

GRAMMATICALLY THINKING

Summing up the teaching of the first year with a comprehensive grammatical project

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Abstract. This paper describes a teaching experience conducted and carried out as part of the coursework of first year students of architecture at Strathclyde University. The workshop is the Third of three workshops planned to take place during the course of the first year studio, aimed at introducing new ways of thinking and introducing students to a new pattern of architectural education. The experiment was planned under the theme of “Evaluation” during the Final stage. A grammatical approach was chosen to deliver the methodology in the design studio, based on shape grammars.

1. Three stages: Three workshops

The presented work is based on a pedagogical model of the beginning studio (Ibrahim et al., 2010) that structured the first year studio and divided it into three consequent stages: recognition, production then evaluation.

THE EARLY STAGE	THE MIDSTAGE	THE FINAL STAGE
Recognition	Production	Evaluation
<i>Nurturing the Skill of Seeing</i>	<i>Reflecting/ Designing in response to a need</i>	<i>Evaluating the acquisition of the three skills</i>
<i>Complexity Level</i>	<i>Complexity Level</i>	<i>Complexity Level</i>
Abstract Experimentation	Goal-Driven Composition	Experiencing Architecture
<i>Target Thinking Type</i>	<i>Target Thinking Type</i>	<i>Target Thinking Type</i>
<i>Imaginative / Divergent thinking</i>	<i>Induction to Reasoning/ Convergent thinking</i>	<i>Balanced/ Critical thinking</i>

Figure 1 The three stages of the beginning design studio (Ibrahim et al., 2010).

Three experiments were scheduled to take place accordingly over the course of each stage in order to evaluate the effectiveness of the framework in delivering the planned learning outcomes for each stage. The early stage experiments were crafted with a main goal of nurturing the skill of seeing; with more creative and ill-defined design tasks (Ibrahim et al., 2010), the mid stage ones utilize formal strategies to help students designing with constraints (Ibrahim et al., 2011); while the final stage's tasks aim at creating connections, testing the understanding, harvesting the fruits of the whole year's efforts in the most architectural-like experience of the year.

1. Introducing grammar in the beginning studio structure

From its success in analyzing and synthesizing design, shape grammar has been brought into design education in various forms (Stiny and Gips, 1972). In many instances, it is introduced in design computation classes as a generative design system or brought in the design studio work as an innovative design methodology. Moreover, there is no comprehensive literature on using it for the beginning design studio education.

Despite this interesting fact, the methodology is thought to be well-suited for teaching beginners from other different theoretical aspects:

- First, The grammar's concept is mainly about "making tacit knowledge explicit" (Pantazi, 2008). A pedagogical grammar therefore could benefit from manifesting this implicit knowledge in a more abstracted way.
- The grammar development and application stages expose some of the main design strategies, principles and even simple compositional operations. The implicit teaching of these issues makes the methodology more relevant for teaching beginners composition and visual correlation (Knight, 1999, Economou, 2000)

- Shape grammars' scenarios capture the layout of the design process and adjust students to it. The operations of cognition, production as well as evaluation are embedded in these scenarios in a way that promises beginners development of a good understanding of and control over their own design processes.
- The methodology is also very significant to be used under the studio's project based approach as the implementation stage of synthetic shape grammars involves a playful "Making" process. This could be clearly seen in some early examples like Fleming's wall grammar (Flemming, 1990). Other examples such as Knight's work with UCLA students (Knight, 1999) show the power of this simple mechanism to inspire students producing large and complex designs in their studio experimentations.

To apply the grammar in the beginning studio structure, its deterministic, strictness and unequivocal nature will be the main aspect of the methodology to be reconsidered in order to keep the process open in every stage of the structure's model. The applied model will be a more general interpretation of the theory that promises some degree of flexibility in its vocabularies and rules' description to allow all these reinterpretation and changing situations to occur.

2. Final stage: evaluation

Evaluation is not an intuitive process, it is a rational one in which, students sway back and forth between testing and questioning, using both non-empirical data and intuition in creating and executing. Beginners then are engaging in judgment that is followed by careful and numerous repeated analysis. The results of the evaluation are communicated back to recognition and production's steps for improvement or adjustment of the solution, or for changing the requirements.

