GRAMMARS AND PEDAGOGY

Towards new media art and design education strategies

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Abstract. The impact of computational grammatical design on pedagogy has received little attention in art education due to the dominant modes of traditional approaches to art and design education. This paper explores the pedagogical implications of grammatical strategies using computers for judgements of design within an art educational setting.

Grammatical strategies are studied for their effect on the judgements of novice artists in a new media educational context. It is argued that concepts of grammar and views of contingency are used in a variety of senses in the conception and form making of artists; that finding methods for discussing and utilising complex visual information is aided by grammatical formalisation; that these strategies are evidently effective at both early and mature stages of the realisation of a project. The research explores the relation between computer and art on three levels in which grammar is used: as a sense of grammar, as a computational paradigm and as a description of a kind of computer program.

Grammatical formalism is apparent in two dimensional linear and non-linear animations using Photoshop, Premiere and Director, and in solid modelling programs such as Extreme 3D, Form Z, Strata Studio Pro, 3D Studio Max and SoftImage. Web site construction also impacts on the judgements of 2D and 3D design. Computational grammatical programs generate forms that reflect alternative understandings of art and design. Art practise is defined in terms of developing consistent and appropriate design language for the contingency at hand. Form making using grammatical tools, both recursive and array types, is discussed in terms of their applicability and educative value. Reference is made to formal qualities for critique and strategic capability of alternative pedagogy for generation of forms.

Examples provided show how simple rule sets develop into complex derivational sequences that challenge traditional strategies for computer imaging. The paper demonstrates the value of a sense of grammars for novice art and design practitioners by using first hand examples of experimental work at the South Australian School of Art, University of South Australia. For novice artists and designers, grammars in conjunction with reflective practice is offered as a useful mind set that supports an interest in actively defining a new kind of art. Illustrations provided show the utility of a contingent sense of grammar for pedagogy and highlights the significant role of grammar in pedagogy.

1. Introduction

This paper suggests the use of grammars in providing an effective learning environment for art students against criteria contained within identified generic

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graduate qualities. It encourages the development of a student-centred teaching practice incorporating grammatical pedagogical strategies together with modern information technologies to construct a learning environment that is rich and varied, and supportive of a wide range of learning styles.

In examining current research, it becomes apparent that many educators are now evaluating the use of grammars for creating an effective learning environment in the fields of architecture and art. The University of South Australia has committed itself to the facilitation of an effective learning environment by identifying a set of generic graduate qualities. These qualities can be seen as characteristics or abilities, and reflect the extent to which our teaching enables our students to acquire process ability as well as the mastery of content.

Educational infrastructure is undergoing a revolution but there is a constant need to facilitate understanding, creation and discussion of art and design. As described in the recent White Paper (March and Tapia, 1997), grammars provide a pictorial means of describing form without the traditional critical reliance on words that entail circularity and ambiguity.

Metaphors of grammars enable analytical and generative possibilities while opening and facilitating discourse in relation to Herrnstein Smith's notion of "contingencies of value" (Herrnstein Smith, 30), Kristeva's notion of "la langue" (Kristeva 1989, 213) and Rorty's notion of "ironist theory" (Rorty 1989, 105).

Formal grammatical systems supply an additional approach to critique through rigorous retrospective analysis. From my early experiences using grammars in design and art education (Neate, 1995; Schumacher, 1996; Bruton, 1998), I argue that a sense of grammar and the grammatical mechanism may facilitate an elucidation of personal art and design philosophies that contribute to vital form-making practice.

1.1 CONCEPTUALISING GRAMMAR

The term of grammar is used in several senses:
• as a sense of grammar,—the term encompasses hermeneutic reflection and contingency;
• as a computational paradigm,—referring to the shape grammar mechanism (or protocol), and;
• as a description of a kind of computer program,—referring to software that inherently operates grammatically. Following the work of architectural exponents, all three senses may be utilised in the pedagogy of art education.

2. Pedagogy: using generic graduate qualities

Pedagogy reflects an educational institution's mission statements and philosophical principles for practice. An identification of generic graduate qualities enables the initial use of assessment goals (instead of more general subject aims) to identify subject directions and content.

