presence is minimum. We have their first appearance in the third year reviews, in two case studies (2G, 2H) and then in the diploma reviews in three case studies (3C, 3F, 3G). These belong mainly to the domain of Abstract Notions (2%)

The domain of Metalanguage has a minimum presence in the discourse that reaches 1.5%.. .

FOR FURTHER RESEARCH:

If we had an equal representation of the design domains in the discourse, each one of them would claim a 6% (100/17) participation in the discourse. Any domain that has a participation bigger than 6% will be further examined. Variability will also be taken into consideration. A presence of a substantial variability means that the domain obtained a significant importance in parts of the discourse. Overall as a conclusion one can say that the dominant and important design domains for further research from the Bartlett School of Architecture are the following:

From the transmission domains:

The two dominant transmission domains in the discourse are the domains of Representation and Process. Not for their consistent presence throughout the discourse, which is only 4.5% for R and 5.5% for PR, but for the variability they present. (R 10% , PR 27.5%)

From the architectural domains:

None is strongly represented in the results from the group of the most stable ones . All the architectural domains that belong to the variable group i.e. Structure, Immediate Use, Context, Programme Use, Geometry Form, Space Form, Architectural Elements are of great interest.

Extra-architectural domains will not be examined for the Bartlett.

4.4 GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE

In Greenwich , the reviews of the second semester of the first and the third year, of the academic year 1993/94 were studied. Nine reviews were presented in the first year and nine in the third year. The project at both levels is the same in thematic approach (content) but not in programme (in relation to size and functional requirements) . The first year students did a Film Club in Soho, the third year students did a Film School in Soho. The concepts that all the students (first-third) used were the same. The process followed at both levels is exactly the same. The level of complexity in terms of the use of the building and its scale differs , the third year brief being more complex and bigger in scale than the first year one. [3]

The first year at Greenwich consisted of 120 full time students. The year had a co-ordinator that was responsible for the briefs and their organisation. The year was subdivided in six tutorial groups. There was one part-time tutor responsible for each group. Although each group was running the same general brief, the method of teaching and the final outcome was very different most of the time . The review process was used to make the students aware of the diversity of teaching methods that existed in the year, as well as to allow the tutors to exchange ideas and design approaches[4]. Two official reviews and an unofficial one at the beginning of the project took place, during the semester under observation. The unofficial one was an internal group review, with the participation of just one invited critic.

The official reviews (interim and final) involved everybody in the year. They took place over two days and were organised around three tutorial groups for each day. Each crit panel consisted of the group tutor, of a tutor that belonged to another tutorial group and often an invited critic as well. The three reviews of the tutorial groups were held simultaneously in the same studio space and students were urged to participate in the discussion, but they very rarely did so. The student numbers were high and therefore the reviews were quite short, with the exception of the final reviews, which were perceived as more important and consequently lasted longer. The time scale of the reviews under observation varied between ten minutes to half an hour. A review rarely lasted longer than half an hour.

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3. Although this was not always the same under the new educational paradigm. Breifs like 'Art Gallery, along the river Thames' appeared simultaneously in first and third year programmes.

4. The above maybe indicates a shift from a tutor versus student transmission to a tutor versus tutor didactic reinforcement.

The third year at Greenwich had a slightly different structure. It consisted of ninety students. The students were subdivided in four 'ateliers'. Each 'atelier' had one or two tutors running it. The 'atelier' under observation had two tutors, and was very different in content and design approach from the other 'ateliers'. Diversity within the year was stressed. At the beginning of the year the students could choose an 'atelier'. Twice during the year a presentation of each 'atelier's' work took place in front of the whole year.

The reviews were held officially twice during the semester, the latter of these being the crucial one. The first interim review under observation is an internal group review involving only the 'atelier' tutors. The other two involved an invited critic as well. The students presented their projects whilst standing in the presence of the crit panel and other students. The presence and participation of other students during the review was of a high quantitative and qualitative standard. One of the main reasons for that may be that by the end of the year the students had to present their project verbally to the external examiner and a lot depended on that for their assessment. Consequently each student valued the presence and participation of their fellow students in the reviews as a valuable learning experience. The final review was a kind of a rehearsal for their final assessment. The different 'atelier' reviews took place in parallel in the same studio space. The reviews were timetabled at 20 minutes per student but this was not strictly followed, and they tended to last much longer. Final reviews were timetabled at 45 minutes per student due to their importance. In the final analysis Greenwich reviews tended to be much longer than the Bartlett equivalents.

The structure of the reviews under observation appeared to be the same one, the first year reviews being the shortest and the final year reviews being the longest. The reviews were tape recorded, transcribed at full length and were transformed into a text. The time scale though is different from year to year. As a result the lengths of the text of the case studies under analysis are different. The content of the specific project of each term in the first and third year will be presented in parallel in the analysis of the case studies.

PRESENTATION OF CONCEPTS SPECIFIC TO THE CINEMATIC THEME

As we have already mentioned, third year and first year projects share a common 'theme', that of the cinema. Some concepts used during the first and third year reviews are common and unique to the cinematic programme. Some of them, although they are architectural concepts, are brought to the surface and intensified

because of the cinematic programme. All these concepts were introduced along with the programme and relate to cinematic terms.

The use of the film in a studio project introduces the issues of framing and editing for the students. Framing is introduced in relation to recording a space or an event (in a static or in a dynamic sense), editing in relation to the process of bringing the frames together in a sequence, to form the whole and the narrative. Because film encloses within it qualities such as time, space and movement, it has the capacity of becoming for the students another reading of spatial reality. Through the use of film in the design process and through making their own recordings, students use often the concepts of framing, editing and movement through space.

A clarification under which domain these concepts will be classified is needed for a better understanding of the case studies will follow.

<u>The concept of frame and framing</u>

The concept of framing or 'mise en scene' in the cinematic world confronts choices on what and how to shoot, that means on what to see through a camera and how to see it. This concept translated in architectural tackles issues of visibility form and architectural elements and can become part of different domains.

a. When framing refers to structure,
i.e. 1H' 28.29. so I suspended my building from this frame structure .....
then it is classified under the domain of structure SR
b. When framing refers to openings,
i.e. 1F' 86. 87. we could watch it's movement through the frames.....
then it is classified under the domain of architectural elements EL
c. When framing refers to framing of images,
i.e. 1D' 54. I wanted to put an emphasis on the framing of images....
then it is classified under the domain of geometry form GF, since it is relating to a two dimensional representation.
d. When framing refers to framing a space,
i.e. 1D' 46. 47. 48. through small windows that frame the three internal different conditions (in the box)
2G' 42. the building is basically a series of frames.....
then it is classified under the domain of space form SF.
e. When framing becomes an activity, that relates to the activity of the cinema and of the camera,
i.e. 1F' I thought the whole purpose of it was to frame a movement.....

1D' 132. My idea of frames is different. It is taken from the cinema....
1D' 133. 134 It is the way you look at things, through the framing of the camera.....
1B' 60. by framing the movement.....
then it is classified under the domain of abstract notion A.

The concept of editing

The concept of editing or montage is perceived as the dynamic cinematic concept in relation to framing. It relates to the activity (process) in which a number of frames are put together in order to create a meaningful sequence. Within the following case studies editing, is mainly used in analogy to the design process under the transmission domain of Process (PR)

I.e. 2F' 78. 79. 81. 83 You have gone in different directions, but you haven't pulled it all back together, it is a matter of being in the editing booth with the information you've got, or whether you need to cut out several sequences.

The concept of movement

The concept of movement through space is dominant in every architectural discourse. The cinematic recording is in a sense the only one that can represent the movement through space in a sequential and 'real' way . Thus the concept of movement within a cinematic project becomes a focus and acquires different qualities that belong to a diversity of domains, which are the following:

a. When movement relates to a person going through a space ,
I.e. 1I' 13. by I thought that the human element moved through space.....
then movement will be classified as a simple activity under the domain of Immediate use IU.
b. When movement relates to an object,
I.e. 1F' 72. We get such a minute glimpse of the movement (of the ball) we can't really see it .....
1C' 57. so the image can move.....
then movement does not relate to function, but still it relates to an activity, that of an object. In this case it will be classified under the extra-architectural domain of object O.
c. When movement is used as an abstract notion,
I.e. 1F' 107. and then you could create the movement .....
or when it is used as a cinematic notion,
I.e. 1C' 56. The camera can move .....

not referring to a specific activity , of people or objects, in this case it will be classified under the extra-architectural domain of abstract notions A.

Other cinematic concepts

Anything to do with cinema in broader terms, like film, script, narrative, geographical plane, spectator , focusing of camera etc. will be classified under the domain of abstract notions A.

I.e. 2D' 28. a cinematic cycle is made.....

2I' 80. like I am stating what a cinema is for me.

I.e. 2C'11. I used the idea of layering through the film.....

4. 4. 1 FIRST YEAR

The first nine case studies belong to the first year of Greenwich University , School of Architecture and Landscape. They belong to the second term of the academic year 1993/94. The semester started with an introductory programme, that lasted a week and it was about an " Incidental Space or a Boundary Condition in Soho". The students had to visit Soho, become familiar with the area and record a condition. This could be a simple activity (sitting, going through), a small space (courtyard, well) an arcitectural element (staircases, lampposts) or a boundary condition (threshold, window, fence). That became their starting point for developing their ideas, about the semester's brief that was "A Meeting House in Soho". For all the groups the first part of the semester was spent in processing and deriving ideas for their 'Meeting House" and the second part of the semester in resolving the architectural space of their small building.

Submission: By the end of the semester all the students had to produce:

a) Drawings and models that will show the development of their investigations and concepts derived from those.

b) A site location mapping to scale no larger than 1: 1000.

c) Drawings of a work of architecture showing spatial, structural and material qualities, to a scale of 1/100.

d) Model of a work of architecture showing structural, spatial and material qualities, to a scale of 1/100.

e)At least one critical structural section to a scale of 1/10.

d) At least one critical detail to a scale of 1/1.

For the tutorial group under analysis, the brief of a "Meeting House in Soho" developed into a " Film Club in Soho". The students were asked to develop some concepts in relation to cinema and Soho. They had to combine those to arrive to their final result,

a small building on the Kingly Street site. A more specific step by step description of the process followed by the group up to the final project will be presented with the reviews.

FIRST INTERIM REVIEW (Table 4.15)
4 MARCH 1994
"THE LANGUAGE OF FILM"
The review addresses the project on the level of the initial concept formation.
The students visited Soho during the first week of the semester 'block week'. They had to choose a 'theme' defined by a 'word', which they had to investigate and present graphically and verbally.(Prog. 1)

The introduction of the concept of the cinema took place through the introduction of a film to the group, that investigated the urban contemporary condition. The students explored further their 'theme' through watching and analysing the film 'Koyaniskatchi' and visiting and recording their chosen Soho site, Kingly Street. (Tutorial Supplements 1, 2). Through these parallel readings they had the opportunity to refine and enrich their investigation and formulate their first concept about the two 'worlds', the world of the cinema and the world of Soho.

The aim of the review is to clarify each student's theme and to start discussing connections and layering between parallel readings.

<u>PROJECT 1A"</u>
Hiding and revealing (SF 17,5%) as different conditions changing, as time passed is the 'theme' of this project. Some blocked windows (EL 19%) on top of a bar (BT 3%) in Soho (C 3%) are the starting point for the investigation. Then the student recorded time sequences (A 13.5%) from the film and created similar sequences on site. She recorded a door by approaching it. The door hides and reveals an existing scaffolding (IU 3%). The way that these sequences are represented (R 19%) and the process (PR 15.5%) by which the student is trying to clarify her concepts (i.e. by changing the scale (GF 3%) of the recordings) are discussed. The domains of SR 2%, PU 1%, M 1% and O 1% have a minor presence in the crit. This is a discourse that mainly deals with the use of different representation techniques as a process, that will help the student to express her theme, as well as with spatial issues abstract notions and architectural elements. The dominant domains in the text are the domains of Space Form, Architectural Elements, Representation and Process.

1A' DESI	1ST GN	YEAR DOM	ST	1ST UDE	INT NT	REV	IEW TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							2				2			2
IU							3				3			3
C			2				1				3			3
PU							1				1			1
GF							3				3			3
SF			10				7				17			17.5
HT														
SY														
EL			7				11				18			19
BT			1				2				3			3
M							1				1			1
	R			3				14				17		17.5
	TR													
	CR													
	PR			4				11				15		15.5
		O							1				1	1
		A			3				10				13	13.5
		NUM	20	7	3	30	31	25	11	67	51	32	14	97
		%	21	7	3	31	32	26	11	69	53	33	14	%

1B' DESI	1ST GN	YEAR DOM	ST	1ST UDE	INT NT	REV	IEW TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							3				3			3
IU			4				4				8			8
C			3				8				11			10
PU														
GF			2				11				13			12
SF			2				11				13			12
HT														
SY														
EL			4				3				7			6
BT														
M							1				1			1
	R			2				19				21		19
	TR													
	CR							2				2		2
	PR							18				18		16
		O							7				7	6
		A			2				5				5	5
		NUM	15	2	2	19	41	39	12	92	56	41	14	111
		%	13	2	2	17	38	35	10	83	52	36	12	%

1C' DESI	1ST GN	YEAR DOM	ST	1ST UDE	INT NT	REV	IEW TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			3				9				12			6
IU							3				3			1.5
C			3				3				6			3
PU														
GF			13				45				58			29
SF			3				6				9			4.5
HT							3				3			1.5
SY														
EL			6				8				14			7
BT			2								2			1
M							1				1			0.5
	R			8				15				23		12
	TR							4				4		2
	CR							7				7		3.5
	PR			4				16				20		10
		O			5				21				26	13
		A			1				13				14	5.5
		NUM	30	12	6	48	78	42	34	154	108	54	40	202
		%	15	6	3	24	39	22	15	76	54	28	18	%

TABLE 4.15 : CONTENT OF FIRST YEAR, INTERIM REVIEWS (GREENWICH)

PROJECT 1B'

Framing the movement' (A 5%) is the theme of the project. Descending (IU 8%) underground and arriving at a closed door (EL 6%) is the starting point for the Soho investigation Soho (C 10%). Vertical (GF 11%) movements were recorded and represented from the film. A lot of representation techniques (R 19%) are suggested for the student to use to expand his investigation, like superimposing different images (O 6%) or producing a collage. The spatial qualities (SF 13%) of some presented images are discussed, as well as the potential for the student to take them on board and translate them into a structural (SR 3%) model (PR 16%). The domains of M 1% and CR 2% have a minor presence in the crit.

This is a discourse that mainly deals with the use of different representation techniques as a process that will help the student to express his theme, as well as formal and spatial issues. The dominant domain is the domain of Representation.

PROJECT 1C''

Objects trapped into orthogonal grids, (the grid being a metaphor of the framing of the camera) is the 'theme' of this project. A table - chair complex in front (SF 4.5%) of a grid- tilled wall is the starting point for the investigation. Clouds trapped in a grid of window frames in the film , a wire mesh trapped in a grid of window frames (EL 7%) on site are some of the images presented by the student in a grid form (R 12%). Two methods of approach (PR 10%) are indicated by the tutors (CR 3.5%). One is for the student to create a flip-book as a metaphor of the moving image of the cinema (A 5.5%) , the other is to investigate the formal and material (SR 6%) qualities of objects (O 13%) trapped in a grid. The concept of grid and how the grid could be challenged could be part of the investigation (GF 29%). The domains of IU 1.5%, HT 1.5%, BT 1% and TR 2% have a minor presence in the crit.

This is a discourse that deals mainly with issues of geometry form in relation to grid and extra architectural objects , process and representation. The dominant domain is the domain of Geometry Form.

FIRST YEAR, SECOND INTERIM REVIEW (Table 4.16)

17 MARCH 1994

'THE LANGUAGE OF THE FILM'

The review addresses the project at the level of the development of the initial concept into a spatial object (3d model). It focuses on the process that each student used to achieve this transition.

The students had to combine their parallel readings of Soho, the film and the site, and come up with a model through which they would transform their concept 'theme' into

1D'	1ST	YEAR		2ND	INT	REV	IEW								
DESI	GN	DOM	ST	UDE	NT		TU	TOR			TO TAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			4				5				9			7	
IU			8								8			6	
C			3								3			2	
PU															
GF			21				21				42			31	
SF			18								18			13	
HT															
SY															
EL			4				1				5			4	
BT			2								2			1.5	
M															
	R			7				18				25		19	
	TR							4				4		3	
	CR			1				5				6		4.5	
	PR			4				4				8		6	
		O			1								1	1	
		A			2				1				3	2	
		NUM	60	12	3	75	27	31	1	59	87	43	4	134	
		%	45	9	2	56	20	23	1	44	65	32	3	%	

1E'	1ST	YEAR		2ND	INT	REV	IEW								
DESI	GN	DOM	ST	UDE	NT		TU	TOR			TO TAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			1				5				6			4	
IU							2				2			1.5	
C			1								1			1	
PU			1				7				8			6	
GF			9				11				20			14.5	
SF			20				21				41			30	
HT															
SY															
EL			7				7				14			10	
BT							1				1			1	
M							1				1			1	
	R			7				10				17		12	
	TR			1				2				3		2	
	CR							4				4		3	
	PR			3				7				10		7	
		O			6				4				10	7	
		A													
		NUM	39	11	6	56	55	23	4	82	94	34	10	138	
		%	29	8	4	41	39	17	3	59	68	25	7	%	

1F'	1ST	YEAR		2ND	INT	REV	IEW								
DESI	GN	DOM	ST	UDE	NT		TU	TOR			TO TAL				
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%	
SR			1				8				9			8.5	
IU			3				1				4			4	
C			3				5				8			7.5	
PU							2				2			2	
GF							4				4			4	
SF			2				6				8			7.5	
HT															
SY							3				3			3	
EL			4				6				10			9	
BT							2				2			2	
M															
	R			4				16				20		18	
	TR							5				5		4.5	
	CR							2				2		2	
	PR			1				6				7		6.5	
		O			2				12				14	13	
		A							9				9	8.5	
		NUM	13	5	2	20	37	29	21	87	50	34	23	107	
		%	12	5	2	19	34	27	20	81	49	32	19	%	

TABLE 4.16 : CONTENT OF FIRST YEAR, INTERIM REVIEWS (GREENWICH)

a 3d space. The model would deal with 'cinematic' issues like frame, editing, light, movement and would form a first suggestion of a film club. (Tutorial Supplement 3) It would also address architectural issues of materials, structure, boundary condition etc. The aim of the review is to reveal the connections between the initial 'theme' and the model, as well as to discuss the spatial qualities of the model and it's connection to the world of 'cinema'.

PROJECT 1D' '

Boundary conditions and the way they are formed by the use of lines, planes and spaces is the theme of this project. The boundary condition of a bench that is altering with its occupation (IU 6%) is the starting point for the project. Several different boundary conditions (SF 13%)were recorded from the film and from the site (C 2%). The images were analysed into their constituent formal elements i.e. lines, planes and volumes. (GF 31%) Later on they were translated into a model (R 19%) , a box that contains the three different boundary conditions formed by lines, planes and volumes in a sequence. You can view the box in two different ways. Through three window frames (EL 4%) on the one side and through shadow casts on the other side. This can be achieved by the use of a light projector on a simple perspex surface. The material quality of the model (SR 7%) is discussed. The transition between the different boundary conditions presents a problem in the model (CR 4.5%). Some alternative solutions are offered to the student (TR 3%). He is advised (PR 6%) to photograph the model expressing the concept of framing the images that he borrowed from the cinema (A 2%). The domains of BT 1.5% and O 1% have a minor presence in the crit. This is a discourse that deals mainly with the concept of boundaries and their geometrical qualities. The dominant domains is the domain of Geometry Form.

PROJECT 1E"

Boundaries and the spaces (SF 30%) created between them is the 'theme' of this project. The railings that exist in front of a house wall is the starting point of the investigation. Several different boundary conditions and spaces that exist between two objects (O 7%)are recorded from the film and from the site. Boundaries are classified under four categories, moving and static, vertical and curved ones (GF 14.5%). These categories are translated into four vertical planes in a model (R 12%). The translation to the model is not perceived as very successful by the tutors (CR 3%). The railings are criticised for losing their qualities of privacy (PU 6%). The rocks and the underground barrier (EL 12%) are criticised as being too different in scale and in substance to be translated into the same slim wire mesh object. Issues of visibility and communication are not thoroughly researched by the student. The student is urged to further investigate (PR 7%) the different conditions that boundaries create through

their material quality (SR 4%). The domains of IU 1.5%, C 1%, BT 1% and M 1% have a minimum presence in the crit.
This is a discourse that mainly focuses on the formal and spatial qualities of boundaries. The dominant domain is that of Space Form.

PROJECT 1F'

Framing the movement is the 'theme' of this project. Going underground (SF 7.5%) arriving (IU 4%) at a closed door, and feeling trapped (PU 2%) is the starting point for the Soho investigation (C 7.5%). Vertical movements (GF 4%) are recorded and represented from the film. These are translated into a model , (R 18%) a tower that frames the movement of a falling ball (O 13%) , through small windows (EL 9%). The model is discussed for its material quality and its industrial feel (SR 8.5%). Should the model remain like it is or should it become more elegant (SY 3%) ? Is this model a representation of a cinematic condition (A 8.5%) or will it be placed as a building (BT 2%) on site? (TR 4.5%) The model needs some alterations (PR 6.5%) so that it can frame the movement in a more cinematic and successful way (CR 2%).
This is a discourse that focuses on the model and how successfully it represents the theme of framing a movement. The dominant domain is the domain of Representation.

FIRST YEAR, FINAL REVIEW (Table 4.17)
2 JUNE 1994
"THE FILM CLUB"
The review addresses the project at the final stage, the stage of completion.
The students had to translate their initial concepts to a film club building . They had to go through several transformation stages, i.e.. collages, drawings, modelling to allow their initial spatial and cinematic concepts to translate into plans, section and elevations of a building proposition. The programme of the building consisted of a video library, of a small cinema, of a cafe-bar and administration.
The aim of the review is to look at the consistency that exists between final plans and initial concepts and to highlight the positive and negative elements on the formal, structural, functional level of the proposition.

PROJECT 1G"

Compression between two objects, or compression of a space (SF 12%) is the theme of this project. The doorway in Soho (C 55%), a window in the film, the scaffolding (EL 11%) on site are the things compressed by the use of several representation techniques (R 17%) . Compression (O 16%) can happen crossways. Compression

1 G' 1ST YEAR FINA L REV IEW														
DESI GN DON ST UDE NT TU TOR TO TAL														
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			2				1				3			2
IU			1				1				2			1.5
C			4				3				7			5.5
PU							1				1			1
GF			5				7				12			9.5
SF			8				7				15			12
HT														
SY														
EL			9				5				14			11
BT							1				1			1
M														
	R			10				12				22		17
	TR			1				1				2		1.5
	CR							10				10		8
	PR			2				10				12		9.5
		O			10				10				20	16
		A							6				6	4.5
		NUM	29	13	10	52	26	33	16	75	55	46	26	127
		%	23	10	8	41	21	26	12	59	44	36	20	%

1 H' 1ST YEAR FINA L REV IEW														
DESI GN DON ST UDE NT TU TOR TO TAL														
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			3				9				12			11.5
IU			3				2				5			5
C			2								2			2
PU			3								3			3
GF			4				10				14			13.5
SF			12				9				21			20
HT														
SY														
EL														
BT														
M														
	R			4				12				16		15
	TR			3								3		3
	CR							5				5		5
	PR			5				5				10		9.5
		O			5				4				9	8.5
		A							4				4	4
		NUM	27	12	5	44	30	22	8	60	57	34	13	104
		%	26	11.5	5	42.5	29	21	7.5	57.5	55	32.5	12.5	%

1 I' 1ST YEAR FINA L REV IEW														
DESI GN DON ST UDE NT TU TOR TO TAL														
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			27				4				31			18
IU			20				7				27			16.5
C			7								7			4
PU			9								9			5
GF			10								10			6
SF			20				5				25			15
HT														
SY							2				2			1
EL			4				1				5			3
BT														
M														
	R			12				15				27		16
	TR			1				3				4		2.5
	CR							5				5		3
	PR			8								8		5
		O			3								3	2
		A			6								6	3
		NUM	97	21	9	127	19	23		42	116	44	9	169
		%	58	12	5	75	11	14		25	69	26	5	%

TABLE 4.17 : CONTENT OF FIRST YEAR, FINAL REVIEWS (GREENWICH)

contains the notion of tension of keeping things apart (as an opposition). The building is perceived as keeping the two neighbouring walls apart, as keeping the city apart. (A 4.5%) The building is compressed between these two walls. The rods are bent (GF 9.5%) in the model. The problem is that this existing tension is not expressed powerfully enough in the model and drawings for the tutors (CR 8%). They offer to the student the alternative (PR 9.5%) to experiment with tension, using another model. They suggest that he should squeeze some rods between two walls to scale, and use the result of the experiment to enrich his representation.
This is discourse focusing mainly on formal, spatial, representation issues, architectural elements and extra-architectural activities like bending and compressing. The dominant domain is the domain of Representation.

PROJECT 1H'

The theme of this project is light, dark and how shadows are transforming space. The first model is a box with three frames and a wire mesh as a content. Through projecting light one can create shadows (O 8.5%) on different textures. The wire mesh is used to create some collages (R 15%) that represent the different areas of the building (PU 3%). The final model, the building itself , is suspended in the middle of a structural frame (SR 11.5%). The concept of light dark is translated into spaces with specific functions, like dark/cinema, light/cafe' (IU 5%). The tutors are not happy with the translation which they find quite sterile (CR 5%). The investigation is not taken on board in the final stage (PR 9.5%) . The frame-structure is very plain and rigid, not adding any shadows in the project and not transforming the space (SF 24%). The frame needs to be enriched formally (GF 13.5%) and the student needs to work much more to cover up missing stages and contextual issues (C 2%). This is a discourse which focuses on structural, formal, spatial, representation and extra architectural issues. The dominant domain is the domain of Space Form.

PROJECT 1I''

Movement in relation to texture is the theme of this project. Two sequences of the camera moving across boundaries and different textures are recorded, one from the film and one from the site (C 4%). The site is perceived as compressed and is represented as a box. The scaffolding becomes the object in a box (O 2%). The student records the deformation (GF 6%) of the object, that happens through textures and through light. Four different layers (SF 15%) out of four different materials (SR 18%) relate to each particular space of the building (PU 5%). The metal sheet becomes the cinema (IU 16.5%), and administration, the glass becomes the library, the stocking becomes the cafe and bar. The layers are translated into materials and spaces in the building through the use of drawings and a model

GR DESI	1ST GN	YEAR DOM	COMPARATIVE 1ST INT. REV				2ND INT REV				FINAL REVIEW			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			17			4	24			6	46			11
IU			14			3.5	14			4	34			9
C			20			5	12			3	16			4
PU			1			0	10			3	15			3
GF			74			18	66			17	36			9
SF			40			10	67			17	61			15
HT			3			1								
SY							3			1	2			0.5
EL			39			9.5	29			8	19			6
BT			5			1.5	5			1	1			0
M			3			1	1			0				
	R			61		15		62		17		65		16
	TR			4		1		12		3		9		2
	CR			9		2		12		3		20		5
	PR			53		13		25		7		30		7.5
		O			34	8			25	7			32	8
		A			34	8			12	3			16	4
		NUM	216	129	68	411	239	111	37	379	228	124	48	400
		%	53	31	16	%	63	29	8	%	57	31	12	%

4.18 : COMPARATIVE CONTENT OF FIRST YEAR DISCOURSE (GREENWICH)

(PR 5%). The arch (EL 3%) in the entrance of the library is studied in a detailed model 1/10. The presentation (R 16%) tried to give the feeling of movement (A 3%) through texture in the building. The drawings are criticised as being unclear (CR 3%). They need possibly more concrete information (TR 2.5%). They need to become more occupied, i.e. to show how the cinema is operating. A discussion on the material quality and style (SY 1%) of the model takes place. Generally the response of the tutors is very positive and the project is perceived as a successful one.
This is a discourse focusing on structural, functional, spatial and representational issues. The dominant domain is the domain of Structure.

4. 4. 1. 1 SIMILARITIES AND DIFFERENCES IN THE FIRST YEAR DISCOURSE

Similarities and differences are going to be grouped (Table 4.18) :

A. In relation to student-tutor participation

With two exceptions, project 1D' , 1I', in all the projects above analysed , the participation of the tutors in the discussion varies in relation to the student's participation but is overall larger than the students equivalent. In the first interim review the participation of the students comes up to 20% overall, in the second interim review it reaches 38%. and in the final review it is 52%. It is clear that the students participate more in the discussion as the project progresses. On an individual base , there is no indication of why some students participate more in the discussion than others ,other than the more positive the tutors are towards a project, and the students are clear about what they have to say, the more they participate in the discussion.

The use of architectural and extra-architectural domains by the students and tutors is quite variable . Transmission domains are discussed also by students and tutors but the main part of the discourse is handled by the tutors.

B. In relation to transmission domains

Transmission domains take up 30% of the total first year discourse covering almost one third of it. They have an almost equal presence in every review varying from 25% minimum to 36% maximum. Particularly in the first interim reviews, 31% of the discourse belongs to transmission domains, of which 5% is used by the students. In the second interim reviews, 29% of the discourse belong to transmission domains, of which 7% is used by the students. In the final reviews, 31% of the discourse belong to transmission domains, of which 11% is used by the students. Of all the transmission

domains the ones most used are the domains of Representation 16% and Process 7.5%.

The domain of Representation in particular has an almost equal presence in the nine reviews, varying from 12% minimum to 19% maximum. It does not present any particular pattern in the variations. It is quite important to notice that out of nine case studies, in four of them (1B', 1F', 1H', 1G') the domain of Representation becomes the dominant one. The domain of Process has a more substantial presence in the first interim review claiming 13% of the discourse and a smaller presence in the second interim and final reviews at 7%. The presence of the domain of Process in each particular review varies accordingly, from 16% maximum (1B' first interim review) to 5% minimum (1I' final review). The domains of Transmission and Criticism have a very insignificant presence in the discourse, their participation varying from 0 to 5% with the only exception of review 1G' where the domain of Criticism comes up to 8%. .

C. <u>In relation to architectural domains</u>

For each project the student has his/her own departure (parole) for his/her design. The chosen 'theme' is very indicative for the use of specific architectural domains.

Most of the chosen themes relate to geometrical and spatial issues. Some of them focus mainly on geometrical issues I.e. projects 1C' Theme: objects trapped into orthogonal grids, 1D' Theme: the geometrical substance of boundary conditions. Some of them focus mainly on spatial issues I.e. projects 1A' Theme: hiding and revealing, project 1E' Theme: boundaries and spaces created between them, project 1G' Theme: compression of a space, project 1H' Theme: light and dark and how shadows transform space. Two projects focus on issues of movement , project 1B', 1F' (the same project is reviewed twice) Theme: framing the movement, project 1I' Theme: movement in relation to texture.

As a consequence reviews 1C' and 1D' have the Geometry Form domain dominant in the discourse, 29% and 31% equivalent . Reviews 1A', 1E', 1G' and 1H' have the Space Form domain dominant in the discourse, 17.5%, 30%, 12%, 24% equivalent. Review 1A' has a big percentage 19% of Architectural Elements present in the discourse as well. Reviews 1B' , 1F' and 1I' are more diverse in their content. Review 1B' has an equal participation of Context (C 10%), Geometry Form (GF 11%) and Space Form (SF 13%) domains. Review 1F' has an equal participation of Structure (SR 8.5%), Context (C 7.5%), Space Form (SF 7.5%), and Architectural Elements (EL 9%) domains. Review 1I' has an equal participation of Structure (SR 18%), Immediate Use (IU 16.5%) and Space Form (SF 15%) domains. It is quite important to keep in mind that the above mentioned dominant domains are not necessarily dominant in the crit , but are the dominant ones amongst the architectural domains used in the crit.

Apart for the idiosyncratic character of the reviews, the discourse overall presents some patterns. In the first and second interim reviews, the dominant domains are the domains of Geometry Form (GF 18% , 17%) and Space Form (SF 10% , 17%). The participation of the other domains in the discourse apart from the domain of Architectural Elements (EL 9.5%, 8%) is insignificant. The final reviews are characterised by a greater diversity and by the involvement of a wider spectrum of architectural domains. These are, the dominant still being the Space Form domain (SF 16%), the domain of Structure (SR 11%) of Immediate Use (IU 9%) Geometry Form (GF 9%) and Architectural Elements (EL 6%). The domains of C and PU have a minimum presence in the discourse. The domains of HT, SY, BT are non - existent.

D. <u>In relation to extra architectural domains</u>

Extra architectural domains cover 12% of the discourse. Generally in the first intermediate review they cover a bigger percentage 16% in relation to the second intermediate review where they cover 8% , and to the final review where they cover 11%. . In almost all the reviews the Object domain is raised in relation to the Abstract Notion domain. Only in review 1A' where the concept of time is used, is the Abstract Notion domain raised to 13.5% and the Object domain remains at 1% .

The domain of Metalanguage is totally absent from the first year discourse.

4. 4. 2 THIRD YEAR

The second nine reviews belong to the third year of Greenwich University, School of Architecture and Landscape. They belong to the second term of the academic year 1993/94. The semester started with a film analysis. The students had to design a film school in Soho of approximately 1600m2. During the semester they visited two film schools, to be able to understand better how a film school operates. They discussed problems of the film schools with teaching staff and students. The given programme. was a complex one including: administration, viewing and teaching, editing, production, training, technical accommodation and services. The students had to resolve their building in every aspect, including architectural detailing and services. Submission included:

a) Drawings and models that will show the development of the investigations and concepts derived from those.

b)Site location and context presentation.

c) Full drawings of the building, including everything that was needed to make the concept of the building eligible I.e. plans, elevations, sections, axonometrics, perspectives to scale. The drawings would include detailing.
d) A section 1/10 that will show a part of the detailing of the building.
e) a model of the whole building at 1/200 scale in context, and a fraction of it at a larger scale that would show materiality and detailing.
f) A technical report that would include client analysis, brief analysis, site analysis, design process and scheme design plus the technical solutions in relation to support and services.

A more specific step by step description of the process followed by the group up to the final project will be presented with the reviews.

THIRD YEAR, FIRST INTERIM REVIEW (Table 4.19)
11 MARCH 1994
"THE LANGUAGE OF FILM"
The review addresses the project on the level of the initial concept formation as well as the development of the initial concept into a spatial object (3d model). It focuses on the process that each student used to achieve this transition.

The students had to explore a 'theme' that would relate to the film language, through watching a film and visiting and recording their Soho site (programme 1). They had to combine their parallel readings of Soho, the film and the site and come up with a model through which they would transform their concept 'theme' into a 3d space. The model would deal with 'cinematic' issues like frame, editing, light, movement and would form a first suggestion for a film school.

The aim of the review is to reveal the connections between the initial 'theme' and the model, as well as to discuss the spatial qualities of the model and it's connection to the world of 'cinema'.

PROJECT 2A"
The 'theme' of the project is 'dialogue': a dialogue between masculinity and femininity. (A 20%) The student makes a formal analysis (GF 14%) of two photographs (R 14%). One is from the film 'Blade Runner" (a woman walking in the street) and the other is from Soho (C 4%) (a motorbike (O 12%)). The photographs are analysed into layers, structural (SR 2%) and non structural elements, (EL 4%) and inside and outside elements (SF 17%). According to the tutors the elements of the dialogue are not very well defined. You need to have two systems of concepts , of

2A' DESIGN		3RD YEAR DOMAIN		1ST UDENT			TUTOR				TOTAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							3				3			2
IU														
C			5								5			4
PU														
GF			6				14				20			14
SF			14				9				23			17
HT														
SY														
EL			3				2				5			4
BT			2				2				4			3
M														
	R			11				9				20		14
	TR							1				1		0.5
	CR							1				1		0.5
	PR			3				9				12		9
		O			6				10				16	12
		A			10				17				27	20
		NUM	30	14	16	60	30	20	27	77	60	34	43	137
		%	22	10	11	43	22	15	20	57	44	25	31	%

2B' DESIGN		3RD YEAR DOMAIN		1ST UDENT			TUTOR				TOTAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR							3				3			2
IU			4								4			3
C			5				2				7			5
PU			5				1				6			4
GF			3				16				19			13
SF			17				18				35			24
HT														
SY														
EL														
BT							5				5			3.5
M							1				1			0.5
	R			4				12				16		11
	TR													
	CR							1				1		0.5
	PR			5				26				31		21.5
		O			5				10				15	11
		A			1				1				2	1
		NUM	34	9	6	49	46	39	11	96	80	48	17	145
		%	23	7	4	34	32	26	8	66	55	33	12	%

2C' DESIGN		3RD YEAR DOMAIN		1ST UDENT			TUTOR				TOTAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			1				2				3			3
IU							2				2			2
C			2				4				6			7
PU							3				3			3
GF			3				3				6			7
SF			5				13				18			20
HT														
SY														
EL			2				1				3			3
BT							3				3			3
M							1				1			1
	R			6				6				12		14
	TR			1				3				4		5
	CR							2				2		2
	PR			7				10				17		19
		O							1				1	1
		A			5				3				8	9
		NUM	13	14	5	32	32	21	4	57	45	35	9	89
		%	15	16	5	36	36	24	4	64	51	39	10	%

TABLE 4.19 : CONTENT OF THIRD YEAR, INTERIM REVIEWS (GREENWICH)

formal elements to be able to have a conversation. The student needs to clarify her formal systems in relation to femininity and masculinity (PR 9%) and translate these into a building (BT 3%). The domains of TR 0.5%, and CR 0.5% have a minor presence in the review.

This is a discourse that is mainly metaphoric, bringing a lot of extra-architectural elements and concepts in, along with formal, spatial, representation and issues of process. The dominant domain is the domain of Abstract Notions.

PROJECT 2B'

The project has two parallel themes. One is of a mechanism (replica) breaking through a glass and the other one is of the hierarchy of space in relation to scale. Both themes come from the analysis of the film "Blade Runner" . Berwick street market (C 5%) offers an analogy of breaking boundaries. The market extends towards the street and then retreats into the storage spaces (IU 3%), from the public to the private (PU 4%). The above concepts are translated into three small spatial models (R 11%) that have to do with hierarchy of space, with layers and with the idea of breaking through layers, through a void of planes (SF 24%). The tutors find the interpretation of the 'themes' into conceptual models quite simplistic. A lot of richness from the first investigation and images (GF 13%) is left out in the translation. The idea of a skin that is taken off to reveal the mechanism (O 11%) under it (replica) is lost in the process (PR 11%). The student is advised to go back to the initial images and start working with architectural issues, like order, disorder, texture (SR 2%) , layering before starting to design the building (BT 3.5%). The domains of M 0.5%, CR 0.5% and O 1% have a minimum presence in the review.

This is a discourse which mainly focuses on formal, spatial and issues of representation and process. The dominant domains are the domains of Space Form and Process.

PROJECT 2C''

Different densities of light and dark (SF 25%) and how these affect space is the 'theme' of this project. Photographs from a Soho (C 7%) alleyway (EL 3%) are taken and analysed into different layers from dark to light. These are translated into a 3d model (R 14%) made out of glass (SR 3%). The model is quite obscure (A 4%) and reveals the shadows of the forms (GF 7%) that exist between its layers by the use of light. The tutor suggests that the model could form a screen in the final building (BT 3%) creating a boundary between the inside and the outside space or between two different functions (IU 2%). The student is urged (TR 5%) to start working with the building programme (PU 3%) superimposing his concept on site (PR 19%) because he is behind (CR 2%). The domains of M 1% and O 1% have a minimum presence in the review.

2D' DESI	3RD GN	YEAR DON	ST	2ND UDE	INT NT		REVI TU	EW TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			6				4				10			4
IU			4				8				12			5
C			10				14				24			10
PU			7				8				15			6
GF			21				8				29			12
SF			25				24				49			20
HT														
SY			6								6			2.5
EL			1				6				7			3
BT			2				4				6			2.5
M			1								1			0.5
	R			2				8				10		4
	TR			1				1				2		1
	CR							5				5		2
	PR			8				17				25		10
		O			3				11				14	6
		A			15				13				28	11.5
		NUM	83	11	18	112	76	31	24	131	159	42	42	243
		%	34	4	7	46	31	13	10	54	65	17	17	%

2E' DESI	3RD GN	YEAR DON	ST	2ND UDE	INT NT		REVI TU	EW TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			17				17				34			25
IU			3				4				7			5
C			5				1				6			4.5
PU			2				6				8			6
GF			13				9				22			16
SF			3				12				15			11
HT														
SY			2								2			1.5
EL			6								6			4.5
BT			2				1				3			2
M														
	R			1				5				6		4.5
	TR			1								1		0.5
	CR			1				5				6		4.5
	PR			9				12				21		15
		O												
		A												
		NUM	53	12		65	50	22		71	103	34		137
		%	39	9		48	36	16		52	75	25		%

2F' DESI	3RD GN	YEAR DON	ST	2ND UDE	INT NT		REVI TU	EW TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			1								1			0.5
IU			15				4				19			12
C			7				5				12			8
PU			3								3			2
GF			8				6				14			9
SF			9				4				13			9
HT			1				1				2			1
SY														
EL			7				3				10			6.5
BT			2								2			1
M														
	R			10				9				19		12
	TR			1				6				7		4.5
	CR							11				11		7
	PR			5				26				31		20
		O			4				2				6	4
		A			3				3				6	3.5
		NUM	53	16	7	76	23	52	5	80	76	68	12	156
		%	35	10	4	49	15	33	3	51	50	43	7	%

TABLE 4.20 : CONTENT OF THIRD YEAR, INTERIM REVIEWS (GREENWICH)

This is a discourse mainly focusing on spatial issues and issues of representation and process. The dominant domains are the domains of Space Form and Process.

THIRD YEAR, SECOND INTERIM REVIEW (Table 4.20)
22 APRIL 1994
"THE FILM SCHOOL"
The review addresses the project on the level of the first building formation. It raises contextual issues and focuses on the process that each student followed to translate the initial concept into an architectural proposition.

The students had to use their conceptual models and drawings on site, to scale to arrive at that transition. They had to familiarise themselves with a film school programme (programme 2). In the meantime they visited two different scale film schools in central London. Using the experience of the visits they started to form a better feeling for the kind of space they were to create.

The aim of the review is to look at the consistency of the process from the initial concept to the first building proposition.

PROJECT 2D"

Cinematic space is the 'theme' of this project. The concepts of frame of focus and of geographical plane (A 11.5%) are used to reproduce the film and site images. The images of the surrounding streets become stage sets (O 6%) in the building which is a solid cube with reflective surfaces (SR 4%). The five stage sets become five boxes (GF 12%) placed on top of each other. The position of the spectator(IU 5%) in relation to the stage set frames (EL 3%) is discussed. The tutors suggest that the spectator - visitor should be outside the frame (SF 20%) and that the film school (BT 2.5%) should develop behind the frames of the stage sets. The problem is that the drawings (R 4%) are presented without the context (C 10%), which is so important for this project (PR 10%). Are the visitors to the school going to juxtapose the outside reality to the inside one? The student wants the building to be private (PU 6%) during the day and open to visibility during the night. This could be true only for the first two floors claim the tutors. Overall they question (CR 2%) the necessity for the five floors and the monolithic (SY 2.5%) appearance of the building. The domains of M 1% and TR 1% have a minimum appearance in the review.
This is a discourse which mainly focuses on contextual, formal, spatial, cinematic issues and process. The dominant domain is the domain of Space Form.

PROJECT 2E"

Light, it's distortion and how this affects space is the 'theme' of this project. A device of a layered glass (SR 25%), that allows light to travel only in one direction becomes the inspiration point for the student. The student experiments with models (R 4.5%) and creates a double wall (EL 4.5%), that through the vertical glass panels that are crossing it, can light up the interior space (SF 11%) of the building (BT 2%). The device appears to work and does not seem to have structural problems according to the tutors. The grid (GF 16%) that the student has set for himself is too strict (CR 4.5%) and does not allow him for some flexibility with the plan (IU 5%). He is advised to free himself at least in one direction from the grid and to think how his device can work in relation to the programmatic use (PU 6%) of his building (PR 15%) and it's orientation (C 4.5%). The domains of SY 1.5% and TR 0.5% have a minimum presence in the review.

Here we have a discourse which mainly focuses on technical, formal, spatial issues and process. The dominant domain is the domain of Structure.

PROJECT 2F'

Transparency and layering (SF 9%) are the 'themes' for this project. A series of conceptual models (R 12%) express the themes of framing, obscurity(A 35%) and transparency. A series of glass models express the theme of vertical (GF 9%) layering. The objective for the student is to have a permanent definition of the building (BT 1%), where the movable parts would not be the screens (EL 6.5%) but people (O 4%) . The editing rooms (IU12%) form the spine of the building, creating a void, and the larger spaces accommodate the public part (PU 2%) of the building. The student is criticised (CR 7%) for the fact that he is not sufficiently focused enough in his investigation (PR 20%) and that he is not bringing together all his themes to his final proposal. He is asked to do an editing job, on his information (TR 4.5%). Out of the four models that present the building on site (C 8%), he is asked to choose the one that is closest to his former ideas. The domains of SR 0.5%, HT 1%, BT 1% have a minor presence in the review.

This is a discourse mainly focusing on immediate use, contextual, formal, spatial issues, and issues of representation and process. The dominant domain is the domain of Process.