The main objective of the evaluation is for students to take more responsibility for their personal decisions and an important component of it is self-criticism (Farivarsadri, 2001). The student should be able to criticize his/her own work as well as the works of the others, and to share his/her ideas with them.

2.1. THE APPLIED SHAPE GRAMMARS MODEL

Experiencing architecture at this stage means to develop what could be seen as the students' most comprehensive design experimentation of the year, meaning also to give them ownership and opportunities to make meaning for themselves in their projects. Allowing students to take full responsibility for their project is one way to encourage depth and thorough, elaborative processing of information. This also confines the probabilities of

the implemented grammatical models between the analytical and synthetic scenarios (Figure 2).

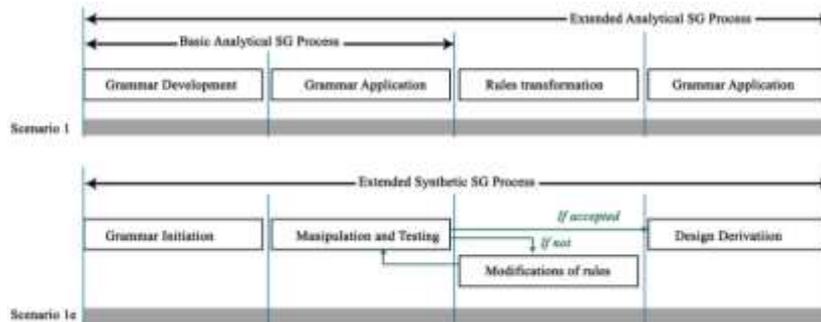


Figure 2 the suggested SG models for the final stage

2.2. EVALUATING THE “EVALUATION” STAGE

Generally in the beginning studio projects, the students’ design process is seen as important as their end product. But in evaluating the final stage’s success, the steps taken from the beginning of the process until the end are more important (Utaberta et al., 2010, Seymour, 2008).

Chances for monitoring the students’ progress are greater for the final stage’s projects as the allocated time is probably enough and consequently more focus is given to the design process. Firstly, the focus is given to the evaluation of their self-learning process, the way in which they have benefited from precedents, their previous experimentations and the whole year teachings. Secondly, the evaluation of the evaluation of their self-criticism, the rationale behind their decisions, the logic they based their evaluation on, the pedagogical outcome of the previous (Rolheiser and Ross)’s stages and most importantly the way they did respond to it in the transformation of design and the generation of alternatives.

3. The final Stage Experiment: Doing it his way (design language)

As the final experimentation in the year, beginning students were introduced to the idea of design languages from the grammars’ point of view, believing that great artists and designers are distinguished by the regularity of their approach or the qualities of their output. “*The quality of consistency*”(Bruton, 2008) seems to be a structural fundamental for good design. They were required to develop their own grammatical tools, the set

of strategies offered for reconsidering the process of design thinking. The tool includes use of metaphors of grammar that frame the design process in terms of core structural components. These components are the fundamental conceptual tools that offer alternative strategies for design.

3.1. THE WORKSHOP

Rather than allowing student to analyze work found in books or online resources, they were required to analyze their own work, to develop consciousness about their own languages, process and design elements in an extended grammatical process that consists of all stages of Analysis->Design->Transformation->Design.

Days before the workshop, Strathclyde first year students were notified to bring their design portfolio that contains the whole year's studio work. The tutorial began with examples from architectural and artistic styles showing the resemblance between designs from the same language. The linguistic interpretation of design was then introduced in terms of vocabularies, rules and derivation.

A group of around thirty volunteers were selected to proceed with the workshop's experiment in groups of twos:

Firstly, each was asked to analyze his/her work, find regularities and extract his/her own language. In this step they had to script their design logic whether graphically or in words.

Secondly, each has to exchange his/her language with his/her design partner and according to the new language he/she has to design a space for meditation. Students had to communicate and express his language in a clear way so as to help his/her friend understanding and using it.

The third step was to criticize and evaluate the design language in hand and make whatever needed modification on the vocabularies, rules or both.

The final stage was then to redesign the meditation space using the transformed language.

4. Observations

Being dependant on the whole year's teaching this stage's outcomes are mainly influenced by the studio curriculum. The students' response, their structured analysis and reflections were not only affected by their intuition, the accumulated knowledge and the teachings of the project-based studio affected the maturity and depth of their studio practice.

