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A Shape Grammars Approach to Bvlgari'sEmerald Necklaces Design Language

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1. INTRODUCTION

Antiques may become cultural symbols that may be treasured by their countries, thus giving them an extra added value in addition to their design value whether because of their material, design or history in relation to specific people or events.

The rule of thumb used by most antique experts is that anything that is 100 years old or more may be considered as an "antique". However, items that are old but not quite old are called "vintage".

Considered as a "vintage", this paper addresses Bvlgari's emerald necklace designs through a shape grammars approach to generate designs after Bvlgari's style.

Thoughts about Style:

Design cognition focuses on the different processes and psychological activities of how humans perceive, understand, process, formulate, generate, store, retrieve and recycle design related knowledge that leads to the creation of artifacts. These activities create "specific features" that are repeated in a design product, thus characterizing this product as an "individual style". Due to the existence of design styles, outstanding design products can easily be recognized by the public as "cultural symbols". [Chan, 2015]

According to the [Webster's New World Dictionary 1988], the definition of style is: a manner or mode of expression, execution, construction, or design in any art, period or work. The [Cambridge Dictionary 2018], defines Style as: a way of doing something, especially one that is typical of a person, group of people, place, or period. An Artist's style may be characterized by having common specific repeated features in his/her designs, by using a technical unit, a "feature" that is repeated in his/her work and often characterizes this work, and the nature of the composition.

In this paper, four different examples of the emerald necklaces after Bvlgari's style are analyzed to derive the rules governing the design language or style. Shape grammars come in handy with such an approach, as they offer the chance to re-design or design new products after a specific style.
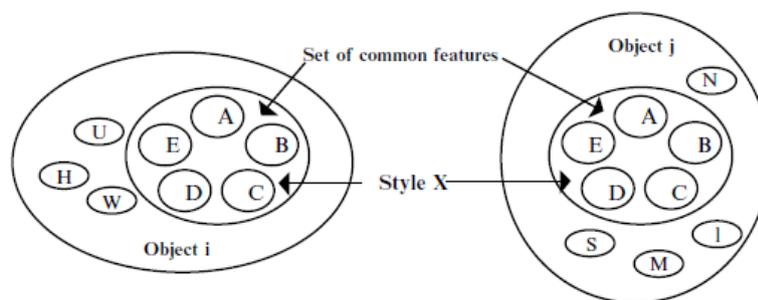

Fig. (1): Two different objects having several common features among them creating a style "X". [Chan, 2015]

What is the Bvlgari style and when did it emerge?

Sotirio Georgis Boulgaris (1858-1932) was the son of a family of Greek silversmiths. Sotirio immigrated to Italy, where he shortened his surname to Bulgari. By 1900, he had set up his first shop selling silver, antiques, and jewels. Although Bulgari had been making jewelry since the 1920s, the style that we know

today comes predominantly from the 1950s and 60s when his three sons; Paolo, Gianni and Nicola ran the business and personally oversaw the design studio*.

The three brothers ushered in a new style of jewels. Bold combinations of colored stones, daring volumes and smooth, simple shapes offered an exciting and exotic new choice in a time when Paris and more traditional designs dominated the market. This brave new look was soon recognized as the Bulgari style. Bulgari was amongst the first jewelers in the 1950s to use color in a daring new way, choosing gems for their effect rather than for their value alone, which opened up a whole new and exciting palette of colors and designs. Bulgari jewelry design is distinctive and often imitated. In the 1970s, many of the more expensive Bulgari pieces (such as necklaces, bracelets and earrings) were characterized by instantly recognizable, bold, architectural designs combining large and weighty gold links with interlocking steel. [Betts, 2011].

The trademark is usually written BVLGARI in the classical Latin alphabet that is why the Italian Bulgari is written with the Roman Latin alphabet lacking the character U (but not the sound) and replacing it with the V.

2. ANTIQUE AND VINTAGE DESIGNERS' LANGUAGES:

For each designer there are some own features that are frequently used in his/her designs. A style is created when specific features are repeated in different designs for the same designer. Different antique or vintage designers like Chiparus, Bvlgari, Tiffany, Mucha, Faberge, Galle and many others have specific features that are obviously noticed in their designs, Fig. (2).