THIRD YEAR, FINAL REVIEW (Table 4.21)

1-3 JUNE 1994

"THE FILM SCHOOL"

The review addresses the project at the final stage, the stage of completion. The students had two more weeks to work on their project after the review, until their final

2G'	3RD	YEAR		FINA L		REVI EW								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			6				15				21			9
IU			21				7				28			11.5
C			4				12				16			7
PU			2								2			1
GF			14				4				18			7.5
SF			29				16				45			19
HT														
SY														
EL			7				19				26			11
BT			1				2				3			1
M			1								1			
	R			8				15				23		9.5
	TR							2				2		1
	CR							8				8		3
	PR			3				27				30		12.5
		O			4				5				9	4
		A			4				4				8	3
		NUM	85	11	8	104	75	59	9	136	160	63	17	240
		%	35	5	3	43	31	22	4	57	66	27	7	%

2H'	3RD	YEAR		FINA L		REVI EW								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			14				14				28			10.5
IU			30				7				37			14
C			18				5				23			8
PU			14				2				16			6
GF			3				22				25			9
SF			20				17				37			14
HT							2				2			1
SY														
EL			9				15				24			9.5
BT			3				4				7			3
M							1				1			
	R			3				11				14		5
	TR			2				3				5		2
	CR			1				10				10		4
	PR			5				3				8		3
		O			12				4				16	6
		A			8				5				13	5
		NUM	111	10	20	141	89	27	9	125	200	37	29	266
		%	42	4	7	53	33	10	4	47	75	14	11	%

2I'	3RD	YEAR		FINA L		REVI EW								
DESI	GN	DON	ST	UDE	NT		TU	TOR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			16				1				17			8
IU			24				4				28			13
C			8				1				9			4
PU			14				7				21			9.5
GF			13				10				23			10.5
SF			34				20				54			24
HT							2				2			1
SY														
EL			4				9				13			6
BT			1								1			0.5
M														
	R			9				2				11		5
	TR							5				5		2
	CR							5				5		2
	PR			12				7				19		8.5
		O							3				3	1
		A			5				5				10	5
		NUM	114	21	5	140	54	19	8	79	168	40	13	221
		%	52	9.5	2	63.5	24	8.5	4	36.5	76	18	6	%

TABLE 4.21 : CONTENT OF THIRD YEAR, FINAL REVIEWS (GREENWICH)

portfolio review. The students had to present their building proposal in the most coherent way possible including large scale architectural details. The initial concept in relation to the final proposition is discussed.
The aim of the review is to look at the clarity of the final proposition, in relation to the initial concept as well as at the consistency between the students verbal and visual presentation.

PROJECT 2G '

The use of light, and how it transforms space is the starting point for this project. That introduced the idea of layering and framing from the film. (A 3%) Two conceptual models (R 9.5%) that use layering and light, give the opportunity to the student to classify the images (O 4%)taken from these into categories like, layers, silhouette (GF 7.5%), shadows, spatial thresholds (SF 19%) etc. These create a spatial vocabulary for the student, to use in his final proposal. The building is basically a series of frames (EL 11%) going through the site. As a result, areas of the building are framed for an outside viewer. The studio space is in the basement, the cinema on the first floor, the library at the top (IU 11.5%). The entrance is criticised (CR 3%) by the tutors for its complexity. The context (C 7%) is missing from the project. The translation (PR 12.5%)of the different light densities and qualities of the first conceptual models into the building appears to be simplistic in relation to materiality (SR 9%). The student is advised to consider the use of different materials to reintroduce the subtleties of his first models to the project. The domains of PU 1%,BT 1%, TR 1% have a minimum presence in the review.
This is a quite evenly distributed discourse. The dominant domain is the domain of Space Form.

PROJECT 2H'

The concept which underlies this project is that film can change reality. In the film you can experience both the process of changing reality and the 'skin' (O 6%) the product. This 'theme' is translated into a conceptual model by the student (PR 3%), that actually express this cinematic process (A 5%). The concrete slab placed on site (C 8%) contains the process of the production, i.e. the editing rooms and the 'skin' placed across the site contains the product i.e. the cinema and exhibition space (IU 14%). In between the two, a structural grid (SR 10.5%) is set up to accommodate all the interactive parts (PU 6%) of the film school (BT 3%). The space is open and flexible (SF 14%). Every function and every element (EL 9.5%) of these spaces i.e. bookcases, drawing boards are incorporated in the structure of the grid (GF 9%). The question that is discussed quite extensively (TR 2%) is the interaction between the two parts of the building. Particularly attention is paid to the role of the glazed wall in

GR DESI	3RD GN	YEAR DOM	1ST AD	INT TD	REV EAD	%	2ND AD	INT TD	REV EAD	%	FINA AD	L RE TD	VIEW EAD	%
SR			9			2.5	45			8.5	66			9
IU			6			2	38			7	93			13
C			18			5	42			8	48			7
PU			9			2.5	26			5	39			5
GF			45			12	65			12	66			9
SF			76			22	77			15	136			19
HT							2				4			0.5
SY							8			1.5				
EL			8			2	23			4	63			8
BT			12			3.5	11			2	11			1.5
M			2			0.5	1				2			
	R			48		13		35		6.5		48		7
	TR			5		1.5		10		2		12		2
	CR			4				22		4		23		3
	PR			60		16		77		15		57		8
		O			32	8			20	4			28	4
		A			37	9.5			34	6			31	4
		NUM	185	117	69	371	338	144	54	536	528	140	59	727
		%	50	32	18	%	63	27	10	%	73	19	8	%

TABLE 4.22 : COMPARATIVE CONTENT OF THIRD YEAR DISCOURSE (GREENWICH)

this interaction. At present the scale of the two parts is not very clearly (CR 4%) presented by the student. He is asked to produce a small volumetric model and three dimensional drawings from the street (R 5%). The domain of HT 1% have a minimum presence in the review.
This is an evenly distributed discourse between the domains of Structure, Immediate Use, Space Form and Architectural Elements.

PROJECT 2I "

The inside, outside transition using light effects is the 'theme' of this project. A conceptual model (R 5%) made with different materials, glass, steel, concrete (SR 8%) and video by the use of different lighting is the starting point for the investigation. (PR 8.5%) Reflection plays an important role because it creates the illusion of an inside space.Thus the conversation between the inside-outside is established(SF 24%). The building is formed by four concrete slabs (EL 6%) and two diagonal routes that cross them. The cross over point of these two routes is the central space of the building, where all the interaction (PU 9.5%) and main circulation happens. It works as well as a kind of link, a visual access point. The editing and the viewing rooms are places opposite one other (IU 13%) and which establish a visual communication. The student is criticised (CR 2%) in relation to her central space. It is not as clearly defined spatially nor as transparent as it is described (TR 2%). The tutors suggest to her to use it as a meeting point for two different geometrical systems (GF 10,5 %) that will work on two different levels and with the context as well (C 4%).
This is an evenly distributed discourse. The dominant domain is the domain of Space Form.

4. 4. 2. 1 SIMILARITIES AND DIFFERENCES IN THE THIRD YEAR DISCOURSE

Similarities and differences are going to be grouped (Table 4.22):

A. In relation to student-tutor participation

The participation of the tutors in the discussion varies in relation to the students. It develops from a tutor dominant discourse, to a student dominant discourse. The students' participation in the discussion in the 1st interim review reaches 38% , rises to an almost equal participation in the 2nd interim review 48% and becomes greater in the final review 53% than that of the tutors . It is clear that the students participate more in the discussion as the project progresses.

Architectural domains are discussed by students and tutors, but the main part of the discourse is handled by the students. In opposition the main part of the discourse in relation to transmission domains is handled by the tutors. The use of extra-architectural domains by students and tutors is variable.

B. In relation to transmission domains

Transmission domains used in the third year reviews cover 25% of the total discourse, occupying one fourth of it. They vary a lot in relation to their presence in every review starting from 14% minimum to 43% maximum participation. Specifically their presence drops in the discourse as the project progresses. Particularly in the first interim review, 32% of the discourse belongs to transmission domains, of which 11% is used by the students. In the second interim review 27% of the discourse belongs to transmission domains, of which 7% is used by the students. In the final review 19% of the discourse belongs to transmission domains, of which 6% is used by the students. Of all the transmission domains the ones most used are the domains of Representation 8% and Process 12%. .

The domain of Representation has an equal presence in the 1st interim reviews rising to 13%, and dropping to 6.5 % in the 2nd interim review. In projects 2D' and 2E' the participation in the discourse is only 4.5% where it remains 7% in the final reviews, with a participation of 9.5% in projects 2G' and 2H' and 5% in project 2I' . The domain of Process starts from a 16% participation in the 1st interim review, drops down to 14.5% in the 2nd interim review, and to 8% in the final review. The presence of the Process domain in each particular review varies accordingly from 21.5% maximum (2B' first interim review) to 3% minimum (2H' final review). It is quite important to notice that out of nine case studies in three of them (2B', 2C', 2F') the domain of Process becomes the dominant one. The domains of Transmission and Criticism have a very insignificant presence in the discourse, their participation varying from 0 to 7% .

C. In relation to architectural domains

For each project the student has his/her own departure (parole) for his/her design. The chosen 'theme' is very indicative for the use of specific architectural domains. The 'themes' chosen by third year students, have a high level of complexity including within them several different architectural issues. The 'themes' presented are the dominant ones within each case study. Most of the chosen themes relate to cinematic issues. Projects 2D' , 2F' and 2H' have a cinematic theme that deal with issues of reality, framing, and focus. Projects 2C', 2E', 2G' and 2I' have as a theme light and how it transforms space. Project 2A' has 'dialogue' as a theme and project 2B' has two spatial themes , layering and hierarchy.

The themes as already stated are quite complex and contain a lot of formal, spatial and sometimes technical issues. Projects 2A', 2B' , 2D', have the domains of Geometry Form (GF 14%, 13%, 12%) and Space Form (SF 17%, 24%, 20%) as the dominant ones of the discourse. Project 2C' has the Space Form domain (SF 20%) as the dominant domain in the discourse. Project 2E' has Structure (SR 25%), as the dominant domain in the discourse. Projects 2F', 2G', 2H' and 2I' have Immediate Use (IU 12%, 11.5%, 14%, 13%) and Space Form (SF 9%, 19%, 14%, 24%) as the dominant domains in the discourse. Again it is important to bear in mind that the above mentioned dominant domains are not necessarily dominant in the crit but are the dominant ones amongst the architectural domains used in the crit.

Apart for the idiosyncratic character of the reviews, the overall discourse also presents some patterns. In the first and second interim reviews, the dominant domains are the domains of Geometry Form (GF 12% , 12%) and Space Form (SF 22% , 15%). In the second interim reviews the domain of Structure (SR 8.5%) has a substantial presence as well. The final reviews are characterised by a greater diversity and by the involvement of a wider spectrum of architectural domains. These are, the dominant still being the Space Form domain (SF 19%), the domain of Structure (SR 9%) of Immediate Use (IU 13%) Geometry Form (GF 9%) and Architectural Elements (EL 8%). Overall the domain of Space Form is the dominant one in all three levels. The domain of Context has a presence that achieves 8% . The domains of PU and BT have a minimum presence in the discourse. The domains of HT and SY are non - existent.

D. <u>In relation to extra architectural domains</u>

Extra architectural domains cover 11% of the discourse. Generally in the first intermediate review they cover a greater percentage 18% than in the second intermediate review, where they cover 10% , whilst in the final review they cover only 8%. . Object and Abstract Notion domains do not present a pattern in their use and they have an equal participation in the discourse (O 5%, A 6%).

The domain of Metalanguage is totally absent from the third year discourse.

GR DESI	1ST GN	YEAR DOM	COM ARA TIVE 1ST	INT.	REV		2ND	INT	REV		FINA I REV IEW			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			17			4	24			6	46			11
IU			14			3.5	14			4	34			9
C			20			5	12			3	16			4
PU			1			0	10			3	15			3
GF			74			18	66			17	36			9
SF			40			10	67			17	61			15
HT			3			1								
SY							3			1	2			0.5
EL			39			9.5	29			8	19			6
BT			5			1.5	5			1	1			0
M			3			1	1			0				
	R			61		15		62		17		65		16
	TR			4		1		12		3		9		2
	CR			9		2		12		3		20		5
	PR			53		13		25		7		30		7.5
		O			34	8			25	7			32	8
		A			34	8			12	3			16	4
		NUM	216	129	68	411	239	111	37	379	228	124	48	400
		%	53	31	16	%	63	29	8	%	57	31	12	%

GR DESI	3RD GN	YEAR DOM	1ST	COM PAR INT	ATIV E REV		2ND	INT	REV		FINA L RE VIEW			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			9			2.5	45			8.5	66			9
IU			6			2	38			7	93			13
C			18			5	42			8	48			7
PU			9			2.5	26			5	39			5
GF			45			12	65			12	66			9
SF			76			22	77			15	136			19
HT							2				4			0.5
SY							8			1.5				
EL			8			2	23			4	63			8
BT			12			3.5	11			2	11			1.5
M			2			0.5	1				2			
	R			48		13		35		6.5		48		7
	TR			5		1.5		10		2		12		2
	CR			4				22		4		23		3
	PR			60		16		77		15		57		8
		O			32	8			20	4			28	4
		A			37	9.5			34	6			31	4
		NUM	185	117	69	371	338	144	54	536	528	140	59	727
		%	50	32	18	%	63	27	10	%	73	19	8	%

TABLE 4.23 : COMPARATIVE CONTENT OF FIRST AND THIRD YEAR DISCOURSE (GREENWICH)

4. 4. 3 DISCUSSION OF THE SIMILARITIES AND DIFFERENCES IN THE DISCOURSE ACROSS THE YEARS AT **GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE**

A. In relation to student-tutor participation (Table 4.23, 4.24)

The students' participation becomes more substantial as the project progresses in both years. The students' participation in the discourse in the first interim reviews is 20% for the first year and 38% for the third year. The students' participation in the discourse in the second interim reviews is 38% for the first year and 48% for the third year. The students' participation in the discourse of the final reviews is 52% for the first year and 53% for the third year. One can observe that the students' participation in the discourse follows the same pattern in the first and third years.

The variations of student-tutor participation in the reviews do not follow specific pattern. A student - tutor equal participation in the review is probably an indication of the consistency of the project presented .

The use of the architectural domains by tutors and students varies in the first and third year discourse. Only in the final crit of the third year discourse do we find that the students consistently use more architectural domains than the tutors. Transmission domains are discussed mainly by the tutors in the first and third year reviews. The use of the extra-architectural domains by tutors or students is quite variable in the Greenwich discourse.

B. In relation to transmission domains

Transmission domains are used quite extensively in the reviews. Generally they constitute 27% of the discourse of the total reviews, 30% of the first year reviews, and 25% of the third year reviews. Out of the 18 reviews under analysis from the two years, only in three project does the percentage of transmission domains fall below 25%. ; In projects 2D', 2H',and 2I ' .

If one classifies the transmission domains in relation to their variability and presence in the discourse one can say:

1. REPRESENTATION (R)

The difference in variation reaches 10.5%. . The lowest percentage in the second interim third year reviews is 6.5% . The highest percentage in the second interim first year reviews is 17%. . The overall presence in the discourse is 11%..

2. TRANSMISSION (TR)

			GRE ENW ICH				COM PAR ATIV E							
DESI	GN	DOM		1ST	YEAR		3RD	YEAR			TO TAL			
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD	%
SR			87			7	120			7	207			7.5
IU			62			5	137			8	199			7
C			48			4	108			7	156			6
PU			26			2	74			4.5	100			3.5
GF			176			15	176			11	352			12.5
SF			168			14	289			18	457			16.5
HT			3			0	6			0.5	9			0.5
SY			5			0.5	8			0.5	13			0.5
EL			87			7	94			5.5	181			6
BT			11			1	34			2	45			1.5
M			4			0.5	5			0	9			0.5
	R			188		16		131		8		319		11
	TR			25		2		27		2		52		2
	CR			41		3.5		49		3		90		3
	PR			108		9		194		12		302		11
		O			91	8			80	5			171	6
		A			62	5.5			102	6			164	5
		NUM	683	362	153	1190	1051	401	182	1636	1728	763	335	2826
		%	57	30	13	%	65	25	11	%	61	27	12	%

TABLE 4.24 : COMPARATIVE CONTENT OF GREENWICH DISCOURSE

The difference in variation reaches 2% . The lowest percentage in the first interim first year reviews is 1%. The highest percentage in the second interim first year reviews is 3%. . The overall presence in the discourse is 2%.

3. CRITICISM (CR)

The difference in variation reaches 5%.. The lowest percentage in the first interim third year reviews is 0% . The highest percentage in the final first year reviews is 5% . The overall presence in the discourse is 3% .

4. PROCESS (PR)

The difference in variation reaches 6%.. The lowest percentage in the second interim first year reviews is 7% . The highest percentage in the first interim third year reviews is 16%.. The overall presence in the discourse is 11% .

Representation and Process are the dominant transmission domains in the discourse, the most variable of them being the domain of Representation. The domain of Representation has a bigger participation in the first year discourse (16%) and is the dominant domain in four case studies. The domain of Process has a bigger participation in the third year discourse (12%) and is the dominant domain in three case studies.

C. In relation to architectural domains.

Architectural domains are the dominant ones in the reviews. Generally they constitute 61% of the discourse of the total reviews, 57% of the first year reviews, and 65% of the third year reviews.

One can distinguish several patterns in the use of specific architectural domains. Looking at the comparative tables , we can distinguish two types of architectural domains in relation to their variability and presence in the discourse.

A. The ones that have a low participation in the discourse. These additionally tend to be the ones that have a quite stable presence in the discourse throughout the years .

1. CONTEXT (C)

The difference in variation reaches 5% . The lowest percentage in the second interim first year reviews is 3% . The highest percentage in the second interim third year reviews is 8% . The overall presence in the discourse is 6% .

2. PROGRAMME USE (PU)

The difference in variation reaches 5% . The lowest percentage in the first interim first year reviews is 0% . The highest percentage in the second interim and final third year reviews is 5% . The overall presence in the discourse is 3.5% .

3. HISTORICAL TYPE (HT)

The domain is almost non existent . The overall presence in the discourse is 0.5% .

4. STYLE (SY)

The domain is almost non existent. The overall presence in the discourse is 0.5% .

6. BUILDING TYPE (BT)

The difference in variation reaches 3.5%. The lowest percentage of the final first year review is 0%. The highest percentage in the first interim third year reviews is 3.5% . The overall presence in the discourse is 1.5% .

B. The ones that present a great variability in the discourse going from low to high percentages in a specific order presenting a pattern.

1. STRUCTURE (SR)

The difference in variation reaches 8.5% . The lowest percentage in the first interim third year reviews is 2.5% . The highest percentage in the final third year reviews is 9% . The overall presence in the discourse is 7.5% .

2. IMMEDIATE USE (IU)

The difference in variation reaches 11% . The lowest percentage in the first interim third year reviews is 2% . The highest percentage in the final third year reviews is 13% . The overall presence in the discourse is 7% .

3. GEOMETRY / FORM (GF)

The difference in variation reaches 9%. . The lowest percentage in the final first and third years reviews is 9% . The highest percentage in the first intermediate first year reviews is 18% . The overall presence in the discourse is 12.5% .

4. SPACE / FORM (SF)

The difference in variation reaches 12% . The lowest percentage in the first interim first year reviews is 10% . The highest percentage in the first interim third year reviews is 22%. The overall presence in the discourse is 16.5% .

5. ARCHITECTURAL ELEMENTS (EL)

The difference in variation reaches 7.5%.. The lowest percentage in the first interim third year reviews is 2%. . The highest percentage in the first interim first year reviews is 9.5%. The overall presence in the reviews is 6%. .

To conclude one can say that Structure (4%, 6%, 11% first year, 2.5%, 8.5%, 9% third year) and Immediate Use (3.5%, 4%, 9% first year, 2%, 7%, 13% third year) domains tend to increase as the projects develop in both first and third years. The Geometry Form domain tends to decrease as the projects develop in both first and third years (18%, 17%, 9% first year, 12%, 12%, 9% third year). Space Form does not appear to have a particular pattern of participation in the discourse. Architectural Element slightly decreases in the first year from the first interim review to the final review (9.5%, 8%,

6%) , but increases in the third year from the first interim review to the final review (2%, 4%, 8%). The above mentioned changes are not statistically significant per se, but they are interesting in terms of the overall pattern they present. The fact that the development of the content of the design language across the years seems to be almost identical is quite important.

If the research follows the classification made of the architectural domains into those relating to architectural substance or physical presence (SR, IU , C, PU) and those that relate to form and style (GF, SF, HT, SY) , the essence of architecture, then we could observe : That the pair GF, SF (29% in both years) is much more used in the first and third year reviews than the pair SR, IU (12% in first year, 15% in third year).

C. <u>In relation to extra-architectural domains:</u>

Extra-architectural domains have a substantial presence in the reviews. Generally they constitute 12% of the discourse, 13% in the first year reviews and 11% in the third year reviews. Both Object and Abstract Notions domains have an almost equal participation in the discourse (O 6%, A 5%). One can observe that in both years they drop in percentage as the project advances, in the first year from 16% to 12% and in the third year from 18% to 8%.

The domain of Metalanguage has a minimum presence in the discourse that goes up only to 0.5%.

<u>Some additional comments:</u>

This more focused field work leads us to specific questions that need further exploration. As a general conclusion one can say that the pattern with which design language transforms in both years in relation to transmission, architectural and extra-architectural domains, is the same.

However a substantial difference appears to exist in relation to the conceptual 'themes' used by the students at the beginning of the projects. The first year students use simple conceptual 'themes' usually relating to one design domain (GF, SF), as their starting point. The third year students use complex conceptual 'themes' , that contain more than one architectural domain (cinematic themes), as their starting point. But even if the 'theme' chosen by a first and third year student is similar, a more detailed examination of it, will show the difference that exists in the level of complexity with which it is addressed. For example, first year case study 1H' and third year case study 2I' deal with the issue of light and how this transforms space.

In case study 1H' the conceptual model deals with the shadows formed on different textures when light falls on them. Later light and dark is taken literally and is translated to light and dark spaces according to their function (cinema dark, library light). In case study 2I' the conceptual model is about how light transforms reality. Materials in relation to reflection create a transition between inside and outside space, an unreal space. So we have an interaction and a conversation between real and unreal spaces, inside and outside spaces, visual communication and communication of ideas, hidden spaces and revealed spaces .

It is obvious that in the second case study we have a variety of sub- themes that belong to the initial theme of light and how this transforms space. This raises a very important question in relation to the development of design language that takes place between the first and third years of architectural studies, and it calls for further research. The role of the domain of Architectural Elements needs further research as well. It seems as if Architectural Elements are used in a different way between the first and third years. It seems to be that in the first year they are used as unique self contained parts, and in the third year as part of the description of the final project.

FOR FURTHER RESEARCH:

If we had an equal representation of the design domains in the discourse, each one of them would claim a 6% (100/17) participation in the discourse. Any domain that has a participation bigger than 6% will be further examined. Variability will also be taken into consideration. A presence of a substantial variability means that the domain achieved a significant importance in parts of the discourse. Overall as a conclusion one can say that the dominant and important design domains for further research from the Greenwich School are the following:

From the transmission domains:

Two domains present an interest for further research, the domain of Process with an overall presence of 11% in the discourse and the domain of Representation with an overall presence of 11% in the discourse.

From the architectural domains:

From the group of the most stable ones the domain of Context presents an interest with an overall participation in the discourse of 6% . All the architectural domains that belong to the variable group i.e. Structure, Immediate Use, Geometry Form, Space Form , Architectural Elements are also of great interest.

From the extra-architectural domains:

The presence of both extra-architectural domains in the discourse is substantial. 13% for first year and 12% for third year. What could be of great interest is to see how they relate to the architectural domains.

Although the domain of Programme Use does not have a substantial presence in the Greenwich discourse it will be further researched since it is the only architectural domain that presents a difference in its use between the Bartlett and Greenwich.

BARTLETT-GREENWICH COMPARATIVE 1ST YEAR													
DESIGN DOMAIN			BARTLETT				GREENWICH				TOTAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD
SR			36			5	87			7			
IU			104			14.5	62			5			
C			26			3.5	48			4			
PU			25			3.5	26			2			
GF			164			23	176			15			
SF			91			12.5	168			14			
HT			17			2.5	3			0			
SY			1			0	5			0.5			
EL			81			11	87			7			
BT			34			4.5	11			1			
M			6			1	4			0.5			
	R			37		5		188		16			
	TR			35		5		25		2			
	CR			43		6		41		3.5			
	PR			22		3		108		9			
		O							91	8			
		A							62	5.5			
		NUM	585	137		722	683	362	153	1190			
		%	81	19		%	57	30	13	%			
BARTLETT-GREENWICH COMPARATIVE 3RD YEAR													
DESIGN DOMAIN			BARTLETT				GREENWICH				TOTAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD
SR			112			11	120			7			
IU			174			17	137			8			
C			78			8	108			7			
PU			72			7	74			4.5			
GF			123			12	176			11			
SF			167			17	289			18			
HT			4			0.5	6			0.5			
SY			12			1	8			0.5			
EL			79			8	94			5.5			
BT			38			4	34			2			
M			5			0.5	5			0			
	R			47		4.5		131		8			
	TR			31		3		27		2			
	CR			39		4		49		3			
	PR			18		2		194		12			
		O			4	0.5			80	5			
		A			2	0			102	6			
		NUM	864	135	6	1005	1051	401	182	1636			
		%	87	12.5	0.5	%	65	25	11	%			
BARTLETT-GREENWICH COMPARATIVE													
DESIGN DOMAIN			BARTLETT				GREENWICH				TOTAL		
AD	TD	EAD	AD	TD	EAD	%	AD	TD	EAD	%	AD	TD	EAD
SR			148			8.5	207			7			
IU			278			16	199			7			
C			104			6	156			5.5			
PU			97			6	100			3.5			
GF			287			17	352			12.5			
SF			258			15	457			16			
HT			21			1	9			0.5			
SY			13			1	13			0.5			
EL			160			9	181			6.5			
BT			72			4	45			2			
M			11			0.5	9			0.5			
	R			84		5		319		11			
	TR			66		4		52		2			
	CR			82		5		90		3			
	PR			40		2		302		10.5			
		O			4	0			171	6			
		A			2	0			164	6			
		NUM	1449	272	6	1727	1728	763	335	2826			
		%	84	16	0	%	61	27	12	%			

TABLE 4.25 : COMPARISSON OF THE CONTENT OF THE DISCOURSE AT THE BARTLETT AND GREENWICH

4. 5 DISCUSSION OF THE SIMILARITIES AND DIFFERENCES IN THE CONTENT OF THE DISCOURSE ACROSS THE TWO SCHOOLS OF ARCHITECTURE

One must bear in mind that the field work in the two schools, apart from the different timing, has some additional differences. The Bartlett field work is broader, taking on board a wider spectrum of information and advancing up to the diploma school. The Greenwich material is focused only on two academic years that undertake a similar project. So some differences between the two schools are already expected. The comparison can really happen at the first and third year levels of both schools and some more general conclusions can be drawn out of it. The Bartlett field work is less consistent since in every academic year three different projects are examined. The Greenwich field work is more consistent since it investigates the development of one project in both academic years. The thesis argues that the set up of the Greenwich project is not accidental. It is due to the change that took place in architectural education during the last five years.

COMPARISON IN RELATION TO FIRST AND THIRD YEARS, SOME OBSERVATIONS IN RELATION TO DIPLOMA

The similarities and differences between the two schools will be grouped (Table 4.25):

A. <u>In relation to student-tutor participation.</u>

BARTLETT : We have a tutor dominant discourse in the first and the third year. The students' participation is up to 36% in the first year and 42% in the third year. No particular pattern appears in the participation across terms.

GREENWICH: Here we also have a tutor dominant discourse in first and third years The students' participation is up to 36% in the first year and 46% in the third year. There is a pattern in the students participation across the semester. In the first year it rises from 20% in the first semester to 52% in the third semester. In the third year it goes up from 38% in the first semester to 53% in the third semester.

Numerically the general results of the two schools appear to be the same. As a final outcome we have a tutor dominant discourse throughout in both degree courses. But the structure is completely different. Within the six semesters at the Bartlett there is not even one semester in which the students participate more in the discourse than the tutors. By contrast in Greenwich, in the final reviews of both years the students' discourse is slightly more dominant over the tutors one. Only in the Diploma of the Bartlett do we have a student dominant discourse that rise up to 63%..

B. In relation to transmission domains

BARTLETT: There is a low percentage of presence of transmission domains in the discourse . One exception is the first year, second semester , where the domains of representation and criticism are raised. There is a19% participation of transmission domains in the first year (14% first term, 33% second term, 12% third term), and a 12.5% participation of transmission domains in the third year (14% first term, 12% second term, 15% third term). The only transmission domain that presents an interest, is the domain of Representation, as it appears to be the more variable (up to 9% for the two years) and the most used (R 5%) of all, especially in the third year. However its presence is still insignificant in relation to the overall discourse.
We have only one exception at the Bartlett in relation to transmission domains. The first term of Diploma at the Bartlett where transmission domains cover up to 41% , of which the domain of Process takes over and goes up to 28% .

GREENWICH: There is a substantial percentage of presence of transmission domains in the discourse, 30% participation of transmission domains in the first year (31% 1st interim 29% 2nd interim 31% final reviews) and 25% participation of transmission domains in the third year (32% 1st int. 27% 2nd int. 19% final reviews) . The transmission domains of Representation and Process are the ones with a significant presence in the discourse. Both come up to 11% participation each. The domain of Representation is the most variable and the domain of Process the most stable.

COMPARATIVE: The Bartlett and Greenwich do differ substantially in relation to transmission domains. In the Bartlett the process of work is discussed very rarely and happens mainly implicitly. Representation does not play any particular role other than presenting the project under discussion. The Greenwich discourse is process oriented and representation appears to be an important part of it. It is very indicative that Representation becomes the dominant domain in four out of nine first year case studies and Process becomes the dominant domain in three out of nine third year case studies. Thus the domains of Representation and Process plays a leading role within the Greenwich discourse. This is a phenomenon which is worth exploring further.

It is quite revealing that the domains of Criticism and Transmission are almost almost completely absent in the discourse of both schools. If we take into consideration that reviews are about criticism and transmission, this confirms our initial hypothesis that the transmission of architectural knowledge during the reviews takes place mainly implicitly.

C. In relation to architectural domains

BARTLETT: Architectural domains appear to be quite variable in the discourse (see comparative tables) . The important domains in the first two years of analysis are the domains of Structure (SR 8.5%), of Immediate Use (IU 16%), of Geometry Form (GF 17%), of Space Form (SF 15%) and of Architectural Elements (EL 9%). There is an increase in the use of the domains of Structure (5%-- 11%) , Immediate Use (14.5% - 17%) and Space Form (3.5% -9%) from the first to the third year and a decrease in the use of the domains of Geometry Form (23% - 12%)and Architectural Elements (11% -8%). Generally the discourse appears more focused in the first year and more diverse in the third year. The dominant first year domain is the domain of Geometry Form (23%). The dominant third year domains are the domains of Immediate Use (17%) and Space Form (17%).The diploma at the Bartlett has a very high percentage of Programme Use domains (25%) all the other architectural domains remaining quite low.

GREENWICH: Architectural domains appear to be quite stable in the discourse between the two years. The important domains in the first two years of analysis are the domains of Structure (SR 7%) of Immediate Use (IU 7%), of Geometry Form (GF 12.5%), of Space Form (SF 16%) and of Architectural Elements (EL 6.5%). Generally the discourse appears to have a similar pattern of development in both years. Structure and Immediate Use domains increase as the project progresses, the Geometry Form domain decreases and the Space Form domain is quite variable in both years. Architectural Elements decrease in the course of the first year and increase in the course of the 3rd year . The dominant domains in the first year discourse are the domains of Geometry Form (15%) and Space Form (14%). The dominant domain in the third year discourse is the domain of Space Form (18%).

COMPARATIVE: The Bartlett and Greenwich share the same important architectural domains in the first two years . These are the domains of SR, IU, GF, SF and EL. Content wise the two schools appear to be quite similar. The Greenwich architectural domains appear to have a smaller percentage of participation in the discourse, because architectural domains have an overall smaller participation in the Greenwich discourse (61%) than the Bartlett equivalent(84%).

At the beginning of the analysis we classified the architectural domains into those that relate to architectural substance or physical presence (SR, IU , C, PU) and those that relate to form and style (GF, SF, HT, SY). According to this classification we could observe :

That the first group of domains together constitute 26.5 % - 43% of the Bartlett first-third year discourse and 18% - 26.5% of the Greenwich first-third year discourse. That the second group of domains together constitute 38% -30.5% of the Bartlett first-third year discourse and 29.50% -30% of the Greenwich first-third year discourse. In both schools there is an increase in the presence of the domains of substance from first to third year and a decrease (Bartlett) and stability (Greenwich) in the presence of the domains of formal and spatial organisation in the discourse. It seems like the use of the domain of Geometry Form is crucial for first year students in both schools. In parallel, the domain of Space Form, (I.e. spatial organisation) is introduced earlier at Greenwich than in the Bartlett discourse. Definitely in both schools the architectural design language becomes more balanced and diverse in the third year as more architectural domains take part in equal terms in the discourse. The difference between the two schools lies in the fact, that, although the Bartlett discourse becomes more substance oriented in the third year, for the Greenwich discourse formal and spatial issues remain equally important to the substance ones.

Unfortunately the Bartlett diploma cannot take part in the comparative discussion between the two schools. But nevertheless we can add that the diploma discourse appears to lose the diversity of the third year discourse, becoming quite focused at the level of the substance of the design language, having as the dominant domain the domain of Programme Use.

D. <u>In relation to extra-architectural domains.</u>

BARTLETT: We have an almost complete absence of extra-architectural domains in the Bartlett discourse. A very small percentage appears in the third year (0,5% mainly in the third term crits (Mary Rose Museum)) and in the diploma reviews (2% mainly in the third term crits).

GREENWICH: A substantial presence of extra-architectural domains exists in the Greenwich discourse. They constitute the 12% of the overall discourse , the percentage split equally between them (Objects 6%, Abstract Notions6%). The Object domain is slightly increased in the first year discourse (up to 8%) and the Abstract Notion domain remains stable throughout the discourse.

COMPARATIVE: A substantial difference in relation to the use of extra-architectural domains exists between the two schools. The Bartlett appears much more introverted and self-referential in relation to the use of architectural concepts. Greenwich appears much more diverse, using extra-architectural concepts to initiate

architectural ideas. The domain of Metalanguage is not used in either schools of architecture.

4.6 CONCLUSIONS

To conclude, the two schools differ substantially in the use of transmission and extra-architectural domains. They share a similarity in relation to the content of architectural domains but not in relation to their use. At the Bartlett every term is an independent educational unit. The projects are different, tackling an architectural issue of a similar scale through the use of a variety of 'programmatic themes' . A rationale exists through which the choice of the projects is made. Issues of scale (small to big), complexity (simple to complex in relation to programme) and typology (different building types ie. housing project, arena, museum) contribute to the structure of the curriculum in relation to the studio projects. According to the curriculum, the students have to go through all the stages of programmatic complexity to learn how to solve unique situations. Through their education they become more competent as the years advance, by being able to design bigger and more complex briefs. The emphasis is on product and not on process.

In Greenwich every semester relates to the next one. The year appears as a unity. The projects change but there is always a common 'theme' in the background shared by all the programmes. This 'theme' can be a contextual 'theme' i.e. river Thames or a programmatic 'theme' i.e. meeting places or an extra-architectural 'theme' i.e. film. This 'theme' can be shared by 1st, 2nd or 3rd year students. The students are encouraged to focus on the 'theme'. There is an emphasis on the process of revealing and reproducing the layered complexity that exists within this 'theme'. The 'theme' becomes the vessel for the students to form their architectural concepts. The rationale behind this is that every 'theme' contains within it different levels of complexity . On that front, third year students are expected to perform at a different level of complexity than the first year students in relation to the same 'theme'. Their final product is more demanding (scale wise and programme wise) than the one given to the first year students. The assumption behind this is that the student's knowledge develops in a cyclical interactive fashion. Its development happens not necessarily in a linear fashion but in leaps.

Because the projects in the Bartlett are programmatically different, the design language content of the Bartlett has a greater variability than at Greenwich. That means that it is much more difficult for someone to distinguish operational patterns in

the design language of the Bartlett than at Greenwich. In relation to a tutor - student participation in the discourse, it seems like Greenwich is working more successfully towards a more substantial student participation during reviews, than the Bartlett. This phenomenon is maybe due to the fact that we have semesters at Greenwich and terms at the Bartlett. At Greenwich, one has the opportunity to run a longer programme than at the Bartlett. The students focus long enough on the subject and feel more self-confident to present and support it. In parallel the use of an explicit process in tackling the design problems gives the students the feeling that they can be in control of their product.

The content analysis shows very clearly how the domain of Process along with the domain of Representation become dominant in the new educational paradigm. The discussion is not only about the outcome, the final product, but on the process of how the outcome came into being. Extra - architectural domains make their appearance at Greenwich, turning the discourse from a self-referential one to a more open one. Apparently all the above changes did not happen at a stroke. The Bartlett diploma appears very idiosyncratic and probably belongs to the transitional phase. The use of the domain of Process in the diploma is quite intensive ,especially in the first term. It is also the year where we have a presence for the first time of a small number of extra-architectural domains in the Bartlett.

Architectural domains offer a complex image. In relation to content both 1st and 3rd years in both schools appear to be similar . In both schools we have a transition from a more focused discussion, mainly in relation to formal issues in the first year, to a more diverse and complex discussion in the third year . Diverse in relation to how many architectural domains participate in the discourse, complex in relation to the architectural 'themes' used by the students.

In the first year because of the limited choices that reviews present in relation to their thematic richness, we have the phenomenon of very focused reviews. Different specific solutions do provoke different discourses, that are focused only on the issue under examination. The tutors respond to the students' initial statement. What is structurally excluded from the discourse is as important as what is said. This a phenomenon that takes place equally in both schools of architecture and probably has to do with the inability of the first years to absorb more information. Third year reviews are diverse and more complex offering the opportunity of a more elaborate discussion. Within that diversity the two schools stress different architectural issues. Issues of substance are more important for the Bartlett and spatial issues more important for Greenwich.

Overall we can say that in relation to content development throughout the years the Bartlett moves from a formal discourse, to a discourse that deals mainly with spatial issues and issues of substance. Greenwich appears to remain quite stable in a spatial discourse. In relation to the development of design language within the years Bartlett does not seem to present a clear pattern, in opposition to Greenwich that shares the same pattern in both years.

The domains that have a minimum presence in the discourse are indicative of a non-transmission or of an implicit transmission. The minimum use of the domains of Transmission and Criticism, along with the absence of any discussion on the discipline of architecture or of architectural education, indicates that a substantial part of the transmission happens implicitly in the reviews. The minimum presence of the domains of Style, Historical Type and Building Type in the discourse of both schools is very indicative. The absence of the domain of Style means that the discourse is not explicitly stylistic. The Historical Type domain is used in the Bartlett only in a very few case studies and in an idiosyncratic way. The overall absence of the domains of Historical Type and Building Type from the discourse suggests that typology (in the sense of building and historical types) is not used or is implicitly used as a method of transmission in both schools.

All the above outcomes relate to the content of design language. Reading through the text, we noticed that apart from the absence of several domains from the discourse, there is a size difference in the presence of different design domains within the discourse. From the text it is obvious that the time distribution amongst the domains is not equal. Some domains contain only few words and some of them are double or even triple in length . The question about the form of each domain i.e. its relative size within the discourse is a very important one as it is indicative of the intellectual or visual character of the domains and their way of transmission. The next chapter will set out to reveal the intellectual and visual form of the design domains. It will examine if this form is an inherent characteristic of each domain or if it changes within or across the years and within or across the two schools.

CHAPTER 5

THE VISUAL AND INTELLECTUAL FORM OF THE DISCOURSE

5. 1 INTRODUCTION

In the previous chapter we presented the content of the design language and its classification. The content analysis of the discourse happened at the level of significant units'. The 'significant units' were perceived as the smallest conceptual units that could be found in the text. These were named design domains and were classified into different conceptual categories. Each 'significant unit' includes smaller units (words) within it that cannot form a concept on their own. In this part of the analysis we are going to see how many words are needed to come together to form a significant unit for each design domain . In the present analytical level the formal expression of the design domains is going to be examined. The concept of form here relates to the relative size of each domain within the discourse. The relative size includes the time factor spent for each design domain within the discourse .

The formal expression of design domains refers to the form of the context in which communication takes place. It relates to the materiality of the design language i.e. the form of its visual and intellectual operations. As we stated in the introduction, the discussion within the reviews takes place on two separate levels simultaneously, the visual and the intellectual· All design domains have both qualities, visual and intellectual within them. Their difference lies in the dominance of the visual quality over the verbal or vice versa, in relation to their main characteristics and to the way they are used. A design domain that is expressed by the use of only two words appears to be more dense than another one that is expressed with five. Fewer words used means that the design domain under analysis is verbally more implicitly, as it operates rather on a visual level. More words used means that the design domain under analysis is verbally more explicit, as it operates rather on an intellectual level. In the first case one has more verbal control of the concept and in the second case one has less verbal control of the concept and of the transmission.

This chapter will deal with the visual/intellectual form of the discourse and with the level of the verbal explicitness of the discussion.
The analysis of data will take place on two levels.

1. The first level is more focused on the different design domains and the expression form of each domain within the discourse. We can name that the micro-level of analysis. A decision was already taken in the previous chapter (after the results of content analysis) on the domains that will be researched in depth in this chapter. These are the domains of :

1. Structure (SR)
2. Immediate Use (IU)
3. Context (C)
4. Programme Use (PU)
5. Geometry Form (GF)
6. Space Form (SF)
7. Architectural Elements (EL)
8. Representation (R)
9. Process (PR)

Additionally the domains of Objects (O) and Abstract Notions (A) will be analysed for Greenwich.

After going through the Bartlett and Greenwich data separately, a comparative discussion will follow where the analysed data will be juxtaposed.

2. The second level is more general. At that level the visual/intellectual form of the discourse will be discussed in total. We can name that the macro-level of analysis. This level relates to the changes that happen to the formal expression of the design domains across the years for both schools of architecture, and it will lead us to more general conclusions.

5. 2 MICRO-LEVEL OF ANALYSIS

THE READING OF THE TABLES

The example that follows is taken from the first year of the Bartlett School of Architecture.

	1ST YEAR			BARTLETT							
	1ST TERM			2ND TERM			3RD TERM			TOTAL		
D.D	dom	word	dens	dom	word	dens	dom	word	dens	dom	word	den
SR	21	148	70	3	18	60	12	58	48	36	224	62
IU	44	278	63	18	96	53	42	278	66	104	652	62
C	12	52	43				14	73	52	26	125	48
PU	10	46	46				15	142	94	25	188	75
GF	76	560	73	47	286	60	41	250	60	164	1096	67
SF	27	77	28	22	106	48	42	291	69	91	474	52
EL	39	96	26	20	103	52	22	119	54	81	318	39
R	6	51	85	22	170	77	9	80	88	37	301	81
PR	4	32	80	11	112	102	7	61	87	22	205	93

VERTICAL READING

This table is divided vertically into four columns, one for each of the three terms of the year and a fourth column for the total year discourse. The first vertical column gives the design domains under examination. The second vertical column gives the number of domains that exist in the first term of the first year in the Bartlett discourse. The third vertical column shows the total number of words contained in the domain under examination. The fourth vertical column calculates the average number of words contained per ten domains. (Ten instead of one because it shows more clearly the density differences between the domains). The fifth vertical column is about the number of domains that exist in the second term of the first year in the Bartlett discourse etc. .... The final vertical column of the table shows the total average density of ihe domains under examination in the first year discourse.

HORIZONTAL READING

Each line relates to a different design domain. E.i. the first domain under examination in the second line is the domain of Structure. Reading from left to right we have the number of domains of Structure contained in the first year Bartlett discourse 1st term (21), the total number of words contained within the domain of Structure within the 1st term (148), the average number of words contained in ten domains in first term (70) which gives us the density number etc....

Reading the table will give us the density of each design domain within each

	1ST YEAR 1ST TERM			BARTTLETT 2ND TERM			3RD TERM			TOTAL		
D.D	dom	word	dens	dom	word	dens	dom	word	dens	dom	word	den
SR	21	148	70	3	18	60	12	58	48	36	224	62
IU	44	278	63	18	96	53	42	278	66	104	652	62
C	12	52	43				14	73	52	26	125	48
PU	10	46	46				15	142	94	25	188	75
GF	76	560	73	47	286	60	41	250	60	164	1096	67
SF	27	77	28	22	106	48	42	291	69	91	474	52
EL	39	96	26	20	103	52	22	119	54	81	318	39
R	6	51	85	22	170	77	9	80	88	37	301	81
FR	4	32	80	11	112	102	7	61	87	22	205	93

	3RD YEAR 1ST TERM			BARTTLETT 2ND TERM			3RD TERM			TOTAL		
D.D	dom	word	dens	dom	word	dens	dom	word	dens	dom	word	dens
SR	36	279	77	68	576	85	8	75	94	112	930	83
IU	62	426	69	54	420	78	58	417	72	174	1263	73
C	38	129	34	19	111	58	21	145	69	78	385	49
PU	25	236	95	14	139	99	33	287	87	72	662	92
GF	45	256	57	39	266	68	39	274	70	123	796	65
SF	59	371	63	39	247	63	69	500	72	167	1118	67
EL	36	182	50	15	85	56	28	162	58	79	429	54
R	20	138	69	16	145	90	11	102	93	47	385	82
FR	8	81	10	1	10	10	9	76	84	18	167	93

	DIPLOMA 1ST TERM			BARTTLETT 2ND TERM			3RD TERM			TOTAL		
D.D	dom	word	dens	dom	word	dens	dom	word	dens	dom	word	dens
SR				4	18	45	6	24	40	10	42	42
IU	12	58	48	15	150	10	24	163	68	51	371	73
C	39	82	21	2i	171	81	25	141	56	85	394	46
PU	33	260	78	95	860	90	100	863	86	228	1983	87
GF	30	222	74	14	100	71	16	93	58	60	415	69
SF	22	131	59	18	119	66	28	140	50	68	390	57
EL	24	43	18	18	123	68	21	119	57	63	285	45
R	10	71	71	19	173	91	4	25	63	33	269	82
FR	88	910	103	14	136	97	10	89	89	112	1135	101

TABLE 5.1 : THE VISUAL AND INTELLECTUAL FORM OF THE DISCOURSE AT THE BARTLETT

semester and within the year as a whole. It offers the opportunity for a comparative reading amongst the design domains under analysis within the first year discourse. The greater the density, the more the domain operates on an intellectual level. The smaller the density the more the domain operates on a visual level. For a comparative analysis across the years and across the two schools any domain that has a density of 70< will be regarded as operating on an intellectual level. Any domain that has a density of 55> will be perceived as operating on a visual level.