This paper contends that a strategic use of the grammars as a pedagogical tool may contribute to the achievement of these qualities by: assisting the

acquisition of both deep and surface knowledge about form-making in art; facilitating insights into personal identity through reflective action; encouraging the practice of critical awareness and innovative application of ideas and systems; developing an overview of the key operations and strategies in their respective areas of visual exploration by using collaborative technologies for communication; engendering a legitimate sense of the place of art in society as a humanising force for change; extending the range of art activity into the community and industry; and, supplying international networks that explore overlapping issues.

2.1 THE QUALITIES OF A UNIVERSITY OF SOUTH AUSTRALIA GRADUATE

The University of South Australia has committed itself to the facilitation of effective learning by identifying a set of generic qualities that it seeks to develop in its graduates. The qualities, requiring contextualisation and interpretation according to the different academic fields of application, are summarised in Table 1 below.

TABLE 1. Graduate qualities.

1. Graduates will be able to operate effectively with and upon a body of knowledge of sufficient depth to begin professional practice.
2. Graduates will be prepared for life-long learning in pursuit of ongoing personal development and excellence in their professional practice.
3. Graduates will be effective problem solvers, capable of applying logical, critical, and creative thinking to a range of problems.
4. Graduates will be able to work both autonomously and collaboratively as professionals.
5. Graduates will be committed to ethical action and social responsibility as professionals.
6. Graduates will be able to communicate effectively in professional practice and community activity.
7. Graduates will demonstrate an international perspective as professionals and citizens.

2.2 TOWARDS APPLYING GRAMMARS IN ART EDUCATION

Many educational researchers have followed the pedagogical work of Diana Laurillard of the Open University in the UK. Her philosophy comprises of a combination of situated learning plus reflection (Laurillard 1993, 29). Laurillard's model suggests the importance of:

- students' apprehension of structure;
- integration of distinct portions of learning into an integrated whole; active learning;
- the use of feedback;
- reflection.

These qualities inherently reside in grammatical approaches to education as seen in the experience of tertiary educators (Mitchell, 1990; Knight, 1992, 1994;Stiny, 1972; Tapia, 1997; Seebohm, 1991; Woodbury, 1991; Lauzzana, 1988). The use of grammars has been extensively documented in the fields of architecture (Penz 1992) and engineering but few studies have been undertaken in the art field (March and Tapia, 1997) other than calls for visual literacy (Brown 1994, 11).

2.2.1 How Graduate Qualities and their Indicators may be implemented by the use of Grammars in Teaching.

In identifying a set of generic qualities, the University of South Australia has also developed a series of indicators exemplifying how graduates may demonstrate the achievement of a particular quality.

1. Graduates will be able to operate effectively with and upon a body of knowledge of sufficient depth to begin professional practice.

• demonstrate an understanding in broad outline of a whole discipline or professional area (concepts, theories, proponents) including a knowledge the boundaries;
• apply knowledge (demonstrate application of theory to practice in real situations, appreciate limitations of theory, use materials, devices, safety codes and practices, specific equipment and techniques appropriately);
• identify the methodological and substantive limitations of the field and the discipline or professional area's mode of inquiry;
• recognise the social and historical context of knowledge;
• demonstrate appropriate understanding of current research areas in the or professional area of inquiry.

When the grammatical paradigm is used in a supplementary, complementary or whole-course manner, many of the indicators listed above may be realised. Grammatical understanding offers a theoretical and practical conception of form-making. Computational generative systems may define the boundaries and expand the horizon of form-making possibilities so that the student’s discipline awareness of technique and context is broadened.

2. Graduates will be prepared for life-long learning in pursuit of ongoing personal development and excellence in professional practice.

• locate, evaluate, manage, and use information in a range of contexts ie. be information literate;
• understand the limitations of, and have the capacity to evaluate, their knowledge;
• understand and accept personal weaknesses, strengths, and preferred learning styles,
• have knowledge of a range of learning strategies, and take responsibility for their learning and development;
• maintain a positive concept of self as capable and autonomous;
• sustain intellectual interest and critical thinking as a mature professional.

The other indicators within this quality attempt to describe characteristics which will be developed as information literacy is achieved. A grammatical methodology is an effective medium in which to develop understanding of the

limitations of knowledge. Using rules sets assists the evaluation of alternative outcomes.