4.1. EXTRACTING THE VOCABULARY

Students were required to formulate the consistency of their design approach, so they varied in their ways of expressing the language using

narrative or graphical presentation or a mix of both of them. What is more important was that their efforts revolved mainly around two different models for the language extraction:

One is simply a guide for the general (and sometimes specific) design preferences embedded in their project, described as a *like* and *dislike* list of strategies, design aspects, geometrical forms, etc. Figure 3 and 4 show a written and graphical example of the preferences language.

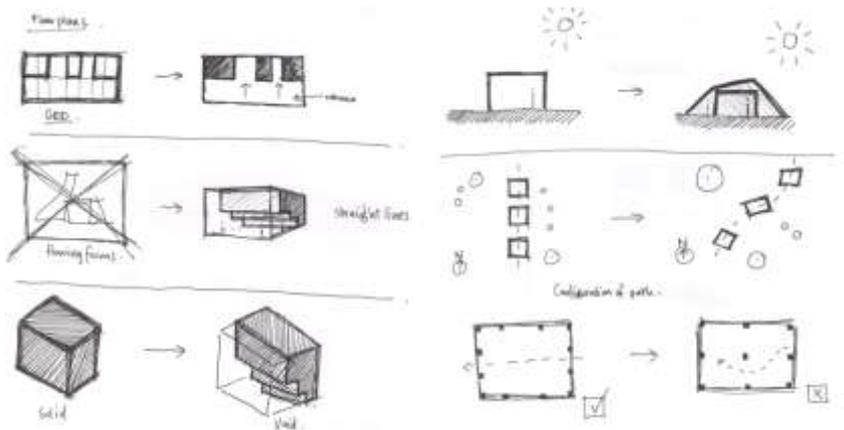


Figure 3. a graphical presentation of the design language in the form of like and dislike design preferences (Student: Jonathan Dawson-Bowman)

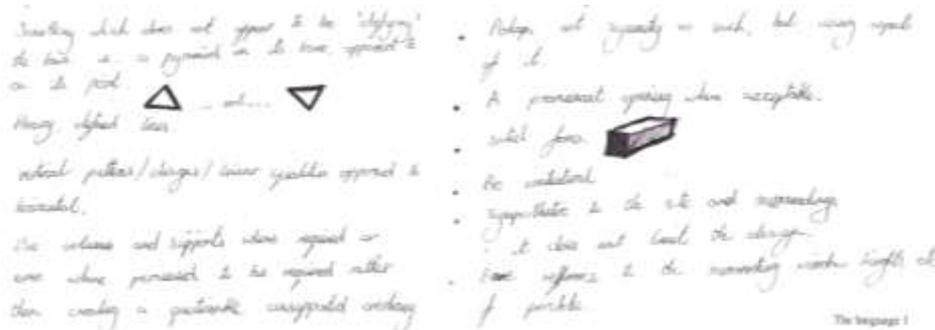


Figure 4. An example of a written language of preferences (Student: Christine Halliday)

The other model resembles the rule based models, offering step by step recipes for their formal or conceptual design process.

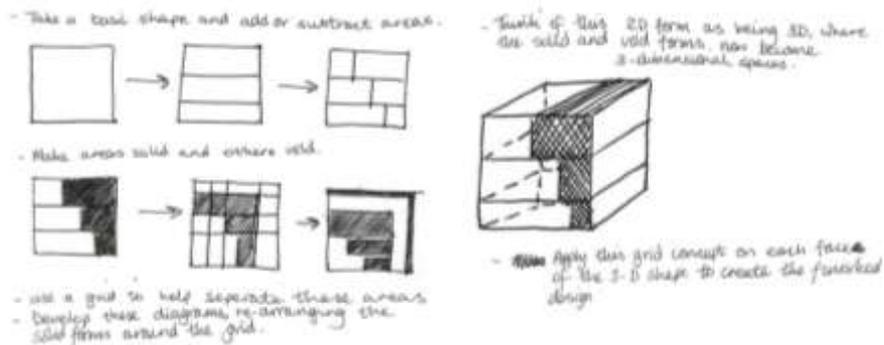


Figure 5. a rule-based description of the language influenced by the subdivision grammar of the “How to do it?” workshop (Student: Claire)