5. 2. 1 BARTLETT SCHOOL OF ARCHITECTURE

1ST YEAR (Table 5.1)

The density of each domain does not present a clear pattern of development across the terms. Only the domains of Space Form (28, 48, 69) and Architectural Elements (26, 52, 54) show a density increase during the year, that means that they become more intellectually expressed. On the level of total density, the domains that operate mainly on the visual level are the domains of Context (48) Space Form (52) and Architectural Elements (39) . The domains that operate mainly on the intellectual level are the domains of Programme Use (75) Representation (81) and Process (93).

3RD YEAR

There is a tendency for an overall increase in the density level of each domain between the terms . More domains present this pattern, and more clearly than in the first year. The domains of Structure (77,85,94) Context (34,58,69), Geometry Form (57,68,70) Space Form (63, 63, 72) Architectural Elements (50, 56, 58) and Representation (69,90,93) show a density increase during the year, which means that in the course of the year they increasingly operate on an intellectual level.

On the level of total density the domains that mainly operate on a visual level are the domains of Context (49) and Architectural Elements (54) . The domains that mainly operate on a intellectual level are the domains of Structure (83) Immediate Use (73) Programme Use (92) Representation (82) and Process (93).

DIPLOMA

Here also like in the first year, one cannot see a clear pattern developing between the terms in the density level of each domain. Not one domain present an overall increase pattern as all of them have a density that increases or decrease quite arbitrarily .

On the level of total density the domains that mainly operate on a visual level are the domains of Structure (42), Context (46) and Architectural Elements (45) . The domains that operate mainly on an intellectual level are the domains of Immediate Use (73)

Programme Use (87) Representation (82) and Process (101).

5. 2. 2 THE VISUAL/INTELLECTUAL FORM OF THE DESIGN DOMAINS ACROSS THE YEARS IN THE BARTLETT

Only the third year presents an overall density increase pattern, in the course of the year, in most design domains but this can perceived only as an indication, as the sample under analysis is not very significant.

On the level of the total results however some interesting observations can be made. The architectural domains of Context and Architectural Elements are the domains that operate mainly on a visual level throughout the discourse. The domains of Programme Use, Representation and Process are the domains that operate mainly on an intellectual level throughout the discourse. The domain of Immediate Use is mainly intellectual in the third year and diploma. The domain of Structure is quite variable changing from an intellectual domain in the third year discourse, to a visual domain in the diploma discourse. Space Form is mainly visual in the first year and has an average density in third year and diploma. Geometry Form is quite stable and present an average density. The above results are significant as they derive from an extensive data analysis.

In relation to their development across the years a tendency for a more intellectual operation appears between the first and the third year in five domains , with the exception of the domains of Geometry Form (67, 65), Context (48, 49), Representation (81, 82) and Process (93, 93) that remain stable . Most domains share the same density between the 3rd year and diploma, with the exception of the domains of Structure (83, 42) Space Form (67, 57) and Architectural Elements (54, 45) that are used on a more intellectual level in the diploma.

Overall we cannot trace any kind of specific pattern in the development of the density of the discourse between the first, third years and diploma.

	1ST YEAR 1ST			GREE NWI TCH 2ND								
	INT	REV		INT	REV		FINA L REV			TOTA L		
D.D	dom	word	dens	dom	word	dens	dom	word	dens	dom	word	dens
SR	17	71	42	24	145	60	46	286	62	87	502	58
IU	14	76	54	14	64	46	34	226	67	62	366	59
C	20	108	54	12	67	56	16	96	60	48	271	56
PU	1	11	110	10	78	78	15	90	60	26	179	69
GF	74	461	62	66	429	65	36	251	70	176	1141	65
SF	40	206	52	67	338	50	61	340	56	168	884	57
EL	39	202	52	29	103	36	19	110	58	87	415	48
R	61	452	74	62	560	90	65	649	10	188	1661	88
FR	53	420	79	25	225	90	30	261	87	108	906	84
O	34	164	48	25	121	48	32	170	53	91	455	50
A	34	256	75	12	103	86	16	124	77	62	483	78
	3RD YEAR 1ST			GREE NWI TCH 2ND								
	INT	REV		INT	REV		FINA L REV			TOTA L		
D.D	unit	word	time	unit	word	time	unit	word	time	unit	word	time
SR	9	37	41	45	373	83	66	405	61	120	815	68
IU	6	36	60	38	306	80	93	623	67	137	965	70
C	18	87	48	42	245	58	48	300	63	108	632	59
PU	9	69	77	26	213	82	39	317	82	74	599	81
GF	45	272	60	65	470	72	66	411	62	176	1153	66
SF	76	465	61	77	531	69	136	903	66	289	1899	66
EL	8	30	38	23	111	48	63	358	57	94	499	53
R	48	337	70	35	274	78	48	386	80	131	997	76
FR	60	530	88	77	792	103	57	572	10	194	1894	97
O	32	195	61	20	145	72	28	151	54	80	491	61
A	37	250	67	34	225	66	31	244	79	102	719	70

TABLE 5.2: THE VISUAL AND INTELLECTUAL FORM OF THE DISCOURSE AT THE BARTLETT

5. 2. 3 GREENWICH SCHOOL OF ARCHITECTURE

1ST YEAR (Table 5.2)

The domains of Structure (42, 60, 62) of Context (54, 56, 60) of Geometry Form (62, 65, 70) and Representation (74, 90, 100) show a density increase during the 1st year, from 1st interim review to final review, which means that they become more intellectual in the course of the year.

On the level of the total density the domains that mainly operate on a visual level are the domains of Context (56) Architectural Elements (48) and Objects (50) and the domains that mainly operate on an intellectual level are the domains of Representation (88) Process (84) and Abstract Notions (78).

3RD YEAR

The domains of Context (48, 58, 63) of Architectural Elements (38, 48, 57) and Representation (70, 78, 80) show a density increase during the 3rd year which means that they have a tendency to operate more on the intellectual level in the course of the year.

On the total density level the domains that mainly operate on a visual level are the domains of Context (59) and Architectural Elements (53) and the domains that mainly operate on an intellectual level are the domains of Immediate Use (70) Programme Use (81) Representation (76) Process (97) and Abstract Notions (70) .

5. 2. 4 THE VISUAL/INTELLECTUAL FORM OF THE DESIGN DOMAINS ACROSS THE YEARS AT GREENWICH

The total results of Greenwich are similar to the Bartlett ones with the additional presence of the domains of Objects and Abstract Notions in the analytical tables. The domains of Context, Architectural Elements and Objects (only for the first year) are the domains that mainly operate on a visual level throughout the Greenwich discourse. The domains of Immediate Use (apart from both first years) Programme Use (not for first year Greenwich), Representation, Process and Abstract Notions are the domains that mainly operate on an intellectual level throughout the Greenwich discourse. The domains of Structure is variable and the domain of Space Form is mainly visual in the first year. The domain of Geometry Form is quite stable throughout the discourse having an average density. The above are significant results as they derive from an extensive data analysis.

In relation to the development within the years two domains, that of Context and Representation, become consistently more intellectual within both years. In relation to

the development across the years a tendency for an intellectualisation appears between the first and the third year in most domains, with the exception of the domains of Geometry Form (65, 66), Representation (88, 76) and Abstract Notions (78, 70). Overall the changes in density between the two years do not seem substantial.

5. 2. 5 DISCUSSION OF THE SIMILARITIES AND DIFFERENCES IN THE VISUAL/INTELLECTUAL FORM OF THE DISCOURSE ACROSS THE TWO SCHOOLS OF ARCHITECTURE

The density of the discourse on the level of the design domains in both schools of architecture is very similar. Design domains operate in the same way with very few diversities . The development of the density of the discourse across the terms does not present any significant pattern overall . In both schools the domains of Context and Architectural Elements operate mainly on a visual level. The domain of Object is mainly visual at Greenwich. The domains of Immediate Use (apart from both first years) Programme Use, Representation and Process operate mainly on an Intellectual level in both schools. The domain of Abstract Notions is mainly intellectual at Greenwich. The domain of Space Form has an average density in the discourse apart from the first year at the Bartlett where it is primarily visual. The domain of Programme Use is operating on an intellectual level apart from the first year at Greenwich were it has an average density. The domain of Structure has an average density at Greenwich and a variable one at the Bartlett. The domain of Geometry Form has an average density in both schools.

As we suggested low density domains mean a less explicit verbal transmission. This can have several explanations, the most obvious one being that low density domains are transmitted mainly on the visual level, or that they are used mainly for their visual qualities i.e. the domain of Space Form in the first year of the Bartlett , and the domain of Structure in the Diploma where their transmission happens mainly on the visual level. In addition we can observe that the three main domains that have a low density, the domains of Context, Architectural Elements and Objects contain pre-existing common knowledge (for students and tutors) that does not need to be explained exhaustively in order to be transmitted or understood. We do not know what a space is or what a drawing is before going to an architectural school to become architects, but all of us know what orientation is, what a staircase is and what a camera is. So the above domains provide us with fragments of 'typological' knowledge in the sense that they contain intellectual and formal qualities recognisable as such by both students and tutors. The use of these domains does not pre-suppose the existence of a prior architectural knowledge and their low density

within the discourse show that they are used mainly for their visual qualities.

As a result we may presume that high density domains having a more explicit verbal transmission, are transmitted mainly on the intellectual level. The domains that belong to that category are the domain of Immediate Use (partly) and mainly the domains of Programme Use, Abstract Notions (architectural domains), and the domains of Representation and Process (transmission domains) . What is said above is true for the domains of Programme Use and Abstract Notions . They usually contain complex architectural or extra-architectural concepts (like public, social, time, movement etc.)that are not visual, nor are transmitted on a level at which they can just be visually expressed. The domain of Immediate Use as presented in content analysis contains the concepts of function or use of a space and of a simple activity, both of which are mainly abstract and not visual, and the concepts of circulation and location which are mainly visual. In the first years the domain of Immediate Use has an average density and it is used equally for both its visual and intellectual qualities. In the third year and Diploma it is mainly used for the concepts of use and event. Programme Use includes concept of function but on a more abstract general level, like public, social etc.

We offer a similar interpretation for the transmission domains of Representation and . Process. The explanation that could be given here is that we tend to talk more about situations when we try to explain, describe and transmit them on a verbal or visual level. For these domains the qualities of communication are more important than the visual/intellectual ones. They strongly relate to the activity of communication of different situations and ideas. Representation is about how you describe or explain what you did on the visual level. It is indicative that Representation becomes more intellectual as the semester progresses in both years at Greenwich. That means that we have a switch from a more visual use of the domain at the beginning of the project to a more explanatory one. Process can work both on a visual or on an intellectual level but it is predominantly the domain of communication of methodology. How you did what you did, how you describe or explain it. Both domains are in essence descriptive and explanatory.

The table containing the densities of the domains across the two schools presents an interest for some more focused comparative observations.
The domain of Structure is quite variable (lowest density 42 Bartlett diploma, highest density 83 third year Bartlett) for both schools. That shows that in the third year of the Bartlett it is used more on an intellectual level and in the diploma more on a visual level.

The domain of Immediate Use (lowest density 59 first year Greenwich, highest density 73 third year diploma Bartlett) shows an increase from the first year to the third year in both schools from a more visual level to a more intellectual level.
The domain of Context is quite stable throughout the discourse, operating mainly on a visual level.
The domain of Programme Use is mainly operating on an intellectual level with the only exception being the first year at Greenwich.
The domain of Geometry Form is quite stable throughout the discourse and is used equally on a visual and intellectual level.
The domain of Space Form (lowest density 52 first year Bartlett, highest density 67 third year Bartlett) is slightly variable and has an average density. It is slightly more visual in the first year of the Bartlett.
The domain of Architectural Elements is quite stable, being visual throughout the discourse.
The domain of Representation is quite stable, operating mainly on an intellectual level.
The domain of Process is quite stable, operating mainly on an intellectual level.

Generally the expression form of the discourse is similar between the two schools. Minor differences can be identified in the use of the domains of Structure, Programme Use and Space Form.

5. 3 MACRO-LEVEL OF ANALYSIS

	1ST TERM			2ND TERM			3RD TERM			TOTAL		
	DOM	WORD	DENS	DOM	WORD	DENS	DOM	WORD	DENS	DOM	WORD	DENS
1ST B	291	1707	58.6	201	1299	64.6	230	1531	66.5	722	4537	62.8
3RD B	385	2499	64.9	293	2605	88.9	327	2421	74	1005	7525	74.8
DIPL B	311	2144	68.9	289	2681	92.7	313	2244	71.6	913	7069	77.4
1ST GR	411	2595	63.1	379	2474	65.3	400	2877	71.9	1190	7946	66.7
3RD GR	371	2456	66.2	536	4099	76.5	727	5106	70.2	1634	11661	71.3

Table 5.3

The table presents the expression form of the overall discourse (the numbers include the totality of the domains) at the three different levels at the Bartlett (1st, 3rd and diploma) and at two different levels at Greenwich (1st, 3rd years). The discourse has a tendency to become more intellectual with the progress of academic years in both schools. In relation to the density within the years (Bartlett) and semesters (Greenwich) only first year in both schools present a tendency to become more intellectual as the

year and the semester progresses. The above progress is just an indication. It is not by any means a substantial one.

5. 4 CONCLUSIONS

In opposition to the content of the discourse where the two schools had substantial differences, in relation to the expression form of the discourse the two schools appear to be quite similar . Similar in relation to which domains overall are operating on a visual or intellectual level . Similar as well in relation to the development of the expression form of the discourse across the years.

The consistency of the results which derive from a quite diverse sample of data, shows that the design domains contain visual and intellectual qualities within them, in relation to their operation, that are not influenced by the context in which they are communicated. We have already seen that differences exist between the two schools in relation to the programmes set and the content of design language. The overall striking similarity of the results in relation to the density of the discourse forces us to think that some domains have inherent within them a visual or an intellectual quality.

The domains of Representation and Process appear to operate on an intellectual level in both schools because of their transmission quality. But with a more focused observation we can see that the use of the domain of Process differs slightly within the two schools. The domain of Process as we have already found is equally present in the Bartlett diploma and in the first year at Greenwich. Here the difference in relation to the level of operation is indicative. Although in both cases Process is overall operating on an intellectual level, comparatively the process used in the first year of the Greenwich (84) has a tendency in operating on a more visual level than the one used in the Bartlett (101) diploma.

On the level of the architectural domains the two schools are similar. The domains of Context, Architectural Elements and Objects are operating predominantly on a visual level, containing within them fragments of pre-existing knowledge. The domains of Programme Use and Abstract Notions are operating predominantly on an intellectual level. The domains of Structure, Immediate Use, Geometry Form and Space Form are more flexible as they can operate equally on both levels.

On the macro-level of analysis we have an indication of a difference which exists in

relation to the density between and across the years at Greenwich and the Bartlett. The transmission of the first year at Greenwich appears to function on a less visual level than the Bartlett one. The Greenwich third year appears to function on a more visual level than the Bartlett one. Finally the diploma appears to be the most intellectual of all. The above results are confirmed by the content analysis results. As we have already seen in the previous chapter in relation to content, the Bartlett discourse moves from a formal , to a spatial and functional (from a visual to a more intellectual) discourse . Greenwich appears to move from a formal (for the first year) to a spatial discourse and in this case the leap from a visual to an intellectual discourse appears less intense.

Generally we can say that the expression form of the discourse does not present big differences but shows some tendencies in its development that are paralleled in both schools. The first year the transmission in both schools is more implicit, being influenced overall by the fact that the discourse is mainly visual and formal, and becomes less visual in the third year and even less in the diploma. This is apparent, as we have already seen, at Greenwich, in the first year students' choices of design 'themes' in relation to those of the third years. But the Greenwich first year discourse appears less implicit than in the Bartlett first year, possibly due to the explicit use of design process.

The present analytical level has helped us to clarify the visual or intellectual operation of the different design domains. It has given us an insight into the expression form of the domains, but it did not give us a clue to how the different design domains relate to one another. Are the visual domains or the intellectual ones more open to relate to one another in sequence ? This is the next question we are going to investigate. In the next analytical step we shall examine the design domains that enter into relationships of combination. We shall therefore examine the expression substance i.e. the material function of the design language.

CHAPTER 6

THE MATERIAL FUNCTION OF THE DISCOURSE

6.1 INTRODUCTION

At this level of analysis we shall research the sequential relationships or the relationships of combination that exist between the different domains ,the expression substance of the discourse. We will look at the relationships amongst domains that form an articulated continuous chain that cannot be broken without disturbing the meaning of the text. Each domain has a linear or 'horizontal' relationship with the domains that precede or succeed it, and a good deal of its capacity to 'mean' derive from this pattern of positioning. This pattern of positioning offers us the possibilities of retrieving the design language as shaped by action and the design choices of the designer. In linguistics this corresponds with the plane of the syntagm[1]. In the articulated language, this space is linear and irreversible and refers to relationships of combination, to the syntagmatic relationships.

Reading the text reveals that some domains do not relate with their neighbouring domains (strong boundary) whilst others do (weak boundary).

A. In the case of a non existent relationship, two different domains follow each other with no obvious connection between them.

A typical example would be:

(GF) The cube is the dominant theme of this project.

(IU) The exhibition gallery is located ..... GF ( ) IU

B. In the case of an existing relationship two different domains that follow each other enter a relationship of combination. Relationships of combination taking place between two architectural or non architectural domains are going to be codified by the symbol (*). Relationships of combination taking place between two transmission domains or an architectural and a transmission domain are going to be codified by the symbol (@).

A typical example would be:

(IU) You have to go

(SF) outside the cube to

---

1. see Ferdinard De Saussure, Course in General Linguistics, Fontana/Collins, 1974, pp 122-127, and Roland Barthes, Elements of Semiology, Hill and Wang, New York 1986, 111 Syndagm and system, pp 58-88. De Saussure classifies the relationships that exist in language as the ones belonging to the syntagm (syntagmatic) and those belonging to the system, of the associative or vertical plane (systematic or paradigmatic)

(IU) visit the upper floor ..... IU (*) SF (*) IU

The domains do not necessarily relate only to the immediate previous or the immediate following domains. Sometimes relationships can take place between domains that are further up or down in the text.

For example:

(SY) I try to separate morphologically

(SR) the service zone

(IU) and the circulation zones from the rest of the building ..... SY * SR 1* IU

Both the service zone and the circulation zones are relating to the STYLE domain (SY). In this case the 1* symbolism in the text means that the domain is relating to the one existing one place up in the text analysis. The 2* symbolism would mean that the domain is relating to the one existing two places up in the text analysis etc.

6.2 CLASSIFICATION OF RELATIONSHIPS OF COMBINATION

To form a first classification of these relationships proved to be a complex task. What is interesting for us to understand is not only their existence, but the "kind of" relationships that different domains form amongst themselves. It is also interesting to see which particular design domains enter the specific 'kind of" relationship.

After a first reading of the texts the following categories of relationships of combination were classified:

A. TRANSMISSION RELATIONSHIPS (@)

B. SPATIAL RELATIONSHIPS (*)

1. Geometry or form (* Geom)
2. Space articulation (* Spatial)
3. Space substance (* Subst)

A more detailed description of the relationships and which domains are taking part in them will follow.

6. 2. 1. TRANSMISSION RELATIONSHIPS (@)

The distinction of transmission relationships proved necessary for the simplification of the whole task. These kind of relationships are all the ones that try to explain, understand or describe a project in conceptual or visual terms.

For example:

...your building (BT) from your drawings, plans and sections (R)..... BT @ R
...the quality of your presented axonometric (R) helps us to understand (TR)R @ TR
...I cannot thoroughly understand (TR) the elevations (EL)..... TR @ EL

All transmission domains enter a transmission relationship amongst them. Additionally architectural domains that relate to transmission domains enter transmission relationships. The most popular relationships between architectural domains and transmission domains are formed with the involvement of the transmission domains of Process and Representation.

6. 2. 2. SPATIAL RELATIONSHIPS (*)

These relationships are the ones that are formed between architectural domains. One domain follows another in combination, presupposing the previous or informing the next one. These relationships we shall call **spatial** as they are mainly architectural . They can be divided into different sub-categories in relation to their particular architectural quality. This quality is usually defined by the domains that take part in forming the relationship. We have already classified in content analysis the design domains as formal, spatial and substance ones (physical presence). The sub categories of the spatial relationships derive from the content analysis classification, and are the following:

1. GEOMETRICAL OR FORMAL (* Form)

These relationships are usually formed between the domains that relate to geometrical or formal qualities like: Geometry Form (GF), Style (SY), Historical Type and other architectural or extra-architectural domains.
For example:
...The issue of order and disorder is very important (GF) in relation to the building elevations (EL) GF * EL
...I tried to propose the north elevation (EL) to be much more heavy (SY)..EL* SY
...the exhibition gallery is located (IU) at the centre of the cube (GF)..... IU * GF

2. SPACE ARTICULATION (* Spatial)

These relationships are usually formed between domains that relate to space articulation, Space Form (SF), and other architectural or extra-architectural domains.
For example :
...we have double height (SF) living spaces (IU)..... SF * IU
...the door acts (EL) as a kind of boundary (SF)..... EL * SF

3. SPACE SUBSTANCE (* Subst)

These relationships are usually formed between the domains that relate to immediate use, programme and materiality like: Structure (SR), Immediate Function (IU), Programme (PU) and other architectural and extra-architectural domains.

For example:

...the scientific part of the building (BT) seems very inflexible (IU)... BT * IU

...you need to provide certain structures (SR) that would help the operation of different functions (PU).... SR * PU

...if you translate the curves (GF) into materials , maybe soft ones (SR)... GF * SR

For the formation of the above categories of relationships at least one equivalent domain that belongs to each of the above mentioned categories must participate in the relationship e. I . we cannot have a spatial articulation relationship without the presence of the domain of Space Form.

The architectural domains of Context (as the outside space, the container) Architectural Elements and Building Type as well as the extra-architectural domains of Objects and Abstract Notions can form formal, spatial or relationships of substance. The kind of relationship they form depends on the domain they are relating to. For example:

...the grid (GF) of your windows (EL) GF * EL

...for example your exterior and interior (SF) platforms (EL) SF * EL

...I am using stainless steel (SR) to cover parts of my roof (EL) SR * EL

The domain of Architectural Element enters three different relationships (formal, spatial, relationship of substance) in the above example. The same can happen with the domain of Objects. It enters three different (formal, spatial, relationship of substance) relationships in the following example:

...and these are the curved lines (GF) coming from the rocks (O) O * GF

...the rocks are (O) a static physical boundary (SF) O * SF

...creating shadows (O) on different textures (SR) O * SR

The analysis of data will take place on two levels.

1. The first level is more focused on the different design domains and how they relate within the discourse. We can name that the micro-level of analysis. A decision was already taken in the chapter of content analysis as to the domains that were researched for their expression form. The same ones will be researched in this chapter for their expression substance. In the analysis that follows we shall try to see which domains are entering the relationship of combination throughout the design discourse

in both schools of architecture.

2. The second level is more general. On that level the classification of the discourse in total will be discussed. We can name that the macro-level of analysis. This level relates to the changes that happen to the relationships of combination between the design domains across the years for both schools of architecture, and it will lead us to more general conclusions.

6. 3 MICRO - LEVEL OF ANALYSIS

THE READING OF THE TABLES

This level of analysis will take place across the years in both schools. Two kind of tables are introduced in a matrix form. The first table allows us to calculate the second table which is necessary for the results and the discussion. The first table is a numerical one, the second one a percentage one. The example that follows is taken from first year of the Bartlett.

TABLE 1

The first table relates to the actual numbers of relationships found in the text. This table is actually a symmetrical matrix table that relates to the 1st year in total. So if we look for example at how many times the domain of Geometry Form (GF) relates to the domain of Architectural Elements (EL), no matter whether we do a vertical or horizontal reading (horizontal row 6, vertical column 8 or horizontal row 8, vertical column 6) we shall find number 26. That means that GF was related 26 times in sequence with EL in the overall discourse.

1ST YEAR BA RTL ET — TABLE 1

	SR	IU	C	PU	GF	SF	EL	R	PR		dom	X2
SR		1	4		4	3	4		1		36	72
IU	1		3	9	20	23	21	1			104	208
C	4	3		2	8	3					26	52
PU		9	2			4	1	1			25	50
GF	4	20	8			13	26	5	2		164	328
SF	3	23	3	4	13		13	1	2		91	182
EL	4	21		1	26	13		1			81	162
R		1		1	5	1	1				37	74
PR	1				2	2					22	44
oth	4	4	4	1	17	8	8	8	4			
TOT	22	82	24	18	95	70	74	17	9			

HORIZONTAL READING

Reading from left to right, in the first vertical column we find the domains under examination. In the nine columns that follow we have the number of times the domain under examination enters a sequential relationship with the other domains. The tenth column of the table (units) indicates how many times each domain appears in the total text under analysis, i.e. that means in the first year discourse. These numbers are taken from the content analysis previously done. Because each domain can enter in two relationships simultaneously in sequence, i.e. with the domain preceding and with the domain following, the possible maximum number of relationships that a domain can enter is double the number of its presence in the discourse. For example we can find 104 Immediate Use domains in the text. These can enter into 208 possible relationships. So the eleventh column is about the maximum possible interactions.

VERTICAL READING

Reading from top to bottom, in the first horizontal row we find the domains under examination. In the nine rows that follow we have the number of times the domain under examination enters a sequential relationship with the other domains under analysis. The tenth horizontal row is about the number of relationships that the domain under analysis enters with domains that are not under analysis. I.e., the domain of SF enters into 8 relationships with the domains of SY or BT or CR etc. The eleventh horizontal row gives us the total number of sequential relationships into which each domain enters .

Note that this table cannot be used in its present form for the research discussion, because it cannot be comparative due to the different length of each years discourse.

TABLE 2

This is the table where the numbers found in the previous table are turned into 1/100 percentages. As a result this table cannot be read as a matrix table. One has to read it vertically and horizontally.

	1ST YEAR. BARTLETT TABLE 2								
	SR	IU	C	PU	GF	SF	EL	R	PR
SR		0.5	7.7		1.2	1.6	2.5		2.3
IU	1.4		5.8	18	6.1	13	13	1.3	
C	5.5	1.4		4	2.4	1.6			
PU		4.3	3.8			2.2	0.6	1.3	
GF	5.5	9.6	15			7.1	16	6.7	4.5
SF	4.2	11	5.8	8	4		8	1.3	4.5
EL	5.5	10		2	7.9	7.1		1.3	
R		0.5		2	1.5	0.5	0.6		
PR	1.4				0.6	1.1			
oth	5.5	1.9	7.4	2	5.2	4.4	4.9	11	9.7
%	28	39	46	36	29	38	46	23	21

HORIZONTAL READING

Reading from left to right, in the first vertical column we find the domains under examination. In the nine columns that follow we have the percentage of the relationships of combination that the domain under examination enters with the other domains. For example out of 208 possible Immediate Use relationships only 20 belong to the domain of Geometry Form (table 1). In percentage terms that means that only 9.6% Immediate Use domains relate to the domain of Geometry Form etc.

VERTICAL READING

Reading from top to bottom, in the first horizontal row we find the domains under examination. The nine rows that follow have the percentage of the number of times the domain under examination enters a relationship of combination with the other domains under analysis. The tenth horizontal row is about the percentage of the number of relationships that the domain under analysis enters with domains that are not under analysis.

The eleventh horizontal row is giving us the total percentage of the numbers of relationships of combination into which each domain enters . For example out of 208 possibilities of relating the domain of Immediate Use relates only 82 times (table 1) that means that its classification is 39.2%.. So in the first year discourse the domains that have the weaker classification (that means entering in relationships of combination with other domains) are the domain of Context (46.21%) and the domain of Architectural Elements (45.6%). The strongest classification belongs to the domain of

Process (21%) (not entering in relationships of combination with other domains).
The above discussion of the 'openness to relate' of design domains is relative to the first year discourse. For a comparative discussion across the years and the schools, the domains that have an interaction of 45% and above (we were forced to lower 100:50% because of the results of the 1st year Bartlett) will be perceived as 'interactive' domains and the ones that have an interaction of (100:3) 33% and below will be perceived as 'non interactive' domains. The domains in between are perceived as having an average interaction. Usually this average interaction is due to the ability of these domains to form spatial relationships with other specific domains . For example in the case study under presentation the domain of Programme Use has an average interaction due to the spatial relationship that forms with the domain of Immediate Use that reaches 18%.

If the domains were relating equally and fully to a total percentage of 100% , then they would form an average percentage of relating of 8% (100: 12 maximum number of domains under examination in the Greenwich case study). Any relationship that is 8% and above will be highlighted and will be considered as important in being mainly spatial . A vertical reading of the interactive relationships will give us the relationships that the domain of the column enters with other domains. A horizontal reading of the interactive relationships will give us the relationships that the other domains enter with the domain of the row I.e. the domain of Geometry Form does not enter any interactive relationship with other domains (vertical reading) but the domains of IU, C and EL form interactive relationships with the domain of Geometry Form. The vertical reading refers to the 'openness to relate' of the domains, the horizontal reading to the interactive plane of the first year discourse.

The domains that are mostly interactive with other domains in the discourse are not necessarily the 'interactive' domains . For example the domain of Geometry Form takes part in the syntagmatic plane by relating to the domains of IU, C and EL, but it is not one of the 'interactive' domains in the discourse. The domain of Immediate Use takes part in the syntagmatic plane by relating to the domains of PU, SF and EL and has an average 'interaction'. The role of the syntagmatic plane is functionally central, as it is formed by the 'key' sequential relationships of the discourse.

ANALYSIS PRESENTATION AND DISCUSSION
For each year and for both schools of architecture the analysis of the two tables will be presented, mainly by reference to the second table, the one containing the percentages . A comparative presentation of the interactive domains and of the syntagmatic plane for each consecutive year will then take place first for the Bartlett

1ST YEAR BART LETT									TABLE 1		
	SR	IU	C	PU	GF	SF	EL	R	PR	dom	X2
SR		1	4		4	3	4		1	36	72
IU	1		3	9	20	23	21	1		104	208
C	4	3		2	8	3				26	52
PU		9	2			4	1	1		25	50
GF	4	20	8			13	26	5	2	164	328
SF	3	23	3	4	13		13	1	2	91	182
EL	4	21		1	26	13		1		81	162
R		1		1	5	1	1			37	74
PR	1				2	2				22	44
oth	4	4	4	1	17	8	8	8	4		
TOT	22	82	24	18	95	70	74	17	9		

1ST YEAR BARTLETT TABLE 2									TABLE 2		
	SR	IU	C	PU	GF	SF	EL	R	PR	dom	X2
SR		0.5	7.7		1.2	1.6	2.5		2.3	36	72
IU	1.4		5.8	18	6.1	13	13	1.3		104	208
C	5.5	1.4		4	2.4	1.6				26	52
PU		4.3	3.8			2.2	0.6	1.3		25	50
GF	5.5	9.6	15			7.1	16	6.7	4.5	164	328
SF	4.2	11	5.8	8	4		8	1.3	4.5	91	182
EL	5.5	10		2	7.9	7.1		1.3		81	162
R		0.5		2	1.5	0.5	0.6			37	74
PR	1.4				0.6	1.1				22	44
oth	5.5	1.9	7.4	2	5.2	4.4	4.9	10.8	9.7		
%	28	39	46	36	29	38	46	22.7	21		

TABLE 6.1 : MATERIAL FUNCTION OF FIRST YEAR (BARTLETT)

and then for Greenwich. A comparative discussion across the years and between the two schools will follow.

6. 3. 1 BARTLETT SCHOOL OF ARCHITECTURE

1ST YEAR (Table 6.1)

The first year discourse does seem to be interactive (all the domains used are <50%). However, the domains that appear to be relatively interactive within it (that means creating more relationships of combination) are the domains of Context (46.1%) and Architectural Elements (45.6%). The domains that appear to be most non interactive are the domains of Structure (27.6%) Geometry Form (28.9%), Representation (22.7%) and Process (21%) . The domains of Immediate Use (39.2%), Programme Use (36%), and Space Form (38.2%) have an average interaction.

THE SYNTAGMATIC PLANE

The following domains are taking part in the syntagmatic plane of the first year discourse:

The domains of PU (18%), SF (12.6%) and EL (13%) relate to the domain of Immediate Use.

The domains of IU (9.6%), C (15.6%) and EL (16%) relate to the domain of Geometry Form.

The domains of IU (11%) and EL (8%) relate to the domain of Space Form.

The domain of IU (10%) relates mainly with the domain of Architectural Elements.

Out of the above relationships two are two sided and for that reason quite intensive. These are the relationship between Immediate Use and Space Form and the relationship between Immediate Use and Architectural Elements. The domains that do not take part on the syntagmatic plane are the domains of Structure, Representation and Process.

We see that the dominant interactive relationships in the first year discourse, the ones actually that constitute the syntagmatic plane are the formal relationships (GF) and the relationships of substance (IU). Spatial relationships follow. Transmission sequential relationships are almost non existent.

3RD YEAR BART LETT									TABLE 1	
	SR	IU	C	PU	GF	SF	EL	R	PR	dom	X2
SR		5	6	3	17	14	9	8		112	224
IU	5		17	16	23	39	24	3		174	348
C	6	17		3	8	16	7	2	1	78	156
PU	3	16	3		5	15	1			72	144
GF	17	23	8	5		16	19	2		123	246
SF	14	39	16	15	16		27			164	328
EL	9	24	7	1	19	27		3		79	158
R	8	3	2		2		3		2	47	94
PR			1					2		18	36
oth	19	8	16	7	21	17	9	7			
TOT	81	135	75	50	111	145	99	27	3		

3RD YEAR BART LETT TABLE 2									TABLE 2	
	SR	IU	C	PU	GF	SF	EL	R	PR	dom	X2
SR		1.4	3.8	2.1	6.9	4.2	5.7	8.5		112	224
IU	2.2		11	11	9.3	12	15	3.2		174	348
C	2.7	4.9		2.1	3.2	4.8	4.4	2.1	2.7	78	156
PU	1.3	4.6	1.9		2	4.5	0.6			72	144
GF	7.6	6.6	5.1	3.5		4.8	12	2.1		123	246
SF	6.2	11	10	10	6.5		17			164	328
EL	4	6.9	4.5	0.7	7.7	8.2		3.2		79	158
R	3.6	0.8	1.3		0.8		1.2		5.5	47	94
PR			0.6					2.1		18	36
oth	8.5	2.3	10	4.8	8.5	5.2	5.7	7.4			
%	36	39	49	35	37	44	62	28.6	8.2		

TABLE 6.2 : MATERIAL FUNCTION OF THIRD YEAR (BARTLETT)

3RD YEAR (Table 6.2)

The domains that are interactive in the third year discourse are the same ones as in the first year discourse. These are the domains of Architectural Elements (62%) and Context (48.5%). The domains that are non interactive, as in the first year, are the domains of Representation (28.6%) and Process (8.2%) both transmission domains. The domains of Structure (36%), and Geometry Form (36.5%) both non interactive in the first year have an average interaction in the third year. Immediate Use (38.7%), Programme Use (34.7%), and Space Form (43.6%) have an average interaction as well. All of the domains form sequential relationships with other domains apart from the domains of Structure and Process.

THE SYNTAGMATIC PLANE

The following domains take part in the syntagmatic plane in the third year discourse:
The domain of R (8.5%) relates to the domain of Structure.
The domains of C (10.9), PU (11.1), GF(9.3%), SF (11.9%), EL (15.2%) relates to the domain of Immediate Use.
The domain of EL (12%) relates to the domain of Geometry Form.
The domains of IU (11.2%), C (10.2%), PU (10.2%), EL (17.1%) relates to the domain of Space Form.
Out of the above relationships, one is two sided: the relationship between Immediate Use and Space Form. The domain that does not take part in the formation of the syntagmatic plane is the domain of Process.

The dominant interactive relationships in the third year discourse are the relationships of substance (the ones formed around the domain of Immediate Use) and the spatial relationships (the ones formed around the domain of Space Form). So the third year interactive plane is different to the first year one. Formal relationships are replaced by spatial relationship. Relationships of substance are an important part of the syntagmatic plane in both first and third year discourses. Transmission relationships are almost non existent on the syntagmatic plane, with the only exception the domain of Representation relating to the domain of Structure.

DIPL OMA BART LETT										TABLE 1	
	SR	IU	C	PU	GF	SF	EL	R	PR	dom	X2
SR		1				2	3		1	10	20
IU	1		2	21	3	14	6			51	102
C		2		16	6	9	7		15	85	170
PU		21	16		11	15	17	4	1	228	456
GF		3	6	11		9	4	1	1	60	120
SF	2	14	9	15	9		13	3	6	68	136
EL	3	6	7	17	4	13		2	3	63	126
R				4	1	3	2		2	33	66
PR	1		15	1	1	6	3	2		112	224
oth	4	4	22	20	15	10	8	8	10		
TOT	10	51	77	105	50	81	64	20	39		

DIPL OMA BART LETT TABLE 2										TABLE 2	
	SR	IU	C	PU	GF	SF	EL	R	PR	dom	X2
SR		1				1.5	2.4		0.4	10	20
IU	5		1.2	4.6	2.5	10	4.7			51	102
C		2		3.5	5	6.6	5.5		6.7	85	170
PU		21	9.4		9.2	11	14	6	0.4	228	456
GF		2.9	3.5	2.4		6.6	3.2	1.5	0.4	60	120
SF	10	14	5.3	3.3	7.5		10	4.5	2.6	68	136
EL	15	5.1	4.1	3.7	3.3	9.5		3	1.3	63	126
R				0.8	0.8	2.2	1.6		0.9	33	66
PR	5		8.8	0.2	0.8	4.4	2.4	3		112	224
oth	20	3.9	13	4.4	13	7.3	6.3	12.1	4.5		
%	55	50	45	23	42	59	50	30.1	17.2		

TABLE 6.3 : MATERIAL FUNCTION OF DIPLOMA (BARTLETT)

DIPLOMA (Table 6.3)

The diploma discourse seems to be the most interactive discourse in comparison to the first year and third year ones. Five domains out of nine are interactive, these being the domains of Structure (55%), Context (45.2%), Immediate Use (49.9%) of Space Form (59.4%) and Architectural Elements (49.9%). The most non interactive domains are the domains of Programme Use (22.9%) Representation (30.1%) and Process (17.2%) . The last two are non interactive throughout the Bartlett discourse. The domain of Geometry Form (41.5%) has an average interaction.

THE SYNTAGMATIC PLANE

The following domains participate in the formation of the syntagmatic plane in the diploma discourse:

The domain of SF (10.3%) relates to the domain of Immediate Use.

The domains of IU (20.5%), C (9.4%), GF (9.2%), SF (11%), EL (13.5%) relates to the domain of Programme Use.

The domains of SR (10%), IU(13.7%), EL (10.3%) relates to the domain of Space Form.

The domains of SR (15%) SF (9.5%) relates to the domain or Architectural Elements.

The domain of C(8.8%) relates to the domain of Process.

Out of the above relationships two are two sided: the relationship between Immediate Use and Space Form and between Space Form and Architectural Elements. The domain that does not take part in the syntagmatic plane is the domain of Representation.

We can see that the dominant sequential relationships in the diploma discourse, the ones that are mainly taking part in the formation of the syntagmatic plane, are primarily the relationships of space substance (the ones formed around the domain of Programme Use) and on a second level the spatial relationships (the ones formed around the domain of Space Form) . So the diploma interactive plane is different from the third and the first year one, in the fact that the domain of Immediate Use is replaced by the domain of Programme Use in creating complementary relationships on a more intellectual level. Spatial relationships are reduced. Formal and transmission relationships are almost non existent . Only one exception exists. The sequential relationship of Process to Context (8.8%) .

6. 3. 2 THE MATERIAL FUNCTION OF THE DISCOURSE ACROSS THE YEARS IN THE BARTLETT

The domains that are more open to create relationships of combination throughout the Bartlett discourse are the domains of Architectural Elements EL (45.6, 62, 49.9) and Context C (42.3, 48.5, 45.2). That means that the above domains act as the main participants in the creation of the sequences and consequently in the formation of the syntagmatic plane. We have already mentioned that the architectural domains of Context and Architectural Elements are quite flexible and can form formal, spatial or relationships of substance. The kind of relationship they form depends on the domain they are relating to, hence they are so interactive.

Out of the architectural domains, the domains of Structure (27.6, 36, 55) and Geometry Form (28.9, 36.5, 41.5) are the ones that form the minimum relationships of combination in the first year. The domain of Programme Use (36, 34.7, 22.9) forms the minimum relationships of combination in the diploma. But in spite of that, both Geometry Form in the first year and Programme Use (in a more intensive way) in the diploma constitute the main syntagmatic plane. That means that other domains relate to them in a sequence offering them a protagonistic role in the structure of design language. And once more it is confirmed, additionally to the content analysis results, that the design language transforms from a formal one in the first year, to a more abstract one tackling issues of architectural substance in the diploma.

The domains that do not relate in sequence throughout the Bartlett discourse are the domains of Representation (22.7, 28.6, 30.1) and Process (21, 8..2, 17.2). Transmission domains are the ones that try to explain, understand or describe a project in conceptual or visual terms and the analysis show very clearly that they are not interactive. Process whenever present remains more isolated than Representation. Representation relates more to Structure in the second year discourse, Process to Context in Diploma. This results show very clearly that the transmission relationships overall do not belong to the syntagmatic plane.

THE SYNTAGMATIC PLANE

Some interactive relationships have a consistent presence in the syntagmatic plane throughout the discourse (from first year to diploma). For that reason they are very important for the understanding of the structure of design language. The sequential relationship between the domains of Immediate Use and Space Form shows the importance that the concept of movement through space has , for an architectural discourse. Our perception of space is never a static one. We move through it in order to understand (read), describe and above all experience a space . Movement

through space is used as an explanatory and experiential device in the design discourse within the reviews.

The interactive relationships between the domains of Architectural Elements and Geometry Form (only in the first and third years), and Architectural Elements and Space Form are different kind of relationships but very important as well. They function on the level of the structure of design discourse. We have already said in the previous chapter that Architectural Elements provide us with fragments of 'typological' knowledge in the sense that they contain conceptual and formal qualities recognisable as such by both students and tutors. They belong to the field of pre-existing knowledge. They act from day one as bonding elements in the discourse and as mediators in creating formal and spatial configurations.

These are complemented by the relationship existing between the domains of Immediate Use and Programme Use. Both domains create relationships of substance and probably they act in a quite complementary way. They create relationships of substance at two different levels the one on the level of Immediate Function and the other on a more distant abstract one. What is really interesting is that the domains of Geometry and Space Form and of Context and Architectural Elements, the 'visual' domains, do not relate much to each other.

On a general level the structure of the syntagmatic plane changes every year. In the first year it is formed mainly by relationships of substance (IU) and formal relationships. In the third year we have mainly relationships of substance (IU) and spatial relationships. The structure of the syntagmatic plane in the diploma is different from the previous years. In the diploma syntagmatic plane, we have the participation of mainly relationships of substance (PU) and on a second level of spatial relationships. Additionally more architectural domains participate in the syntagmatic plane across the years , and as a result it becomes more complex in its structure. The syntagmatic plane of the Bartlett discourse appears to be formed mainly by relationships of substance (starting from a simple level IU towards a more complex and conceptual one PU) and secondarily by formal and spatial relationships.

1ST YEAR GREENWICH												TABLE	1
	SR	IU	C	PU	GF	SF	EL	R	PR	O	A	dom	x2
SR		6	3	2	16	17	8	11	5	6	3	87	174
IU	6		5	5	4	28	9	4	3	2	2	62	124
C	3	5			2	12	9	6	6	4	1	48	96
PU	2	5			1	6	3	1	2		1	26	52
GF	16	4	2	1		29	20	34	8	32	10	176	352
SF	17	28	12	6	29		24	19	11	19	6	168	336
EL	8	9	9	3	20	24		8	5	12	3	87	174
R	11	4	6	1	34	19	8		21	9	8	188	376
PR	5	3	6	2	8	11	5	21		7	11	108	216
O	6	2	4		32	19	12	9	7			91	182
A	3	2	1	1	10	6	3	8	11			62	124
oth	5	4	1	0	43	24	0	6	0	6	10		
TOT	82	72	50	21	167	176	101	124	77	97	55		

1ST YEAR GREENWICH TABLE 2												TABLE	2
	SR	IU	C	PU	GF	SF	EL	R	PR	O	A	dom	X2
SR		4.8	3.1	3.8	4.5	5.1	4.6	2.9	2.3	3.3	2.4	87	174
IU	3.4		5.2	9.6	1.1	8.3	5.2	1.1	1.4	1.1	1.6	62	124
C	1.7	4.1			0.5	3.6	5.2	1.6	2.7	2.2	0.8	48	96
PU	1.1	4.1				1.8	1.7		0.9		0.8	26	52
GF	9.2	3.2	2.1	1.9		8.6	12	9	3.7	18	8.1	176	352
SF	9.8	23	13	12	8.2		14	5.1	5.1	10	4.8	168	336
EL	4.6	7.2	9.4	5.7	5.7	7.2		2.1	2.3	6.6	2.4	87	174
R	6.3	3.2	6.2	1.9	9.6	5.6	4.6		9.7	4.9	6.4	188	376
PR	2.9	2.4	6.2	3.8	2.3	3.3	2.8	5.6		3.8	8.9	108	216
O	3.4	1.6	4.2		9.1	5.6	6.9	2.4	3.2			91	182
A	1.7	1.6	1	1.9	2.8	1.8	1.7	2.1	5.1			62	124
oth	2.9	3.2	2.1	0	3.1	1.5	0	1.1	0	3.3	8		
%	47	58	52	40	47	52	58	33	35.5	53	44.2		

TABLE 6.4 : MATERIAL FUNCTION OF FIRST YEAR (GREENWICH)

6. 3. 3 GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE

1ST YEAR (Table 6.4)

First year Greenwich discourse is a quite interactive discourse as seven domains out of eleven have an interaction above 45%. The domains of Structure (47%) Immediate Use (58%), Context (52%), Geometry Form (47%), Space Form (52.4%), Architectural Elements (58%) and Object (53.3%) are interactive domains. We can say that only the domain of Representation is on the borderline between a strong and an average interaction (33,8). The domains of Programme Use (40%) Process (35.5%) and Abstract Notions (44.2%) have an average interaction. All of them participate in the syntagmatic plane.