3. Graduates will be effective problem solvers, capable of applying logical, critical, and creative thinking to arrange of problems.

• gather, evaluate and deploy relevant information to assist problem solving, ie. analysis and synthesis;
• define researchable questions in the discipline or professional area;
• apply strategies to conceptualise problems and formulate a range of solutions

Grammars can be used in several ways to develop problem solving skills in the learner. At the most simple level, when a grammar is used in an supplementary manner, problems may be analysed and represented in a variety of ways. Research into the source of ideas is required to interpret form-making decisions and to generate elegant derivations when using a grammar. This also aids the development in the learner of an understanding of various parts of the discipline and thence to issues of researchable questions, cross-disciplinary boundaries and problem solving strategies.

4. Graduates will be able to work both autonomously and collaboratively as professionals.

• work in a self directed way;
• use logical and rational argument to persuade others, to negotiate with others;
• work collaboratively with different groups, identify the needs of others and build positive relationships;
• work in a team (cooperate with all team members, share ideas, forgo personal recognition, negotiate solutions when opinions differ, resolve conflict, recognise strengths of other team members, share responsibility, convey a shared vision for the team, display a commitment to make the team function effectively).

A grammatical approach provides a teacher with an enormous base from which to resource problem based and active learning. While not the only resource for such style of learning, it may be utilised in a supplementary or complementary manner for this effect. Methods such as individual and group project and problem based learning stimulate deep learning in students. Autonomous and collaborative professional work will be produced by deeply motivated reflective learners who have had opportunities both to take control over their learning and also to work with others to work through the tensions and conflicts which produce effective team work.

5. Graduates will be committed to ethical action and social responsibility as professionals and citizens.

• demonstrate a commitment to personal ethical actions within professional contexts;
• define social aspects of a particular technology (political, economic, legislative, sociological, environmental etc);
• appreciate the impact of social change, the political decision-making process and economic imperatives of business and industry;
• recognise social justice issues relevant to the discipline and professional area;
• appreciate the importance of sustainable development;
• demonstrate responsibility to the community (be aware of safety, efficiency, innovation, cost-effectiveness).

Ethical and social issues need to be embedded and examined in a range of discipline and content areas so that some of these indicators may be identified in our graduates. Grammars may be used in this area to provide resources to demonstrate current practice and issues of social and ethical concern to the community and to professional arts bodies. The use of grammars may inform academic debate over such ethical issues as copyright and intellectual property, plagiarism and censorship. As a student is encouraged to reflect on the development of a design grammar, questions such as the responsible use of derivational alternatives and the corresponding economic and societal effects will also have to be answered.

6. Graduates will be able to communicate effectively in professional practice and community activity.

• demonstrate oral, written, mathematical, and visual literacies as appropriate to the discipline or professional area;
• display sensitivity to their audience in organising and presenting ideas;
• communicate appropriately with professional colleagues and the public.

When students are encouraged to use grammatical approaches as a resource for their learning, they are exposed to a wide range of graphic and form - making possibilities that may enhance community arts activity.

7. Graduates will demonstrate an international perspective as citizens.

• appreciate the importance to professional practice of social issues arising from multicultural Australia;
• identify international standards and practices within the discipline or professional area;
• value differences which arise from language, culture or place.

The use of grammars in art and new media education allows a wide-range of international resources to be accessed. In this way international trends within a particular field of study may be identified and examined. Research organisations, universities and schools of art, architecture can share information about international art issues, products and systems that can be monitored and documented for further development. Students can be directed to previously identified “cases” or encouraged to select trends which they wish to monitor or issues on which they wish to collect international opinion.

3. Case Studies

3.1 ARCHITECTURE

Since 1960s pedagogy for architecture and art overlapped in response to the impact of reductionism. Minimalism and post-object art remain part of the “plurality” of styles currently on mainstream circuits. Some architectural educators have challenged ideas of “uninformed” complexity and pluralism by using the shape grammar mechanism, The grammatical paradigm and work on shape computation is well established in architectural education (March 1997, 12) and has been applied in areas as diverse as archaeology and engineering—fields that are interested in artefacts (March 1997, 6). Reports of many pedogogical issues are contained in the journals of ACADIA (Jordan,

1990; Kensek and Noble, 1992; Maver, 1994); and as a tool for design using computers in architecture (Penz, 1992).