The ability to analyze special stylistic features of different artifacts, especially in the three dimensions requires practice even for trained designers and art experts.
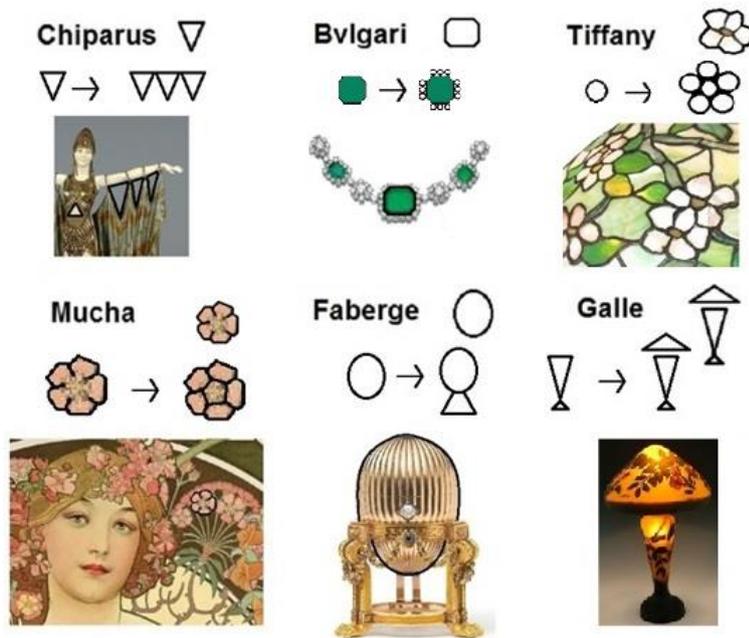

Fig. (2): Extracting common features from different designers' works
Producing different design languages

Language is a set of symbols, letters and numbers used in the delivery of information. Language has its own structure or "syntax", which is its alphabet, consisting of words, phrases and sentences in specific relationships. According to Merriam-Webster's Dictionary, "Syntax" is the arrangement of words

* http://www.thejewelleryeditor.com/jewellery/article/bulgari-history-of-style-celebrities-iconic-design/
Accessed October 2017

and phrases to create well-language. When dealing perceived exactly the same language; style is the features combined together language of design designer. Fig. (3) shows designers repeated in their may be called: their special

formed sentences in a with design, "Style" can be as "Syntax" in natural arrangement of special to create a well-known according to a specific specific features of several work characterizing what "*Style*".

Fig. (3): Analyzing the main features of different
Antiques and vintages of designers' languages

For the design of antiques, the dots, lines, joints and elements are the objects that make up the shapes. They are the main constituents of the design governed by specific relationships, rules and grammar to form the language of design. This approach seems to lend itself easily to be implemented through a Shape Grammar's approach.

3. SHAPE GRAMMARS APPROACH

The shape grammar formalism was founded in the early seventies by [Stiny & Gips, 1972]. They used terms like (I) initial shape, to which rules are applied, label (L) is a symbol associated with the shape, rule (R) is the step process where a transformation of a shape is applied. A shape rule consists of two parts separated by an arrow pointing from left to right, in the form of: if - then rule

if **LHS** *then* $\Longrightarrow$ **RHS**

if the **L**eft-**H**and **S**ide shape is found *then* $\Longrightarrow$ change it to the **R**ight-**H**and **S**ide shape

The left part of the arrow is termed the Left-Hand Side (LHS). It depicts a condition in terms of a shape and a label. The right part of the arrow is termed the Right-Hand Side (RHS). It depicts how the LHS shape should be transformed and where the label is positioned. The label helps to direct the transformation into the new shape as Fig. (4).
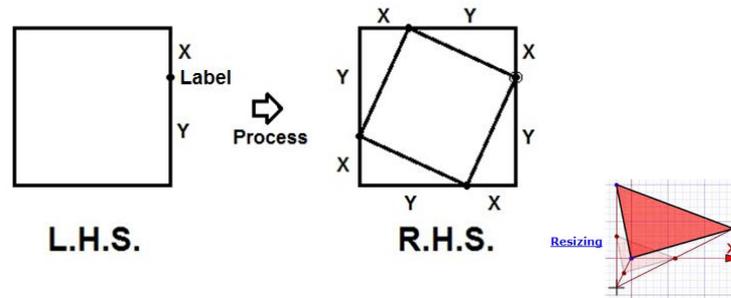
Fig. (4): An example of a shape grammar rule, where the left-hand side
is the initial shape, and the right-hand side is the new shape