THE SYNTAGMATIC PLANE

The following domains take part in the formation of the syntagmatic plane in the third year discourse:

The domains of PU (9.6%), SF (8.3%) relate to the domain of Immediate Use.

The domains of SR (9.2%), SF (8.6%), EL (11.5%), R (9%), O (17.6%), A (8.1%) relate to the domain of Geometry Form.

The domains of SR (9.8%), IU (22.6%), C (12.5%), PU (11.5%), GF (8.2%), EL (13.8%), O (10.4%) relate to the domain of Space Form.

The domain of C (9.4%) relate to the domain of Architectural Elements.

The domains of GF (9.6%), PR (9.7%) relate to the domain of Representation.

The domain of A (98.9%) relates to the domain of Process.

The domain of GF (9.1%) relates to the domain of Objects.

Out of the above relationships the two sided ones are between:
Immediate Use and Space Form, Geometry Form and Space Form, Geometry Form and Representation, Geometry Form and Objects.

We can see that the main domains that take part in the syntagmatic plane are the formal and the spatial relationships. Relationships of substance and transmission do not appear to be so sequential.

3RD YEAR GREENWICH											TABLE 1	
	SR	IU	C	PU	GF	SF	EL	R	PR	O	A	dom	x2
SR		8	4	8	18	39	15	10	4	10	2	120	240
IU	8		10	25	15	47	19	3	2	2	3	137	274
C	4	10		7	6	24	10	10	14	15	5	108	216
PU	8	25	7		3	13	3		4		1	74	148
GF	18	15	6	3		41	8	13	9	9	12	176	352
SF	39	47	24	13	41		24	16	17	14	26	286	578
EL	15	19	10	3	8	24		4	3	4	3	94	188
R	10	3	10		13	16	4		23	3	7	131	262
PR	4	2	14	4	9	17	3	23		5	7	194	388
O	10	2	15		9	14	4	3	5			80	160
A	2	3	5	1	12	26	3	7	7			102	204
oth	10	8	1	8	17	6	5	10	15	13	15		
TOT	128	142	106	72	151	267	98	94	103	75	81		

3RD YEAR GREENWICH TABLE 2 TABLE 2													
	SR	IU	C	PU	GF	SF	EL	R	PR	O	A	dom	X2
SR		2.9	1.8	5.4	5.1	6.7	7.9	3.8	1	6.2	1	120	240
IU	3.3		4.6	17	4.3	8.1	10	1.2	0.5	1.2	1.5	137	274
C	1.6	3.6		4.7	1.7	4.2	5.3	3.8	3.6	9.4	2.4	108	216
PU	3.3	9.1	3.2		0.8	2.2	1.6		1		0.5	74	148
GF	7.5	5.5	2.7	2		7.1	4.2	4.9	2.3	5.6	5.9	176	352
SF	16	17	11	8.8	12		13	6.1	4.4	8.7	12.7	289	578
EL	6.2	6.9	4.6	2	2.3	4.2		1.5	0.8	2.5	1.5	94	188
R	4.2	1.1	4.6		3.7	2.7	2.1		5.9	1.9	3.4	131	262
PR	1.6	0.7	6.5	2.7	2.5	2.9	1.6	8.7		3.1	3.4	194	388
O	4.2	0.7	6.9		2.5	2.4	2.1	1.1	1.3			80	160
A	0.8	1	2.3	0.7	3.4	4.5	1.6	3.7	1.8			102	204
oth	4.2	3.7	0.5	5.4	4.9	1	2.7	0.9	3.8	8.1	7.3		
%	53	52	49	49	43	46	52	35.7	26.4	47	39.6		

TABLE 6.5 : MATERIAL FUNCTION OF THIRD YEAR (GREENWICH)

3RD YEAR (Table 6.5)

Third year discourse is as interactive as the first year one, as seven out of eleven domains form sequential relationships. The domains that are the most interactive are the domains of Structure (53.3%) Immediate Use (58%) Context (48.8%), Space Form (46.2%), Architectural Elements (58%) and Objects (46.7%). The domain that is less interactive is the domain of Process (26.4%). The domains of Programme Use (44.6%), Geometry Form (42.8%), Representation (35.7%) and Abstract Notions (39.6%)have an average interaction.

THE SYNTAGMATIC PLANE

The following domains take part in the formation of the syntagmatic plane in the third year discourse:

The domains of PU (16.9%), SF (8.1%), EL (10.1%) relate to the domain of Immediate Use.

The domain of O (9.4%) relates to the domain of Context.

The domain of IU (9.1%) relates to the domain of Programme Use.

The domains of SR (16.2%), IU (17.1%), C (11.1%), PU (8.8%), GF (11.6%), EL (12.7%), O (8.7%) and A (12.7%) relate to the domain of Space Form.

The domain of R (8.7%) relate to the domain of Process.

Out of the above relationships the two sided ones are between Immediate Use and Space Form, Immediate Use and Programme Use. The domains that do not relate to one another at all are the domain of Programme Use to the domains of Representation, and Objects, and the domain of Objects to the domain of Abstract Notions.

The syntagmatic plane in the third year discourse is structured mainly by spatial relationships (the ones formed around the domain of Space Form). Formal and transmission relationships do not appear to take part in it as in the first year. So third year interactive plane is different from the first year one in the sense of becoming more focused.

6. 3. 4 THE MATERIAL FUNCTION OF THE DISCOURSE ACROSS THE YEARS AT GREENWICH AND DISCUSSION OF THE SIMILARITIES AND DIFFERENCES ACROSS THE TWO SCHOOLS OF ARCHITECTURE

	COMPARATIVE MATRIX					
	BARTLETT				GREEN	
D.D.	1st	3rd	dipl		1st	3rd
SR	28	36	55		47	53
IU	39	39	50		58	52
C	46	49	45		52	49
PU	36	35	23		40	49
GF	29	37	42		47	43
SF	38	44	59		52	46
EL	46	62	50		58	52
R	23	27	30		33	36
PR	21	8	17		36	26
O					53	47
A					44	40

Table 6.6

The domains that are forming relationships of combination throughout the Greenwich discourse are the domains of Structure (47, 53.3) Immediate Use (58, 51.6), Context (52, 48.8), Space Form (52.4, 46.2) Architectural Elements (58, 52) and Objects (53.3, 46.7). The domain of Geometry Form is interactive only in the first year GF (47, 42.8). The domains of Programme Use (40, 44.6) and Abstract Notions (44.2, 39.6) have an average interaction in both years.

The domains that are the most interactive throughout the discourse in both schools are the domains of Architectural Elements and Context . The domains of Structure, Immediate Use and Space Form are interactive in the Bartlett diploma and in both years at Greenwich.

It is apparent from the analytical results that the Greenwich discourse is more interactive than the Bartlett one. The domains that enter into relationships of combination in 1st and 3rd years are more than triple at Greenwich than at the Bartlett (14 at Greenwich 4at the Bartlett) (see comparative table). Not even in the diploma level does the Bartlett achieve the Greenwich level of interaction. That means that the relationships of combination are much more complex and multi layered at Greenwich than at the Bartlett. Throughout the Greenwich discourse all architectural domains and an extra-architectural one, that of Objects, take a substantial part in the formation of relationships of combination.

The domains that do not form relationships of combination in the major part of the discourse are the domains of Representation and Process , with the exception of the domain of Process(35.5, 26.4) in the 1st year of Greenwich and of the domain of Representation (33.8, 35.7) in the 3rd year of Greenwich . The domain of Representation in the first year of Greenwich enters in an interactive relationship with the domain of Geometry Form and the domain of Process with the domain of Abstract Notions. The domain of Process in the third year of Greenwich enters into an interactive relationship with the domain of Representation. All the above are indicative of the fact that, even when the transmission domains are overall non interactive at Greenwich, they participate in the formation of the interactive/spatial plane in opposition to the Bartlett, where they remain much more in isolation. So the method (process) by which the students design at Greenwich is closely connected on the one hand with representation and form and on the other hand with the borrowing of extra-architectural notions for the formation of spatial concepts. In the third year at Greenwich the method is less interactive and explicit than in the first year but it still retains it's strong bonds with representation. The first year students are using more formal relationships and less spatial ones than the third year students.

THE SYNTAGMATIC PLANE

The relationships that take part in the formation of the syntagmatic plane are very important in the sense that they focus the discourse and they are indicative of the structure of the design language. Some sequential relationships have a consistent presence throughout the discourse and some of them are present in the syntagmatic plane of one of the two schools. The interactive relationship between the domains of Immediate Use and Space Form shows the importance that the concept of movement through space has , for the creation of the architectural language. This is complemented by the relationship existing between the domains of Immediate Use and Programme Use. Both domains create relationships of substance and probably act in a quite complementary way. Both of the above relationships are present throughout the discourse.

The interactive relationships between the domains of Architectural Elements and Geometry Form (only in the first year at both schools and in the third year Bartlett), and Architectural Elements and Space Form (throughout the discourse) are of a different nature as we have already seen. They function on the level of the structure of design discourse. They are more intensive at the Bartlett, since at Greenwich we have their replacement partly by the domain of Objects, which plays the same role within the discourse as the one played by Architectural Elements.

The interactive relationship between the domains of Geometry Form and Space Form is non existent at the Bartlett discourse, but present at the Greenwich one (where it is more intensive (two sided) in the first year discourse than the third year discourse). This relationship is about the formal structure of space. Together with the relationship of Immediate Use to Space Form they form a complex and elaborate architectural discourse at Greenwich, since they tackle simultaneously issues of substance, form and space.

The relationships of Geometry Form to Representation and Geometry Form to Objects are present and two sided only in the first year discourse of Greenwich. As we have already said both representation and the use of extra-architectural domains are very important for the design 'method' used in the first year of Greenwich . In this case, the formal qualities of the objects are the ones that allow through their representation the metaphor to the formal qualities of an architectural space to take place.

On a general level the structure of the syntagmatic plane in relation to the domains that are taking part in it, and in relation to their number, is variable between the two schools. We can see that the syntagmatic plane in the first year at the Bartlett (9 interactive relationships) is much less complex than the first year at Greenwich(19). The third year syntagmatic plane of the Bartlett (11) is as complex as the Greenwich one (14). The complexity of the syntagmatic level of the Bartlett diploma is the same as the third year one (12). The presence of the total number of the relationships of combination that each domain enters into, along with the constitution of the syntagmatic plane give the results of the structure of the relationships of combination in the discourse.

We have already seen that the syntagmatic plane at the Bartlett appears to be formed mainly by relationships of substance (starting from a simple level (IU) towards a more complex and verbal one (PU)) and secondarily by formal(1st year) and spatial (3rd year, diploma) relationships. The syntagmatic plane at Greenwich is mainly spatial (formal only in the first year). The focus between the two schools is different. This transformation has to do with the change of the architectural discourse from a more functional to a more spatial one.

6. 4 MACRO - LEVEL OF ANALYSIS

	1ST TERM			2ND TERM			3RD TERM			TOTAL		
	DOM	REL	%	DOM	REL	%	DOM	REL	%	DOM	REL	%
1ST B	291	120	41.3	201	78	38.8	230	95	41.3	722	295	40.8
3RD B	385	197	51.2	293	142	48.5	327	145	44.3	1005	484	48.2
DIPL B	311	116	37.3	289	112	38.7	313	116	37	913	344	37.6
1ST GR	411	211	51.3	379	169	44.6	400	188	47	1190	568	47.7
3RD GR	371	176	47.4	536	215	40.1	727	362	49.8	1634	753	46.1

Table 6.7

The table presents the expression substance of the overall discourse in three different levels at the Bartlett (1st, 3rd and diploma) and at two different levels at Greenwich (1st, 3rd years). We cannot see the existence of a definite pattern in how interaction develops across the years in both schools. In the Bartlett the discourse has a tendency to become more interactive in the third year and less interactive in the diploma. At Greenwich first and third year are very similar in the level of their interaction. Some differences exist. Mainly they have to do with the discourse becoming more focused in the third year and with the process being more explicit in the first year.

Across the schools first year at Greenwich is more interactive in relation to the Bartlett one. Third years share the same level of interaction in both schools.

6. 5 CONCLUSIONS

	COMPARTMENTAL FORM						COMPARTMENTAL MATERIAL					
	BARTLETT			GREEN			BARTLETT			GREEN		
D.D.	1st	3rd	dipl	1st	3rd	D.D.	1st	3rd	dipl	1st	3rd
SR	62	83	42	58	68	SR	28	36	55	47	53
IU	62	73	73	59	70	IU	39	39	50	58	52
C	48	49	46	49	46	C	46	49	45	52	49
PU	75	92	87	69	81	PU	36	35	23	40	49
GF	67	65	69	65	66	GF	29	37	42	47	43
SF	52	67	57	57	66	SF	38	44	59	52	46
EL	39	54	45	48	53	EL	46	62	50	58	52
R	81	82	82	88	76	R	23	27	30	33	36
PR	93	93	101	84	97	PR	21	8	17	36	26
O				50	61	O				53	47
A				78	70	A				44	40

Table 6.8

At this point a comparison of the results of expression form and expression substance

for both schools of architecture is necessary. In the previous chapter we said that low density domains are transmitted through their visual qualities, or they are mainly operating on a visual level, and also they contain fragments of pre-existing knowledge within them. The high density domains are transmitted through their intellectual qualities, or they are mainly operating on an intellectual level. Transmission domains belong to a different classification as they are mainly used as explanatory and presentation tools .

Looking at the comparative tables of both expression form and substance throughout the discourse (Table 6.8) the first observation is that, generally, the low density domains such as those of Context, Architectural Elements and Objects (mainly 1st year) are interactive and vice versa. The high density domains like those of Programme Use, Representation and Process are non interactive or have an average interaction (Programme Use). This is true for most domains i.e. the domain of Structure is low density and is interactive in the Bartlett diploma, the domain of Geometry Form has a relatively high density and is non interactive in the 1st year Bartlett discourse etc.

The comparison of the two tables (expression form-expression substance) indicates that the domains that are transmitted for their visual qualities or through their visual qualities are actually the main participants of the syntagmatic plane, which seems to be constituted mostly by visual/spatial relationships of combinations. Taking into consideration that the main participants of the syntagmatic plane are the domains of Context, Architectural Elements and Objects it contains also within it fragments of 'typological' knowledge. We can see that all the domains that take an active part in the syntagmatic plain (Structure, Geometry Form, Space Form) are domains with strong visual (formal) qualities. The domain of Immediate Use is a particular case. In three cases (diploma, 3rd year Bartlett and Greenwich) it has a high density and is interactive as well. That means that it is used for its visual and verbal qualities simultaneously being a transitional domain. In that way it has the ability and the potentiality to be the most open domain in the discourse in relation to its transmission and visibility.

Transmission domains have a high density throughout the discourse and are non interactive mainly in the Bartlett discourse. That means that they are not part of the syntagmatic plane as they are not operating on a visual level but rather on an intellectual level . The situation is rather different as we have already seen in the Greenwich discourse. The domains that mainly take part on the syntagmatic plane are the domains of Immediate Use, Programme Use (only in diploma), Geometry Form and Space Form. These are the key domains that structure the architectural discourse.

More specifically the interactive plane consists of:
The domain of Immediate Use (3 interactive relationships) and Geometry Form(3) in the first year Bartlett, the domains of Immediate Use (5) and Space Form (4) in the third year Bartlett, and the domain of Programme Use (5) in the Bartlett diploma. The main relationships that constitute the interactive plane are spatial relationships that operate on the visual level. We observe that not all the above domains that belong to the Bartlett syntagmatic plane are visual domains. For example the domain of Programme Use is mainly an intellectual domain. But if we look again at the 'kinds' of relationships that the domain of PU forms, for example in the Bartlett diploma discourse, we observe that all the domains it is relating to, are mainly visual i.e. the domains of EL, SR, IU, C etc. In this case we can claim that although the domain of PU is predominantly an intellectual domain it is operating on a visual level by being connected to a visual domain .The same is true for all the intellectual domains that belong to the syntagmatic plane. They relate mainly to visual domains and by so doing they operate mainly on a visual level (We have already noticed that visually transmitted domains do not relate amongst themselves i.e. GF, SF, C and EL, a fact that strengthens the argument. Visual qualities precede verbal in the syntagmatic plane. The same is true for the Greenwich discourse, where the main participants of the syntagmatic plane are transmitted visually anyway. In the Greenwich first year we have the domains of Geometry Form (6) and Space Form (7) and in Greenwich third year we have the domain of Space Form (8) that takes part in the interactive plane. All three are transmitted mainly visually.

To conclude we have seen that because of their properties the architectural domains have an inability to operate on a visual and verbal level simultaneously. They alternatively operate at one level or the other. Only the domain of Immediate Use, a transitional domain, presents this capacity of operating simultaneously on both levels and is the most open domain for someone to communicate and transmit.

In this chapter we have seen that the syntagmatic plane is mainly the plane of the visual relationships of combinations. It is the level of the material function of the design language. The next level of investigation relates the content form of the design language to its visual and intellectual expression. The next chapter will show us how design domains are used within the discourse, if they are descriptive, stating facts, involved in the process or setting up design conditions, and design rules. The next level of analysis will be about the verbal expression of the discourse, that is about verbal propositions . It will offer us an understanding at how different design domains participate in decision making and thought shaping within each case study.

CHAPTER 7

THE VERBAL EXPRESSION OF THE DISCOURSE

7.1 INTRODUCTION

The first level of analysis was about the content, the second level about the expression form, the third level about the expression substance or material function of the discourse and this level is about content form i.e. the verbal expression of the discourse. The proposition is defined by the structure of verbal expression. The propositions allow classifications to be made through the use of grammar and reveal choices . This analytical level has to do with the focus of interest of each design domain. For example on the one hand a descriptive proposition refers only to the project presented during the review and focuses on practice. On the other hand a conditional proposition (sets conditions) refers to a deeper level, to the underlying design principle of the project under presentation. This analytical level has to do with the degree of control tutor and student possess over the selection and organisation, of design 'themes ' and rules. It has also to do with the design method that students follow in order for the student to arrive where they want to be. This analytical level along with the level of expression form relates to the verbal explicitness of the discourse.

The verbal expression of the reviews under analysis is structured in two ways, each one of which has two sub-categories:

A. ON PRACTICE
1. Descriptive D
2. Factual F

B. ON UNDERLYING PRINCIPAL
1. Conditional C
2. On Process P

A more detailed description will follow.

A. ON PRACTICE

This category is a straightforward account of the issues that are already present in the project under discussion.

1. DESCRIPTIVE PROPOSITION (D)

Where the project under presentation is described. The description relates only to what exist on the wall.

For example:

...My project consists of three block of flats....

...The stairs that lead to the upper floor are located outside the cube...

2. FACTUAL PROPOSITION (F)

An information is stated without explanation.

For example:

...I found this wall on top of a bar in Carlyle Street....

...For an exhibition space this is quite crucial...

B. ON UNDERLYING PRINCIPAL

This category is about the selection (setting up conditions) and organisation(controlling the process) of the knowledge that is transmitted through the presented project. It is about choice and setting up design rules.

1. CONDITIONAL PROPOSITION (C)

Where conditions are set by the student or by the tutor in relation to the final product.

... so for this part of the building there are spaces that need some flexibility...

....after all I want my museum to be an educational institution in parallel...

...how you are going to rearrange the spaces if needed....

The difference between a factual and a conditional proposition is that a factual proposition state facts that do not relate necessarily to the building itself but a conditional proposition sets up the rules by which the building is designed.

2. ON PROCESS (P)

The process that the student went through to arrive to the final result, as well as the process that the tutor is offering to the student is explained.

For example:

...But in order to have a dialogue you have very clearly to define which elements you are using and how, from the early stages of your project....

... you have to edit your information....

...I tried to imagine how these windows were before they were blocked out . I recorded this wall and presented both conditions...

At this analytical level we shall to examine the numerical presence of the propositions in relation to the design domains for each academic year in both schools . A comparative discussion will follow.

BARTLETT TAB 1

	1ST					3RD					DIP				
D.D.	D	F	C	P	TOT	D	F	C	P	TOT	D	F	C	P	TOT
SR	3	22	8	3	36	19	61	31	1	112	2	7	1		10
IU	41	31	31	1	104	51	71	52		174	11	10	27	3	51
C	1	121	13		26	8	35	34	1	78		22	37	26	85
PU	2	9	14		25	3	18	51		72	15	75	124	14	228
GF	23	55	83	3	164	7	35	81		123	9	30	19	2	60
SF	14	29	48		91	30	28	108	1	167	8	18	38	4	68
EL	13	27	41		81	15	38	25	1	79	7	22	29	5	63
R	3	25	9		37	5	38	1	3	47		26	1	6	33
RR				22	22				18	18				112	112
OTH	4	80	52		136	6	90	39		135	4	128	47	22	201
TOT	104	290	299	29	722	144	414	422	25	1005	56	338	323	194	913

BARTLETT TAB 2

	1ST					3RD					DIP				
D.D.	D	F	C	P	TOT	D	F	C	P	TOT	D	F	C	P	TOT
SR	0.4	3	1.1	0.4	F	1.8	6	3		F	0.2	0.7	0.1		
IU	5.6	4.3	4.3	0.1	D,F,C	5	7	5.2		F	1.2	1	2.9	0.3	C
C	0.1	1.6	1.7			0.8	3.5	3.5		F,C		2.2	4	2.8	C
PU	0.3	1.2	1.9			0.3	1.2	5		C	1.6	8.2	13	1.3	C
GF	3.2	7.6	11	0.4	C	0.7	3.5	8		C	0.9	3.3	2	0.2	F
SF	1.9	4	6.6		C	3	2.8	11		C	0.8	1.8	4.1	0.4	C
EL	1.9	3.7	5.6		C	1.5	3.8	2.5	0.2	F	0.7	2.4	3.1	0.5	F,C
R	0.4	3.5	1.2		F	0.5	3.8		0.3	F		2.8	0.1	0.6	F
RR				3	P				1.8					12	P
OTH	0.5	11	7.2		F	0.5	8	3.8		F	0.4	14	5.1	2.4	F
%	15	40	41	4	100	14	41	42	3	100	6	37	36	21	100

TABLE 7.1 : VERBAL EXPRESSION OF BARTLETT DISCOURSE

THE READING OF THE TABLES

Table 1

The first table relates to the actual numbers of propositions found in the text.

Table 2

The second table relates to a % percentage with which each design domain participates within each proposition. (These percentages are calculated on the total number of domains that participate in the first year i.e. 722 for the Bartlett). For example in the Bartlett from the descriptive propositions in the first year, first term 0.4% are Structural domains, 7.2% are Immediate Use domains etc.

HORIZONTAL READING

Both tables are divided into three sections one for each year 1st, 3rd and diploma for the Bartlett, and two sections one for each year 1st, 3rd for Greenwich. Each section is subdivided into five columns. The first column relates to the descriptive propositions, the second column to the factual propositions, the third column to the conditional propositions, the fourth column to the propositions relating to the process, the fifth column to the total number of the design domains that are present within each year in table 1 and to the dominant proposition in relation to each design domain in table 2.

VERTICAL READING

Each line relates to a different design domain, ie. second line to the domain of Structure, third line to the domain of Immediate Use etc. The last line of the first table relates to the total number of propositions within each year. The last line of the second table relates to the percentage of each proposition within the year, i.e.. in the first year Bartlett we have 18% of descriptive propositions, 47%of factual propositions etc.

The significant results will be highlighted . Any percentage that is above 2.5% (10domains 10% : 4propositions) will be perceived as substantial and worth discussing. Therefore we shall not exhaustively describe the tables column by column i.e. first the descriptive propositions then the factual etc. It is obvious that the design domains that have an overwhelming presence in the discourse are the ones that will have the biggest participation within the different propositions. The tendency that the students have to use some domains as mainly descriptive, some as factual etc. seems more interesting for some fruitful conclusions. A discussion will therefore take place for each design domain and its verbal expression across the years .

BARTLETT TAB 1

	1ST					3RD					DIP				
D.D.	D	F	C	P	TOT	D	F	C	P	TOT	D	F	C	P	TOT
SR	3	22	8	3	36	19	61	31	1	112	2	7	1		10
IU	41	31	31	1	104	51	71	52		174	11	10	27	3	51
C	1	121	13		26	8	35	34	1	78		22	37	26	85
PU	2	9	14		25	3	18	51		72	15	75	124	14	228
GF	23	55	83	3	164	7	35	81		123	9	30	19	2	60
SF	14	29	48		91	30	28	108	1	167	8	18	38	4	68
EL	13	27	41		81	15	38	25	1	79	7	22	29	5	63
R	3	25	9		37	5	38	1	3	47		26	1	6	33
RR				22	22				18	18				112	112
OTH	4	80	52		136	6	90	39		135	4	128	47	22	201
TOT	104	290	299	29	722	144	414	422	25	1005	56	338	323	194	913

BARTLETT TAB 2

	1ST					3RD					DIP				
D.D.	D	F	C	P	TOT	D	F	C	P	TOT	D	F	C	P	TOT
SR	0.4	3	1.1	0.4	F	1.8	6	3		F	0.2	0.7	0.1		
IU	5.6	4.3	4.3	0.1	D,F,C	5	7	5.2		F	1.2	1	2.9	0.3	C
C	0.1	1.6	1.7			0.8	3.5	3.5		F,C		2.2	4	2.8	C
PU	0.3	1.2	1.9			0.3	1.2	5		C	1.6	8.2	13	1.3	C
GF	3.2	7.6	11	0.4	C	0.7	3.5	8		C	0.9	3.3	2	0.2	F
SF	1.9	4	6.6		C	3	2.8	11		C	0.8	1.8	4.1	0.4	C
EL	1.9	3.7	5.6		C	1.5	3.8	2.5	0.2	F	0.7	2.4	3.1	0.5	F,C
R	0.4	3.5	1.2		F	0.5	3.8		0.3	F		2.8	0.1	0.6	F
RR				3	P				1.8					12	P
OTH	0.5	11	7.2		F	0.5	8	3.8		F	0.4	14	5.1	2.4	F
%	15	40	41	4	100	14	41	42	3	100	6	37	36	21	100

TABLE 7.1 : VERBAL EXPRESSION OF BARTLETT DISCOURSE

7. 2 BARTLETT SCHOOL OF ARCHITECTURE

DATA PRESENTATION AND DISCUSSION (Table 7.1)

Some domains have the tendency to be used mainly for one category of verbal expression and some of them present an even spread. The discussion will start with the presentation of each domain separately within the Bartlett discourse.

SR: The domain of Structure has a tendency of being mainly factual (3.0% first year, 6.0% third year) throughout the discourse.

IU: The domain of Immediate Use has a wide spread of participation, being descriptive, factual and conditional both in first (5.6, 4.3, 4.3) and third years (5.0, 7.0, 5.2).

C: The domain of Context is mainly conditional in the third year (3.5%) and diploma (2.8%). In the diploma discourse it is also involved quite extensively with the domain of Process (2.8%).

PU: The domain of Programme Use has a tendency to become more conditional (5.0% third year, 13.5% diploma) as the years go by . It participates quite substantially as a factual domain in the diploma (8.2%) discourse.

GF: The domain of Geometry Form is mainly conditional in the first (11%) and third (8.0%) years . It participates quite substantially as a descriptive (3.2%) and factual (7.6%) domain in the first year discourse and as a factual domain in both third year (3.5%) and diploma (3.3%).

SF: The domain of Space Form is mainly conditional (6.6% first year, 10.7% third year, 4.1% diploma) throughout the discourse. It has a substantial participation as a descriptive and factual domain in the first year (4% F) and third year (2.8% F) discourses.

EL: The domain of Architectural Elements is mainly factual (3.7% first year, 3.8% third year, 2.8% diploma) and conditional (5.6% first year, 2.5% third year, 3.1% diploma) throughout the discourse. Its participation as a conditional domain is more significant in the first year discourse.

R: The domain of Representation is mainly factual (3.5% first year, 3.8% third year, 2.8% diploma) throughout the discourse.

PR: The domain of Process has a presence only in the first year (3%) and in the diploma (12.3%) discourse.

OTH: Mainly factual.

At a general level the sub-division of the discourse in different propositions is almost identical in the first and third year , but presents some differences in the diploma. Descriptive domains (15, 14, 6) drop in the diploma. Factual and conditional domains (

40, 41, 37) (41, 42, 36) have an equal participation throughout the discourse. The proposition of process (4,3,21) shows a dramatic rise in the diploma.

The verbal structure of the design language has remained almost the same between the first and third years. There is a decrease in the descriptive domains and an increase in the propositions of process in the diploma. These results show that the conditional propositions and the propositions of process, the crucial ones in term of setting up design rules and describing design method, have almost the same presence in the first and third years covering almost half of the discourse. A major part of the design remains implicit as the process used is not explicit. Defining design 'themes' and setting up rules for their realisation, is equally important for first and third year students. The diploma discourse differs in the sense that it becomes more process oriented. The conditional propositions slightly drop (36) but there is a significant rise in the propositions of process (21). Overall there is an indication that no development exist in the number of conditions that the students have to set as they mature. The conditions are there from the start. The interesting question to be researched is what kind of conditions the students are using .

The dominant descriptive domain throughout the discourse is the domain of Immediate Use. Factual propositions cover an extensive number of different domains. As shown earlier the most important factual domains, which are revealed by the analysis are the domains of Geometry Form, Architectural Elements and Representation. The dominant conditional domains are the domain of Geometry Form in the first year, Space Form in the third year and Programme Use in the diploma. The propositions of process have a very small presence within the first and third year discourse, so their results are not perceived as indicative. In the diploma the domain of Context has a raised participation in setting conditions and being involved with the design process.

GRE ENWICH TAB 1

D.D.	1ST D	F	C	P	TOT	3RD D	F	C	P	TOT
SR	2	29	44	12	87	1	53	52	14	120
IU	12	16	33	1	62	42	32	57	6	137
C	1	12	20	15	48	6	36	38	28	108
PU		8	16	2	26	6	18	46	4	74
GF		32	102	41	176	2	51	100	23	176
SF	7	29	94	38	173	15	25	166	23	289
EL	6	21	52	8	87	14	38	32	10	94
R	1	64	20	103	188	3	36	6	86	131
RR				108	108				194	194
O	1	17	54	19	91	2	18	55	5	80
A		10	43	9	62		30	58	14	102
OTH		64	19	4	87	4	68	31	28	131
TOT	30	302	497	361	1190	95	465	641	435	1636

GRE ENWICH TAB 2

D.D.	1ST D	F	C	P	TOT	3RD D	F	C	P	TOT
SR	0.1	2.5	3.6	1	C		3.2	3.1	0.8	F,C
IU	1	1.3	2.7	0.1	C	2.6	1.9	3.5	0.5	D, F
C		1	1.7	1.2		0.3	2.2	2.3	17	
PU		0.6	1.3	0.1		0.3	1.1	2.8	0.2	C
GF		2.6	8.5	3.4	C	0.1	3.1	6.1	1.4	F
SF	0.5	2.5	7.8	3.1	C	0.9	5.2	10	1.4	C
EL	0.5	1.7	4.3	0.6	C	0.8	2.3	1.9	0.4	
R		5.3	1.6	8.6	P	0.2	2.2	0.5	5.2	P
RR				9	P				12	P
O		1.4	4.5	1.6	C	0.1	1.1	3.3	0.3	C
A		0.8	3.6	0.7	C		1.8	3.5	0.8	C
OTH		5.3	1.6	0.3	F	0.2	4.1	1.9	1.7	F
%	3	25	42	30	100	6	28	40	26	100

TABLE 7.2 : VERBAL EXPRESSION OF GREENWICH DISCOURSE

7. 3 GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE

DATA PRESENTATION AND DISCUSSION (Table 7.2)

The Greenwich discourse presents a clearer picture in relation to the use of each domain and its main tendencies .

SR: The domain of Structure is mainly factual (2.5% first year, 3.2% third year) and conditional (3.6% first year, 3.1% third year) .

IU: The domain of Immediate Use is mainly conditional in the first year (2.7%) and descriptive and conditional in the third year (2.6% D, 3.5% F).

C: The domain of Context does not have any significant presence in the discourse.

PU: The domain of Programme Use is mainly conditional in the third year (2.8%).

GF: The domain of Geometry Form is mainly conditional (8.5% first year, 8.1% third year) and factual (2.6% first year, 3.1% third year)in both years. It is involved with the process in the first year (3.4%).

SF: The domain of Space Form is mainly conditional (7.8% first year, 10% third year) and factual (2.5% first year, 5.2% third year). It is involved with the process in the first year (3.1%).

EL: The domain of Architectural Elements is conditional (4.3%) in the first year and factual (2.3%) in the third year.

R: The domain of Representation is mainly factual (5.3%) in the first year, and involved with the process (8.6% first year, 5.2% third year) in both years.

PR: The domain of Process is involved with process (9% first year, 12% third year in both years)

O: The domain of Objects is conditional (4.5% in first year, 3.3% in third year) in both years.

A: The domain of Abstract Notions is conditional (3.6%, 3.5%) in both years.

OTH: Mainly factual.

At a general level the structure of the design language is almost the same between the first and the third years. Descriptive domains have a 3% participation in the first year and 6% in the third year. Factual domains have a 25% participation in the first year and 28% in the third year. Conditional domains have a 42% participation in the first year and 40% in the third year. Propositions of process have a 30% participation in the first year and 26% in the third year. The conditional propositions and the propositions of process hold the control of the discourse since together they arrive at a percentage which is greater than 50% in both years. The emphasis lies equally on the design principals and on the descriptions of the design process used by the students.

The domain of Immediate Use is mainly descriptive in the third year. Factual domains are all the domains apart from the domains of Programme Use, Process, Objects and Abstract Notions. We have the participation of six design domains in conditional propositions (SR, IU, GF, SF, O, A) in both years, of which the dominant conditional domains are the domains of Geometry Form and Space Form . Additionally we have the participation of Architectural Elements in the first year and Programme Use in the third year in conditional propositions . Four design domains take part in the design process in the first year (GF, SF, R, PR) and they drop to two (R, PR) in the third year, the dominant domains being those of Representation and Process.

7. 4 DISCUSSION OF THE SIMILARITIES AND DIFFERENCES OF THE VERBAL EXPRESSION OF THE DISCOURSE ACROSS THE TWO SCHOOLS OF ARCHITECTURE

The discourse has the same verbal expression at all educational levels in relation to descriptive, factual and conditional propositions. Where the descriptive propositions are reduced we have a rise of the propositions of process. This happens in the Bartlett Diploma and in both years at Greenwich and, as a consequence, the discourse becomes more explicit. Our interest focus on the conditional propositions and on the propositions of process because they are the ones that allow this explicitness to take place. The presence of the conditional propositions is the same (around 40%) in both schools of architecture throughout the discourse (only the diploma discourse drops to 36%). This shows that design choices and decisions are made equally at all educational levels . The students very early on, from step one are setting up the conditions and the rules by which they design in order to arrive to a specific architectural proposition.

Some domains seem to have the same verbal expression in both schools throughout the discourse. The domain of Programme Use is mainly conditional in third years and diploma. The domain of Geometry Form is mainly conditional in the first and third years and factual in the diploma. The domain of Space Form is conditional at all levels. The domain of Architectural Elements is factual and conditional throughout the Bartlett discourse, conditional in the first year and factual in the third year at Greenwich . The domain of Representation is mainly factual not taking into account it's participation in the proposition of process at the Greenwich School of Architecture. The domain of Structure is mainly factual and conditional in both third years, and in the first year at Greenwich. It is factual in the first year at the Bartlett. The domains of Immediate Use

and Context show a variability.

The main difference between the two schools lies in the explicitness of the process. At the Bartlett the conditions are stated clearly and explicitly and the product is described. Apart from the diploma design process remains implicit. At Greenwich design process becomes as important as design conditions. The student and the tutor talk a lot about "how', the method by which the student arrives where he/she wishes to be. In this process the domains of Geometry form, Space Form and mainly the domain of Representation are used. An additional difference exists between the Barttlet and Greenwich discourse. At Greenwich we have the presence of two extra architectural domains, the domains of Objects and Abstract Notions, that set architectural conditions mainly by analogy.

7. 5 CONCLUSIONS

The visual/verbal operation of the discourse and its verbal expression is perceived as its form, and the material function as part of its substance. On a macro-level up to now the discourse does not present any overall developmental pattern across the years on any analytical level, the only exeption being the visual/intellectual operation of it. This operation has a tendency to become more intellectual across the years, but even this development is indicative rather than substantial[1]. As the form of the discourse is equally influenced by its visual/intellectual operation and by its verbal expression (level of design decision making), we can claim that the macro-level form of the discourse remains overall the same across the years .

The discourse within Greenwich (on a macro-level) is similar between the two educational levels (first, third years)on almost in every front (visual/intellectual form, material function and verbal expression). The discourse within the Bartlett is slightly rnore diverse not presenting a real pattern, indicating that the form and the substance of the discourse in different educational levels depends on idiosyncratic issues that exist within each year . We have said already that the Bartlett field work is more diverse, than the Greenwich one. So these general results probably reflect the initial field work choices.

This implies that the way architectural knowledge is communicated (apart from idiolectic differences , see Bartlett diploma) has almost the same verbal explicitness

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1. For example the Bartlett diploma discourse has a density rise only of 3% which cannot be perceived as really substantial.

across the levels within both schools. So verbal explicitness is not an issue that is acquired through development i.e. a priori first year is more verbally explicit and diploma less or vice versa , but through the structure of the transmission of architectural knowledge. This structure is due to the fact that a major part of architectural knowledge is communicated visually and as a consequence implicitly and this is influenced only by the process or method of transmission used. So architectural teaching does not have the ability to become fully verbally explicit. The results are very indicative on that front. The main obvious difference across the schools on the macro-level of analysis relates to the process. Design process is more visible at Greenwich than at the Bartlett, and that seems to influence the structure of the design language within each discourse.

On the micro-level the analysis presents some very interesting results in relation to the use of specific design domains within the discourse, across levels and between the two schools. On the level of transmission, we have already said that the domains of Representation and Process are used much more and in a different way at Greenwich than at the Bartlett. On the level of the verbal expression, transmission domains are mainly involved with process. The domain of Representation is factual as well, in the sense of presenting facts. Transmission domains operate mainly on an intellectual level and mainly interact between themselves and not with the architectural domains. Only three exceptions exist, in the Bartlett diploma where Process interacts with Context and in first year at Greenwich where Representation . interacts with Geometry Form and Process with Abstract Notions. The verbal expression analytical results confirm the above outcome, as they show that only the domain of Context at the Bartlett diploma is involved with process . At Greenwich apart from the domains of Representation and Process the domains of Geometry Form and Space Form are involved with design process in the first year. Only in the first year of Greenwich (with the exception of the Bartlett diploma)do architectural domains relate to design process , which as a result also rises the verbal explicitness of the discourse.

Architectural domains present a much more complex image. They are operating on a visual or intellectual level, and because of their inner properties, as we have seen, have an inability to operate on both levels simultaneously. Only the domain of Immediate Use is an exception to the above rule and it is characterised as a transitional domain and is variable at the level verbal expression. The domains of Context, Architectural Elements and Objects are mainly visual, the first being quite variable in its verbal expression, the second being mainly factual and conditional and the third being mainly conditional. The domains of Programme Use and Abstract Notions are mainly intellectual and conditional. The domain of Structure although

variable is rather visual, factual and conditional . The domains of Geometry Form and Space Form being visual and intellectual simultaneously are quite variable in their transmission but are mainly conditional. From the above description it seems that both visual and intellectual domains can be conditional but the intellectual domains are mainly conditional. The domain of Space Form set up conditions at all educational levels in both schools.

We have already discussed that the interactive syntagmatic plane is the plane of spatial sequential relationships. The domains that are mainly involved in the interactive(syntagmatic) plain in both schools are descriptive, factual and are setting the conditions along with other domains. The domains of Architectural Elements in both first years and Objects in the first year of Greenwich are more conditional than later on. That shows that probably they are playing a more substantial role in initiating ideas and solutions at the beginning of the educational process. The clarification of the role of the verbal expression of design domains will come within the next chapter. A careful reading of the data under analysis reveals that design domains can take part in spatial relationships and in parallel in the formation of relationships of oppositions and similarities. Their operation is much more complex than it initially appeared. It seems like conditional propositions are the ones that mainly structure relationships of opposition and similarity and set conditions for the project. They are the ones that initiate concept formation in design activity, as they set up design rules and reveal design intentions. The study of the relationships of opposition and similarity i.e. of conditional propositions will lead us to an in depth analysis of the cognitive function of the discourse.

The first tables have shown that the conditional propositions are evenly used in the discourse, that means that students of all levels are equally using the conditional propositions. Are first year students setting up the same kind of conditions and design rules to follow, as the third year students? Which design domains are participating in the decision making and how? For a clearer understanding of the cognitive function of the discourse in the next chapter we need to see how design rules are organised and how conditional propositions are structured, which design domains are involved in their formation and what 'kind' of relationships they form.

CHAPTER 8

THE COGNITIVE FUNCTION OF THE DISCOURSE

8. 1 INTRODUCTION

The content substance is the level of the cognitive function of the design language. In the previous chapter we investigated the verbal expression of the design domains and indicated the importance that conditional propositions hold, in revealing the structure at the level of decision making in the design discourse. A multiple text reading helped us to realise that the analysis of the conditional propositions will lead us to the study and classification of the relationships of functional contrast i.e. opposition and similarity.

In the cognitive function of the discourse lies the nature of the meaning of the design language. This level of analysis along with the level of material function (the syntagmatic plane) uncovers an important binary classification which gives to it its important function, that of communication. This level of analysis examines the relationships of functional contrast that design domains form amongst them. In that sense it deals with the systematic plane and the interaction of the syntagmatic and systematic plane of the design language [1].

The syntagmatic relationships as we have seen in the analysis of the material function of the discourse, are relationships of different domains or parts of the same domain whose coherence relies on something that exists in the text. They operate upon a horizontal dimension, (possibilities of combination, rules of combination).They are spatial relationships. The systematic plane consists of relationships of functional contrast i.e. opposition or similarity.These relationships operate upon a vertical dimension that linguists would call the paradigmatic dimension. These relationships are part of the systematic plane and in parallel they allow the interaction between the systematic and syntagmatic plane to take place. Their interaction will be the analytical aim of the present chapter.

In what follows we present the relationships of functional contrast discovered in the text under analysis .

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1. see Roland Barthes, "Elements of Semiology", p.p. 58 - 88, on Syntagm and System.

8. 2. RELATIONSHIPS OF FUNCTIONAL CONTRAST (#)

The domains that form relationships of functional contrast are the ones that mainly set up conditions. The relationships of functional contrast are formed within the same domains (binary oppositions, oppositions) or amongst different domains that share a common attribute, so the comparison, the similarity or the opposition can take place. The absence of a shared common attribute between two different domains that enter a relationship of functional contrast, creates a relationship of forced similarity or forced opposition. We therefore have three different 'kinds' of relationships of functional contrast :

A. BINARY OPPOSITIONS

These are oppositional pairs like small-big, public - private. They exist only within each domain. They can be present in the text as oppositional pairs, or the opposition can take place in absentia .

For example:

a....the open windows and the closed ones....(EL)

b....if you are talking about hiding and revealing .....(SF)

c....the amphitheatre is very small (big).....(GF)

Binary oppositions are going to be underlined in the text and grouped under the design domains to which they belong, I.e. stand - move is going to be classified under the domain of Immediate Function, above - below is going to be classified under the domain of Space Form etc. The dominant oppositional pair (if one exist) within each case study will be underlined.

B. RELATIONSHIPS OF OPPOSITION (# O)

Relationships of opposition are relationships of exclusion. Similar domains oppose each other through the existence of a binary oppositional pair that is not present necessarily in the text. ...the one being horizontal # and the other vertical (GF)...(horizontal-vertical)

...three conflicting elements # it would be better if they were two things (EN)...(complex-simple)

Some oppositions are straightforward, some are more complex in their structure. Sometimes two possible oppositional pairs exist behind a relationship of opposition.

...I wonder if your building is a core with things attached to it # or if it is a single building...BT (complex # simple, parts # whole)

Relationships of opposition between the same domains are setting conditions, as they are part of the conditional propositions.

In the text the domains in opposition will be showing **bold** having the symbol (o)

allocated in front of them. For example:

65.C IU o **It forces someone to <u>move</u>**

66.C IU o **instead of <u>standing</u>**

In the analysis first the domains in opposition will be presented, followed by the classification of their verbal expression , and the text will then follow. The binary opposition that underlies the relationship will be indicated by brackets ( ). For example:

65. C IU # 66. C IU

It forces someone to move # instead of standing (move # stand IU)

In the above example the binary oppositions exist in the text and they are underlined.

C. RELATIONSHIPS OF SIMILARITY (# S)

Relationships of similarity are formed between different domains. We have three different types of relationships of similarity:

1. (C.A.)

The domains appear to be grouped (classified) together through a common attribute. We can have more than two domains belonging to the same group of domains sharing a common attribute. This common attribute can be present or not in the text. For example:

...(You have to define) what kind of dialogue you are going to have (A) # between inside outside (SF) # between straight lines and curves (GF)# between femininity and masculinity (A)...

SF # GF # A

'Dialogue' is the common attribute that classifies all the above domains together I.e. Lines and curves with femininity and masculinity.

...I wanted to create a small space (SF)/a courtyard (EL) # My housing complex consists of a series of separate houses (BT)/ attached to each other (SF) # forming two very slight curves (GF)..

SF/EL # BT /SF # GF

'Small scale and individuality' is the common attribute (absent in the text) that classifies all the above domains together.

2. (F. S.)

Two different domains are forced into a relationship of similarity without sharing a common attribute. For example:

...the building itself (BT) # to act as a camera (O)...

BT # O (s)

The building itself is forced to a similarity with a camera. A common attribute does not exist.