My early pedagogical applications of the shape grammar paradigm in art education used video recordings of key exponents such as, Lionel March (Bruton, 1998) who demonstrated a use grammatical method of using grids to construct art works, Terry Knight (Bruton, 1998) who presented a teaching tool for the simple understanding of grammatical possibilities with two forms, John Rollo (Bruton, 1998) who demonstrated his approach to shape grammars in architecture and engineering, Gerhard Schmitt (Schmitt 1997, 7) whose work on Phase X recognised the discursive educational power of the computational grammatical approach, Thomas Seebohm (Seebohm, 1992) who realises the limitations and relevance of the grammatical approach for art education, Raymond Lauzzana (Bruton 1998) who together with Lyn Pocock-Williams used LISP to identify grammatical aspects well known painting styles, Antony Radford and Robert Woodbury (Bruton, 1998) whose architectural program effectively utilises grammars as a pedagogical tool.

3.2 ART

a) Case A (Emma Neate) Illustration (Honours) student—This example shows early attempts to use the shape grammar approach for the analysis and generation of a poster design. Saul Bass' poster work, for the movie *The Man with the Golden Arm* of was chosen for analysis, a pictorial grammar was devised and used to produce some derivations on the computer.

b) Case B (Anthony Rudge) New Media animation/modelling (final year) student—Discussions about grammars and his 3D computer models of vehicles led to alternative directions with new relevance for this student.

c) Case C (Tim Sterling) (Final year)Sculpture student—A series of discussions about commonalities and differences in the entire corpus of the student's work were followed by selection and rejection of a specific visual vocabulary and rule sets. The subsequent operation of the selected rule sets enabled new work to emerge.

4. Pedagogical Implications of Grammatical Strategies

4.1 THE CURRENT PROBLEM

A basic question that academics in the art field have not fully addressed is "How can we use grammars to help provide an effective learning environment? We face the pressures of reduced human and financial resources and the demand for quality teaching. Can we justify the time taken to learn a new methodology? What are the benefits for ourselves and our students?" The pedagogical issues involved in the development of a grammatical approach to art education are:

- The identification of graduate qualities
- The relation of pedagogy to graduate qualities
- The application of the theory in the art education studios

4.1.1 Context

The modern system of fine arts emphasised drawing as a fundamental skill and right of passage to knowledge. Three dimensional form-making skills often use Renaissance models. Twentieth century art education has been dominated by the 1920s the Bauhaus methodologies (Itten, 1964).

Today, factors such as the writings of Continental theorists and the growth in new media increasingly dominating curricula. A complex and confusing "plurality" of world views and art pedagogy suggest a need for innovative, grammatical, flexibly structured and transparent art educational pedagogy may be of value.

4.2 A Solution to the Problem

One method of answering this question is to design and evaluate grammatical methodology against criteria contained within generic graduate qualities. The impact of grammatical design theory on pedagogy has received little attention in art education due to the dominant modes of traditional approaches to art and design education. The benefits of shape grammars over other language mediums when analysing and communicating the design of form, is that they facilitate a means of: "exploring the generation of other designs with the same style or convention; comparing separate interpretations of the same body of work; comparing the compositional make up of two or more styles of design; developing new styles of design, and, transforming from one style to another" (Rollo 1995, 79). Grammars might be used to enhance critical appreciation and develop rigorous critique, to diminish vague characterisation of styles based upon personal responses of often self appointed experts (Bruton 1990, 118).

5. Conclusion

As academics consider the development of subjects and courses, and in the current economic climate, it will be seen that grammars can be used as more than a conceptual toy in developing a high-quality learning environment. Early adopters of grammars will always exist, and many will rightly continue to research means of using grammars in their teaching. For the majority grammars need to be considered as a continuously evolving resource with which to supplement their teaching especially in regard to new media and internet (HREF1). Rather then detracting from academic freedom it provides a flexible base to resource the teaching of art students and to provide flexibility and competition in the education "market".

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