Shape transformation can be achieved through four main types of processes: translation, rotation, reflection and dilation or resizing. These transformations fall into two categories; rigid transformations which do not change the shape or size of the initial shape, and non-rigid or parametric transformations which may change the shape and size of the initial shape. The different transformation processes may include addition, subtraction, translation, rotation, mirroring, reflection, scale changes or resizing and combinations of all, as in Fig. (5).
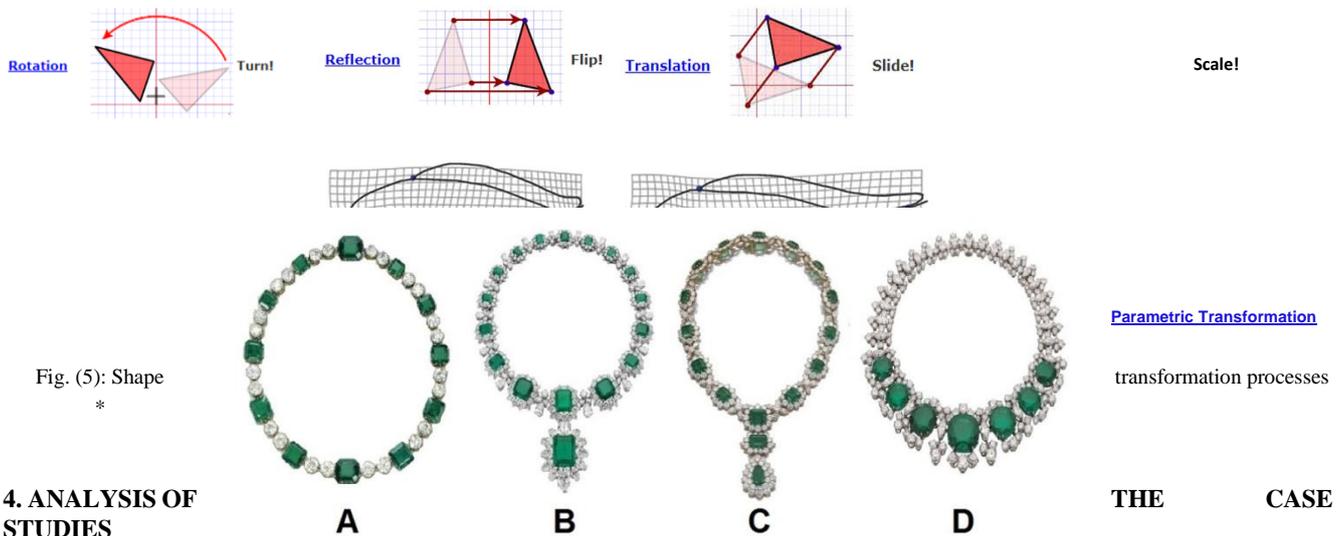
Fig. (5): Shape transformation processes

4. ANALYSIS OF THE CASE STUDIES

By analyzing Bvlgari's emerald necklace design language, it is obvious that there is a repetition of specific features in most of his works, which may change parametrically in different forms and dimensions to give different aesthetics and different designs – Fig (6).

Fig. (6): Different Bvlgari's showing repetition of emerald necklace designs specific features

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https://www.mathsisfun.com/geometry/transformations.html - accessed December 2017

The following Table [1] represents the rules governing four chosen case studies of his famous emerald necklace designs put together in a shapes matrix to help in the conceptual design phase of Bvlgari's shape grammar. It shows all possible alternatives that may be applied by the user to generate the same or new emerald necklaces designs after Bvlgari's style.

Table [1]: The Shapes Matrix of Bvlgari's emerald necklace design language derived from the four case studies containing 17 shape rules

5. THE IMPLEMENTATION

The following section of the paper presents the implementation of the suggested approach. The implementation proceeds in two steps; designing the "Bvlgari Tool Bar" from within AutoCAD and developing an example from the matrix of shapes.

5.1. The Proposed Design of the "Bvlgari Tool Bar":

The Bvlgari's Tool Bar is an add-on in AutoCAD that is divided into four parts referencing the four case studies mentioned above. The user can access the whole Bvlgari's grammar upon his choice. All the seventeen design rules are accessible through this "Tool Bar".
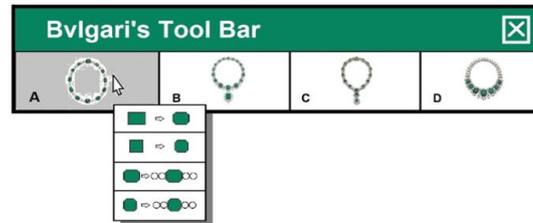

Fig. (7): The suggested Bvlgari's Design Tool Bar

When the cursor floats over any of the four icons of the case studies, a pull-down menu appears next to the chosen icon, showing all design rules under this specific icon, giving the chance for the user to choose among the different rules as he/she pleases.

5.2. An example of a new design from the matrix of shapes.

This section of the paper presents a new design of an emerald necklace that mimics Bvlgari's designs by using the suggested Shape Grammar. Figure (8) shows the specific rules that have been used to develop the new design.

Fig. (8): An example of a new design generated using the Bvlgari Tool Bar

6. DESIGN VALIDATION

Referencing Bvlgari's emerald necklace design shown in figure (9), which is one of the collection of the international actress Elizabeth Taylor, to the new design produced from the suggested shape grammar, the presence and resemblance of several features and characteristics of Bvlgari's original design style is obvious, which assures the stability and applicability of the suggested Bvlgari's style in addition to the correctness of the proposed grammar.