Most of the times we have the participation of more than two domains in a relationship of forced similarity. This takes place whenever the main domains are part of a chain of spatial (complementary) relationships. For example:

....boundaries formed (SF)# by the cars parked (IU)/ on site (C)

SF # IU/C

'by cars parked on site' is the spatial relationship that interacts with the domain of SF. The absence of a common attribute that will connect the above domains, forces them to enter a relationship of forced similarity.

3. **(F. O.)**

Some relationships of similarity are formed trough a forced opposition. These relationships can occur amongst similar domains, but they often occur amongst dissimilar domains. These relationships seem oppositional on a first reading, but on a second reading some pairs of similarity are revealed . For example a relationship of forced opposition between similar domains will be :

...I did not want that to be a massive statement(SY) # I wanted it to be a relevant substantive gesture (SY) (massive#substantive, SY) ¯ SY # SY

On a first level the opposition is taking place between massive#substantive. This is a forced opposition behind which two similarities exist, massive=unsubstantive and small=substantive both of which are relationships of forced similarity.

For example a relationship of forced opposition between dissimilar domains will be :

...they are not elements in dialogue (O) they are just forms composed together (GF) ...

O # GF

On a first reading we have a forced opposition between elements and their composition. On a second reading, elements are perceived as distinctive units including formal qualities that lose their 'independence' when composed together. So the following pairs of forced similarity occur (elements= distinctive units # composition= whole uniform).

In the text the relationships of similarity will be presented in a similar way to the relationships of opposition, with the only difference being the symbol (s) allocated in front of them.

57.C EL s **It appears like a series of columns**

58.C SF * s **placed in front of the building having no connection with it**

59.C O s **that is a stage scenery**

In the analysis first the domains of similarity will be presented. The 'kind' of relationship of similarity i.e. (C.A.) or (F.O.) or (F.S) will also be noted. Whenever a common attribute exists which allows for the similarity to take place, the common attribute will be exposed. For the relationships of forced opposition or forced similarity the exact

pair in opposition or similarity will be exposed in brackets. For example:
57.C EL/ 58.C SF # 59.C O
It appears like a series of columns / placed in front of the building having no connection with it # that is a stage scenery (columns = stage scenery) (F. S.)

8. 2. 1 SIMPLE - COMPLEX RELATIONSHIPS OF FUNCTIONAL CONTRAST

Not all relationships of similarity share the same complexity. They form different levels of complexity. These depend on the number of different domains, of spatial relationships and of relationships of forced opposition or forced similarity that participate in a relationship of similarity.
Relationships of similarity form three levels of complexity:

1. (C1) A # B or A # B # C #D..... or A# B/B.....

The first level (simple) contains within it relationships between a domain that is similar to another domain. All relationships of opposition by definition belong to that category. All three types of relationships of similarity can belong to that category as well. For example:
..In some ways you need to have a spectator (A) # outside (SF)...
A # SF (spectator=outside) (F.C.) Level of complexity 1.

The relationship of similarity of (C.A.) is the only one that can take place amongst more than two dissimilar domains and still remain one of simple complexity as it forms straightforward classifications. For example:
...for us the staircase (EL) # the tower (EL) # its construction (SR) # and the view (SF) ...
EL # EL # SR # SF (c.a. dominant) Level of complexity (C1).

The (F.S.) or (F.O.) relationships can include numerically more than two domains and still belong to the simple classification, if one of the two domains participate more than once in the formed relationship. For example:
.....The arena is orthogonal (GF) / and is placed in the middle of a structural grid (GF)/I understand that you tried to have an ordinary and simple style (SY) (orthogonal + structural grid = ordinary + simple) C GF / C GF # C SY
The domain of GF repeats itself as part of a formal relationship.

2. (C2) A # B/C or A/B # C/B or A # B/C # D #E .....

The second level of complexity contains within it relationships of similarity (C.A. / F.S./ F.O) between a domain and several domains that have already formed a spatial

relationship amongst them, I.e. relationships of similarity amongst a domain and a spatial relationship or amongst spatial relationships. For example:
the facade during the day (EL)/to be reflective (SR) # and at night when it becomes dark outside (SF)/ to become transparent (SR) (reflective = solid # non reflective = transparent = facade) EL/SR # SF/SR
Relationship of F.O amongst two already formed spatial relationships. Level of complexity 2.

Relationships of similarity sharing a common attribute can belong to the second level of complexity when in the chain of similarities we have the participation of spatial relationships. For example:
..I wanted to create a small space (SF)/a courtyard (EL) # My housing complex consists of a series of separate houses (BT)/ attached to each other (SF) # forming two very slight curves (GF).. SF/EL # BT /SF # GF

3. **(C3)** A # B/C # D or A/B/C # D # E or A/B # C/D # E/F .....
The third level of complexity contains within it relationships of similarity (C.A. / F.S./ F.O) between two domains or one domain and a spatial relationship etc. that have already formed a relationship of similarity amongst them and a third domain or a third spatial relationship I.e. relationships of similarity between already formed relationships of similarity. For example:
(I was interested in Palladian architecture (HT) # in a very simple theatrical form (GF)) # (an amphitheatre expressed (BT)/ through the use (IU)/ of the courtyard (EL))...
HT # GF # (BT / IU / EL)
(an amphitheatre expressed (BT)/ through the use (IU)/ of the courtyard (EL)) enters as an already formed spatial relationship into the relationship of similarity with the domains of HT and GF. The domains of HT and GF have already formed a relationship of forced similarity amongst themselves. Here we have the formation of two forced relationships of similarity that create a level of complexity 3.
This level of complexity presents a large number of combinations of different 'kind' of relationships.

To conclude we can say that the relationships of opposition are by definition simple and that the relationships of similarity can form different levels of complex relationships involving from two to several domains within their structure. In all relationships of similarity apart from the 'kind of', their level of complexity I.e. C1, C2, C3 is going to be indicated in the analysis.

The analysis of the verbal structure of the discourse will take place at two levels:

A. At the first level, (micro-level) four case studies, one from each year and from each school will be presented (The complete text analysis and the presentation of the relationships of functional contrast, for each case study, can be found in the appendix (floppy disk). Only the design rules and conditions of each project will be presented in this chapter). The two first year case studies, one from the Bartlett and one from Greenwich will be individually discussed after being presented. Two third year case studies will follow. Some preliminary conclusions and observations will lead to the establishment of a more general analytical framework, that will allow for a more general comparison to take place between the first and third year case studies and between the Bartlett and Greenwich .

B. At the second level (macro-level)the total analytical results of all first year and third year case studies at both schools will be presented. (Note that the analysis of the text of all the first, third year case studies of both school will be presented in the appendix (floppy disk), and only the analytical tables will be included in the text).
A more general discussion will follow in relation:
1. To the individual domains participating in the relationships of functional contrast.
2. To the level of complexity of the relationships of similarity across the years and the schools.
3. To the predominantly visual or intellectual relationships across the years and the two schools.
4. To the design 'themes' and rules used within each of the case studies.

8. 3 MICRO - LEVEL OF ANALYSIS

All four case studies (from both schools) under discussion, are chosen from the final reviews. They are the ones that present the highest level of complexity within each level. A presentation of design rules for each case study and a discussion on the functional relationships found in the text will follow.

8. 3. 1 FIRST YEAR LEVEL

BARTLETT SCHOOL OF ARCHITECTURE

THIRD TERM PROJECT: AN OPEN PROPOSITION

DISCUSSION ON PROJECT G
(see floppy disc, file: 1. B. 1st year analysis p.p. 30-35)
The text is multilayered. Some domains enter simultaneously into relationships of combination, opposition and similarity (i.e. 58. SF) . All binary oppositions belong mainly to the domain of Geometry Form. The domains of Space Form and Style follow. Relationships of opposition do not exist. Relationships of similarity are complex. The domains of C, GF, SF, SY, PU, HT, BT, IU, EL,Odomains are taking part in them. Half of them belong to the first level of complexity (7 out of 14) and the other half to the second level of complexity (6) and third level of complexity (1).

All conditions and rules are set through the use of relationships of functional contrast. The central 'theme' as such does not exist in the above case study. The student has a starting 'theme' but this is challenged later on. Design rules are created that are informing and transforming each other. In sequence these rules are:
1. The theatre is open and allows for experimental activities and interactions.(1GS) (EN)
2. The student is using Paladian architecture in a typological way . Along with it come the rule of symmetry and the use of a simple theatrical form. (2GS) (EX)
3. Taking the design rule 'open' (from the first condition) into account, the student creates an amphitheatre expressed through the use of a courtyard . (2GS) (EX)
4. On a first reading the project excludes all asymmetrical relationships . On a second reading the student is introducing an a-symmetrical element in the building i.e. a twisted pavement. (3/ 4GS) (EN)
5. The proposal remains formally simple as the gesture of the twisted pavement remains quite discreet. (5-7GS) (EN)
6. The student introduces the a-symmetrical element in the project to establish a conversation between the building, it's interior space and it's context. (6/8GS) (EN)
7. The 'false' colonnade plays the role of a stage-set in the symmetrical front

elevation . (9/10GS) (EX)

8. Apart from the 'twisted' pavement a second element is challenging the rule of symmetry within the project; that of the different heights and volumes existing within the building. (11/12GS) (EN)

9. The student gives more importance to the front elevation than to the rest of the building. As a consequence for her the front elevation is a very strong symmetrical element that overpowers the volume articulation of the building. (13/14 GS) (EN)

Paladian architecture(2GS) is the one that is used at the level of typology as a visual reference to introduce rules and concepts. Some of the initial conditions are not challenged throughout the project like the rule of openness (1GS) which remains a stable condition of the building throughout the discourse. Some are transformed like the rule of simplicity i.e. from being equivalent to symmetry it becomes equivalent to discreet (5/6GS). Some are challenged, like the rule of symmetry (3/4/8GS). New rules are added to the project like the one of false representation (stage set)(8GS) and the relationship of the building to its context (7GS).

The 'theme' introduce a typological reference which becomes a starting point for visual and intellectual rules to be altered and transformed. Every new condition that is introduced on a visual level is tested on an intellectual level and vice-versa against the already existing condition. If the new one does not fit it is rejected or it is taken on board transforming the pre-set conditions. The process that leads from one rule to another is explicit and implicit (which rules fall within the explicit and which within the implicit category will be further researched). Visual conditions are mainly discussed on the level of geometrical and spatial configurations and the discourse functions at an intellectual level.

GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE ARCHITECTURE

FINAL REVIEW. PROJECT: A FILM CLUB IN SOHO

DISCUSSION ON PROJECT G'

(see floppy disc, file: 4. G 1st year analysis p.p. 178-184)

In this case study the relationships of binary oppositions are formed by the domains, of SR, IU, GF, SF, O, and A and the dominance belongs to the domain of Objects. Two relationships of opposition exist, between the domains of SF and GF. Relationships of similarity have a more substantial presence within the discourse than the relationships of opposition. Additional domains take part in them, these being the domain of Architectural Element mainly and the domains of C, IU, R, SR . 7 relationships of similarity belong to the first level of complexity, 7 to the second level of complexity and

1 to the third level of complexity.

All conditions and design rules are set up by relationships of functional contrast and mainly by relationships of similarity. In sequence these rules are:

1. The initial theme of the project is 'compression'. (1G'S) (EX)
2. The student transfers the compression existing in a doorway and a window, between two cars etc. in a model. He expresses compression by using distorted linear elements. (1/2/3G'S)(EX)
3. The model introduces the themes of the linear movement and the layering of space to the project. (4/5G'S)(EN)
4. The heavy space on the drawing becomes a staircase for the student. (6G'S)(EX)
5. The dense lines on the drawings become boundary conditions . (7G'S)(EX)
6. The 'flying' scaffold introduces a third theme to the project that relates to the city, that of the walls coming in and compressing the building. (8/10G'S)(EX)
7. The student expresses that theme by using more vertical lines (more dense = more tense = more beams) in the building design. These are going to help him to keep metaphorically the city apart. (9/11G'S)(EX)
8. For the student the walls are compressing and bending the beams . (12/13G'S, 1G'O)(EX)
9. The tutor suggests to the student to express the tension in his building by the visual appearance of something crumbling. (14G'S)(EX)
10. For the tutor the successful expression of the notion of keeping the city apart has priority over the function of the building. (15G'S)(EX)

The central 'theme' is that of compression.(1,2,3G'S). The translation of the visual to the intellectual is quite apparent throughout the discourse i.e., from images to the model (1/2/3 G'S), from drawings to architectural elements (6G'S) and to spatial concepts (7G'S) and is the one that transforms and introduce the themes. Conditions set in the beginning are enriched by new conditions introduced in the project, like the layering of the space (4G'S), and the city walls coming in and compressing the building (5G'S), adding complexity to the discourse.

The use of an extra-architectural 'theme' along with the use of relevant images, becomes the starting point for visual transformations to occur. Conditions are not challenged but are transformed through the interaction that takes place between the visual and the conceptual level. Visual conditions are clearly described and defined and are the main ones that go through transformations creating the conditions for conceptualisation to occur.

8. 3. 2 THIRD YEAR LEVEL

BARTLETT SCHOOL OF ARCHITECTURE

THIRD TERM PROJECT: MARY ROSE MUSEUM

DISCUSSION ON PROJECT H

(see floppy disc, file: 2. B 3rd year analysis p.p. 85-91)

The analytical reading of the text becomes more complex as more domains are taking part in the formation of the relationships of functional contrast than in the first year discourse. Binary oppositions are formed within six domains, these being the domains of IU, PU, GF, SF, SY, BT. The dominant binary oppositions belongs to the domains of IU and SF. Slightly more domains are involved in the formation of the relationships of similarity,the additional domains being the domains of C, BT,and A. Only two relationships of opposition exist. These belong to the domains of IU and PU. 4 relationships of similarity belong to the first level of complexity, 11 to the second level of complexity and 1 to the third level of complexity.

Conditions and rules are set by the relationships of functional contrast. The starting point for this project or the 'theme' is of an extra-architectural nature and it derives from the event of the ship's discovery:

1. The student suspended Mary Rose above the water , so it looks like emerging from it. (1-2HS) (EX)
2. The student imitated the old harbour structures to design a steel bridge for the building. (2/3HS) (EX)
3. The water under the main hall of the building is visible and functions like a canal. (4HS) (EN)
4. The circulation ramps are encircling the exhibit hiding most parts of it, allowing only fragments of it to be visible. (5/6/12-2HS) (EN)
5. The proposal is too permanent and too solid for the tutor. It does not express the tension and the movement of the ship's uplifting. (7HS)
6. The student to create movement introduces a diagonal line in the plan and round ankles in the corners of the platforms. (8/9-2HS, 1-2HO) (EN)
7. The student introduces the above elements with the intention to create an informal space as well. (10-2HS) (EN)
8. The tutor believes that these elements are confusing the circulation instead of offering informality. A museum is not about confusion but about eligibility. (11-2HS, 2-2HO) (EN)
9. The student designed a formal square in front of the building that allows visibility. (13-2HS) (EN)
10. The design of the piazza is not successful for the tutor. It should give the feeling of

approaching a memorial. (14-2HS) (EX)
11. The tutor believes that the building's heroic structure is reducing the importance of Mary Rose . The display of the exhibit becomes more important than the exhibit itself. (15/16-2HS) (EN)

The project starts with an extra-architectural reference. The reference to the ship's discovery (1-2HS). This reference is set first on the intellectual level and then it is translated to the visual level. For this translation the old harbour structures(2-2HS) are used as a typological visual reference. New rules are introduced that are not necessarily connected to the initial theme. Diagonal lines are introduced to reinforce movement around the exhibit (8/9-2HS). Different formal elements than the symmetrical orthogonal ones are introduced as well to create an informal atmosphere inside the building (10-2HS). The effectiveness of the above is challenged by the tutors. The approach to the building seems to set up new rules that are not clear(11.14HS). An opposition exist between the building and it's internal organisation (15,16HS).

The student is setting up his conceptual rules which are challenged on the visual level (actual design) by the tutors. Apart from their starting point the rules (extra-architectural and typological references) which mainly relate to the overall building articulation , relate to issues of visibility, formality and circulation in relation to the interior space articulation. The project does not have an overall central theme that brings all the rules together . Rules about approach and structure relate to the ship's uplifting, but visibility, formality and circulation relate to it's interior space articulation.

GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE

FINAL REVIEW. PROJECT: A FILM SCHOOL IN SOHO

DISCUSSION ON PROJECT 2H''

(see floppy disc, file: 2. G 3rd year analysis p.p. 247-257)
More domains are taking part in the formation of the relationships of functional contrast than in the first year discourse. Binary oppositions are formed within eight domains, these being the domains of SR, IU, PU,C, GF, SF, A,R. Most binary oppositions belong to the domain of SF. We have only four relationships of opposition between the domains of A, SF and GF. Additionally the domains of EL and O are involved in the formation of relationships of similarity. 6 relationships of similarity belong to the first level of complexity, 15 to the second level of complexity and 3 to the third level of complexity.

All conditions are set through relationships of functional contrast. An extra-architectural theme forms the starting point and dictates the overall structure of the project. This relates to the film being the product and containing a process within it:

1. For the student the film is the representation of our reality , it is unreal. Shafts bury Avenue is like the film while the site looks fragmented and more real. (1/3-2H'S) (EX)
2. In the conceptual model Shafts bury Avenue is the skin, the film and the site are the concrete slab and the process. (2-2H'S) (EX)
3. The functions of the film school that need isolation are placed in the concrete slab (process) and between the concrete slab and the skin the more social space are allocated. (4/10-2H'S)(EX)
4. The skin is the result of the film and forms the public circulation for the school (6-2H'S) (EX)
5. Within the grid (that exist between the concrete slab and the skin) the more informal areas are allocated (7-2H'S)(EN)
6. The rooms for the film production are isolated, rigid, closed, dark . The intention is for these spaces to have an immediate contact with light and life (8-2H'S) (EN)
7. The function of the spaces are incorporated in the circulation (9-2H'S) (EN)
8. In the articulation of spaces, visibility is offering movability i.e. cafe and open staircase (11/14 -2H'S)(EN)
9. The 'skin' represents the film in a metaphoric way. The 'skin' contains the film space perceived as a product . (12-2H'S) (EX)
10. The concrete slab has an elevation that is articulated by the use of a grid structure protruding out. (13-2H'S) (EX)
11. The concrete slab (editing rooms, process) is not visible from the outside. As a result the building becomes an internal statement and is quite monolithic for the tutor. (15/16-2H'S) (EN)
12. From the beginning the skin was reflexive for the student. The intention is that the two parts of the building (concrete slab - skin) are kept apart engaging into a conversation. (17/18-2H'S)(EN)
13. The tutor believes that the conversation between the two parts of the building is not formally integral. The one side is too much articulated in relation to the other one. The tutor suggests that a passageway between the two parts could offer the possibility of a more successful dialogue. (18/20 -2H'S) (EN)
14. The glazed facade could work like a broken screen for the tutor. This will allow for a visibility of the inner spaces of the building. (19-2H'S) (EN)
15. For the tutor the wall that is part of the 'skin' should work as a kind of interpenetration and not like a fix barrier. It can create a tension between two things (21/22 -2H'S) (EN)
16. The wall (the 'skin') should extend to be visible from Charring Cross. This extension

could offer between other things an entrance to the garden. (23/24-2H'S) (EN)
18. The wall could become an interface, a membrane. (25-2H'S)(EX)
19. The structure of the building transforms from a beam to a bookshelf, taking a more active part in the making of the interior space. (26-2H'S)(EN)

In the above case study there is a close interaction between the intellectual rules and their visual expression. The 'theme' is extra-architectural (the split between process-product) and sets up the general framework under which the rules operate. The project starts off from a site investigation (1,2H'S) and moves into a model where issues of structure and materiality (concrete slab/skin) are introduced and translated into the programme (4H'S). The cinematic split is expressed by two different parts of the building The dialogue between the two parts of the building, between the process and the product is the one that introduce new rules to the project. These new rules are mainly formal and spatial.

The extra-architectural theme introduce new architectural rules in the project but is never challenged. The new rules are formed primarily on the visual level and are developed by the interaction that takes place between the visual and the intellectual.

8. 3. 3 DISCUSSION OF THE COGNITIVE FUNCTION OF THE DISCOURSE ACROSS THE CASE STUDIES

No general conclusions can be drawn from this level of analysis. The four case studies help us to focus and set up a general framework, under which a more general comparison (taking into account the 36 case studies involved) across the schools and across the two different educational levels can take place.

8. 3. 3. 1 A COMPARISON ACROSS THE EDUCATIONAL LEVELS - A FRAMEWORK / FROM SIMPLE TO COMPLEX STRUCTURE

All the conditional propositions of the four analysed case studies are set by relationships of functional contrast, these being binary oppositions, relationships of opposition and similarity. The opposite is not true as binary oppositions can be part of any proposition and not necessarily of the conditional ones. The relationships of functional contrast are crucial because it is actually through them that architectural concepts are formed and that architectural discourse is possible.

As we have already stated, relationships of opposition are of simple complexity.
In relation to the level of complexity of the relationships of similarity in both schools we

have:

In the first year Bartlett the presence of 7C1, 6C2, 1C3 relationships of similarity.

In the third year the presence of 4C1, 11C2, 1C3 relationships of similarity.

In the first year Greenwich the presence of 7C1, 7C2, 1C3relationships of similarity.

In the third year the presence of 6C1, 15C2, 3C3relationships of similarity.

It is obvious from the analysis of the four case studies that the level of complexity of the discourse between the first and third year in both schools changes. It becomes more complex in the third year as more domains and spatial relationships are participating in the formation of the relationships of functional contrast .

The relationships of similarity tend to rise in their level of complexity, from relatively simple ones, such as:

1.GS 14. C SF # 15. C PU

I wanted an open space # that would allow for experimental activities and interactions

Open space # experimental activities (F.S.) (C1)

where we have a straightforward similarity, and developing into more complex ones:

12HS 1.C SF / 2.C C # 3.C PU

Mary Rose is suspended/ above the water # so it could look like emerging from it (suspended= emerging) (F.S.) (C2)

where one domain is not simply relating to another domain but to a spatial relationship.

The change in the level of complexity needs to be confirmed by a more general analysis.

8. 3. 3. 2 A COMPARISON ACROSS THE SCHOOLS - A FRAMEWORK ENDOSTRUCTURE VERSUS EXOSTRUCTURE

Reading through the case studies we realised that relationships of functional contrast apart from their different level of complexity can be classified within two broad categories. These are of abstract(endostructure) and relational (exostructure)nature[2]. Architecture posses a certain (endo)structure. This contains specific internal rules and laws . These rules and laws are formed within an ordered and extended context. They are formed internally (endo) by the way architectural domains are structured, or externally by reference to other objects (exo), architectural (i.e. type, historical type)

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2. The terms are borrowed from Chris Sinha "Language and representation" Publ. by Harvester-Wheatsheaf, New York 1988, Chapter 5, 'Context: Background, Presupposition and Canonicality', p.p.164-207. For Chris Sihna the dimension of endostructure versus exostructure can serve as an important organizing principle for the analysis of background knowledge, representation and signification.

or not (of a representational nature) that posses by analogy similar rules and laws, that means that they possess their own endo and exo structure .

The first category of endostructural relationships refers to the internal relations of architectural elements or design domains. The second category of exostructural relationships refers to their relational context. All architectural domains I.e. SR, IU, PU, C, GF, SF, HT, SY, EL and BT can form both type of relationships . When they relate to the domain of R or to extra-architectural domains they form a priori exostructural relationships . Representation and extra-architectural objects or concepts possess their own endo-exo structure which does not necessarily coincide with the endostructure of the architectural proposal within which they are used.
Additionally, when the domains of HT, EL and BT are used in a typological sense, for their endo-exo structural qualities , then they form exostructural relationships I.e.:
2BS we avoided having panels (EL) at the corners of the stand (SF)
1CS the tower (EL) that offers the possibility of a view (SF)
In the first example 'panels' are used as part of the structure of the stand. They belong to the internal architectural rules of the proposal. In the second example 'tower' is introduced as a typological element, as an external import to the project.

The endostructural relationship acknowledges and identifies what the domain is, and is concerned mainly with the differences that exist within the domain or with the similarities and differences that exist between different architectural domains. It is concerned with binary oppositions or oppositions like inside/outside, vertical, horizontal etc. Binary oppositions and oppositions are always endostructural. Relationships of similarity at all levels of complexity can be endostructural, as long as by relating, they structure their own endostructural rules I.e.:
5.GS I thought it was a proper colonnade (EL) # placed in front of the building, having no connection with it (SF) (F.O.) (C1)

In the second category of exostructural relationships an architectural domain or a spatial relationship relates to an architectural element (typology) or to an extra-architectural concept or element. These relationships are not about the internal relationship of the architectural domains but about the relationship of the architectural domains to an architectural object or not of a representational nature (it can be an extra-architectural concept, that in order to be used is translated visually) that is disclosed in front of them or exists outside them. The exo-structural relationships of similarity on this level take place between the architectural domains and the type, object or concept , I.e.:

2G'S 16.C GF # 18.C O/19.P R

vertical, distorted, linear elements # did you use compression/to structure your model(distorted elements= are compressed)(C2)

Compression is expressed visually by distorted elements. The exostructural relationship allows the relationship of a concept and it's visual representation to take place.

In both categories of relating (endo-exo) the interaction between the visual and the intellectual takes place Within the endostructural relationships there is a predominance of the intellectual level (systematic) and within the exostructural relationships there is the predominance of the visual level (syntagmatic).

Within the system (endostructural relationships) we have relationships that lose their metaphoric qualities because they are used too often and they turn into "universal rules'. We name these relationships 'fixed'. For example:

3.GS 37. C SY # 40. C GF / 41.C GF

so it is quite discreet # by twisting something / that would not be so complex (C1)

Discreet = simple, and in opposition non discreet=complex

We have a relationship of similarity that is formed through a relationship of forced opposition. The metaphor discreet=simple has lost it's meaning because it is used very often within the current architectural paradigm.

It can be that the endostructural relationships are more predominant than the exostructural ones (system/conceptual or syntagm/ visual) in the discourse. At least in the case studies examined up to now it seems like system is predominant at the Bartlett (most relationships are endostructural) and syntagm is predominant at Greenwich,

(relationships of similarity are mainly exostructural). More data will need to be taken into account to be able to arrive to a more general conclusion.

8. 3. 3. 3. INITIAL DESIGN 'THEMES" AND THE STRUCTURE OF DESIGN RULES IN THE PROJECT / COLLAGE VERSUS PARTI

In the four case studies under examination all initial 'themes' belong to the syntagmatic plane, as they are formed by exostructural relationships. Case study G uses Palladio in a typological way, case study G' the extra-architectural concept of compression and it's formal interpretation, case study H the old ship's discovery (archaeological connotations) and the old harbour structures in a typological way and case study H' the extra-architectural cinematic concept of Process (editing)/ Product (film)) and their relationship. The design rules that follow the initial 'themes'

belong to the syntagm or the system (it depends on each case study). In the case studies under observation, it seems like systematic rules are more open to challenges and alterations, thus allowing the parts to form the whole and they operate mainly on the conceptual level. The syntagmatic rules create a priori similarities and are mainly transformational. They allow for a more global approach and they operate on the visual level.

In all four case studies we have the simultaneous presence of both endo-exo structural approaches and the absence of a central idea or parti that ties all the design rules together. The rules come together in a form of collage as they are not complementing each other . A more general analysis of design rules within the different case studies is necessary if we want to draw some more substantial conclusions.

For the macro-level analysis some general tables will be presented. These will relate to the participation of the different domains in the relationships of binary oppositions and similarity, to the classification of the relationships of opposition and similarity into simple and complex ones, and to endostructural and exostructural relationships. A discussion on design 'themes' and rules will then conclude the chapter.

8. 4 MACRO - LEVEL OF ANALYSIS

The presentation will take place in three parts. The first part is more focused. It is about the participation of individual domains in the relationships of functional contrast. The second part is about the level of complexity and quality of the relationships of functional contrast. The third part is about the design 'themes' and rules used and discussed within the case studies.

8. 4. 1 PART 1

THE PARTICIPATION OF THE DESIGN DOMAINS IN THE RELATIONSHIPS OF FUNCTIONAL CONTRAST

For this level of analysis all the domains that participate in the relationships of binary oppositions, and oppositions and similarities, were counted for all first year and third year projects in both schools . Relationships of opposition are simple and mainly endostructural, formed between two similar domains, and relationships of similarity are endostructural or exostructural, simple or complex, and formed between two dissimilar domains or spatial relationships.

OPPO SITIO NS
BART LETT 1ST YEAR

D.D.	A	B	C	D	E	F	G	H	I	TOT	%
SR		3						1		4	2.4
IU	4	4	5	1	2	3		4	1	24	14.4
C		3								3	1.8
PU			1					9		10	6
GF	11	3	7	3	4	5	9	4	3	50	30.1
SF	3	13	4	5	5	5	5	10	12	62	37.3
HT				1						1	0.6
SY							3			3	1.8
EL		1	1							2	1.2
BT			1		1					2	1.2
M											
R					1	3				4	2.4
TR											
CR					1					1	0.6
O											
A											
TOT										166	100

OPPO SITIO NS
BART LETT 3RD YEAR

D.D.	2A	2B	2C	2D	2E	2F	2G	2H	2I	TOT	%
SR				6	5	2			2	15	5.4
IU	2	4		5	2	10	1	15	2	41	14.8
C					1					1	0.4
PU	3	5	2	3		1		7	4	25	9
GF	11	17	11	14	5	3	4	3	4	72	26
SF	7	8	17	6	3	17	18	13	12	101	36.6
HT											
SY	2				4			3	2	11	3.9
EL											
BT		1	1					1		3	1
M											
R				3	1					4	1.4
TR					3					3	1
CR									1	1	0.4
O											
A											
TOT										276	100

OPPO SITIO NS
GREEN WICH 1ST YEAR

D.D.	A'	B'	C'	D'	E'	F'	G'	H'	I'	TOT	%
SR			1	2		1	1	3	6	14	4.9
IU	1	6		2		2	1		5	17	6
C											
PU					7	1		1	1	10	3.5
GF		5	31	13	17	2	10	4	2	84	29.6
SF	14	14	9	6	22	9	9	18	13	113	39.9
HT											
SY						5			2	7	2.4
EL											
BT											
M											
R	3			3					2	8	2.8
TR			1							1	0.3
CR											
O		3					13		3	19	6.7
A			3				7			10	3.5
TOT										283	100

OPPO SITIO NS
GREEN WICH 3RD YEAR

D.D	2A'	2B'	2C'	2D'	2E'	2F'	2G'	2H'	2I'	TOT	%
SR	2			5	5		2	3	1	18	4.4
IU		1		4	2		6	12	6	33	8.2
C								1		1	0.2
PU		2		6	2		1	13	12	46	11.4
GF	10	14	6	14	11	11	9	12	3	90	22.3
SF	17	8	11	47	7	6	23	26	38	183	45.5
HT											
SY											
EL											
BT				1					1	2	0.5
M											
R		1	2		1	1		3		8	1.9
TR			1							1	0.2
CR		1								1	0.2
O	2			1						3	0.7
A	4		2	2		1	1	6		16	3.9
TOT										402	100

TABLE 8.1 : RELATIONSHIPS OF OPPOSITION

8. 4. 1. 1 BINARY OPPOSITIONS

THE READING OF THE TABLES (Table 8.1

Within every year and every case study the relationships of opposition are counted (binary oppositions and oppositions). The percentage of participation of each domain within the relationships of opposition is calculated (last vertical column) . Any domain with a participation greater than 6.25% (100: 16 the possible active domains in the field of relationships of opposition =6.25) will be perceived as important for the discussion. The domain of process is excluded from these tables as it does not form any conditional propositions and does not participate in the relationships of functional contrast.

DISCUSSION

Relationships of binary oppositions have a continuous presence throughout the discourse and repeat themselves in the different case studies . For example the binary oppositions of small - large or inside - outside can be found in numerous case studies, used in the same way in both Schools of Architecture.

Two main domains form relationships of binary opposition and opposition throughout the discourse, the domains of Geometry Form and Space Form. (31GF, 37.3SF 1st year Bartlett) (26GF, 36.2SF 3rd year Bartlett)(29.6GF, 39.9SF 1st year Greenwich)(22.3GF, 45.5 3rd year Greenwich). The domains of Immediate Use and Programme Use follow with a substantial presence mainly in the third year discourse (14.8IU, 9PU 3rd year Bartlett) (8.2IU, 11.4PU 3rd year Greenwich). As an exception the domain of Immediate Use has a noticeable presence in the first year at the Bartlett 13.4% and the domain of Objects in the 1st year at Greenwich 6.7%.

The main binary oppositions used within the architectural domains of IU,PU,GF and SF throughout the discourse are:

Within the domain of IU:

flexibility/rigidity, functional/non functional, entrance/exit, stand/move, going up/going down, going in/going out, arriving/leaving, empty/occupied, visitor/inhabitant,

Within the domain of PU:

private/public, reality/utopia, dead/lively, individuality/socialisation, expensive/cheap, alienation/familiarity, control/free, formal/informal, eligible/confusing, innocent/sinister, interactive/isolated, traditional/modern,

Within the domain of GF:

big/small, symmetry/asymmetry, organised/unorganised, simple/complex, dominant/subordinate,

SIMIL. ARITI EB
BARTLETT 1ST YEAR

D.D.	A	B	C	D	E	F	G	H	I	TOTAL	%	T.D.D	%
SR	1	2	2					2	1	8	3	36	22.2
IU	1	7	2		3	5	3	2	5	28	10.8	104	26.9
C		1	1				3	4	1	10	3.8	26	3.8
PU	1	2	1				1	6		10	3.8	25	3.8
GF	3	5	17	3	9	15	12	3	9	76	28.7	164	44
SF	1	9	2	1	2	1	11	6	13	45	17.3	91	49.4
HT			1	6			3			10	3.8	17	58.8
SY		1								1	0.3	1	100
EL		2	6		2	5	7	2	5	29	11.2	81	35.8
BT		3	5	1	1	3	2	5	4	24	9.3	34	70.6
M					1					1	0.3	6	16.6
R					3	2				5	1.9	37	13.5
TR					3					3	1.2	35	8.5
OR			4	1	1	1				7	2.7	43	16.3
O						1	1			2	o.7	2	100
A													
TOT										259	100		

SIMIL. ARITI EB
BARTLETT 3RD YEAR

D.D.	2A	2B	2C	2D	2E	2F	2G	2H	2I	TOTAL	%	T.D.D	%
SR	4	2		6	7	4			2	25	6.7	112	22.3
IU	4	8	2	6		5	2	5	10	42	11.3	174	24.1
C	4	1	5		6	1	6	3		26	7	78	33.3
PU	7	4	2	5	1	2	3	7	9	40	10.7	72	55.5
GF	2	15	10	6	4	3		6	17	63	17	123	51.2
SF	5	12	12	1	2	16	16	16	15	95	25.5	167	56.8
HT		2			1		1			4	1	4	100
SY	2				2			2	2	8	2	12	66.6
EL	5	5	6	5		3	1	1	1	27	7.2	79	34.2
BT	6	4	5	3	2	1	2	6	1	30	8.1	38	79
M												5	
R												47	
TR												31	
OR					2			1		3	0.8	39	7.6
O							6			6	1.8	4	100
A								2		2	0.5	2	100
TOT										371			

SIMIL. ARITI EB
GREENWICH 1ST YEAR

D.D.	A'	B'	C'	D'	E'	F'	G'	H'	I'	TOTAL	%	T.D.D	%
SR	1	2	11	1	4	2	1	7	14	43	9.7	87	49.4
IU	3	5	2	5	1	4	2	2	10	34	7.7	62	54.8
C	2	4		2		4	1	1	2	16	3.6	48	33.3
PU					7	2		1	6	16	3.6	26	61.5
GF		5	33	21	7	3	6	8	3	86	19.5	176	48.8
SF	13	8	8	9	17	9	7	11	7	80	18.1	168	47.6
HT			1	1						2	0.4	3	66.6
SY						1			1	2	0.4	5	40
EL	10	3	11	2	7	4	9			46	10.4	87	52.8
BT	2		2	2	1	2				9	2	11	81.8
M												4	
R		3		3	1	2	2		1	12	2.7	188	6.3
TR				2						1	0.2	25	4
OR	1				1					2	0.4	41	4.8
O	1	5	14		7	10	10	5	1	53	12	91	58.2
A	9	5	10	2		5	4		4	39	8.8	62	62.9
TOT										441	100		

SIMIL. ARITI EB
GREENWICH 3RD YEAR

D.D.	2A'	2B'	2C'	2D'	2E'	2F'	2G'	2H'	2I'	TOTAL	%	T.D.D	%
SR	3	2	2	5	10	1	7	8	7	45	8.9	120	37.5
IU		2	1	6	4	4	3	9	9	38	7.5	137	27.7
C	2	1	1	13			4	11	3	35	6.9	108	32.4
PU		3	2	8	6			11	8	38	7.5	74	51.3
GF	15	13	2	8	7	3	8	8	8	72	14.3	176	41
SF	11	18	11	24	11	6	13	11	25	130	25.8	289	0.4
HT									1	1	0.2	6	16.6
SY				3	1					4	0.8	8	50
EL				4	4	2	4	7	4	25	4.9	94	26.6
BT	4	2	1	6	4			1		18	3.6	34	53
M												5	
R	1		4							5	1	131	3.8
TR			1							1	0.2	27	3.7
OR				1	1					2	0.4	49	4.1
O	14	6	1	9		2	5	10		47	9.3	80	58.7
A	7	2	2	13		2	2	8	7	43	8.5	102	42.2
TOT										504	100		

TABLE 8.2 : RELATIONSHIPS OF SIMILARITY

different/similar, strong form/weak form, vertical/horizontal, straight/curved or bend, flat/volumetric, whole/fragmented, monolithic/articulated,
Within the domain of SF:
inside/outside, open/enclosed, solid/void, transparent/non transparent, visible/obscure, crammed/sparse, hidden/revealed, back/front, above/below, underground/overground,
narrow/broad, discreet/imposing, dark/light, depth/shallow, spacious/dense,

Some binary oppositions repeat themselves in the form of synonyms. Some binary oppositions belong to two different domains i.e. small-big can relate to form or can relate to space. It seems like binary oppositions are autonomous, like a game with its own rules, and cannot be influenced by any transmission differences existing between the two schools or architectural differences existing between different case studies. Their participation in the formation of the systematic plane varies as the use of the domain of Geometry Form drops from first to third year in both schools and the domain of Space Form raises between the first to third year in both schools. But their content and form remains stable throughout the discourse. The binary oppositions are part of a contract that everyone needs to accept in order to communicate architecturally.

8. 4. 1. 2 SIMILARITIES

THE READING OF THE TABLES (Table 8.2)

Within every year and every case study the relationships of similarity are counted separately. The percentage of the participation of each domain within the relationships of similarity follows. Any domain's participation greater than 6.25% (100: 16 the active domains in the field of relationships of similarity =6.25) will be perceived as substantial for the discussion. The last two columns of every table of similarity refer to the participation of each domain per se within the relationships of similarity i.e. in the first year Bartlett out of the total existing domains of Structure in the discourse (36) only 22.2% is participating in the relationships of similarity. This account will help us to access the structure of each domain.

DISCUSSION

Many more relationships participate in the formation of relationships of similarity than in relationships of opposition. Although the domains of Geometry Form (1st year B. 29%, 3rd year B. 18%, 1st year G. 19.3%, 3rd year G. 14.7%) and Space Form (1st year B. 15.8%, 3rd year B. 24%, 1st year G. 20.6%, 3rd year G. 26.3%) are again the dominant ones, they are complemented by other domains as well. In the first year the domains

of IU (10.6%), EL (13 %),BT(6.3%) and in the third year the domains of SR (6.4%), IU (11.7%), C (8%), PU (11.7%) EL (6.3%), BT(8%) at the Bartlett have a substantial participation in forming relationships of similarity. In the first year the domains of SR (9.2%), IU (7.7%), EL (10.5%), O(11.3%) and A (8.3%) and in the third year the domains of SR (8%), IU (9%), C (6.8%), PU (6.6%) O (9%) and A (9.2%) at Greenwich have a substantial participation in forming relationships of similarity.

These domains are the architectural ones that participate in the formation of the relationships of similarity. It is indicative that in both third years we have the participation of all the important (in relation to their presence in the discourse) architectural domains in the formation of the relationships of similarity i.e. SR, IU, C, PU, GF, SF. Apart from these we find that the domains of EL and BT in the Bartlett in both years and of the domains of EL in the first year and O and A at Greenwich in both years, all participate in the formation of design rules and conditions.

The domain of EL has a substantial participation in the formation of relationships of similarity in both first years. The above indicates that the fragments of visual typological knowledge are very important in setting up rules and conditions in the first year discourse.The domain of BT although absent from the discourse (very low participation, that's why it was not examined) appears to have a substantial participation in the creation of relationships of similarity (exostructural, belonging to the syntagm) in the Bartlett discourse on both levels. This is perceived as indicative of the existence of a broader typological approach within the Bartlett not necessarily of the historical type. The domains of O and A create conditions and rules in both levels at Greenwich, participating in the formation of exostructural relationships, and this is indicative of the extra-architectural approach that exists within Greenwich.

8. 4. 1. 3 THE COGNITIVE FUNCTION OF THE DOMAINS

Which are the domains that are more active participants of the systematic plane than others? Up to now we have seen the importance and the function of different domains within the design discourse. We have seen also their participation in the syntagmatic (interactive) plane. But their participation in the systematic plane does not depend on their numerical presence within the discourse. The participation of the domains in the relationships of similarity was counted against the overall presence in the discourse of the domains themselves (see final columns of the tables of similarity). The domains that had more than a 50% presence within the relationships of functional contrast, were perceived as playing an important role in the formation of the systematic plane, whilst the domains that had less than 33% (100: 3) presence within

the relationships of functional contrast were perceived as playing an important role in the formation of the syntagmatic plane.

	DENSITY				MATERIAL				CONITIVE G			
	BART		GREEN		BART		GREEN		BART		GREEN	
D.D	1st	3rd	1st	3rd	1st	3rd	1st	3rd	1st	3rd	1st	3rd
SR	62	83	58	68	28	36	47	53	22	22	50	37
IU	62	73	59	70	39	39	58	52	27	24	54	27
C	48	49	49	46	46	49	52	49	4	33	33	32
PU	75	92	69	81	36	35	40	49	4	55	61	51
GF	67	65	65	66	29	37	47	43	44	51	48	41
SF	52	67	57	66	38	44	52	46	50	57	47	40
EL	39	54	48	53	46	62	58	52	35	34	52	26
R	81	82	88	76	23	27	33	36	13			
PR	93	93	84	97	21	8	36	26				
O			50	61			53	47		100	58	58
A			78	70			44	40		100	62	42

THE COMPARATIVE TABLE (Table 8.3)

The result of the table of relationships of similarity is placed together with the final results of the visual/intellectual expression and the material function (sequential relationships) of the discourse for a global comparative discussion. As a reminder, in relation to the visual/intellectual expression the domains that have density 55> are operating mainly on the visual level and the ones that have density 70< are operating mainly on the intellectual level. In relation to the material function the domains that have 45< are interacting in sequence (visual) and the domains that have 33> are not interaciing in sequence (intellectual).

The participation of each domain in the relationships of functional contrast is indicative of its implicit role within the discourse. To discuss issues of operation for the design domains we have to refer back to the level of transmission (visual or conceptual) of the above domains. We have to discuss the visual/conceptual operation and the participation in the syntagmatic plane of each particular domain in parallel to their presence in the systematic plane.

The domain of Structure (THE PARADOX)

The domain of Structure in both years at the Bartlett appears to have a high density (62, 83)and a low interaction (28,36), meaning that it is transmitted mainly on the intellectual level. The paradox is that its participation in the systematic plane is quite low(22,22). It seems as if in reality the domain of structure is operating tacitly on the verbal and visual level in parallel. This is possible as technology can work in an independent way (in the form of a pre existing factual knowledge or background assumptions) on a intellectual and visual level simultaneously.

At Greenwich it operates in exactly the opposite way. Although it is mainly transmitted

visually (rather high density (58,68), high interaction(47,53)) it has a quite substantial participation in the systematic plane of the first year(49) . Here technology is used mainly as materiality and textures. It is through these visual qualities, that the overlapping of the two planes (syntagmatic/systematic) is possible. In that sense Structure at Greenwich in the first year creates mainly exostructural relationships. In the third year its operation is more straightforward. It is transmitted on a visual level and belongs to the syntagmatic plane.

The domain of Immediate Use (THE VISUAL AND INTELLECTUAL)

We have already said that the domain of IU is a transitional domain because of its capacity to work on the visual and the intellectual level simultaneously (Density , B. 62,73, G. 59,70, Interaction, B 39,39 G. 58, 52). This is due to the fact that IU consists of four parts, these being; the use of a space, of an activity, location and movement. Every one of these parts brings with it different qualities. The use of space or activity work more on the intellectual level whilst location and movement work more on the visual level. The domain of Immediate Use in totality is transmitted neither visually nor intellectually. Its transmission lies between the two. Its participation in setting conditions is not very strong (B. 27, 24, G 3rd year 27). Here like the domain of technology, we are faced with the fact of pre-existing knowledge. We do not have to study architecture to know what we mean when we say that this space is a living room or a computer room.

The participation of the domain of Immediate Use in setting up design conditions is strong only in the first year at Greenwich (54) where it is mainly used visually, as movement through space. It acts as a mediator, enabling us to read space through a verbal description and experience it in an abstract way. In that sense it allows for the leap between representation and reality to take place.

The domain of Context (THE VISUAL)

The domain of context has the same use throughout the discourse. It is visually transmitted (density, B. 48, 49, G. 49, 46, interaction, B. 46, 49, G. 52, 49) and is part of the syntagmatic plane (Structure, B. 4, 33, G. 33, 32). It works mainly on the level of visual transformations. The architectural product in the form of a building remains isolated from its environment on the intellectual level.