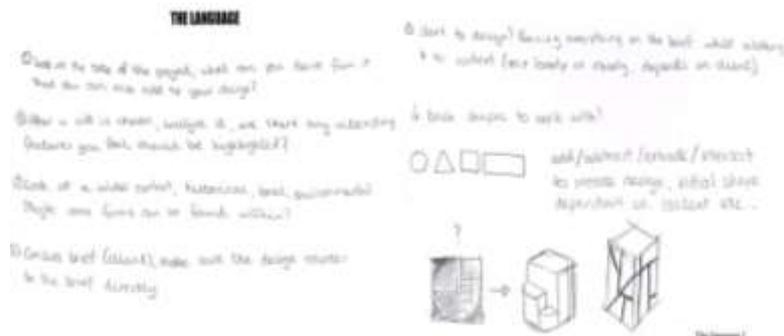


Figure 6 Another step-by-step guide for creating designs under the same language (Student: Simon McGrechan)

Figure 6 shows another example for a design language that expresses in words the process of designing according to the student’s work

3.2. APPLYING THE OTHER’S LANGUAGE

The difficulties associated with this step are not only concerning the application of the others’ languages; once handed their peer’s language, the first challenge for the beginners is in turning the written words into graphical presentation, something that they flawlessly did in the workshop and is believed to be due to the qualitative and quantitative use of narrative in the beginning design studio. They read, understand and reflect graphically upon what they have read; the thing that earned them valuable skills as recipient of knowledge as well as in communicating their ideas (Figure 7).

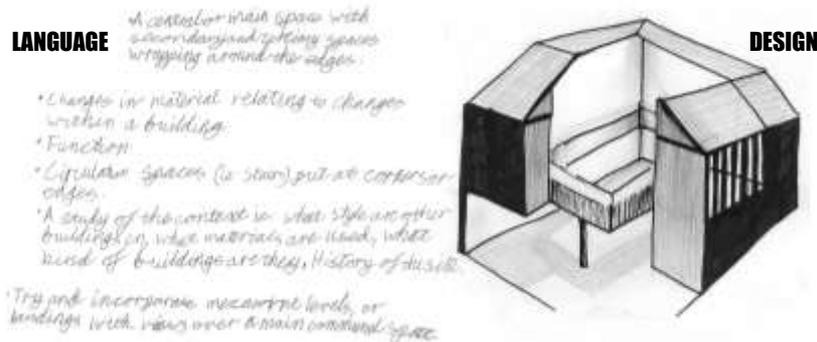


Figure 7 Turning narrative into graphical presentation (Language: Andrew Clark, Design: Jonathan Dawson-Bowman)

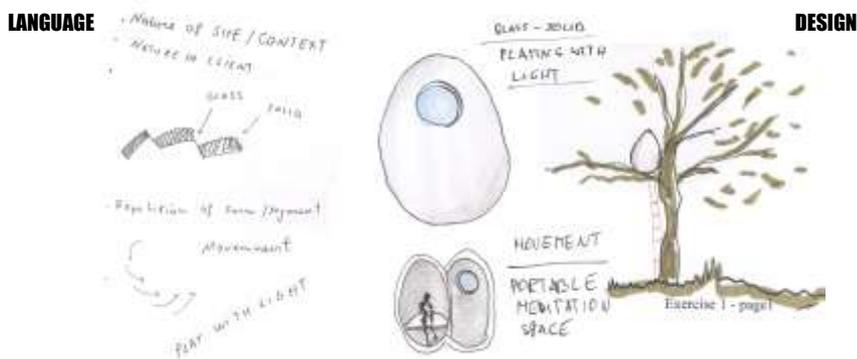


Figure 8 Following her friend's language, Paulina managed to create something special with some general rules (Language: Laura Petruskeviciute, Design: Paulina Naruseviciute)

The second challenge was in following and respecting the language while trying to create something differently- innovative maybe – at the same time. In response to this, some were stuck to the application of the rules while others managed to simultaneously find intuitive ways of escaping the strictness of the rules in the application and being creative (Figure 8).