The domain of Programme Use (THE INTELLECTUAL)

The domain of Programme Use is the most intellectual architectural domain of all. It has an overall high density (B. 75, 92, G. 69, 81) and low interaction (B. 36, 35, G. 40, 45). It has one of the most substantial participation in the systematic plane (B. 3rd year 55, G. 61, 51) . It is the domain that mostly sets conditions on the intellectual level in

order for them to be translated on a visual level.
The participation of the domain of Programme Use in the systematic plane is very low (4) only in the first year of the Bartlett. Reading through the case studies we can see that Programme Use in the first year is used in a strictly programmatic and descriptive way. For example the concept of 'exhibition' or the concept of a stand for the Cathedral contains within it background assumptions.

The domains of Geometry Form and Space Form (THE INTERACTION)
The new data shows ones again the interactivity that these two domains hold for the totality of the discourse. Without any doubt they are the domains without which the operation of design language would not be possible. They are the main participants in the syntagmatic plane of the discourse (more so with the case of the domain of Space Form and less so with the case of the domain of Geometry Form) and they interact between the visual and the intellectual being transmitted visually or intellectually and belonging alternatively to the systematic or the syntagmatic planes .

The domain of Geometry Form is transmitted intellectually at the Bartlett (density, B.67, 65,interaction B. 29, 37) and visually at Greenwich (density, G. 65, 66 interaction G. 47, 43). (The main difference lies in the level of interactivity of the domain). Its participation on the systematic plane varies (B. 44, 51, G. 49, 41). Intellectual transmission and lower participation on the systematic plane gives rise to the ability to structure geometrical rules of an endostructural nature (mainly 1st year Bartlett). Visual transmission and higher participation on the systematic plane indicates the ability to structure geometrical rules of an exostructural nature (mainly 1st year Greenwich).

The domain of Space Form is transmitted both ways at the Bartlett (density, B.52, 67,interaction B. 38, 44) and visually at Greenwich (density, G. 57, 66 interaction G. 52, 46). (The main difference lying on the level of interactivity of the domain). The domain of Space Form is part of the systematic plane, more so in the Bartlett than at Greenwich. It sets up slightly more conditions in the Bartlett than at Greenwich (B. 50, 57, GR. 47, 40).

The domain of Architectural Elements (THE VISUAL)
The domain of Architectural Elements is visually transmitted throughout the discourse. It has a low density(B. 39, 54, G. 48, 53) and high interaction (B. 46,62, G. 48, 53). It has a low participation at the systematic plane (B. 35, 34, G. 3rd year 26) apart from the 1st year at Greenwich where its participation is raised to 52. This is indicative of the fact that it sets up conditions of an exostructural nature.

The domain of Representation (THE INTERFACE)

The domain of Representation is transmitted intellectually (density B. 81, 82, G. 23, 27, interaction B.) but it is almost non existent in setting up conditions for the project (B. 13, 0, G. 6, 4). It operates on the level of transmission and not on the architectural level . Representation is actually bringing together the visual and the intellectual along with the background knowledge. It does not set architectural conditions (hence its absence from the systematic level) so much as transmission conditions.
Representation expresses the hold of reality on thought.

The domains of Object and Abstract Notions(THE EXTRA-ARCHITECTURAL ANALOGY)

The extra-architectural domain of Object has a substantial presence only in the Greenwich discourse. It works mainly on the visual level (density 50, 61, interaction 53, 47). Although a visual domain, it has a high participation in setting up conditions by creating exostructural relationships.

The extra-architectural domain of Abstract Notions has a substantial presence only in the Greenwich discourse. It works mainly on the intellectual level (density 78, 70, interaction 44, 40). It becomes more visual in the third year discourse. Its participation in the systematic plane varies accordingly, 63 for the first year, 42 for the third year.

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THE OUTSIDERS

We have three domains that have a minimum participation in the discourse, (that is why they were not analysed) the domains of HT (58.8, 100) , SY (100, 66,6) and BT (70.6, 79) and whenever present in the Bartlett discourse they belong mainly to the systematic plane . It is indicative that two of them HT, BT are typological domains and the third SY relates to style. It seems like typology, both in a broader sense and secondarily in a more specific sense (historical) plays an implicit role on the level of transmission. Whenever present (and in our case this is mainly at the Bartlett) it creates exostructural relationships (we have to presuppose that the domains of BT and HT are transmitted visually). As for SY we have an indication of its implicit structural role in transmission but the evidence is not substantial enough for more general conclusions to be drown.

8. 4. 1. 4 DISCUSSION / BACKGROUNDING - FOREGROUNDING

The final level of analysis which dealt with content substance, clarifies the way that design domains operate as new data comes to light. Four main ways of operation for the design domains exist within the discourse.

1. Visual transmission = high participation in the syntagmatic plane, low participation in

the systematic plane (the domains of C throughout the discourse and EL 3rd year Bartlett, 3rd year Greenwich and less in the 1st year Bartlett) This creates the plane of the visual transformations.

2. Visual transmission = high participation in the syntagmatic plane, high participation in the systematic plane (the domains of SR, IU, EL 1st year Greenwich, the domains of O and partly GF both years Greenwich, the domain of A 3rd year Greenwich) This is an interactive operation. The simultaneous operation on both planes allows the formation of new rules on the visual level.

3. Intellectual transmission = low participation in the syntagmatic plane, high participation in the systematic plane (the domains of IU for the Bartlett, PU for the Bartlett 3rd year, for the Greenwich both years, partly the domains of GF and SF for the Bartlett, the domain of Abstract Notions for 1st year Greenwich). This creates a plane of intellectual interaction.

4. Intellectual transmission = low participation in the syntagmatic plane, low participation in the systematic plane (the domain of SR, partly IU for the Bartlett and PU only 1st year Bartlett). This is a non interactive operation. It gives pre set structural or functional rules and conditions of a pre-existing knowledge type. This creates implicit transmission on the visual level.

The first and third modes of operation relate to the syntagmatic and systematic planes. The second mode of operation presents a paradox; that of a simultaneously visual and intellectual operation for some domains. The overlapping between the intellectual and visual (systematic, syntagmatic planes) indicates that the operation is taking place on both planes but in different ways I.e. a metal or a wooden surface operates on a visual level as a structural domain, and in parallel transforms visually the functional rules as it relates texturally to the Immediate Use of the spaces. The re-definition of design rules takes the form of 'forgrounding'in the sense of re-creating rules by unconventional connections I.e. surface to function and is taking place on the visual realm. For Greenwich 'foregrounding' as the art of expression itself [3] is dominant.

The fourth mode of operation indicates the operation of 'backgrounding' . By 'backgrounding' we mean a tacit transmission on both visual and intellectual levels. Background (common) knowledge is used implicitly whenever it is needed. For the Bartlett 'backgrounding' dictates the operation of the transmission.

Three domains exist that are most prone to 'backgrounding'in the Bartlett; the domain

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3. see Terence Hawkes "Structuralism and Semiotics", publ. by Methuen & Co. ltd. 1988, chapter 'the structure of literature'. The language is used poetically or aesthetically when its expressive aspect is dominant. Foregrounding then becomes very important. It is the act of placing in the foreground the act of expression, the act of speech itself.

	1ST YEAR BART LETT						
C.ST.	C1	C2	C3	EN	EX	TOTAL	FIX
A	3	1		4		4	2
B	3	7	1	11		11	2
C	10	10		16	4	20	6
D	5	2		1	6	7	1
E	1	7		5	3	8	2
F	8	4		6	6	12	1
G	7	6	1	10	4	14	1
H	5	5		9	1	10	4
I	4	7		9	2	11	5
TOTAL	46	49	2	71	26	97	24
%	47.4	50.5	2	73.2	26.8	100	24.7

	GREENWICH						
C.ST	C1	C2	C3	EN	EX	TOTAL	FIX
A'	6	3	2	2	9	11	
B'	6	6		2	10	12	
C'	16	13		10	19	29	
D'	8	7	1	7	9	16	
E'	11	6	2	2	17	19	
F'	4	4	2		10	10	
G'	7	7	1	1	13	14	
H'	3	4	2	4	5	9	
I'	6	8	2	3	13	16	
	75	57	12	31	105	136	
	57.6	33	8.8	22.7	77.3	100	

	1ST YEAR BART LETT						
C.ST.	C1	C2	C3	EN	EX	TOTAL	FIX
A	3	1	5	9		9	1
B	2	10	1	9	2	11	2
C		10	1	8	3	11	2
D	1	7	4	11	1	12	5
E	2	4	1	5	2	7	3
F	6	3	1	9	1	10	3
G	3	8	1	7	5	12	3
H	4	11	1	11	5	16	2
I	6	1	6	14		14	3
TOTAL	27	55	21	83	19	102	24
%	26.4	53.9	15.6	81.3	18.6	100	23.5

	GREENWICH						
C.ST	C1	C2	C3	EN	EX	TOTAL	FIX
A'	10	4	3	1	16	17	
B'	8	8		5	11	16	1
C'	1	3	2	1	5	6	
D'	11	15	4	7	23	30	1
E'	6	6	1	9	4	13	
F'	1	6		2	5	7	
G'	2	12	1	9	6	15	1
H'	6	15	5	12	14	26	3
I'	3	10	4	4	13	17	1
	48	79	20	50	97	147	7
	32.6	53.7	13.5	34	66	100	4.7

TABLE 8.4: THE COGNITIVE FUNCTION OF THE DISCOURSE

of SR, IU and PU. The domain of EL in the first year seems to be prone to 'backgrounding' as well. These domains contain a socially 'standard' use. The backgrounding is not functioning on the level of the concept only, but on the level of its visual representation as well. It forms intellectual/visual relationships. So a column which is part of the domain of Structure is a background assumption of the form - function complex. The same is true with the concepts of the 'living room' or 'bedroom' that are part of the domain of Immediate Use.

These 'given' background relationships can be violated. Domains that are used through their background assumptions can be used for foregrounding. In our case the use of technology is a very indicative example. From 'backgrounding' at the Bartlett it becomes part of the 'foregrounding' at Greenwich. This metaphoric use allows for the creation of new rules in the act of foregrounding.

The Bartlett discourse proves to be more implicit that the Greenwich one, not only because of the absence of the use of an explicit teaching methodology but because of the use of implicit rules as well. This rules and conditions used during the project (structural, functional and programmatic) exist prior to it in a form of a common shared vocabulary or background assumptions.

8. 4. 2 PART 2

THE STRUCTURE OF THE RELATIONSHIPS OF FUNCTIONAL CONTRAST IN THE DISCOURSE

On the micro-level of analysis we set up a framework for discussion. Functional relationships are classified in three levels in relation to their complexity, simple (C1),complex (C2) (C3) and in two kinds endostructural (EN) and exostructural (EX). Relationships of binary opposition and oppositions are by definition simple and endostructural, so they will not be taken into account in the numerical analysis. All the first and third year case studies in both schools were counted and the final results are presented within four tables.

READING OF THE TABLES (Table 8.4)

Each of the four tables contains the six case studies under analysis (first column), the simple functional relationships C1(second column), the complex functional relationships C2(third column) and C3 (fourth column), the endostructural relationships EN(fifth column), the exostructural relationships EX (sixth column), the total number of functional relationships within each case study TOT(seventh column), and the fixed relationships FIX whenever they exist (eighth) column. The last row of each table

contains the percentages of participation of each category of relationship in the discourse, I.e. we have 62.3% of simple relationship in the Bartlett 1st year.

SIMILARITIES AND DIFFERENCES OF THE STRUCTURE OF THE DISCOURSE ACROSS THE TWO SCHOOLS OF ARCHITECTURE

We have already suggested from the previous level of analysis that possibly system is predominant in the Bartlett (most relationships are endostructural) and syntagm is predominant at Greenwich, (relationships of similarity are mainly exostructural). The overall data analysis confirms this. First (73.2) and third (81.3) years at the Bartlett have mainly endostructural relationships. First (77.3) and third (66) years at Greenwich have mainly exostructural relationships. In relation to simple-complex relationships it seems like Bartlett and Greenwich are very similar. (1st years simple relationships, Bartlett 47.4 Greenwich 57.6, 3rd year simple relationships, Bartlett 26.4, Greenwich 32.6).

SIMILARITIES AND DIFFERENCES OF THE STRUCTURE OF THE DISCOURSE ACROSS THE TWO EDUCATIONAL LEVELS

The structure of the first year discourse is simpler than the third year discourse. Complex functional relationships in the Bartlett are 50.5% (C2) and 2 (C3) in the first year, and 53.9% (C2), 15.6% (C3) in the third year. Complex functional relationships at Greenwich are 33% (C2) and 8.8% (C3) in the first year, and 53.7% (C2), 13.5% (C3) in the third year. First year students are using more functional relationships that relate one domain to another through forced opposition or forced similarity. Third year students are more able to construct complex functional relationships of similarity, relating for example a domain to a spatial relationships, or a spatial relationship to a spatial relationship. They are forming relationships of similarity using more domains than the first year students.

In parallel, exostructural relationships decrease in the Bartlett discourse from first to third year (26.8- 18.6) and in the Greenwich discourse from first to third year (77.3-66). Endostructural relationships increase from first to third year in both schools (B. 73.2-81.3, GR. 22.7-34). This can be seen as an indication of a more articulated design discourse in the third year than the first year. Endostructural are conceptual rules and exostructural are visual rules. Themes and rules becomes more endostructural as the students' knowledge increases in relation to the internal rules that govern the architectural language. Third year students are more capable in conceptualising than the first year students. As we have already said, the system (endostructural relationships) is mainly intellectual and the syntagm (exostructural relationships) consists of visual - spatial relationships. Within the architectural discourse we have the presence of both exostructural and endostructural relationships. Typology and exra-

architectural objects form exostructural relationships. The relationships that create 'foregrounding' at Greenwich are exostructural as they operate on the visual level.

It can be that one of the two 'kinds' of relationships is more predominant than the other one (system/intellectual or syntagm/ visual) in the discourse. System is predominant at the Bartlett (most relationships are endostructural) and syntagm is predominant at Greenwich, (relationships of similarity are mainly exostructural). Fixed relationships belong mainly to the system and not to the syntagm as they are endostructural. They have a presence only in the Bartlett discourse (24.7% 1st year, 23.5% 3rd year) . Fixed relationships are part of common shared beliefs and background assumptions. Most of them concern geometrical and spatial rules. They form an additional proof of the dominance of 'backgrounding' in the Bartlett transmission.

Up to now we examined the 'kinds' of relationships of similarity that exist within the discourse, their complexity and their structure. The examination of the design rules in the project that follows will offer an insight on how the endo and exostructural relationships relate between one another. It will offer an interpretation of the structure of the design language at the level of the discourse.

8. 4. 3 PART 3
INITIAL DESIGN "THEMES' AND THE STRUCTURE OF DESIGN RULES IN THE PROJECT

From the reading of the case studies and the conclusions described earlier it is apparent that every student tends to set up rules to follow very early on in the design process in order to be able to arrive to an architectural proposition. There is a need for a route to be formulated and for that route to be tested. Each move that the student makes has consequences that involves a range of design domains , and is expressed by descriptions and facts. Some of the students' decisions refer only to one domain, but others appear to cut across different ones. While the student moves through the different domains, he/she forms a discipline consisting of rules to which he/she has to be bound. We have already suggested that the student start working by using an initial 'theme'. We questioned the fact that this 'theme' is bringing all the design rules together. This initial 'theme' or design hypothesis and the design rules followed are expressed by conditional propositions. The way that all the design rules relate among themselves to produce the final result is mainly intuitive and implicit, unless it is explained by the use of a specific process.

By the detailed examination of four case studies in this chapter we traced the existence of two different approaches in the way that the students formulate their design rules. The first is more conceptual and is about testing and questioning initial decisions. Within this approach, the students are trying to explain the structure of the rules they are using to design. The second is more visual and is about transforming initial images or concepts. Within this approach the students are creating a priori similarities understanding and translating.

The way that the case studies under analysis operate on the level of the design rules level will be analysed and presented next. The presentation will include all first - third year case studies from both schools (first Bartlett and then Greenwich). The students initial 'theme', design rules (only the discussion, the rules are analytically presented in the appendix by the end of each case study) and the process whenever this is explicitly present will be examined. A discussion will then follow.

BARTLETT SCHOOL OF ARCHITECTURE

8. 4. 3. 1 FIRST YEAR

Presentation of the initial 'themes', conditions and rules set up by the students for their projects and the process followed by them.

FIRST TERM

PROGRAMME: INFORMATION STAND

PROJECT A

THEME: The cube and the strong diagonal symmetry parallel to the main road .

DEVELOPMENT: Implicit.

DESIGN RULES: The project is endostructural. It evolves around a couple of strong geometrical rules (cube, diagonal symmetry) . These are stated very clearly verbally but are challenged visually. The strong rules and their composition does not 'read' clearly in the final proposition. Endostructural rules create endostructural rules in opposition to exostructural ones (representation).

PROJECT B

THEMES: The structure of the stand (prefabricated) along with issues of flexibility (background knowledge stated in a factual way)

DEVELOPMENT: Flexibility of structure opens up a field for experimentation.

DESIGN RULES: The project is endostructural, using background knowledge in relation to technology. Flexibility, the main quality of a prefabricated stand, is challenged by the students as it is not used in their final proposition. It is not used mainly for formal

reasons. The idea of openness is also challenged, as the stand does not relate to the viewing of the Cathedral. In the final proposal Structure(as flexibility) exists in oppositional terms with Geometry Form. Geometry Form exist in oppositional terms with Spatial organisation(visibility).
Endo (SR) in opposition with Endo (GF) and (SF)

PROJECT C

THEME: The tower as the dominant element of the stand.
DEVELOPMENT : Implicit.
DESIGN RULES: The project is primarily endostructural. The initial 'theme' is mainly exostructural as 'tower' is used in a typological way. The 'slopping roof'enters the typology later in the project. This produces a collage of different ideas and priorities that come together into a unique proposition. The dominance of some elements over others is the main issue of the project. The dominant element is relocated during the discussion (from tower to roof to staircase to veranda to diagonal entrance) leaving the project empty of a dominant element. Confusion exists in relation to formal and functional priorities.
Exo is introducing Endo rules that are opposed by Endo rules.

SECOND TERM

PROJECT : ARTIST'S STUDIO

PROJECT D

THEME: A symmetrical modern building using some elements of the Tuscan Order.
DEVELOPMENT : The Tuscan Order introduce some rules on a visual and conceptual level that are questioned and transformed.
DESIGN RULES: This is an exostructural project. Historical typology is used for the introduction of formal rules. These rules are challenged as they are used only on the front elevation and not in the internal spatial articulation. What is more, it is claimed that the formal rules are very difficult to transmit. We have an opposition between external (exo) and internal (endo) organisation.

PROJECT E

THEME: A simple building a cube .
DEVELOPMENT : Implicit.
DESIGN RULES: This is an endostructural project. It is a project based on geometrical rules, on the idea of the cube and its subdivisions. Geometry Form opposes function as these rules are challenged for their functionality. The rules themselves are not present in the drawings. The rule of the diagonal axis although not mentioned initially, seems to be the strongest in the scheme. Here we have a visual mismatch between the initial

'theme' and the final result.
Endo (function) in opposition to Endo (form) in opposition to (Exo) representation.

PROJECT F

THEME: A square symmetrical building.
DEVELOPMENT : Implicit.
DESIGN RULES: This is an endostructural project that is questioned by exostructural rules for its internal organisation. The strict rule of symmetry governs the proposal although it is not consistent on the level of dimensionality and is opposing on the level of functionality. Type is used to challenge the project as it offers a different reading to the proposal from the one expected. (the 'sink' placement). A visual - conceptual gap exists within the project.
Endo (form) is opposing Endo (function). Exo (type) is opposing both form and function.

THIRD TERM
PROJECT: AN OPEN PROPOSITION
PROJECT G

THEME: The use of a very simple theatrical form inspired by Palladian Architecture.
DEVELOPMENT: Palladian architecture, by becoming the starting point, introduces some rules visual rules that are transformed.
DESIGN RULES: This is an exostructural project complemented by endostructural rules. Palladian architecture is the one that is used as a visual reference on the level of typology to introduce rules and concepts. The rule of symmetry is challenged. Initial conditions exists that are not challenged throughout the project, like the rule of openness which remains a stable condition of the building throughout the discourse. Some are transformed like the rule of simplicity I.e. from being equal to symmetry it becomes equal to discreet . New rules are added to the project like the one of false representation (stage set) and the relationship of the building to its context . Exo (type) is introducing Endo rules which are challenged by Endo (symmetry) rules. Additional not interactive (Endo) rules are introduced in the project.

PROJECT H

THEMES: Not stated clearly (An introvert building with form expressing function?).
DEVELOPMENT : Implicit.
DESIGN RULES: In this case an endostructural project is questioned through exostructural rules. The form (twisting) that tries to express function (public-private) creates problems of space manipulation. Issues of visibility and lighting are tackled

through the use of the atrium(type) but in a very questionable way. The lack of visibility from the street creates the typology of a prison. The atrium perceived as a 'type' is not working the way it should (is not sociable). The project does not have a clarity of intentions or a clarity of visual propositions. Exo in opposition to Endo.

PROJECT I

THEMES: Not stated clearly (simplicity of circulation and elevation?) .

DEVELOPMENT : Implicit.

DESIGN RULES: Here too, an endostructural project is questioned through exostructural rules. The cylinder and its function as circulation is challenged as not being very obvious. The simplicity of the elevation is also challenged as not expressing the function of the building (type). This discourse is formed around preconceptions (fixed metaphors i.e. hidden=not easy to use) and the building 'type' of a club.

DISCUSSION

SIMPLE - COMPLEX RULES

The first six case studies have a thematic clarity. They are structured around only one design issue. Case studies A, E, F around the domain of Geometry Form. The rules set up to be followed and discussed by the students are geometrical rules (symmetry, hierarchy, cube subdivisions etc). Case study B is structured around the domain of Structure (prefabricated), case study C around the domain of Historical type (Tuscan order) and case study C around the domain of Architectural Elements (tower, roof).

The last three case studies are different. The themes set up by the students become less explicit and rigid . The lack of thematic clarity is replaced by a set of complicated rules that touch upon relationships between different design domains, i.e. Geometry Form-Space Form for case study G, Geometry Form-Programme Use for case study H, Geometry Form-Immediate Use for case study I. It is indicative that the domain of Geometry Form plays a quite important role in the formation of design rules in all three case studies.

ENDOSTRUCTURAL - EXOSTRUCTURAL RULES

Some case studies are only endostructural i.e. A, E are based on geometrical rules , B on technological background knowledge, but most of them are endo-exo structural. The exostructural rules are involved with typological issues of different levels: a) with typological fragments i.e. tower, roof (case study C), 'sink platform'(case study F), atrium (case study H); b) with building types i.e. amphitheatre (case study C), prison (case study H), club (case study I); c) with historical types i.e. Tuscan order (case study

D), Palladian Architecture (case study G).

These typological rules are used in two ways . In case studies C (tower), D (Tuscan order) and G (Palladian architecture) typology sets up the initial theme of the project. By doing so it introduces conceptual endostructural rules that are questioned and replaced by visual exostructural rules that are further transformed. In the case studies F, H, I endostructural rules are questioned through the use of typology. In case study F the starting 'theme' is formal but is questioned by the use of a building type (amphitheatre). In case studies H, I the formal functional rules are questioned by the use of the building types of prison and club. Here typology is not introducing a starting 'theme' but conceptual and visual rules to question the validity of the pre-set endostructural rules in the project. The discussion shows once again that typology plays an important role in the Bartlett discourse. Typology is functioning in two ways, conceptual and visual, creating endostructural rules of a pre-existing knowledge type and exostructural rules of a visual kind (mainly in case studies D and G).

Endostructural rules are introduced through the use of Geometry Form (with one exception project B that is introduced through the use of technology) in projects A, E, F, H and I. Most endostructural rules do not complement each other but question one another. In case study B form is questioning technology and spatial organisation. In case study C conflicting architectural elements are opposing each other . In case studies E, F, H and I formal rules are opposing function . What is more projects A, E, F present a gap between the drawings (visual presentation) and the concepts (verbal presentation) that is extensively discussed during the reviews. Endo and exostructural rules relate in the same way. They complement each other partially in case study G, and they challenge each other by opposing one another in case studies B, F (in the interior organisation), G, H and I.

The conflict that exists amongst the endo-exostructural rules, and amongst the endostructural rules themselves, reflects the visual and the conceptual gap that exists in the first year discourse. This gap is possibly an indication that first year students have a difficulty in reconciling the visual and verbal levels and that the two levels are functioning in parallel but are not necessarily coinciding.

8. 4. 3. 2 THIRD YEAR

FIRST TERM

PROJECT: "CORNWALL ROAD" HOUSING PROJECT

PROJECT 2A

THEMES: The existence of an open space between the blocks of flats . Functional and formal separation between the circulation and service zones.

DEVELOPMENT : Implicit.

DESIGN RULES: This is an endostructural project. A central theme does not exist in this project. Some themes are more dominant than others (morphological separation - transparency of the elevations) some contradict each other (backyard - market in relation to the open space). The project is the outcome of a collage of different independent endostructural rules coming together.

PROJECT 2B

THEME: An atmosphere of privacy, small scale and individuality.

DEVELOPMENT : Implicit.

DESIGN RULES: This is an endostructural project. It is a rather consistent project in relation to a central theme, that of small scale and individuality . The internal organisation of the flat is questioned through exostructural rules (Victorian flat) . The

- internal organisation should have had larger scale spaces.

PROJECT 2C

THEMES: The housing scheme becomes a statement for the area, a monument, a memorial.

DEVELOPMENT : A memorial expressed by a large scale wall.

DESIGN RULES: An exostructural starting theme is expressed by a visual transformation introducing endostructural rules. Memorial (type) is expressed by the change of the scale of an architectural element (elevations=wall). The 'theme' of the project is questioned for its validity . Endostructural rules follow in relation to the open space (openness, visibility and communication) and contextual issues (relationships with the neighbouring buildings role of the central piazza) not necessarily relating to the exostructural ones. The internal organisation of the flats remains unresolved .

SECOND TERM

PROJECT: ARENA

PROJECT 2D

THEME: The foyer is the important social space of the arena.

DEVELOPMENT : Typology used for roof construction.

DESIGN RULES: This is an endostructural and exostructural project. Endostructural rules

offer the social and flexible part of the project. An exostructural rule, that of type, offers the form, scale and construction of the roof. The chosen type does not help the project at any level. On the level of form it creates conflicting geometries. The kind of flexibility that it offers does not allow for control. On the level of technology it creates lighting and acoustic problems. The alteration of the type towards an organic form is suggested as an alternative. Exo and endo structural rules exist in opposition.

PROJECT 2E

THEME: (Not explicit) Simple and ordinary offering an easy and comfortable access?
DEVELOPMENT : Implicit.
DESIGN RULES : This is an endostructural project which is questioned by exostructural rules. The theme is not explicit . The endostructural rules are structural and formal. The form is challenged through the context of a Victorian city (type). On the level of technology the simplicity and ordinariness of the scheme needs much more detailed work (endo).

PROJECT 2E

THEME: Contextually discreet .
DEVELOPMENT : Implicit.
DESIGN RULES : The project is endostructural. The theme has clarity and is mainly contextual. A concrete buried building (structure, space) , a park on top (context) and a wall as a landmark (form context) are the endostructural rules. An exostructural rule is introduced in the project for its internal organisation (spot light) and is challenged by endostructural rules (not functional).

THIRD TERM

PROJECT: MARY ROSE MUSEUM

PROJECT 2G

THEMES: Contextually discreet, the building gives the feeling of an excavation site.
DEVELOPMENT : The introduction of an extra-architectural exostructural theme creates visual transformations (underground, stepping down, dark space) .
DESIGN RULES : This is an exostructural project. It works on the level of extra-architectural type (feeling of discovery, excavation site). The theme offers some endostructural rules through visual transformations (underground, stepping down, dark spaces). Some endostructural rules are connected to the initial theme(contextually discreet). Some are challenging the exostructural approach (stiff and simple interior space, internal visibility in relation to the exhibit). Representation is challenged through an historical type (Beaux-Art planning) (Exo in opposition to Endo).

PROJECT 2H

THEMES: Mary Rose is suspended above the water as if it is emerging from it. Informal interiors.

DEVELOPMENT: Extra-architectural and typological references create some visual transformations.

DESIGN RULES : An exo-endo structural project. The project starts with an extra-architectural theme and a typological reference; the theme of the ship's discovery and the typological reference to the old harbour structures. The endostructural rules introduced by the type are perceived as unsuccessful. New endostructural rules are introduced that are not necessarily connected to the initial theme. These relate to the overall building articulation, to issues of visibility, formality and circulation. The effectiveness of the above is challenged by the tutors as well. Rules about approach and structure (Endo) relate to the ship's uplifting (Exo) and exist in opposition to it. Rules about visibility, formality and circulation relate to its interior space articulation (Endo) (form opposing function).

PROJECT 2I

THEME: Legibility of the building.

DEVELOPMENT : Implicit.

DESIGN RULES : This is an endostructural project. Primarily, formal rules are followed by spatial articulation (internal organisation, issues of visibility) and programmatic resolution. The explicit strong boundaries that the project introduces are challenged on the level of function and programme.

DISCUSSION

SIMPLE - COMPLEX RULES

All third year case studies are characterised by a thematic clarity. Some rules that follow aim to capture the architectural expression of the initial 'theme'. Some are co-existing, dealing with different issues that are not necessarily connected. Some are opposing each other. The rules involve a lot of different domains in specific structural combinations. They are quite complex, involving programmatic and spatial issues. Geometry Form does not play the leading role any more (only one exception exists, case study 2I). The projects become much more contextual than the first year ones.

ENDOSTRUCTURAL - EXOSTRUCTURAL RULES

Most case studies are exo and endo structural. Only case studies 2A and 2I are completely endostructural having a formal 'theme'. The endostructural rules are involved with typological and extra- architectural issues. Typology relates to architectural elements i.e. wall (case study 2C), lighting hole (case study 2F), to

building types i.e. memorial (case study 2C), factory (case study 2D), old harbour structures (case study 2H), and to historical types i.e. Victorian city and flat (case studies 2B, 2E), Beaux Art planning (case study 2G). Extra-architectural 'themes' belong to the case studies 2G and 2H and relate to the ship's uplifting and discovery.

In the third year case studies we have the presence of two different types of exostructural rules; typological ones and extra- architectural ones. We have seen already in the first year results that typology is used in two ways, to introduce the 'theme' of the project or to be used in order to question endostructural rules. Here we have the appearance of a third way, where we have the transformation of the type by acting upon it. Typology introduces the theme in case study 2D and 2H and 2F as the types of factory, harbour structures , spot light (only on the level of internal organisation) introduce formal and technological issues. Typology is challenging the 'theme'in case studies 2B and 2E by the use of the Victorian scale, and in case study 2G on the level of representation. The transformation of the type relates to the visual alteration of the architectural element in our case by the change of its scale (In case study 2Celevations turn into a massive wall).

We have two projects that are only endostructural, case studies 2A and 2I.
Endostructural rules relate to one another in different ways from the ones we examined in the earlier case studies. In case study 2A we have the combination of different endostructural rules that are coming together independent of each other . In case study 2I strong formal rules are challenged by programme and function. In the rest of the projects endostructural rules are interwoven with exostructural rules. Some times the two modes of approach function independently from one another (case studies 2C, 2H), some times they complement each other (case study 2G in relation to context and not interior space) and more often they exist in opposition, challenging each other (case studies 2B interior organisation of the flat, 2D, 2E context, 2F, 2G interior organisation).

GREENWICH SCHOOL OF ARCHITECTURE AND LANDSCAPE

8. 4. 3. 3 FIRST YEAR

Presentation of the conditions and rules set up by the students for their projects.

Presentation of the process of work wherever this is visible.

FIRST INTERIM REVIEW

PROGRAMME: FILM CLUB

PROJECT A'

THEMES: Time and how time changes almost everything.

DEVELOPMENT: Visual transformations.

DESIGN RULES : This is an exostructural project. The initial extra-architectural 'theme' of time and transformation is picked up from the Soho recordings and is recreated in the film and the Kingly street site recordings. The door as a boundary condition, by hiding and revealing the scaffolding introduces a new endostructural architectural 'theme' in the Kingly street recordings. An endo theme is introduced through the transformation of an Exo theme.

PROJECT B'

THEMES: The feeling of being trapped expressed by using the notion of movement.

DEVELOPMENT: Visual transformations.

DESIGN RULES : This is an exostructural project. The starting point in Soho offers the 'theme' of movement. Vertical and horizontal movements (endo) are recorded in the film. The question is posed as to whether these images can be used on Kingly street site in an endostructural way. More transformations and explorations are needed on the visual level.

PROJECT 1C'

THEMES: Disorder trapped within order.

DEVELOPMENT: Visual transformations.

DESIGN RULES : An endostructural formal 'theme'(order into disorder and vice versa) is visually investigated in various endo and exostructural parallel ways. Grids can trap architectural elements (endo) and frames can trap objects (exo). Grids and frames are the static interpretation of dynamic cinematic images.

SECOND INTERIM REVIEW

PROJECT 1D'

THEMES: Boundaries that exist from the moment they are occupied.

DEVELOPMENT: Boundaries that are formed by the use of lines, planes and volumes . Visual transformations.

DESIGN RULES : An endostructural 'theme' (boundary condition) is explored in exo (cliff) and endo(lines, planes, volumes) ways. The initial 'theme' transforms into the cinematic 'theme' of framing through the use of the model. The frame is able to create both endo and exostructural relationships. A continuous transformation from endo to exo structural rules.

PROJECT 1E'

THEME: Boundaries and the spaces that exist between them.

DEVELOPMENT: Moving and static boundaries. Visual transformations.

DESIGN RULES : An endostructural 'theme' (boundary condition) is explored through images and classification. The images are translated into a model and materials (exo). The translation is challenged as being reductive. The model creates its own endostructural rules that need further investigation.

PROJECT 1F'

THEME: Framing the movement.

DEVELOPMENT: Translation of the images in an abstract way into a model. Visual transformations.

DESIGN RULES : This is an exostructural project that deals with the cinematic concept of framing movement. The model is a structure that presents two different sides (industrial - polished) . It offers the possibility of two different readings, as an object that could be a building or as a tool for further visual investigations.

FINAL REVIEW

PROJECT 1G'

THEME: The notion of a compressed space.

DEVELOPMENT: Visual transformations. The original theme is the compression of the doorway in Soho. This is translated into a conceptual model and a site model.

DESIGN RULES : This is an exostructural project. The use of an extra-architectural 'theme' along with the use of relevant images, becomes the starting point for visual transformations to occur. The central 'theme' is that of compression. The translation of the visual to the conceptual is apparent throughout the discourse i.e.. from images to the model, from drawings to architectural elements and to spatial concepts, and is the dynamic that transforms and introduce the themes. Conditions set at the beginning are enriched by new endostructural conditions independent of those of 'compression' introduced in the project, like the layering of the space , and exostructural conditions like the city walls coming in and compressing the building, adds complexity to the discourse.

PROJECT 1H'

THEME: Light, depth and shadows.

DEVELOPMENT: Visual transformations. Sequences that investigated light and dark and shadows are translated first into a conceptual model and then into the model of the

building.
DESIGN RULES : This is an endo - exostructural project that introduce some endostructural rules (materiality, structure and functional). This translation is perceived as too rigid and geometrical and without richness. The endostructural rules are questioned by the exostructural ones.

PROJECT 11'

THEMES: Movement through boundaries by crossing different textures.
DEVELOPMENT: Visual transformations. Different boundary conditions in Soho and in the film are recorded . A conceptual model is created showing different layering of materials and creating boundaries.
DESIGN RULES : This is an exostructural and endostructural project. Movement through textures (endo) is investigated in exostructural (object in a box) and endostructural (material=function)ways. Endo and exostructural rules are mutually transforming each other. The compression of the city (exo) introduce the theme of fragmentation (endo).

DISCUSSION

SIMPLE - COMPLEX RULES

The Greenwich field work is about the development of the same project at three stages. The above case studies describe the development of the project from the initial stage of conception to the final stage of realisation. At the beginning of the project we have the introduction of some extra-architectural themes I.e. time, movement, frame (one theme for each project). Visual transformations that are established by a very specific method initiate the formation of this first theme (concept). In the interim review we see the further transformation of these themes and in parallel the use of simple rules for the analytical classification of spatial conditions that are researched through visual transformations and modelling I.e. boundaries, framing the movement. In the final review, simple spatial themes establish some basic rules for the formation of the built space . The approach of the projects is mainly formal and spatial. So we see an articulation between establishing themes through the use of a visual method that mainly relates to formal transformations, and the translation of these themes into simple spatial rules that are used for the creation of the architectural proposal.

ENDOSTRUCTURAL -EXOSTRUCTURAL RULES

The exostructural rules that are used in the Greenwich case studies are of the transformational mode. An object I.e. the swing , a space, a boundary condition, an architectural element, some scaffolding is acted upon and transformed by the use of different scales, different means of representation etc. The translation of an object or

type(architectural element) to a drawing and then to a collage or model transforms the structure of the object or the type.

At the beginning, case studies tend to be exostructural (case studies A' time , B' movement , C' grid - frame). All of them (case studies A'(boundaries) B' (vertical, horizontal) C' (order-disorder) translate the exo structural themes into endostructural ones. The interaction between the endo and exo structural rules is also obvious in the next six case studies following from the third year. Two case studies D' and E' start with the endostructural theme of boundary condition and by recording and translating this condition by the use of exostructural rules (collage, modelling) they act upon the initial boundary conditions and create new ones. In case study D', the model introduces a new theme in addition to that of framing, that can be read in both (endo) and (exo) structural ways. In case study F', the model (object) can be used in both endo-exostructural ways. In case studies G', H', I' endo and exo structural rules co-exist in three different ways. In case study G' they exist in parallel i.e. compression (exo), layering (endo). In case study H', they exist in opposition in that light and dark and shadows (exo) are unsuccessfully translated into programme, materials and function (endo). In case study I', endo and exo structural rules complement each other.

8. 4. 3. 4 THIRD YEAR

FIRST INTERIM REVIEW

PROJECT: FILM SCHOOL

PROJECT 2A'

THEMES: Dialogue.

DEVELOPMENT: The use of the initial photographs of the film create a formal dialogue, that takes place by the use of paintings and models.

DESIGN RULES : This is an exostructural project that creates endostructural rules. A dialogue between feminine and masculine elements (exo) is translated into curves and lines, soft and hard materials (endo). The translation takes place on the formal level and is questioned for its clarity in relation to its internal composition. An independent (exo) theme makes the building act as a camera.

PROJECT 2B'

THEMES: The hierarchy of space in relation to layering.

DEVELOPMENT: A choice of sequences from the film "Blade Runner" and from Soho introduces the issues under examination. Some conceptual models investigate the themes further.

DESIGN RULES : An exostructural start (society, replica) sets two different but parallel

endostructural themes. In the 'theme' of breaking through layers (from public to private) (endo) the translation of exo to endostructural rules is thin. In the 'theme' of hierarchy of space (endo) the investigation of endostructural rules appears limited. Issues of scale, materials, forms could be taken on board. Cinematic (exo) issues are missing.

PROJECT 2C'

THEMES: Light and dark and how these conditions affect space .

DEVELOPMENT: The use of layering and transparency for different lighting effects is to be achieved by the construction of conceptual models.

DESIGN RULES : The endostructural theme of light and dark is translated into a model where these qualities are researched. The model used in an exostructural way i.e. by changing scale could become the building itself or parts of the building (endo).

SECOND INTERIM REVIEW

PROJECT 2D'

THEMES: Cinematic 'space'.

DEVELOPMENT: Cinematic analysis of images are drawn from the film and from the Soho site. Small models formed out of these images become stage sets framed within the building.

DESIGN RULES : This is an exostructural project that develops endostructural rules. The exostructural rules function at two levels. On the level of typology (monument, tower), the 'monument' typology is challenged as not representing the function of the film school (a consumerist building). On the cinematic level the initial theme (depth and geographical plane) is developing exostructural (stage sets that reflect the surrounding streets and give the feeling of coming into the film) and endostructural (social spaces in front, private spaces behind the stage sets) rules.

PROJECT 2E'

THEMES: Light and its distortion.

DEVELOPMENT: A device is used in the form of model: A layered glass with special lighting effect creates possibilities of separation screens that offer transparency but not light.

DESIGN RULES : An exostructural theme (light distortion = film school) creates exostructural (device) and endostructural rules. The function of the grid (endo) and the device (exo) in parallel influence the function of the building (endo).

PROJECT 2F'

THEMES: Transparency and layering. Obscurity and orientation.

DEVELOPMENT: Photograph from Soho and the film introduce the themes. These are translated into a model with a movable screen and glass models that investigate the above issues creating spaces in between glass screens.
DESIGN RULES : An exostructural beginning (moving of the camera, focus) is followed by endostructural rules that work in parallel to each other. The transparency and layering relate to the planning and the form (vertical lines) of the building. Obscurity and orientation relate to movement through the building.

FINAL REVIEW

PROJECT 2G'

THEMES: Light. Framing and layering of the film.
DEVELOPMENT: Analysis of recordings leads to conceptual models and to the use of massing and structure. Photos of the models are classified into categories like layers, silhouette, shadows, framing etc. This vocabulary is used for the design of the building.
DESIGN RULES : An exostructural theme (framing and layering of the film) is translated into two different themes. The first one (layering) is introducing a series of layers in the building that acts like a veil(exo). These layers are criticised as showing no transition and no material or formal differences (endo). The second one (framing) introduces the idea of the light box (exo). The functional complication of the door (endo) and the contextual approach of the wall belonging to the garden(endo)are discussed in parallel.

PROJECT 2H'

THEME: The film can change reality. In the film you experience both, the process of changing reality and the skin, the result of the film. The relationship between the process and the product is interactive.
DEVELOPMENT: A conceptual model that represents the process of making a film, is translated into a building proposal, where the concrete slab (the process) includes the spaces of the film school that produce the film and the skin (the film) includes the cinema and the exhibition spaces.
DESIGN RULES : This is an endostructural project that creates endostructural rules through visual transformations . The 'theme' is extra-architectural (the split between process-product) and sets up the general framework under which the rules are operating. The cinematic split is expressed by two different parts of the building. The skin (exo) is public and about film projections(endo). The concrete slab(exo) is private and invisible (endo). The grid interacting between the two includes the informal areas (endo). The dialogue between the two parts of the building, between the process and the product, is the one that introduces formal and spatial rules (endo) to the project that need further investigation on the endostructural level . An independent

endostructural rule introduces the transformation of the structure into a bookshelf.

PROJECT 21'

THEME: Transition from inside to outside space using light effects.

DEVELOPMENT: Experimentation with models using different materials. The transition between the outside and the inside space as discovered through the visual experimentation became the focus for research.

DESIGN RULES : An endostructural initial theme (transition of outside to inside) is transformed through exostructural rules (material experimentation through modelling and filming) to a space proposal, a threshold offering visibility and communication (endo). Materials relate to function (exo). An alternative operation of the cinema space is discussed(endo). The central space is perceived as too complex (endo). The use of the concept of archaeology and discovery (exo) and the superimposition of two different geometries (endo) is suggested.

DISCUSSION

SIMPLE COMPLEX RULES

The third year themes are mainly spatial. The themes are much richer than the first year ones, involving a variety of issues and many more complex rules. Although both first and third years are dealing with cinematic issues only one project in the first year (case study F') takes on board the film metaphor in a global way. Most of the first year projects investigate very specific conditions (architectural like boundaries,or extra-architectural like movement, compression etc.). In the third year the initial themes relate to a cinematic concept (case study 2D' depth geographical plane, case study 2H' process product). This more abstract approach initiates the formation of several endo or exostructural rules that run in parallel, introducing in their turn more rules and involving a range of domains. As the project progresses, the rules become more space-specific and multilayered and the use of the method less dominant.

ENDOSTRUCTURAL - EXOSTRUCTURAL RULES

Most of the exostructural rules that are used in the third year at Greenwich are of a cinematic type. That means they are initiated by the use of extra-architectural domains. Type as building type i.e. a monument, is used only in case study D'. When exostructural rules are introduced in a very abstract level (abstract notions) they are translated into a model form to enable the creation of endostructural rules.(i.e. the process - product theme was translated in an abstract way into a model of a perspex (skin) and a concrete surface(spine) that enabled the creation of the endostructural rule public - private).

A close interaction exists between the exo and endostructural rules throughout the projects. Sometimes an unsuccessful translation of the initial theme to endostructural rules calls for further research. The theme or the exostructural rules are not questioned by endostructural rules. The questioning of an endostructural rule exists only in case study 2D' in relation to the use of the building type (monument against consumerist building) and in case study 2I' in relation to the complexity of the space. Only two case studies (2C' and 2I') have an endostructural starting theme (light and dark). All case studies have at least two rules that run in parallel and form the total structure of the proposition . Case study 2C' seems to be the exception as it appears to be a linear and straightforward translation from an exostructural to an endostructural theme.

For a clearer picture of how the exo-endostructural rules interact are interacting throughout the discourse a diagrammatic chart will follow.

8. 4. 3. 5 DIAGRAMMATIC CHART OF ENDO AND EXO STRUCTURAL RELATIONSHIPS IN THE CASE STUDIES UNDER ANALYSIS

Endo and Exo rules form three kind of relationships:

1. complementary (=)
2. oppositional (#)
3. parallel, where no interaction exist (/)

BARTLETT SCHOOL	SCHOOL OF GREENWICH
FIRST YEAR	FIRST YEAR
A. Endo = Endo # Exo	A'. Exo = Endo
B. Endo # Endo (technology # form, space)	B'. Exo = Exo
C. Exo = Endo # Endo (type # form # function)	C'. Endo = Exo / Exo = Endo
D. Exo = Endo # Endo	D'. Endo =Exo, Endo =Exo = Endo
E. Endo # Endo # Exo (form #function)	E'. Endo = Exo = Endo
F. (Endo # Endo) # Exo (form #function#type)	F'. Exo = Endo = Endo or Exo
G.Exo =Endo # Endo / Endo=Endo	G'. Exo = Endo / Endo=Endo/ Exo=Endo
H. Endo # Endo # Exo (form #function# type)	H'. Endo, Exo = Endo # Exo
I. Endo # (Endo # Exo) (form #function# type)	I'. Exo = Endo = Exo = Endo
THIRD YEAR	THIRD YEAR
2A. Endo =Endo / Endo #Endo	2A'. Exo = Endo / Exo = Endo
2B. Endo =Endo / Endo # Exo	2B'. Exo = Endo / Exo = Endo
2C. Exo = Endo / Endo = Endo	2C'. Endo = Exo = Endo
3D. Endo # Exo	2D'. Exo = Endo = Exo..../Exo # Endo
2E. Endo # Exo	2E'. Exo = Endo =Exo/ Endo = Endo
2F. Endo = Endo / Exo # Endo	2F'. Exo = Endo / Endo = Endo/Exo=Endo
2G.Exo = Endo# Endo / Exo # Endo	2G'. Exo = Endo/ Endo =Endo/Exo=Exo
2H. Exo =Endo# Endo/Endo =Endo(form # function)	2H'. Exo = Exo = Endo/ Endo = Endo
2I. Endo # Endo (form # function,programme)	2I'. Endo = Exo = endo#endo/ Endo = Endo / Exo = endo

NOTES

Exo = Endo (endostructural rules are introduced by an exostructural theme)

Endo = Exo (Endostructural rules are transformed by exostructural means I.e. model, collage)

Exo = Endo # Endo or Exo (type or object used visually in an analytical way)
Exo = Endo =Exo..... (type or object used visually in a transformational way)
Endo # Endo (the architectural issues that exist in opposition within the case studies whenever clear are mentioned)

8. 5 COMPARATIVE DISCUSSION BETWEEN THE TWO SCHOOLS

8. 5. 1 SIMPLE AND COMPLEX RULES

The operation of the conditional propositions in both schools has a strong similarity in structure (from simple to complex) but a difference in content. There is a thematic difference between the Bartlett and the Greenwich case studies. In the Bartlett, first year case studies have a formal approach. By the third year they are more defined with the use of several architectural themes involving typological issues. At Greenwich first year case studies use specific extra-architectural or simple architectural themes. The third year approach is more global and abstract.

One can see that design rules become more complex from the beginning to the end of each year, and between the two years in both schools. Maybe this is more apparent in the Greenwich case studies as they present a unique project throughout the year. The rules move from simple combinations to a more complex structure, as in progress from first to third year projects, with more rules and elements co-existing in parallel to each other. In the Bartlett one case study (G) in the first year and six case studies in the third year (2A, 2B, 2C, 2F, 2G, 2H) present parallel themes which do not interact amongst themselves. At Greenwich two case studies (C', G') in the first year and eight case studies in the third year (2A', 2B', 2D', 2E', 2F', 2G', 2H', 2I') present parallel themes that do not interact amongst themselves.

8. 5. 2 ENDOSTRUCTURAL AND EXOSTRUCTURAL RULES

Exostructural and endostructural rules exist within both discourses but they differ in their content and mode of operation. But before we discuss their differences we shall first present the 'kind of' exostructural rules that exist within the discourse in general and their way of operation in relation to endostructral rules. We have suggested that exostructural relationships are the ones that operate on the visual level being part of the syntagmatic plane. They draw implicitly from the field of background knowledge or explicitly from architectural types (of any scale, from parts I.e. architectural elements to whole building types) or extra-architectural elements I.e. objects. They

draw from architectural representation (mainly in the new paradigm)[4]. A model, for example, can be seen as an object independent of what it represents and be used as such.

There are generally three modes of operation for exostructural rules (relating to a type or an object) in relation to endostructural rules. They relate in a complementary way (Exo=Endo), in an oppositional way (Exo # Endo) or they do not relate atoll (Exo/Endo). The first two coincide with the two modes of operation of design language that of syntagmatic, visual and transformational (complementary) and that of systematic, conceptual and analytical (oppositional) way. Endostructural rules operate through similarity (Endo=Endo), opposition (Endo#Endo) or they do not relate at all (Endo/Endo). Exostructural rules are never oppositional amongst themselves. They operate in a complementary way or in parallel.

Within the visual operation of exostructural rules, two different ways were traced in the case studies under analysis. In the first one (endostructural) a type or object is used in an analytical way. It has to be reduced and analysed in its constituent parts, or rules, so the parts and rules can be used as such and questioned in order to be able to re-create a new system. In the second one (exostructural), a type or object is used in a transformational way. It is perceived in its totality and it is transformed into a new totality. The analytical approach is missing from this process as the transformation presupposes not an explanation but an intuitive understanding of the type or object under transformation. Within the conceptual operation (endostructural) rules are set through oppositions and similarities.

Although traces of both visual modes of operation exist within both school, the difference is very clear between the old and the new educational paradigms. At the Bartlett, exostructural rules are used conceptually as a tool for an implicit criticism and visually in an analytic way . The endostructural opposition between form and function operates in an implicit way in most of the first year projects (six out of nine) and in two of the third year projects. At Greenwich, exostructural rules are used mainly in a transformational way. In the Bartlett the rules are set up and directed by the theme (visible or invisible). This development happens in an abstract way through a conceptual interpretation and use of the rules. At Greenwich the theme is the result of visual stimuli and visual formal transformations. It transforms parallel to the images and it creates rules along the way. This development happens in an expressionistic way .

4.The role of representation in the new paradigm is going to be discussed in the next chapter.

8. 5. 3 PARALLEL RULES, COLLAGE VERSUS PARTI

In both schools we see the introduction of parallel themes or rules in the project which do not interact between them (more in the third year than in the first year. First year projects seem to be 'one liners'). That means that in most cases we do not have the presence of an overall theme (parti) that brings all the different parts of the architectural project together. This can have different interpretations.

The first would be that students of architecture are not capable of producing the only and unique rule 'the central idea' because they are inexperienced. This does not seem a very reliable explanation as the numbers of parallel themes multiplies in the third year instead of decreasing.

The second explanation would have to do with architecture as a discipline. Architecture possesses laws and rules (mainly formal and spatial) that form its inner structure and laws and rules that relate to its relational extended context (contextual, programmatic etc.). The case studies under analysis indicate that parallel readings which exist within them, no matter if they are of an exostructural or endostructural mode fall into the two broad categories indicated above i.e. project 2C memorial is about relational context, visibility, openness and inner structure, whilst the approach of project 2F underground, park, is about relational context, lighting whole and inner structure. All the parallel readings of the Bartlett and most at Greenwich fall within this explanation. The inner rules and the relational rules co-exist, and the project is the representation of their interface.

The third interpretation ties with the concept of collage and can be found at Greenwich i.e. in project G' compression can be seen under both modes of operation (internal, external). Layering belongs to internal laws and city walls to the relational context. The student introduces new rules into the project while he is transforming it. These rules do not question the pre-existing rules, they simply co-exist offering to the proposal a multiple reading.

8. 6 CONCLUSIONS

In the content of the discourse, design domains were classified into architectural, transmission and extra-architectural ones. Architectural domains offer a complex image in both educational paradigms. Within each paradigm, different architectural issues are stressed. Issues of substance are more important for the Bartlett whilst spatial issues are more important for Greenwich. On the level of transmission the differences are more substantial. The content analysis indicates that the domain of Process along with the domain of Representation become dominant in the new educational paradigm. The discussion is not only about the outcome, the final product, but on how the outcome came into being. Also extra - architectural domains make their appearance, turning the discourse from a self-referential one to a more open one.

8. 6. 1. THE FORM OF THE DISCOURSE (VERBAL EXPLICITNESS)

The expression form of the discourse and its verbal expression(expression substance)[5] are perceived as its form. Expression form, the density of the design domains refers to the form of the context in which knowledge is transmitted and received. So far as density is concerned fewer words used means that the use of the design domain under analysis happens verbally and more implicitly and that the domain is operating mainly on a visual level. More words used means that the use of the design domain under analysis happens verbally and more explicitly, and that the domain is operating mainly on an intellectual level. The level of the verbal expression allows classification to be made through the use of grammar and it reveals choices. For the verbal expression, for example, a descriptive proposition refers only to the project that is presented during the review and is focusing on practice. A conditional proposition (sets conditions) refers to a deeper level, to the underlying design principle of the project under presentation. Both the visual/intellectual operation of design domains and the verbal expression indicate the degree of control the teacher and the pupil possess over the selection and organisation of the knowledge transmitted(design 'themes', rules and method) and received in the pedagogical relationship.

In relation to expression form, the studio communication takes place on two separate levels, the visual and the intellectual. All design domains have both qualities, visual and intellectual within them. Their difference lies in the dominance of the visual quality over the intellectual or vice versa, in relation to their main characteristics and to the way they are used. The density of the discourse provides us with information on that front (low density domains operate mainly visually I.e. C, EL, O, whereas high density

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5. Expression form and substance form are used according to the analysis model proposed in the Chapter3, on Method of Analysis p.

domains operate mainly verbally i.e. PU, A).

In relation to content form, the verbal expression of the discourse provides the information on the front of decision making via conditional propositions and propositions of process. Most domains tend to operate as descriptive, factual or conditional. Design domains that operate on an intellectual level are conditional. Geometry Form tends to set up conditions in the first year and Space Form operates at all levels throughout the discourse. The numerical presence of conditional propositions is the same [6] in both schools of architecture. This indicates that design choices and decisions are made equally at all educational levels. From the outset the students seem to be setting up the conditions and the rules by which they design in order to arrive at a specific architectural proposition. In the new paradigm we have a reduction of the descriptive propositions , a rise in the propositions of process and consequently a more verbally explicit discourse.

The discourse overall does not present any obvious development in relation to its density and verbal expression across the years in both educational paradigms. The consistency and similarity of the results, from a quite diverse sample of data, reveals that design domains contain qualities within them, in relation to their visibility and way of expression, that are not influenced by the context in which they are communicated. The form of design language shows that studio communication has almost the same verbal explicitness across levels but not between the two schools. Verbal explicitness is not an issue that is acquired through development I.e. a priori that first year is more visible and diploma less, or vice versa , but through the method of studio teaching and design process used . A major part of architectural knowledge is communicated visually and as a consequence verbally implicitly. So studio teaching does not have the ability to become fully verbally explicit. The main and obvious difference across the two educational paradigms relates to process. Process is more verbally explicit at Greenwich than at the Bartlett, and that seems to influence the form of each discourse.

8. 6. 2 THE SUBSTANCE OF THE DISCOURSE / ITS COGNITIVE FUNCTION

The substance of the discourse is the one that gives to the discourse its signification and corresponds to the syntagmatic and systematic planes in linguistics [7]. Content

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6. The percentage of participation of the conditional proposition in the discourse is around 30%. in all levels in both schools.
7. de Saussure, Ibid. pp.170

form express the sequential relationships existing between domains and the degree of boundary maintenance between domains, that means mainly the spatial relationships. The content substance of the discourse deals with the systematic plane of the design language where the domains are united in absentia through relationships of functional contrast (opposition and similarity).

The content form or the material function of the design language is variable throughout the discourse without presenting a developmental pattern. On the level of design domains, the simultaneous examination of both expression and content form indicates that visual domains (i.e. Architectural Elements) are forming sequential relationships and vice versa, but that intellectual domains (i.e. Programme Use) are not forming sequential relationships. That means that the domains that are transmitted for their visual qualities or through their visual qualities actually are the main participants of the syntagmatic plane, which seems to be constituted mainly by visual relationships of combinations and fragments of background knowledge.

The verbal expression of design language along with its structure indicates the cognitive function of the design language. Binary oppositions and relationships of similarity belong to the systematic plane. Binary oppositions operate in an implicit and explicit way. They form a conceptual matrix, part of the shared common 'langue'[8] of the design language. Conditional propositions are the ones that mainly structure the relationships of similarity of design domains in the systematic plane. They initiate concept formation in design activity, as they set up design rules and reveal design intentions. The relationships of similarity have different levels of complexity in relation to the number of design domains and spatial relationships that participate in them. The development of the design language in both educational paradigms takes place only in the level of complexity of the relationships of similarity. As students advance in their academic studies, they are more capable of constructing more complex architectural relationships.

Two modes of operation exist in relation to concept formation. The endostructural one that is analytical, and it is primarily about understanding and reconstructing the existing relationships between different design domains . It advances from parts to whole. It seems that the endostructural mode of transmission is more connected to background assumptions. In that sense it is more implicit, as parts of these background assumptions are coming forward in the form of fixed relationships of similarity . The exostructural one which is more about perceiving the existing relationships between

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8. for the linguistic division of 'langue' and 'parole' see Roland Barthes 'Elements of Semiology' p.p.13.

different design domains and transforming them. It advances by transforming the whole. The exostructural mode of transmission is more connected to the creation of new rules and new concepts . It is part of the foregrounding. Both modes interact between the visual and the intellectual, the endostructural mode giving a predominance to the intellectual and the exostructural giving a predominance to the visual level. The exostructural mode of operation decreases from the first year to the third year discourse in both schools of architecture. Both modes of operation exist within both schools of architecture, the endostructural being the dominant one in the Bartlett and the exostructural being dominant at Greenwich.

Binary oppositions along 'fixed' relationships of similarity and 'backgrounding' constitute what we can call the 'langue'of design language. Binary oppositions as we have already said operate in a steady way throughout the discourse. Fixed relationships and 'backgrounding' operate in a tacit way and are more dominant in the Bartlett discourse. As a consequence the Bartlett discourse is more implicit than the Greenwich one, not only on the level of process . The Greenwich discourse operates more in a 'foregrounding' mode.

Looking closely at the operation of the different design domains, the domains of Geometry Form and Space Form are the ones that set up the conditions and mainly participate in the formation of design rules. They are the main participants in the formation of the systematic and syntagmatic planes . In the systematic plane, their presence is stable throughout the discourse, while in the syntagmatic plane, their participation varies[9].

In the first year Bartlett we have the domains of IU and GF being the most interactive ones. For architectural concept formation, interaction takes place between the interactive domains of IU and GF on the one hand and on the other hand between the visual domains of SF , EL. The domain of BT connected to typology, is probably working on the visual level as well. Architectural concepts are formed by the interaction of IU and GF with the domain of SF (endostructure) and by the interaction of IU and GF with the (in a broader sense typological)domains of EL and BT (exostructure). The endostructural mode of operation is the dominant one. The students are primarily thinking geometrically and by the use of metaphors are expressing themselves formally. In this way they can turn their architectural thinking into visual expression.

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9. (GF in 1st year B, GF,SF in 1st year Gr, SF in 3rd year B and Gr).

In the third year at the Bartlett we have the domains of IU and SF as the most interactive ones. The domains of IU, PU, GF, SF and BT participate in the creation of relationships of similarity. For architectural concept formation, interaction takes place between on the one hand the intellectual domains of IU and PUand on the other hand with the domain of BT (probably working on the visual level).The domains of GF and SF alternate between the visual and the intellectual forming endostructural relationships when they relate to the domains of IU and PU and exostructural relationships when they relate to the domain of BT. At this level the students are capable of using some already formed architectural concepts to create new ones. It is indicative that the domain of SF changes from being visual in the first year to being more intellectual in the third year, and is not clearly placed within the intellectual or visual realm.

In the first year at Greenwich we have the domains of GF and SF being as most interactive ones. Almost all architectural domains are transmitted mainly on the visual level with the exception of the domains of PU and A which are transmitted on the conceptual level. The domains of SR, IU, GF, SF, EL,and O participate mainly in the creation of relationships of similarity. For the architectural concept formation, interaction takes place on a visual level between the extra architectural domain of O (exostructure) and the architectural domains of EL,SR, (GF,SF visual parts) and the domains of,IU,GF and SF (intellectual parts). The exostructural rules are operating in a transformational way. The first year Greenwich discourse is primarily syntagmatic and takes place on the visual level. The students create architectural concepts largely by using visual transformations, and for that reason representation becomes an integral part of the process.

In the third year at Greenwich we find that the domain of SF is the most interactive and is transmitted mostly on a visual level. All domains are visually transmitted with the exception of the domains of PU,GF and A which are transmitted on the intellectual level. The domains of SR, IU, GF, SF, Oand A participate mainly in the creation of relationships of similarity. For architectural concept formation, interaction takes place between the intellectual domains of GF and A and the visual domains of SR, IU, SF and O. The relationships that involve only the domains of GF and SR, IU and SF are endostructural. The relationships that involve the domains of O and A are exostructural. The former taking place on a intellectual level and the latter on a visual level.

For the architectural concept formation the interaction between the visual and the

intellectual plane is necessary. We have to take into consideration that binary oppositions are the ones, that in parallel to the relationships of similarity, set up the intellectual framework of the architectural discourse. So no matter how visual ly transmitted are the domains of GF and SF, a part of them belongs to the systematic plane. So even if no intellectual domain is visible in the formation of relationships of similarity i.e. first year Greenwich, the interaction between visual/conceptual is still taking place through the domains of GF and SF. However, the use of different domains is not 'fixed'. They can operate in background or foreground modes.

The first year at the Bartlett is mainly systematic and first year at Greenwich mainly syntagmatic. Forms which are primarily what the students use in the first year are used very differently between the two schools. The first year students at the Bartlett mostly analyse 'types' whilst at Greenwich use experience and extra-architectural references. The third year discourse in both schools is more complex and interactive between metaphoric and transformational ways of conceptualisation, and it becomes in some ways more similar. But still the analytical mode of operation of endostructural rules is predominant at the Bartlett and the transformational at Greenwich.

A central idea or parti that ties-all the design rules together does not exist in the projects. Both relational and inner laws exist within the same project. Students start of by using a design 'theme' that introduces some design rules in the project. This design 'theme' can be questioned, abandoned or co-exist with a new design 'theme' that is introduced later in the project. These 'themes' run in parallel. Their meeting point or interface allows us to read the project in both its exostructural and endostructural mode. Parallel rules can overlap, offering to the project the possibility of multiple readings.

The two discourses of Bartlett and Greenwich therefore present similarities and differences in their mode of operation. At the core of the similarities lies architectural concept formation in the studio. At the core of the differences lies a change in the frame of reference that took place in architectural discourse during the recent years, which has influenced the method of design teaching.

CHAPTER 9

TOWARDS A THEORY OF ARCHITECTURAL COGNITION IN DESIGN STUDIO

DISCUSSION AND CONCLUSIONS

9.1 INTRODUCTION

The research has been complex and has moved through different layers of analysis by tackling a diversity of architectural educational issues. The existence of a varied field work stemming from two different architectural educational scenes gave us the opportunity to clarify the structure and form of architectural knowledge and its communication. The similarities which exist between the two educational paradigms allow for the elaboration of a theory of cognition in the architectural studio. The differences allow us to place the educational paradigms within the broader relational context of the architectural discourse.

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The tacit dimension of architectural knowledge and the explicitness of studio communication raises many questions in relation to its function. Architectural language is complex in its structure and indiosyncratic in its communication, due to the co-existence and interaction of its visual and conceptual parts. Its explicitness is not changing, but its learning is developing. The stress on the active role of 'visual thinking' in design is of relatively recent origin. The role of architectural representation has changed from a simple presentation of the architectural object to a design tool. The interaction between the visual and verbal parts of design language initiate architectural cognition. On the level of cognitive development the linear (Piagetian) model of the old paradigm is replaced by the interactive (Vygotskian) model of the new paradigm.

The existing differences on the explicitness of the discourse of the two educational paradigms stem on the one hand from the use of implicit - explicit teaching methods and on the other hand from the use of background architectural knowledge and assumptions (language). Process and product are always present in architectural education, only the emphasis differs. At the Bartlett, the stress is on the product, and explicit teaching methods are absent. Typology plays the role of an implicit visual

stimulus .and fixed design rules, the role of implicit design principals. At Greenwich the method used is one of visual transformations . The visual stimuli are part of the design process and 'foregrounding'.

This chapter examines visual thinking in architectural education and the role of representation. It puts forward a new interactive model of architectural cognition and concept development. This interactive model is based on the visual/verbal interaction. Design rules that set up the conditions of a project are of an endostructural (analytical) and exostructural (visual) nature and operate in a metaphoric (predominately conceptual) and metonymic (predominantly visual) way. Background knowledge is perceived as part of design 'language', as the image bank of the designer and may be operational (primary type), emotive, or experiential. Its contribution in architectural cognition is examined along with the role of 'foregrounding' in creating new design rules. The discussion on the precedent /object and collage/parti dichotomies focuses on issues of teaching methods and design process. Finally, in order to define the factors that contribute to the clarity of design communication, the two different teaching methods in the two schools will be discussed. An attempt is made to place the old and the new educational paradigms within their broader architectural context.

9.2 VISUAL DESIGN THINKING

The discussion of the visual realm and the concept formation of the design language, is a discussion on the formative rules, that govern the function of the design language in studio transmission. Visual thinking (expressed by drawings) and verbal thinking (expressed by speech) are two different kinds of thinking[1]. For Rudolf Arnheim[2] language can suply information by analytical judgements, but it cannot create its own productive thinking. Purely verbal thinking, being useful but sterile, is the prototype of thoughtless thinking. What makes language so valuable for thinking, is the help that words lend to thinking, while it operates in a more appropriate medium, such as visual imagery. The visual medium is superior, because it offers structural equivalents to all characteristics of objects, events, relations i.e. readily definable patterns, of which the geometrical shapes are the most tangible illustration. The

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1. Piaget, J., "Some peculiarities of verbal understanding in the child between the ages of nine and eleven" in *The language and Thought of the Child*, bubl. by Routledge & Kegan Paul Ltd., London1959, p.p.76-127. Syncretic perception is very near the visual thinking. For Piaget syncretism is the negation of analysis and it moves from the whole to the parts. In syncretism the whole is understood before the parts are analysed.

2. Arnheim, R., *Visual Thinking'* Publ. by University of California Press, Berkeley, Los Angeles, London, 1969. Chapter 13, 'Words in their Place' p.p. 226-253

principal virtue of the visual medium is that of representing shapes in two and three dimensions, as compared to the one dimensional sequence of verbal language. In other words, mental depth is unthinkable without an awareness of physical depth.

The need to discuss visual thinking in design language comes from the fact that this research has indicated the importance of its operation within the architectural studio. Visual thinking appears to be more intuitive, didactic and more related to the whole, in the sense that the whole is understood before the parts are analysed. Visual thinking is mainly implicit. Verbal thinking appears to be more analytical and explicit . Visual thinking is a more "subjective synthesis" than verbal thinking, which presupposes analysis. Our mind moves from the whole to the parts in a dialectic relationship. We can claim that in visual thinking every new perception is connected with what immediately precedes it in a sequential way (plane of spatial relationships and visual transformations).

Because of its unpredictability and implicitness, visual design thinking is not always stressed within the discourse of architectural education. The analysis-synthesis model stresses the dominance of the conceptual over the visual, without offering a possible interaction between the two. In the concept-test model, the designer, by conjecturing, or imagining, conceives a solution early in the design process, which is tested in multiple design circles, rejected, or transformed[3]. Drawing and sketching are perceived as design tools , that test the pre-formulated assumptions, thoughts, or ideas. This model recognises the role of drawing in supporting innovation[4] and the interaction between the visual and the conceptual. In this model, however, the concept - even in the form of a visual schemata (preconception) - precedes the visual stimulus , and the process of visual transformations is mainly analytical. The designer starts with a blanc paper and the 'central idea'of the building is mentally conceived. Drawings are perceived mainly as records of previously conceived images, rather than generators of design ideas. The concept-test model thus recognises the role of background knowledge and the use of typology in formulating this 'primary idea'.

Schon, D. [5] using protocol analysis was amongst the first to stress drawing and talking

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3.see Ledewitz, S., "Models of Design in Studio Teaching" in *JAE*, Vol.38, No 2, Winter 1985, p.p. 2-7. Ledewitz is arguing for the concept-test model and against the analysis synthesis model. She suggests as well the project to include a solution type study in which form-generating strategies relevant to the project are derived from analyzing architectural precedents.

4. see Schenk, P., "The role of drawing in the graphic design process" in *Design Studies* Vol 12, No 3, July 1991, p.p. 168-181. A research programme tries to clarify the way in which drawing is employed. The research confirms the importance of the drawings as inovative tools and their participation in the concept-test model.

5. Schon, D., Wiggins, G., "Kinds of seeing and their functions in designing" in *Design Studies*. Vol

as parallel and interactive ways of designing. He further explored different kinds of seeing and their functions in designing. He was also to recognise the importance of seeing in designing, claiming that designing is an interaction of making and seeing/ doing and discovering. In his view, the design process can be schematised as: seeing - moving - seeing. He did not, however, further investigate the role of representation or cognition in this interaction.

9.2.1 THE ROLE OF REPRESENTATION

Drawings have always been perceived as representations of architectural space, as a means of communication, which are expected to be visually attractive[6]. An architectural idea has always been seen as the outcome of an extended graphic development . However, a key finding of this research is, the possibility that visual thinking can precede verbal thinking, and that drawings or images can become active agents in producing design ideas, rather than passive records of them. This stems from the belief that thought is inseparable from the medium in which it is formulated and expressed. Vygotsky[7] argues that, if one changes the tools of thinking available, the mind will have a radically different structure. The linkage between tool use and speech influences cognition.

By analogy, the use of different design mediums expressively chosen, determines the development of design[8] and thus architectural representation becomes part of the design process. Representations, understood as discursive concepts, should not be equated with mental copies or images. They posses, in equal measure, a cognitive or mental aspect and a material aspect. The use of an explicit visual strategy treats drawing (model making or any 'kind' of representation) as being able to function prior to conception, giving to it order and meaning. By contrast, the tacit assumption of a drawing strategy treats drawing (or model making) as a part of the background - a neutral transparent medium that allows the designer to engage directly with real objects and spaces that are considered to make up the design task. In the explicit formulation of a visual design strategy, the designer takes responsibility for the drawing and model making process and for those issues that will contribute to

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13, No2, April 1992, p.p.135-153 and
Schon, D., *The design studio, Exploration of its traditions a potential*, publ. by RIBA Publications Ltd, London 1985.

6. Cuff, D., "Teaching and learning design drawing" in *JAE*, Vol XXXIII, No 3, Spring 1980 p.p.27-32.

7. Vygotsky, L., *Mind in Society, the Development of Higher Psychological Processes*, publ. by Harvard University Press, London 1978, p.126. also chapter 1, "Tool and Symbol in Child Development" p.p.19 -30.

8. see Maller, A., "Towards a critical architectural representation" in *Design Studies*, Vol 12, No 2, April 1991, p.p. 67-72 . Education that takes this future development into consideration will have to encourage students to develop their explanatory capabilities through extensive applications of various experimental visual representation modes.

architectural form. Representations (drawings, models) become suitable instruments for abstract reasoning. They serve not simply to translate finished thoughts into visible models, but are also an aid in the process of working out solutions of problems.

Herbert D. [9] introduces the uncertain quality of design study drawings. Each new mark that is introduced in the drawing brings within it unpredictable qualities , as graphic expression is subject to the mark/interpretation/mark cycle. Thus, the introduction of a new representational technique like photocopying or collaging can alter in an unpredictable way our perception of the drawing at hand. One reads off the sketch more information than was invested in its making. For example, the introduction of computer technology in the architectural drawing introduces more intensively the phenomenon of unpredictability, as the computer can do things that cannot be foreseen by the designer. The power of model making lies in the introduction of three -dimensionality (introduced also by the computer along with issues of simulation) and of materiality. Thus the translation of a drawing to a model alters our perception of the architectural object more drastically. But in the mark/interpretation/mark cycle, it is not only the mark that is unpredictable, but the interpretation as well.

For Goldsmith G[10]. this interactive process creates the 'figural concept'and is no less systematic and logical than any other rational dialectic process. It is a rational mode of reasoning, characterised by systematic exchanges between conceptual and figural arguments. During this interaction there is no predetermined temporal sequence; a concept may lead to a figure or a figure may lead to a concept. Goldsmith G. claims[11] that when design precedents or protocols are used in the design process and encoded as figural or conceptual elements, we find approximately equal numbers of conceptual and figural arguments and equal numbers of propositions originating from figural or conceptual elements. A constant exchange between figural and conceptual arguments exists, one following another in sequence, which Goldsmith' characterises a rational dialectic process. We shall claim later in the chapter, that this is possibly a false assumption, as this research suggests ,that either visual or verbal thinking is dominant for most of the time.

9.see Herbert D. "Graphic Processes in Architectural Study Drawings" in *JAE*, Vol 46/1, September 1992, p.p. 28-39. Herbert analyzed characteristic graphic processes from Le Corbusier's work and from recent study drawings by five contemporary architects. Eisenman amongst them employed various drawing strategiesfor generating form, making the graphic processes a foreground rather than a background issue.

10.see Goldsmith, G., "On visual thinking: the vis kids of architecture" in *Design Studies*, Vol 15, No 2, April 1994, p.p.158- 174. Through an exaustive description of a case study in action Goldsmith arrives to some intresting indications in relation to the figural concept.

11. ibid. p. 173

Representation, treated in an active way, confronts the very act of knowing and concept formation. Thinking has generally been identified with language cognition up to now, and within it, the role of visual thinking has generally been conceived as subordinate. The new use of representation elevates visual thinking operations to those of verbal thinking. In the design process, with every change in the means of representation, a transformation of what is in hand occurs, producing a new proposition to be further transformed. It is of great importance to recognise, that design concepts do not appear all at once , but that they require a process that involves step-by-step transformations and that the interaction which takes place amongst the representation and intellectual thinking is an integral part of architectural cognition. Within that interaction, incomplete concepts and partial forms are generated randomly and intentionally.

9. 3 CONCEPT FORMATION

We have argued that visual operations play a very important role in architectural cognition and can precede intellectual operations. The 'having' or 'entertaining' of a concept is not an all-or-nothing affair, but a developmental process. Thought consists of concepts. A concept is not an isolated, changeless formation but an active part of the intellectual process, constantly engaged in serving communication, understanding and problem-solving. We have argued that architectural concept formation or concept learning occurs through the interaction of visual and intellectual operations. The visual expression in architecture is fundamental for its understanding. Both verbal expression (talking) and visual representation (making) are concrete expressions of architectural thinking and both of them interact with each other transforming our concepts about architecture.

The assumption is that learning architecture is like learning a language and that at the beginning of the learning process thought/architectural concepts and speech/visual forms, develop along different lines, independently of each other up to a certain point in time. At a certain point these lines meet, whereupon concepts become visual and forms conceptual. Schematically, one may imagine concepts and representations as two intersecting circles. In their overlapping parts, concepts and representations coincide to produce what is called architectural thinking[12].

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12. Lev Vygotsky *Thought and Language,* The MIT Press, 1986.
According to Vygotsky in their ontogenetic development, thought and speech have different roots. In the speech development of the child, we can with certainty establish a pre intellectual stage, and in his thought development, a pre lingulstic stage. Up to a certain point in time, the two follow different lines, independently of each other and then they meet, whereupon thought becomes verbal and speech rational.

At Greenwich the verbal presentation of the drawings or models is more successful. The gap between visual and verbal is less apparent. The reason for this is that the students are working primarily with visual transformations . While they are presenting their project they are describing the design process they have gone through to arrive to their final design. Visual imagery is initiating concepts so students tend to describe their images first and the concepts that are derived by them follow. (see appendix floppy disc and photo CD case studies 1I', 1D')

The gap between representation (drawings) and verbal expression is very obvious in the first year crits and particularly when the intellectual mode of thinking precedes the visual (Bartlett). These two aspects (intellectual, visual) develop separately in the students' work until there is a conscious correspondence between them. A student has to learn how to talk about his models/drawings in a coherent way, as well as to express his 'ideas' through drawings and models. When visual and verbal expression coincide the students feel that things are revealed to them through a magic discovery. Third year students prove to be more capable of expressing verbally their representations and vice versa, although gaps still exist between the two modes of expression.

One could argue that the processes leading to architectural concept formation develop along two main lines[13], which also correspond to two forms of mental activity. The first relates to 'complex concept' formation, based on bringing things together under a common 'family name'. This corresponds in linguistics with the plane of syntagm.[14] In the articulated language, this space is linear and irreversible, and refers to relations of combination. The second is the formation of "potential concepts", based on singling out certain common attributes of objects and creating classifications. This corresponds in linguistics with the plane of system. The first approach brings things together through relations of combination and the second, through relations of similarity or opposition.

The design discourse therefore works simultaneously on both the levels of syntagm (the plane of visual transformations and spatial relationships) and of system (the plane of relationships of functional contrast), thus allowing the formation of architectural concepts to take place. The architectural design domains of Immediate Use, Geometry Form and Space Form have a substantial participation in both planes being visual or intellectual. They are the main participants of the design language overall. Other domains i.e. Structure , Context, Architectural Elements are mainly visual, whilst the domain of Programme Use is mainly intellectual. The interaction between the two planes takes place amongst 'visual' and 'intellectual' domains or between domains used for their visual or intellectual qualities. The interaction takes two forms. One gives priority to visual schemas and to the whole that is transformed or analysed in its parts. The other gives priority to mental schema and to the parts that form the whole .

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13. Ibid. pp. 96-145. Vygotsky distinguishes several phases within each concept formation line.
14. Ferdinand De Saussure *Course in General Linguistics*, . Fontana/Collins 1974 pp.122-127 and Roland Barthes *Elements of Semiology*. Hill and Wang. New York 1986. III. Syntagm and System 58-88.

9.3.1 SIMPLE TO COMPLEX CONCEPTS

The development of the design language takes place on the level of cognition and particularly in the formation of relationships of similarity. While observing a first year student designing, Schon D. and Wiggins G. [15] noticed that she used very few domains, whilst she was simultaneously talking and drawing. Two explanations were offered by the researchers. First of all, the student did not seem to have been aware of all the domains that could affect her, and secondly , that complexity is an essential feature of designing. They suggest that the problem solving task confronting the student would have seemed overwhelmingly complex, whereas the sequential structure of her seeing-moving-seeing enables her to manage complexity. They also suspect, that a more advanced student would be able to manage complexity in a more successful way . Their suggestion appears to be validated by our research, which has revealed that students do indeed use more complex structures, as they advance in their education.

Piaget, in his developmental theory of cognition, is criticised as offering only logical truths. For him the child's cognitive development takes place in specific stages, is linear and is from simple to complex and from concrete to abstract concepts. Piaget sees a gradual progression from 'simple' to 'articulated' intuitions. The stages of development are fixed in their sequence and Piaget is therefore accused of inflexibility in his model[16], although he claims that there is an essential difference or logical discontinuity between successive stages. For Piaget, the process of reflective abstraction[17] by which the transformational properties of thechild's intuitive actions are internalised as logical thought, does not merely repeat these actions, but reconstructs them systematically at the level of operational thinking. The adolescent can reason abstractly, since he/she can formally conceptualise possible transformations and their results, without any reference to physical reality. 'Because of this, Piaget is also accused of exaggerating the autonomy of logical development and underestimating the less universally valid forms of reasoning in everyday thinking and sensory experience[18].

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15. op. cit. Schon. D., Wiggins, G. p.p.143-145

16.Boden, M., *Piaget*, publ. by Fontana Press, London 1979. Avalid presentation criticism of the Piagetian model. Stage I relates to the pre-conceptual child the sensori-motor stage, stage II to the intuitive child and the concrete operational stage, only in stage III the child starts constructing operational logical thinking Formal operational stage.

17. Ibid. p.74.

18. Ibid. p.p.77-86. The progression from pre-operational through concrete to formal intelligance is characterized by him via distict logico-mathematical structures of transformation having increasingly powerful mathematical properties. Piaget is focusing in intellectual competence as opposed to intellectualperformance: what it is optimally possible for a person to do, not what she actually does in a specific situation.

By contrast, Vygotsky[19] argues that pre-intellectual thinking and reason work in parallel, both being social and interacting in a developmental way. According to Vygotsky, Piaget divorced the intellectual activity from the practical one, and although he clearly demonstrated that the logic of action precedes the logic of thought, he insists that thinking is separated from reality. For Vygotsky the relation of speech and action is a dynamic one in the course of cognitive development. In that way, he offers an interactive model instead of a linear one , by recognising the power of background social knowledge and sensory experience to transform our view and knowledge of the world at every phase of cognitive development. Imagination and thought appear in their development as two sides of a coin, whose unity is already present in the very first generalisation, in the first concept formed by the individual. He argues that development is a complex dialectic process, characterised by unevenness in the progression of different functions, metamorphosis or qualitative transformation of one form into another, interwining of external and internal factors and adaptive processes. He rejects the concept of linear development and incorporates into his conceptualisation both evolutionary and revolutionary change. Development proceeds in a spiral, passing through the same point at each new revolution, while advancing to a higher level[20].

These contrasting developmental theories can be seen to underly the different educational approaches in programme setting, that exist between the old and the new educational paradigms. The simple to complex realities of the old paradigm takes on board the Piagetan model of cognition, whilst the experiential approach, where students of different educational levels share the same 'themes', takes on board the interactive cyclical development proposed by Vygotsky.

Our analytical results confirm that concept formation advances from simple to complex structures or from lower to higher level of operation. But concept formation never ceases to be interactive with physical reality i.e. visual operations, at any time in its developrment. In order to produce a sensible abstraction, a concept should be generative. It should be able to develop from the concept a more complete image than that offered by the concept itself. Abstraction is grounded in both physical reality and intellectual capacity. As Arnheim[21] claims, abstaction takes place

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19. op cit. (1986)Vygotsky criticise the Piagetian developmental theory of cognition in chapter 2, "Piaget's Theory of the Child's Speech and Thought" p.p.12-57.
20. op cit. (1978) Afterword p. 121 and "Internalization of Higher Psychological Functions" p. 56.
21.op. cit. Arnheim (1969) Capter 9 'What abstraction is not', p.p. 153-172. Chapter 10 'What abstraction is', p.p. 173-187 For Arnheim a harmful dichotomy exist in relation to abstraction : A conception in order to be truly abstract, must be free from any perceptual collateral, which would be viewed as an impurity. False assumptions : an abstract thing could not be concrete at the same time and vice versa, concrete is what is physical and abstract what is mental, all abstraction is supposed to be based on generalisation, an abstraction is a smaller quantity

primarily on the visual level. In order to abstract you must be able to discover the structural essence of a physical entity i.e. principles of things, the forces underlying their appearance and behavior. The abstraction is then formed by relationships of similarity that exert their unifying power by the discovery of the total pattern of the physical structure. Only then according to Arnheim abstraction becomes part of productive thinking.

Apart from simple to complex concept development, we can argue that architectural cognition develops in a spiral rather than linear way. The research indicates that the form of design language (expression and content) remains stable throughout the discourse . For example, if design cognition was developing in a linear fashion, the tutors or students would have been able to control the design language more in the final than in the first year, so its level of explicitness would have been dinstinctively different. Also the participation of conditional propositions would increase during the studies, in other words, first year students would be able to handle fewer conditional propositions than diploma students, which has been shown to be false. On the contrary, conditional propositions are stable and relationships of similarity, which initiate architectural cognition and set conditions and design rules, are equally present at all educational levels.

The spiral concept development described by Vygotsky takes place on the level of verbal visual interaction via the use of representation. With every new representational move, new design complexities are introduced into the project. The relation between visualising by representing and verbal expression (speech) is repetitive and dynamic. Within this frame of operation, visual and verbal thinking develop differently in the course of the studies. Most first year starting 'themes' are formal, irrespective of the design method used, i.e. geometrical rules are very popular at the Bartlett, where analytical design processes are used, and the formal transformations of objects or 'primary types' are very popular at Greenwich, where visual processes are used. At a later stage of studies design 'themes' become more complex. This development is apparent, as third year design 'themes' involve more design domains in relation to first year design 'themes'.

9.3.2 ENDOSTRUCTURE - EXOSTRUCTURE

Reading through the case studies we realised that relationships of similarity, apart from their different level of complexity, can be classified within two broad categories. These are of an abstract(endostructure) nature, which maps onto that of

containing the virtue or power of a greater.

metaphor in signs; and a relational (exostructure)nature[22], which maps onto that of metonymy in signs . Architecture possesses a certain (endo)structure. This contains specific internal rules and laws . These rules and laws are formed within an ordered and extended context. They are formed internally (endo) by the way architectural domains are structured (i.e. binary oppositions, endostructural relationships of similarity), or externally by reference to other objects (exo), architectural (i.e. type, historical type) or not (i.e. objects) that posses by analogy similar rules and laws, their own endo and exo structure . All architectural domains can form both type of relationships .

The endostructural relationships try to explain the internal structure of architecture by analysing it. The exostructural relationships try to understand what is disclosed in front of it and its relationship to an extended relational context[23]. Within the endostructural relationships there is a predominance of the intellectual level (analytical and systematic) and within the exostructural relationships there is a predominance of the visual level (figurative and syntagmatic). In the old paradigm we have a predominance of endostructural relationships and in the new paradigm we have a predominance of exostructural relationships. In both cases, however, we find a decrease in the number of exostructural relationships in relation to endostructural ones from the first to the third year. This also suggests the predominance of analytical thinking in relation to figurative spontaneous thinking at the more advanced educational levels.

A very interesting hypothesis can be formulated here. A student (mainly first year) constructs an exostructural relationship or thinks spontaneously and visually, but, as we have already said, he/she is usually not aware of the concept that this act entails. He/she becomes conscious of this spontaneous concept relatively late (when visual and intellectual modes of thinking coincide). On the other hand, endostructural relationships (analytic thinking) usually are formulated by their intellectual definition and their use is non spontaneous and explicit in relation to the concept itself. So for the student they are easier to handle explicitly. We can suggest that the development of spontaneous visual thinking moves downwards from the abstract to

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22. The terms are borrowed from Chris Sinha *Language and representation* Publ. by Harvester-Wheatsheaf, New York 1988, Chapter 5, "Context: Background, Presupposition and Canonicality", pp.164-207. For Chris Sihna the dimension of endostructure versus exostructure can serve as an important organizing principle for the analysis of background knowledge, representation and signification.

23. see Ricoeur Paul " What is text? Explanation and understanding" in *Hermeneutics and the human sciences*. pp. 145. Paul Ricoeur makes the dinstinction between explanation and understanding as expressing two oppositional positions in the hermeneutics of text. The first one (explanation) comes from linguistic models and relates to sciences. The second one (understanding) comes from a psychological notion and relates to the human sciences.

the concrete, and the development of the verbal analytic thinking moves upwards from the concrete to the abstract. The development on the visual level for each mode of operation takes place in exactly the opposite way. Thus the exostructural and endostructural relationships develop in reverse directions within the design process, but the two processes are closely connected. Analytic concepts grow upward through the interaction with a visual mode that develops downwards (from abstract to specific i.e. from analytic diagrams to the building). Spontaneous concepts move downwards through the interaction with a visual mode that develops upwards (from specific to abstract i.e. from specific objects to analytic spatial diagrams). Seen that way architectural design is neither a top down or bottom up activity but involves simultaneously both movements.

9.3.3 METAPHOR - METONYMY

The design discourse operates on the levels of syntagm (visual) and system (conceptual) at the same time, thus allowing the formation of architectural concepts to take place[24]. The interaction between the two levels is possible through the use of metaphor. The planes of syntagm and system correspond with the concepts of metaphor (of the systematic order) and metonymy (of the syntagmatic order) used by Jakobson[25]. Syntagm cannot 'progress' except by calling successively on new units taken from the associative plane (system) through the creation of metaphors. Jakobson's studies, led him to conclude that not only language, but all sign systems, are organised in terms of metaphor and metonymy, and that stylistic and discursive devices and genres derive from the differential positioning and emphasis of messages according to these two poles. It is obvious that neither of them can function on their own since both syntagm and system are necessary to all discourse.

In Linguistics, metaphor[26], presupposes the establishment of a tension between two terms in the sentence through the violation of a linguistic code. The metaphorical statement then appears as a reduction of this tension by means of a creative semantic pertinence within the sentence as a whole. The emergence of sense is

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24. see Corine Delage, Nelly Marda "Concept formation in a Studio project" In *Educating an Architect* publ. by A.D London 1994. The interaction of the visual and the conceptual level initiate the concept formation.

25. Jakobson Roman *Two Aspects of Language and Two Types of Aphasic Disturbances* in : Jakobson and Halle, 1956 :54-82. "The aspect of the linguistic code governing relations of *selection, substitution and similarity* between linguistic signs was designated by Jakobson as its metaphoric pole, indicating that metaphoric figures depend for their interpretation upon these relations. The aspect of the code governing relations of *combination, contexture and contiguity* was designated metonymic, indicating that the device of metonymy relies upon part whole relations in an ordered, extended context."

26. Paul Ricoeur *Hermeneutics and the Human Sciences* , Cambridge University Press, 1981, Introduction pp. 12-13, and Earl McCormac *A Cognitive Theory of Metaphor*, The MIT Press 1985.

accompanied by a transformation of the referential dimension, endowing metaphor with its power to re-describe reality. The nature of this transformation, which affects not only metaphor, but literary works in general, is clarified by the concept of the text.

In architecture one can say that the pole of exostructure/relational context relates to that of metonymy in signs; and the pole of endostructure/morphology relates to that of metaphor in signs. The way that architectural space presents itself to our re-presentation - is neither endostructure nor exostructure. It is a meeting ground, or interface, of a particular and special kind, which affords us a view of space in both its endostructural and exostructural aspects.

Architectural design is metaphoric and metonymic. The endostructural relationships of similarity examined in the research were of a metaphoric kind as they were relationships of forced similarity, bringing dissimilar architectural elements together and the exostructural relationships were of a metonymic kind. The more dissimilar the referents the bigger the violation of ordinary rules of association.The violation of rules leads to tension and to a new understanding of phenomena. Coyne, R.,[27] in a study of metaphor in the design studio divides metaphors into romantic ones ,where the subjectivity, the importance of the individual, imagination and emotion are valued, and objectivistic metaphors that trade in objectivity, detachment, logic and analysis and entail a notion of method. In the former case, the visual level precedes the conceptual (for us these are of a metonymic order) whilst in the second case the conceptual takes the leading role.

Metaphors are entirely situational. What a particular designer sees and what these entail at a particular moment arises from the changing experience of the designer interacting with the situation. The experiences of the designer (background knowledge) play a critical role in the formulation and exploration of metaphor as a cognitive process.