3.3. EVALUATING AND TRANSFORMING THE LANGUAGE

Transformation was the new key operation in this final stage, the rationale behind the language evaluation and modification was analyzed in the light of the students' work. What could be drawn from the results is that students apparently built their language transformations decisions on one of the following three reasons:

Experimenting: is a curious act of changing or substituting some of the initial shapes or steps of application with others. This is done for the purpose of exploring the implications of such change on the generated

designs as well as on the design derivation process. In Figure 9, for example, the student changed the configuration of the shape multiplication and substituted the L shape arrangement of squares with an S one in two consequent steps of his friend's language

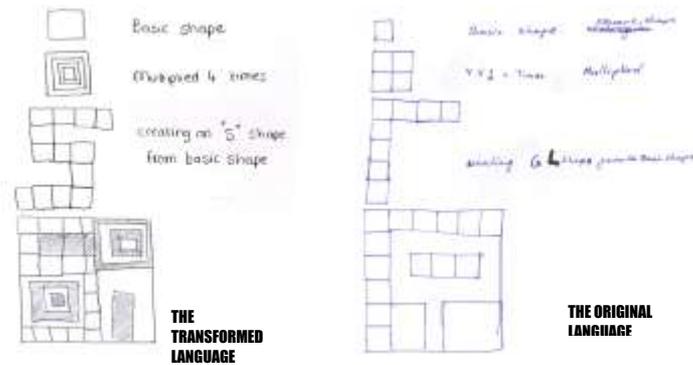


Figure 9. Experimenting with changing and substituting some of the language rules (Original language: Ilir Doci, Transformed language: Jennifer Rooney)

Another transformation (Figure 10) intends to extend the language's formal strategy, incorporating several strategies (addition, extrusion and intersection) alongside its original subdivision one.

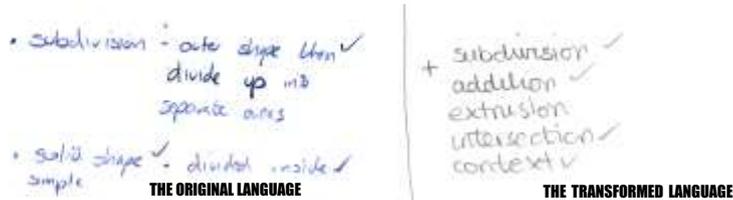


Figure 10. Experimenting by the addition of the three strategies of addition, extrusion and intersection with the subdivision's one (Original language: Simon McGrechan, Transformed language: Ian Duthie)

Rationalizing: is a process in which all design modifications were based on a thoughtful and rational evaluation of the original language's choice of elements and rules. This means that the decision of accepting or rejecting the language –or part of it- is not taken upon personal preferences, it is only built on a logical basis. This debate creates a kind of interesting conversation between both two students' languages (the original and the modified) (Figure 11 and 12).

achievement of the final stage's objectives within the scope of the applied workshop.

One interesting remark was that most of the students dealt with the meaning, needs and sensation of the space more than its outer look. Their conceptual drawings showed more focus on the feeling they want to convey for "meditating", delivering this through the use of material, texture, views, light and shades (Figure 14). Again we can attribute this to the well structured project-based approach of the studio, the openness of the project's theme, the whole year's narrative and the structured evaluation criteria that gave them the idea that design is not only about the beauty of the outer form.

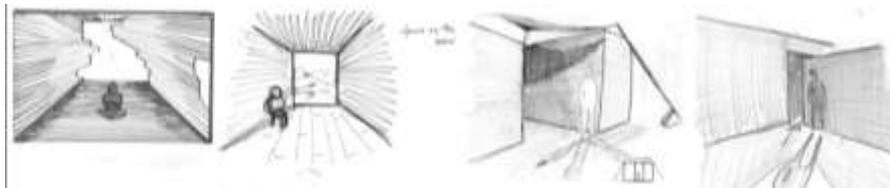


Figure 14. Some of the students' sketches that showed more concern with the configuration of the inner space and its sensational experience

From the feedback session, it has been seen that students feel more confident and productive once they recognize their strengths and respond to the regularities they discover in their bodies of work through the transparent records provided in their grammatical exploration. They are more because they can see how their work was achieved and hence how similar work can be achieved again, and how changes to the use of rules and vocabulary might alter the work.

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