9.3.4 BACKGROUNDING - FOREGROUNDING

Background knowledge or assumptions play a very important role in studio communication and in cognition. Background knowledge is recruited from a much wider repertoire of knowledge, from our total knowledge base. In the background knowledge the form-use of the object[28] achieves representational status in the

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27. Coyne, R., Snodgrass, A., Martin, D., "Metaphors in the Design Studio". JAE, Vol 48, No 2, November 1994, p.p. 113-125

28. op. cit. . for Cris Sinha more artefacts are designed to fulfil a certain purpose (canonical or socially standard) that contain function and form . The relations betwen functions and forms

structure of the object itself (Sinha 1988). Backgrounding does not function just on an intellectual level, but at the level of visual representation as well, framing both syntagm and system. Any form of architectural element or type i.e. tower, atrium etc. any concept of function i.e. bedroom, walking etc. can be part of the form function complex of background knowledge and it possesses endo - exo - structural features that are uniquely of its structure.

Frances Downing[29] offers some suggestions on the role of the visual part of background knowledge in architectural design processes. The approach is strongly experiential as a mental image is defined as the sensation of visual form and space, movement, sound, smell or taste, captured and held for moments of time in the mind of the individual[30]. The study suggests that architectural designers attach meaning to their personal place-experience through emotive, experiential and objective frameworks of meaning. The emotive framework involves personal sentimental references. The experiential framework involves more active body-memory constructions. The two responses are very similar, the first one centering around self and the second around place. The objective framework reflects a more abstract, intellectual response. This include the description of the physical properties of places and typologies. The study argues that an even distribution exists in the use of the three responses in the act of designing. Although the objective framework offers the tools for making places, the emotive and experiential frameworks play an important role in identifying the content of conjectures made during the design enquiry. The very roots of creative endeavour must include the linkage between memory and imagination as a critical part of sustaining, inventing and developing ideas.

The designers' image bank includes mental images relating to the everyday use of objects, primary types and precedents. Precedents and primary elements are defined as built-forms, which have a typological - functional connection to the design task in hand. Everyday objects need not be a built form, but generally share some relationships, which seems appropriate in connection with design enquiry. Objects, primary types and precedents represent experience that has been internalised through the individual's idiosyncratic filtering of experience. Within the image bank it is possible that some 'archetypal' experiences exist that are shared by most individuals[31].

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may be termed design rules, and any artefact may be seen as a material representation of the design rules current in the culture pp. 106

29. Downing, F., "Conversations in Imagery" in *Design Studies*, Vol 13, No 3 July 1992, p.p. 291-319

30. Ibid. p.291

31. Ibid. p. 316. Downing is claiming that in his research repetitive and shared meanings exist amongst the individual designers interviewed.

The structure of any background knowledge can be violated[32]. The ability to de-couple pre-existing design rules of any object or architectural element is crucial for design language development, particularly for its acquisition. This fundamentally creative or innovative cognitive capacity leads to the formation of new design rules, that is to 'fore grounding'.

In linguistics , when language deviates maximally from 'normal' usage, it thrusts the act of expression itself into the foreground. Mukarovsky[33] identifies poetic language as a different form of language with a different function. Its form is an aesthetically intentional distortion of the norms of the standard language, a deformation of ordinary language, while its function consists in the maximum of foregrounding of the utterance[34]. For Mukarovsky the 'aesthetic use of language pushes into the foreground the 'act of expression' itself. This foreground can be of a metaphoric or metonymic mode[35]. Jakobson[36] claims that the metaphoric mode tends to be forgrounded in poetry[37], whereas the metonymic mode tends to be foregrounded in prose. This makes the operation of similarity of crucial importance to poetry and the level of relationships of combination of crucial importance for prose. Poetry and prose thus almost represent the construction of different 'kinds' of language.

In design language 'foregrounding' means a re-definition of design rules (however there is a danger that if too many design rules get re-defined simultaneously the architectural object can become unrecognisable). Design domains are operating in ways that lead us to focus on the role that 'backgrounding' and 'foregrounding' play in the transmission of architectural knowledge. The research has indicated that when the design domains operate at the visual level, they have a high participation in the syntagmatic plane and a low one in the systematic plane. It is striking that cases exist, when their participation in both planes is high. This occurs, when the

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32. In our case the use of technology is a very indicative example. From 'backgrounding' at the Bartlett it becomes part of the 'forgrounding' at Greenwich. At Grenwich technology is not used for its structure but for what this structure represents. These metaphoric use allows for the creation of new rules in the act of forgrounding.

33. see Jan Mukarovsky, 'Standard Language and poetic language' in *A Prague School Reader on Aesthetics, Literary Structure and Style'* selected and translated by Paul L. Garvin, Washington, D.C.: Georgetown University Press p.p.43-4

34. Ibid. p. 43.

35. see Terence Hawkes *Structuralism and Semiotics,* publ. by Methuen & Co. ltd. 1988, chapter 'the structure of literature'. The language is used poetically or aesthetically when its expressive aspect is dominant. Forgrounding then becomes very important .

36. Ibid. p.p. 80-81

37. Jacobson, R., "Closing statement: linguistics and poetics" p.p. 351 in Sebeok, Th. A. (ed.) *Style in Language*, Cambridge Mass. :M.I.T. Press 1960. For Jacobson poetic function is not the sole function of verbal art, but only its dominant, determining function. This function, by promoting the palpability of signs, deepens the fundamental dichotomy of signs and objects. Hence, when dealing with poetic function, linguistics cannot limit itself to the field of poetry.

particular design domains participate in the formation of exostructural relationships. In this case 'foregrounding' is dominant. The research has also indicated that, when the design domains operate at the conceptual level ,they have a low participation in the syntagmatic plane and a high one in the systematic plane. It is noted that cases exist when their participation in both planes is low. Here the particular design domains are not participating in the formation of functional relationships. They are part of the 'backgrounding'.

Backgrounding and foregrounding exist within both educational paradigms, however, their operation is very different. In the old educational paradigm, the educational philosophy is about implicitly analysing and specifying the background knowledge, in order for the students to draw their design hypothesis from it. The relationship between 'architectural knowledge' and background assumptions becomes blurred. Both 'backgrounding' and 'foregrounding' operate at an implicit level. Background knowledge (i.e. technology and function) operates mainly at the intellectual level, through the use of specific common design 'rules'[38] .
'Foregrounding', much less dominant and implicit, is about understanding and synthesising architectural elements, or re-synthesising building types in an innovative way. The discourse is mainly metaphoric.

In the new paradigm, background knowledge is taken on board in an extended experiential sense and operates mainly at the visual level. Visual operation becomes as important as verbal as it advances, simultaneously interacting and initiating cognition.[39] 'Foregrounding', being dominant, operates explicitly and is part of the process that is based on visual transformations. The approach is metonymic.

The new paradigm places in question the operation of a concept - test model. It projects the visual level as an active agent in transmission and architectural cognition. It is very interesting to note ,that the metaphoric mode tends to be 'backgrounded' in the old paradigm, and that the metonymic mode tends to be 'foregrounded' in the new paradigm. This leads us to believe that, by an analogy with prose , 'foregrounding' is possibly of a metonymic mode in architecture.

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38. Within the system (endostructural relationships) we have relationships that loose their metaphoric qualities because they are used too often and they turn into "universal rules'. We name these relationships 'fixed' i.e. small scale = individuality.
39. see Vigotsky Lev, *Thought and Language* (1986). Based on Vygotsky's theory about language development, we can accept that for architecture the visual is not always corresponding to the conceptual. The two modes can operate differently. Their meeting point or interface creates architectural concepts.

9. 3. 5 LANGUAGE AND SPEECH

Designers draw from their background knowledge, from their image bank, in order to produce a highly individual proposition. We hypothesise that part of the image bank contains archetypal images and pre-existing rules shared by all designers [40]. These facilitate communication. Consciousness of likeness presuppose the formation of a generalisation or of a concept, embracing the objects that are alike. This activity in architecture can be individual and creative as the grouping of elements through relationships of similarity has been shown to be not a real one, but a forced one (metaphoric); not one that comes out of specific universal rules, but one that is created. However, it can also be pre-structured. Amongst the forced relationships of similarity, some fixed ones exist that are not part of a creative act and belong to a broader shared system of communication. They are part of background knowledge shared by designers, or at least by the group that is interacting by using them. Binary oppositions belong to the system of fixed relationships as well[41], as they appear to repeat themselves irrespective of the context in which they are communicated.

In linguistics[42], the systematised set of conventions necessary for communication, which is indifferent the material of the signals that compose it, is called 'langue' or 'language'. 'Speech' covers the purely individual part of the 'language'. The 'language' is a collective contract, a social institution and a system of values that has its own rules of operation and is never visible. It is an abstract whole, comprised of relationships, and constituting certain stored cognitive capacities. 'Speech' is essentially an individual act of selection and actualisation. Language and speech exist only in the dialectic process, which unites one with the other. Speech phenomena always precede language phenomena. Language is simultaneously the product and the instrument of speech.

In design discourse, 'speech', the individual expression of the designer, is related to the syntagm, to his/her personal image bank, and it is expressed through the spatial relationships of combinations. This process cannot take place in a vacuum. It is also expressed through the use of metaphors (relationships of similarity) and through the act of 'foregrounding'. For the most part, the 'language'of design discourse is tacit. It comprises a commonly shared background knowledge, of fixed relationships and of relationships of binary oppositions. The relationship of 'language' to 'speech'is

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40. The definition of archetipal images in design can be a very exhiting research filed.
41. Levi-Strauss, C., *The Savage Mind*, publ. by Weidenfeld and Nicolson, London1966. Levi-Strauss tries to decode the basic categories of mind through the examination of myth. He overstress the importance of binary oppositions which have a central place in this decodification. Binary oppositions universally found create cultural meaning and significance
42. op. cit. Barthes, R., (1986) see chapter I " Language and Speech".

interactive. In the design discourse, when 'language' is dominant, 'backgrounding' will be the mode of expression. In the design discourse, when 'speech' is dominant 'foregrounding' will play a leading role.

9.3.6 ARCHITECTURAL ELEMENT AS 'PRIMARY' TYPE

The use of 'primary' type as architectural element is apparent throughout the discourse. 'Primary type' is part of the 'language'. The research hs indicated that 'primary' type operates mainly at the visual level, thus constituting an important part of the 'architectonic' image bank of tutors and students. At the beginning of architectural studies ,'primary' type participates actively in the formation of design rules. Later on its role in setting up design conditions diminishes ,as it develops into a descriptive and factual domain. Through its visual and conditional properties it plays an important role in relation to architectural concept formation particularly for beginning students.

'Primary' type is abstract in the sense that it contains geometrical , spatial, material and functional properties at an elementary level. For example, a wall is horizontal, linear, structured and offers boundary conditions. In order for a 'primary' type to be recognised as such, two operations must take place within the image bank . The first is forming classes under a common 'family' name i.e. all walls, all balconies etc. and the second, forming classifications by singling out certain common attributes (similarities, differences)within the class itself I.e. transparent walls, brick walls or across classes I.e. a (concrete wall), balcony, column etc. Similarities and differences operate in relation to function, structure, texture, form and spatial properties.

Thus a 'primary' element belongs to the background of architectural knowledge and its structure is essentially spatial, not containing any polemically defined set of historical elements. "Primary' type can most simply be defined as a concept which describes a group of objects characterised by the same spatial structure. It is fundamentally based on the possibility of grouping objects by certain inherent structural similarities or differences. It might even be said that 'primary' type means the act of thinking in groups.

Part of the implicit design process, being emotive, experiential or analytical is the selection and the combination of 'primary elements' , for the creation of an individual work. The 'primary' type for the design language, becomes the equivalent of the word in a text, as it constitutes the smallest conceptual component of it. The

introduction of the use of a specific 'primary element', the equivalent of the 'word'[43] ,during the design process is of great importance for the project. It helps the students focus primarily on the visual level and translate their idea onto the intellectual level. The metaphoric shift between visual/intellectual can take place by the introduction of an object that does not belong to the class of the type under use, for example trees as colonnade, cars as walls, window as camera, or by the positioning the 'primary' type under different classes . The latter creates a shift in our perception of the type i.e. roof as balcony (first introduced by Le Corbusier) an elevation like a wall, a window as a door etc. In this way 'primary' type, albeit a part of background knowledge, can take part in the 'foregrounding' [44]. Primary' type can thus be thought of as the frame, within which the metaphoric shift operates.

9.4 TEACHING METHODS IN THE DESIGN STUDIO

In this chapter up to now we have discussed 'visual' thinking and architectural cognition. Cognition is the most crucial part of the design process without which designing would be impossible. Design method deals with different issues of communication and can differ substantially amongst designers or amongst architectural schools. Different design methods stress different aspects of the design process which is an implicit or explicit part of them.

9.4.1 PRECEDENT VERSUS OBJECT

Apart from the use of 'primary' types as architectural elements rather than building types (precedents), which is apparent throughout the discourse, two approaches related to visual stimuli were discovered in the research. The use of precedents (functional formal entities) or historical precedents is more popular in the old paradigm. The use of extra-architectural references (objects) is popular in the new educational paradigm. Both are used to initiate exostructural or endostructural design rules and take an active part in the process of designing.

The use of precedent is implicit in the Bartlett discourse, in the sense that it does not constitute an explicit teaching method . The use of precedent by accumulation[45]

43.Lev Vygotsky *Thought and Language,* The MIT Press, 1986., see chapter 7 Thought and Word.
44. This is taking place in the first year of Greenwich.
45. op.cit. Hancock, J., (1986). He proposes the use of precedents by accumulation i.e. visual analysis, by analogy i.e. transformation retaining resemblance and application i.e. using mainly the design principals of the type p. 72.

(mainly by visual analysis) is completely absent from the discourse. Precedents or historical precedents are used very rarely by analogy (visual transformation of the initial type, resemblance through overall organisation i.e. club, Palladio, Tuscan Order) and are used mainly by application (mainly on the intellectual level). Precedent mainly offers rules (i.e. relation of function to form), techniques or ideas, based on the 'principles' of the type used.

In the analysed case studies precedents are mainly used implicitly[46] and are part of the designer's image bank, being experiential, intuitive or operational ,and as such they become a juxtaposition of memory and reason. The precedent preserves and defines the internal logic of forms, not by techniques or programmes , but by experience and memory· According to Argan C.[47], when designing one is attached to ,or detached to the existing typologies, irrespective of their explicit use as analytic tools. The notion of type conveys a distinction between objectivity and subjectivity in the design process. The objective part is represented by the selection of type and the subjective part by its transformation.

In the new paradigm, 'objects' for design come from very different sources i.e. natural forms, mechanical objects, everyday objects etc. and they are used explicitly in the design process. They are mainly used by accumulation(visual analysis) and analogy (visual transformations) and less by application (offering analytical design rules). Precedents (as building types) and 'objects' (including all extra-architectural concepts, events or objects) take active part in architectural concept formation by creating metaphors and metonymies of different intensity[48] . Precedents are mainly used on the conceptual level (application) offering endostructural rules (Bartlett) and 'objects' are mainly used on the visual level (analogy, accumulation) offering exostructural rules (Greenwich).

Precedents represent referents in design conjecture, which share more similarities than dissimilarities, while anomalies between them are kept to the minimum. The creative endeavour, entails a relatively subtle manipulation of the referent. The metaphoric 'object' presents more anomalies between referents, more dissimilarities than similarities. Thus the metaphoric shift is more capable in introducing new design rules creating 'foregrounding'. At the level of visual transformations, in order for an object to stand out from its metonymic context and become an architectural space, one has to engage in a metaphoric shift. To do so is to topicalize and focus certain

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46.Cases exist i.e. in the first year brief 'The Information Stand', where students are asked to study certain building types. But these types were not used for an explicit design process.
47. Argan C. "On the Typology of Architecture", *Architectural Design* 12, 1963, p.p.564-565.
48. op. cit. Downing, F., p.p. 315-317.

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A typical example of adaptation is case study 11' (first year Greenwich) (see appendix, floppy disc and photo CD) where the student starts recording an alleyway in Soho (a boundary condition), then explores a boundary condition in the film 'Koyaniskatsi' and finally explores boundary conditions in Soho. He then translates all his explorations into a model. With each new visual move a new conceptual element is introduced to the project i.e. the Soho images introduce the 'theme' of boundary, the film sequence introduce the 'theme' of movement through boundaries formed by textures and finally the model is introducing the spatial reading of layering and obscurity. While the student is moving from very specific imagery (Soho alleyway) and abstract it step by step into a spatial schema (model) the concepts that are verbally expressed by him become from abstract (boundary) to more spatial specific (layering and moving through space).

spatial features like boundary definition, inside -outside etc . In this way, metonymic combination and metaphoric selection interact in the construction of architectural space. For instance: a mapping of movements on site is translated into a space, music notation becomes a space.

The outcome of the research has indicated that two 'kinds' of visual operations exist within design cognition . The refinement that is coupled with the use of building type (endostructural - dominant in the Bartlett), and the adaptation[49] that is coupled with the use of an extra-architectural object (endostructural - dominant at Greenwich). Refinement matches the analytical cognitive way of operation and adaptation the spontaneous figurative transformational way of operation. In refinement an initial stage of a generalised schema is sequentially transformed into a specific design. The initial schema can be presented at a high level of mainly formal and less so of spatial abstraction[50] i.e. grid, geometrical or spatial configuration usually of a small scale. Substitution may be regarded as the basic design operation for visual refinement. In substitution, the designer replaces the existing state of design with another representation that has a higher level of particularisation. Refinement is a top down visual development that is coupled with the bottom up analytic mode of cognition - i.e. a student presents verbally and explicitly the geometrical rules with which he/she designed the project, while what he/she is presenting, is the global articulation of the project involving not only geometrical, but spatial, structural and functional rules. In refinement, the conceptual precedes the visual, as the student has to go through the process of abstraction implicitly using his mental imagery (Bartlett) .

In adaptation a specific object, type, precedent is transformed to an abstract spatial schema. The initial schema is specific i.e. it can be a building type, an architectural element, an image, a mechanical tool. By the use of specific representational techniques this schema is abstracted stage after stage to become a spatial diagram. Adaptation is a bottom up visual development, that is coupled with the top down analytic mode of cognition i.e. a student starts verbally presenting an abstract architectural concept like the concept of boundary, while what he/she is presenting is a very specific image of railings in front of a house. In adaptation the visual precedes the conceptual, as the student conceptualises explicitly through the use of specific images and strategies (Greenwich).

Types of adaptation are not properly classified[51]. They involve the use of different

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49. Terms borrowed from Oxman E. R. and Oxman M. R. presented in their article "Refinement and adaptation in design cognition" *Design Studies* Vol 13 No 2 April 1992, p.p. 117-134
50. Durand proposed refinement as method of design (see chapter 2)
51. op. cit. Oxman E.R. (1992).p. 124. They recognise that adaptation in design lacks a body of

representational techniques in combination with formal strategies. The representational techniques involve painting, photocopying, collaging, monoprinting, modelling, photographing, drawing on the computer, just to mention a few. Formal strategies involve transformation of elements of the prior image or design by multiplication, addition, extraction, change of scale etc. These strategies can work through the transformation of precedent or object or through the juxtaposition of more than one of these. The potentials are open to experimentation.

It is obvious that combinations and choices of methods and techniques exist in the explicit or implicit use of precedents or objects in the design studio. Refinement and adaptation are two approaches to design that ,as we have indicated in our research, co-exist in most of the case studies analysed. The research has indicated that refinement of precedent at the Bartlett ,and adaptation of objects at Greenwich ,are the dominant approches, without being mutually exclusive .

9.4.2 COLLAGE VERSUS PARTI

Composition concerns the notion of arranging the parts of architecture like elements in a syntax, and forming a whole, according to certain a priori rules, The global formal and spatial structure of the building is defined as its parti. Parti has always been an implicit or explicit part of the design process. In the concept - test model, it became part of the design method as the students had to formulate a global hypothesis in order to design. The parts of architecture that are structured around the parti and are expressed by it, are the functional, structural and spatial elements. Most of the studies[52] that tried to define parti as the central idea of the building, have mainly dealt with diagrammatic formal analysis, just defining the elements but not their interrelationship.

In order to understand the function of the compositional mode and of parti, Sakellaridou I.[53] analysed eighteen houses of Mario Botta. Her contribution lies in the fact that she not only used analytic diagrams, but defined the structure of the parti, by classifying the relationships formed between different elements that constitute the central idea of the building. "These relations, structured and balanced by the parti, become interrelated by virtue of what we could define as the compositional mode, that is, as the specific way of relating relations to each other, and of building up

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research and a theoretical base. They distinguish three adaptation strategies: Elementary adaptation, schema adaptetion and hybrid adaptation.

52. see Ching, F.,(1979), Clark, R., Pause, M., (1979) (1985)

53. Sakellaridou, I., *A top-down analytic approach to architectural composition*, Ph.D. Thesis, Bartlett Graduate School of Architecture, U. C. L. 1994. For the discussion see final chapter "Towards a theory on the logic of composition" p.p. 278-305

higher order. "[54] In her view, the formation of the conjecture which leads to the parti, is metaphorical; it operates in a top down fashion, and one where creativity in design operates. The parti could be seen as representing the deep structure[55], while relations and compositional mode would define the level of transformations of the compositional structure.

Sakellaridou argues that during design a global conjecture is formed. This conjecture brings together not only the formal aspect of design, but also the spatial and functional ones. Parti thus brings together elements of a very different nature. The comparison(relations) which takes place between the different elements ,is of two kinds: - properties of spatial relationships and properties of similarity and difference (complementary relationships and relationships of functional contrast). The central parti sets the dominant code, which creates the terms of reference for the understanding of the compositional structure. When not present, numerous elements and multiple relations might exist, and form many different categories, which, however, do not have any clear structure. The structure will lack a coherent genetic code. In concluding her research and clarifying its limitations, she acknowledges the need of diverse architectural elements (function, space, structure) to enter an equivalent analysis. ,as she dealt only with the formal properties of buildings,

In the formation of her central hypothesis , the architectural product and not the design process was analysed and the concept - test model was not questioned. That may be the reason why the model presented above seems rather idealised in relation to the use of the parti in the design process. Our research has indicated that during the design process we do not necessarily have the conjecture of a global hypothesis , but rather the visual transformation of an initial 'theme' by refinement or adaptation . We suggest that the design process is not a top down or bottom up process. It is a combination of the two, as intellectual (endostructural) and visual (exostructural) functions interact, while operating in opposite directions to produce arhitectural concepts. The final product does not seem to possess the clarity of a central idea, but seems to be a collage of different design rules. Some of them relate to one another, however, some of them co-exist without sharing a meeting point. [56]

Coyne, R., Snodgrass, A., and Martin, D.,[57] offer an alternative interpretation to

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54. Ibid. p. 279
55. Deep structure, surface structure as 'Chomskian' representations.
56. We suspect that the co-existing rules relate to the endostructure and exostructural relational contect of architecture. Further research is needed at this point.
57. Coyne, R., Snodgrass, A., Martin, D., "Metaphors in the Design Studio", *JAE*, Vol 48, No 2, November 1994, p.p. 118-119

Sakellaridou, I., in relation to the participation of the parti in the design process . The parti emerges as a metaphoric projection and is defined during designing. It can be rejected and replaced by a new parti ,which can represent a major discontinuity in the design development. For them the use of parti is closer to our concept of the initial 'theme',as it can be replaced. The mechanisms of replacement, however, are not examined and the two 'partis', old and new, cannot co-exist. The most interesting part of their argument is ,that parti is usually something other than the building being designed. It is the means of structuring discussion about the design with others. It is sometimes part of the design's justification, but not part of the design action. By offering this hypothesis ,they indicate that verbal description and visual representations may present a communication gap.

This hypothesis can offer one of the possible explanations for the absence of parti from the design projects under analysis. Progress in thought and representation are not parallel, and their relationship is not an unchangeable one. The relation between thought and representation varies depending on the form of verbal and visual activity. The development of representation does not necessarily repeat the development of architectural 'thinking'. The independent elements in a visual field are simultaneously perceived. In this sense visual perception is integral. Verbal expression on the other hand requires sequential processing. Each element is separately labelled and then connected in a sentence structure, making speech essentially analytical[58]. The two modes of expression operate in a very different way[59]. The whole and its parts develop parallel to each other and together. The process of cognition is complex, interactive and non linear. The existence of a global hypothesis or parti on the other hand would suggest a conceptual linear process, which is under question.

Scherr, R.,[60] proposes the classification of architectural fragments as indexes creating a theory of contingency. Within this theory he offers a different interpretation of the design process, questioning the purity of parti. Architectural synthesis has often been conceived as a clean, linear process of design. Parti additionally was conceived as. an independent vision of the absolute, completed order that must be held intact, despite all the complexities of the problem that might suggest otherwise. Non supportive information about site, culture, programme, structure and other factors

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58. Vygotsky, L., "The development of perception and attention" In *Mind in society*, Publ. by Harvard University Press, Cambridge Massachusets, London England 1978, p.p.31-33.

59 One may speculate, that this may also relate to right brain, left brain dominance, and hence ultimately link to individual design competence.

60. Scherr, R., "Arhitecture as Index: Toward a Theory of Contingency". *JAE*, Vol 44, No 3, May 1991, p.p. 172 - 181

were submerged, if not completely silenced, for the parti to retain its clarity and mastery. An architecture of index [61] (physical, non representational manifestations) suggests a theory of connections that implies a cross-referencing to various conditions, some supportive, some conflicting, in a shifting, non-linear evolution. The notion of cross-referencing is integral in offering a different formal analytical rule. It relates to the capacity of architectural form to act as a kind of cross-referencing to other realisations of the building's essential characteristics. The reading of a view or component of a building automatically refers to another invisible condition outside one's immediate perception. Cross-referencing allows us to trace earlier phases of the design process that were either discarded or transformed. Each stage of the process is indexically related to earlier beginnings, so that in the end, the building contains traces or fragments of physical information referring to conditions that existed previously. Any final design is a glimpse to an indexical process, where the design traces are never finalised, as they might take on additional characteristics, or evolve along unexpected paths of development, before the process is terminated. In this way, the possibility of overlapping design 'themes' is offered.

9.4.3 TACIT AND EXPLICIT VERBAL COMMUNICATION OF THE OLD PARADIGM VERSUS THE NEW PARADIGM

The tacit dimension of-knowledge[62] and particularly the tacit dimension of architectural knowledge is ascribed to its non-scientific parts, the ones that cannot be analysed and thoroughly explained. We have already seen in our research that the tacit dimension of studio communication relates mainly to its visual operations and to the absence or presence of an explicit teaching method.

The discussion on the form of design language has revealed its idiosyncratic qualities in relation to the verbal /visual operation and its verbal expression. Along with the interaction of the spatial sequential relationships functioning on the visual realm and the relationships of functional contrast functioning on the intellectual realm, these constitute the mode of design language operation irrespective of the context in which it is communicated. What has proved to be very important in relation to the explicitness and structure of the design language in both educational paradigms, is its visual operation and the role of this operation in architectural cognition.

On the other hand a difference between the old (Bartlett) and the new (Greenwich)

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61. ibid. p. 172. The meaning of the index is not achieved by having to engage intermediate stages of coding and association subject to cultural conditioning and interpretation, but, rather, through an objective translation of explicit physical conditions that generate an inalterable formal response. T

62 see Polanyi, M., *'The tacit dimention'* Routledge & Kegan Paul Ltd London 1967 and Chapter 2 'On design process'

paradigm exists in relation to the explicitness of studio communication . One of the main differences between the two educational paradigms is the absence or presence of design method. The analysis revealed that the absence of a design method in the old paradigm means the implicit use of 'precedent'. In the new educational paradigm, process becomes equally if not more important than the product, and the use of design method is explicit. Morever, the old paradigm operates more at an intellectual level and appears to be less explicit than the new paradigm. The new paradigm operates more in the visual realm than the old paradigm and it appears to be verbally more explicit.

The research results indicate that explicitness in studio communication is due to the visual parts of design language, but it is not controlled by it. It is controlled by the teaching method used within the studio and by the use of pre-existing rules and assumptions in the form of background knowledge. B. Bernstein[63] offers an interpretation for the function of the background knowledge in relation to explicit verbal communication. According to Bernstein[64], language is communicated by restricted[65] and elaborated codes[66] . In the case of an elaborated code, the speaker selects from a relatively extensive range of alternatives , while the probability of predicting the organising elements is considerably reduced. In the case of a restricted code, the number of alternatives is often severely limited, while the probability of predicting the elements is greatly increased. A restricted code gives rise to invisible knowledge transmission, as it is not about an explicit verbal communication. It is about implicit shared criteria and rules. On the contrary, an elaborated code gives rise to an explicit transmission. of knowldge, it is about the formulation of new explicit rules.

These two opposite modes of communication are idealised. In reality the content and structure of communication is much more complex offering different degrees of explicitness. In our case a difference in relation to verbal explicitness definitely exists

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63. Bernstein, B. *Class, Codes and Control,* vol.I,II, Routledge & Kegan Paul, London 1971.

64. Ibid. Bernstein argues that in order for an invisible pedagogy to exist there is a need for the implicit existance of shared common beliefs in an educational situation.

65. Ibid, vol. I, p. 127.**Restricted code** is characterised by strong boundaries and insulation between subjects. It is a code of implicit meaning mainly because its meanings are context dependent so that only those possessing a shared, unspoken, implicit understanding of certain figures of the context can have access to its meanings

66. Ibid. vol. I, p. 125 **Elaborated code** facilitates the construction and exchange of individuated symbols:
"This situation will arise where the intent of the other person cannot be taken for granted, with the consequence that meanings will have to be expanded and raised to the level of verbal explicitness.....The condition of the listener, unlike that in the case of a restricted code, will not be taken for granted, as the speaker is likely to modify his speech in the light of the special conditions and attributes of the listener".

between the Bartlett and the Greenwich. For example, in the old educational paradigm the visual/conceptual interaction operates tacitly at the level of the use of typology (method) and at the level of the operation of background knowledge (i.e. technology): Bernstein[67] maintains that 'primary contextualising fields' exist in invisible pedagogies' ,and that discursive elements of the primary field are selected (type in our case), combined and recontextualised. In addition, specific design rules exist in the form of fixed rules that are repeatedly used and not questioned, indicating the existence in the background of shared common beliefs amongst the designers (students - tutors). The research results reveal the existence of a common cultural identity that reduces the need for the explicitness of design language. We claim that the Bartlett (at the time of the data collection) operated within the realm of the modern movement (functionalist position), and because of that, the use of precedent as a design method could only be mplicit. It is very indicative that precedents are mainly used in order to introduce design principles of a biological /deterministic 'kind' I.e. form follows function The stress on the project rather than the product is inherent in the modern movement approach, which attempted to exorcise the persistent forms , whose semantic and expressive functions depended on the repetition of previous forms.

The modern movement rejected the idea of composition and type, as they were perceived to limit architectural development in its search for new forms. It was an attempt to modify the representational systems. This was to be achieved by free expression ,on one hand, and by biological determinism, on the other. These two contradictory approaches to design represent the opposition between intuition and reason. The intuitive approach was to be based on formal abstractions and has generally been concidered to be based on intuition working in a visual vacuum. The rational approach was based on principles derived from the laws of nature. Inherent was a belief in the ability of science to reveal the essence of nature's mode of operation. Form was merely the result of a logical process by which operational needs and operational techniques were brought together. Biological determinism was teleological, because it saw the aesthetic of architectural form as something, which was achieved without the conscious interference of the designer - as something which was postulated as his ultimate purpose.

In the modern movement, order was considered an independent reality, existing outside time, to be placed in the world through our designs and to be "referred to our faces" through appearances. In other words, it is a "readable order" rather than a

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67. Atkinson, P., op. cit., p.p.170 -175.

"co-creation" of us and the world[68]. The unspoken shared cultural identity thus had very strong and clear boundaries, which did not need to be explicitly communicated. In the meantime, the modern movement rejected the role of background knowledge as being emotive, experiential or objective in design initiation. In the Bartlett field work we discovered the operation of fixed design rules, but along side them, also found the use of background knowledge in the form of building types . Although these building types were mainly used to promote the functionalistic doctrine, they were in parallel operating at the visual realm . Although the modern movement claims the opposite, this realisation forces us to question the operation of design in a visual vacuum.

In the new educational paradigm, the visual/verbal interaction becomes verbally more explicit (elaborated). A fraction of background knowledge is used in an explicit and directed way, being part of the brief and the method. In other words, the use of extra-architectural objects is based on the image banks of the students, containing phenomena like a camera, mechanical tools, the activity of cooking etc. Fixed relationships do not exist and the discourse operates at the level of visual transformations. The intention of the other person cannot be taken for granted, as the discourse explores new grounds and that's why (according to Bernstein) the design process is expanded and raised to the level of verbal explicitness.

The current paradigm operates within the relativistic realm of deconstruction. In Derrida's work, it is the deconstructive method that becomes the focus of attention in architecture, rather than the product itself. Deconstruction should be seen as a "way of working", not a style, as it appears to provide a credible methodology within a predominantly empiricist culture[69] . The deconstructionist assertion that the literary text can have innumerable meanings does not preclude "scientific" inquiry.

Transformational methods, inherited by the formal figurative approaches of the Bauhaus and the Russian Constructivists seem to be aiming at the critical and hypothetical deconstruction of the artefact through its representation as an autonomous text. The work need not be considered a real place; nor a building reflecting the values of a particular time, place and culture, nor a reflection of any designers intentions or clients aspirations. Instead, in the spirit of literary

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68. Pertuiset, N., "The Floating Eye", *JAE*, Vol 43, No 2, Winter 1990, p.p. 7-12. It explains why Le Corbusier exploited the detachment that vision affords us from the things of the world and assigned a Hegelian authority to the universality of forms p. 10.
69. Groat N. Linda., "Rescuing Architecture from the Cul-de-Sac", In *JAE*, no 45/3, May 1992, p.p. 138 - 146 deconstruction offers the combination of a scientific methodology and the affirmation of the creative self that is so predominant in the Aglo- American culture.

The new paradigm proves to be more effective than the old one. The educational validity of the new paradigm operates on several levels. It allows for freedom of expression and opens up possibilities for the creation of a new architectural language. Teaching becomes more explicit as design process is revealed. It is particularly successful with first year students as it introduces to the students a new 'way' of 'looking' and 'thinking'. In order to be able to enter this new world the students have to leave behind their 'preconceptions' about architecture. By using as a starting point a mechanical object, a painting, a tool, to design a space, they realise that they can develop an architectural idea almost from 'anything'. The new educational paradigm encourages the students to work by using different visual techniques like photography, photocopy, tracings, castings, models for their transformations. The 'technique' of free associations is thus developed. The visual and conceptual level work hand in hand. In the place of a linear progression, multiple design cycles exist that influence each other. No 'meaning' is imposed from 'outside' on the projects. The approach is allowing self expression as the projects themselves create their own spatial structure and programme.

Overall the new paradigm is allowing the student to gain confidence in their ability to work on the visual realm with a sense of purpose prior to the acquisition of an architectural syntax. They stop having the agony of a blank paper that needs to be filled. It allows the students to develop their creativity and self-expression, test their potential for innovative response and test their ability to include different conceptual worlds in the project and to understand how these worlds have shaped the process as well as the final "architectural" product.

deconstruction, it becomes an arbitrary array of visual organisational cues , which may, be deconstructed and completed by a free play of interventional and transformational techniques to create a piece of criticism, that is itself a new artefact of autonomous validity. The act of interpretation uncovers a web of possibilities, which can extend indefinitely, constrained only by the creative capacity of the deconstructor. There is no author, no origin, only language, only 'text' and its ability to generate new 'texts'. These multiple readings offer innumerable translations and the final solution is neither dictated nor predicted. Boundaries between subjects are blurred and the code of verbal communication becomes elaborated .

We can easily trace the affiliation of the new educational paradigm to a'decontactivist' approach. The stress on process rather than product, the stress on the image and its deconstruction - an image that is not necessarily an architectural one - are all present in the discourse at Greenwich . Furthermore, the approach is highly experiential ,giving priority to the discovery of new design rules.

9. 5 SUMMARISING THE RESEARCH CONCLUSIONS

The two educational paradigms, the Bartlett being the old one and Greenwich being the new one, have proved to be different in their underlying educational philosophies. The Bartlett expresses the Modern Movement. The stress is on product rather than process. The existing educational philosophy is from simple to complex realities. The view is, that the different type and scale of projects present a hierarchy of objectively difficult tasks for the students to synthesise. There is a linear development in the level of complexity of 'thematic' and 'programmatic' approaches to the projects. The approach is rationalistic. The studio communication is tacit, with precedents being used implicitly to introduce visual imagery and design principals (i.e. form follows function) in the studio.

The new educational paradigm expresses 'deconstruction' and 'experience' as two co-existing approaches to design. Architectural education becomes reoriented from product to process, and as a consequence verbally more explicit. Design methods are introduced that operate within a more 'open' context, where 'experiencing' and intuition take the leading role. The method is to stimulate creativity by introducing into the studio projects, extra-architectural (objects) or architectural realities (primary types) and encouraging the students to experience them. The 'theme' of the project (not the programme) thus acquires an importance not in its level of complexity, but at the level of metaphor. As a consequence, it can be introduced simultaneously at any

educational level and learning advances in spirals.

This research argues that the explicitness of studio communication, which is partly due to the fact that it predominantly takes place at a visual level, is influenced only by the presence of an explicit teaching method. Communication is not becoming more or less explicit, as the years go by, but depends on the idiosyncratic structure of every academic year and project. Similarities that exist within both paradigms lead us to some interesting conclusions in relation to architectural concept formation.

Design domains (the main components of design language) are communicated visually or conceptually, though not at both levels simultaneously. The plane of sequential relationships is the one of visual transformations ,and the plane of relationships of functional contrast is the one that sets up the conditions and rules for the project, most of which are metaphoric. Both levels interact to create architectural concepts. The presence of rules and conditions is the same throughout the architectural educational discourse, which shows that from day one the students are forced to conceptualise. Their initial hypothesis or starting point for the project goes through transformations, as the students set up new rules in the process of design, until they arrive at the final formulation of their proposition. First year decisions are mainly formal and spatial, involving few design domains around them, while, as the studies advance, students tend to involve more domains in setting up more complex rules. This is done in a repetitive spiral fashion.

Background knowledge which is part of design 'language' in the form of 'primary' elements, precedents, experiences and emotions is very important for initiating design ideas in both schools. "Foregrounding' the creative activity of constructing new rules is taking place mainly at Greenwich on the level of visual transformations. The existence of the parti as a global hypothesis that brings all the design rules together is questioned as an idealised situation in both educational paradigms. The architectural discourse is mainly interactive complex and multi-layered. It exist as interface between the design process and architectural product.

9.5.1 CONTRIBUTIONS, LIMITATIONS AND FURTHER RESEARCH

The strength of this research lies in its field work. Anyone who has experienced the educational changes that took place between the late 80's and early 90's at London's architectural schools, cannot have remained indifferent. The responses from tutors and students were positive, negative, or raised numerous questions in

relation to issues of validity, teaching methods etc. of the new educational paradigm. The analysis of two diverse episodes of field work (Bartlett - Greenwich) that cover this educational change has offered us the possibilities of an exciting investigation, particularly since similarities were traced behind the apparent differences .

The contribution of the thesis is threefold. First, the thesis contributes an in-depth understanding of the change that took place in architectural education between the late 80's and early 90's in London. Secondly, it proposes an analytical method, a multilayered text analysis, that allows the revelation of the structure of studio communication. Thirdly, it reveals the importance of visual operations in the learning process and architectural concept formation. In broader terms, this thesis offers an interpretation of the mechanisms that lead to architectural concept formation in the studio. The developmental theory of architectural cognition, across the academic years that this thesis develops, is based on: i) the intellectual and visual operations and the role of representation within design; ii) teaching methods i.e. the use of 'primary' type, precedents and objects in initiating concept formation; iii) the role of backgrounding and 'foregrounding' within design ; iv) the explicitness of verbal communication within the studio. This thesis also questions the existence of the parti, as a unique conceptual structure within the design process.

The research does not attempt to provide answer s to all possible questions in relation to the operation of the two educational paradigms . The Bartlett and Greenwich case studies are linked via their similarities and differences and the research focuses only on those. The research does not offer a specific teaching method that should be followed as the most efficient one in relation to its learning outcomes. On the contrary, the outcome of the thesis indicates that the approach to design education can be multiple and diverse, as long as it acknowledges the importance of visual thinking. When architecture is conceived in the "visual" world, it remains in its totality, implicitly and explicitly situated in the material world, as well as in culture. Consequently, no dichotomy arises between creative or scientific thinking, the autonomy of forms versus cultural determinism, between material reality and interpretation. The thesis proposes that above all architecture should be seen and understood as a cultural artefact, that is neither subject or object, but an interface between the two conditions that exist prior to both, and design cognition should be seen as an interface between visual transformation rules and the intellect.

The approach to the architectural concept formation adopted in this thesis, opens up a field for experimentation and research. The visual/ intellectual interaction in

architectural concept formation, the ability of the visual operations to promote 'foregrounding' within design, and the absence of a central parti from the analysed case studies, poses a lot of new questions that cannot be answered within the scope of this research. Our field work has its limitations . The case studies are students' projects and their analysis is only verbal. A visual and verbal analysis in parallel is needed for the thorough understanding of the intellectual/ visual interaction. Some attempts made on that front[70] are merely descriptive. An attempt to classifiy the methods of visual refinement (intellectual) and adaptation (visual) which this research has identified, could enrich further research into the design process. Many questions are raised around the issue of the absent parti. In the final analysis ,we can not be sure whether parti ,as a unique conceptual structure, is missing from the case studies ,because we have researched students learning about architecture and not professional architects. We suspect that an 'idealised' parti is absent from the design process altogether, however, further research is definitely needed in this matter.

The questions that initiated this research were simple. They are questions shared,on the one hand, by all teachers.-'How can we teach design?' - and on the other hand, by all students -'How can we learn to design?'. This thesis has attempted to shed light on the subject of studio teaching which is still undergoing transformations. It focuses on the issues of design process and design communication, both empirically and theoretically. It advances from a superficial level to a deeper level of understanding studio teaching, trying to decompose and analyse a complex and multilayered phenomenon. The ultimate aim, is to contribute useful insights into learning about architecture, which are valuable to educators and students alike, an aim we hope has been fulfilled.

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70. For example op. cit. Goldsmith, G. (1994), Schon, D. , Wiggins, G., (1992)

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ARCHITECTURAL CONCEPT FORMATION
APPENDIX
Ph.D. Thesis
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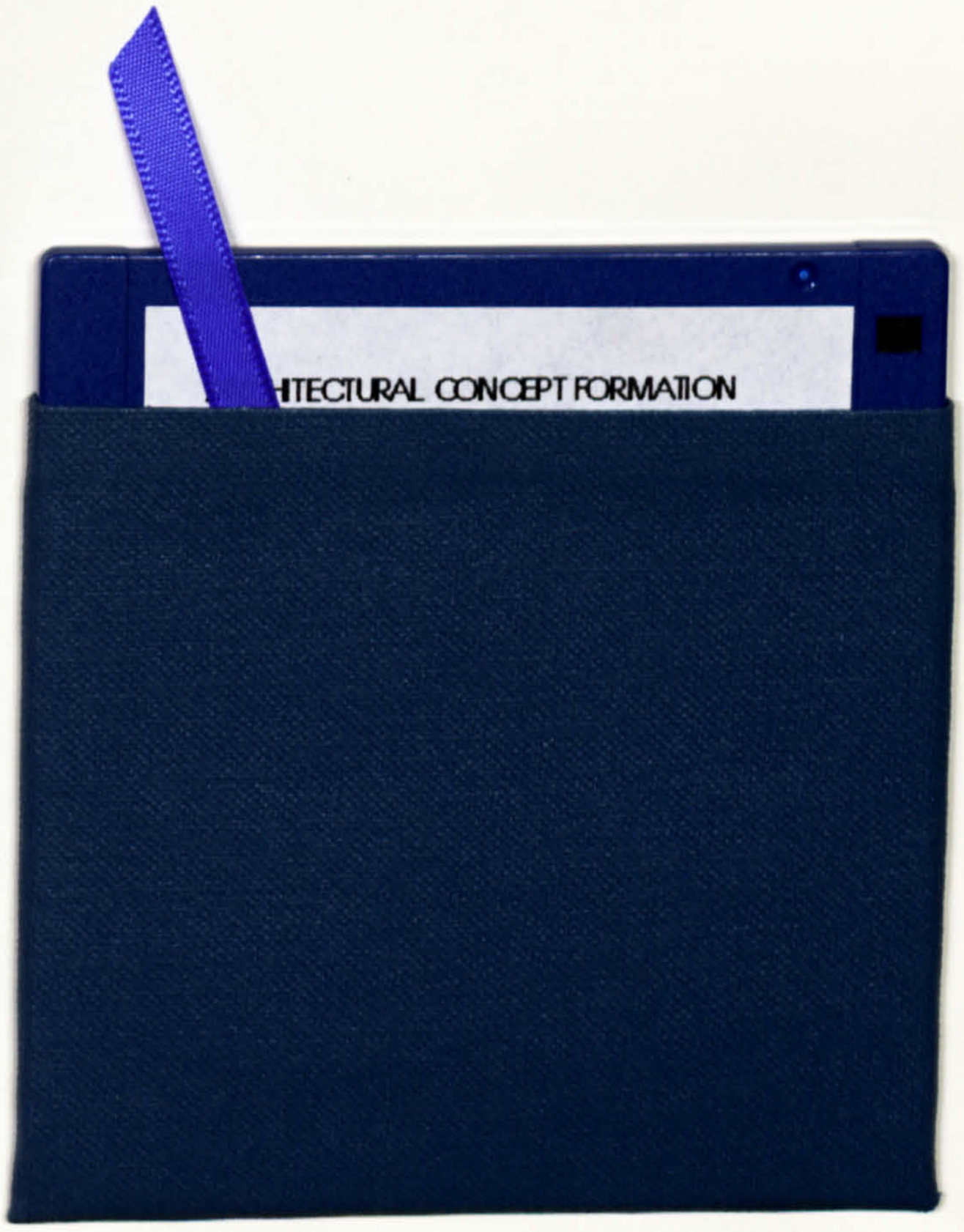

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