Fig. (9): Original Bvlgari's design and a new design
derived from Bvlgari's Shape Grammars Tool Bar

7. DISCUSSION

By using shape grammars that provide rules for the designer to follow, are we actually restricting creativity?

First of all, one should not equate "creativity" with "originality", as most of what seems "new" in a specific domain is simply a re-merging of already existing ideas from the same or other domains but put together in a new way. According to [Koestler 1964], new ideas are generated through the combination of two or more old, existing ideas. Koestler referred to this merging of ideas as bi-sociation. [Shneiderman 2000] describes the creative design process of emergent design and the conscious idea generation as the deliberate connection of matrices of thought.

Thus, creativity may be defined as the ability to see connections and relationships where others have not. The ability to think in intuitive, non-verbal, and visual terms has been shown to enhance creativity in all disciplines.

If the notion that rules governing design would prohibit creativity is true, then Vitruvius' orders of the Greek and Roman columns should have restricted all designers' creativity a long time ago, but definitely this is not the case. Vitruvius' work just governed the orders, proportions and the relationships of many new magnificent designs that came afterwards. Vitruvius's Ten Books on Architecture was used as a "design manual" for more than 1500 years, without prohibiting any designers' creativity. Vitruvius's "design manual" still inspires designers all over the world, and still teaches important lessons regarding the theory of types and the construction of design heuristics [Heath, 1989].

Grammars would only be inhibitors of creativity if they remove desirable design possibilities. According to [Hosny, 2003], using a grammar, in natural language for example, is never meant to be an inhibitor, on the contrary, it guarantees the correctness of the sentence, and in design, it guarantees the correctness of the product, however, be it creative or not, is a function of the user's knowledge, background and perception. Using the same shape grammar, any two designers may produce completely different designs, one of which may be considered creative while the other maybe not.

According to [Chan, 2015], expert designers are more creative than novice designers because they have a richer set of knowledge schemata that provides them with more opportunities to quickly and easily combine and synthesize images together thus producing more creative artifacts.

If creativity can be characterized by recognizing unusual links, then the suggested shape grammars approach with its design "matrix" considered as a "design manual" provides these knowledge schemata and different links for the designer through what may be called: "the choice generating process", by which more diversified options suggested from the user will enhance the chances for creativity, thus providing more opportunities to quickly and easily chose and combine rules together to produce more creative designs.

When dealing with creativity, there are two simple rules; everything is possible, and everything is allowed. Creativity lies in the power to do unusual things, in other words it's thinking "outside the box", and one way of thinking outside the box, is to "mix and match" between concepts or disciplines. In this sense,

the shape grammars offers such a When using the Bvlgari's tool bar, has a wider platform palette to "mix and his/her design, but governed by the required design

Original Bvulgari's Design from Elizabeth Tailor's collection

New Design using Bvulgari's Shape Grammar Tool bar

approach possibility. suggested the designer and a broader match" in still same "*style*".

Shape grammars following

also offer the advantages: artifact's preserving

- They are "style

tools", especially if the original designer of the artifact has passed away, or a piece from a product design is missing and it is required to regenerate the missing piece.
- Considered as "design manuals", they may be useful "educational tools" through which learners may learn the shape creation process of specific artifacts and designs.

8. CONCLUSION:

- The current paper reports on a new category of Shape Grammars applications that has not been addressed before under "Product Design" and that is "Antiques or Vintages" design, through a selected case study of Bvlgari's emerald necklace designs, thus opening the gate to other research papers along the same interest for other kinds of antiques or vintages as an approach to record as much of the authentic artistic products as possible.
- The chosen artifacts in this paper among other art pieces are considered important objects of interest to all countries of the world as they emphasize different cultural values of different people across the world. Also, design features of art pieces may reflect on many fields like architecture, fashion, furniture, lighting units, interior and exterior accessories for buildings and others.
- The shape grammars approach proves to be a valid methodology for reviving known styles of famous and renown designers of well-known product designs; among which are antiques and vintages. They are good means to revive the works of art that have disappeared or do not exist anymore.
- Grammatical rules presented through shape grammars are a sophisticated and useful technique through which it is possible to understand shapes and structures and stages of transformation of specific artifacts, they may act like "educational design manuals" for interested designers.
- Shape grammars present a fruitful approach to obtain new designs that are similar to the works of famous designers after their departure. They are good means of reviving works of art that have been destroyed or do not exist anymore.

A representation of Bvlgari's emerald necklace design is presented. A thorough analysis of his necklace design style is conducted, and a shape matrix containing several design rules governing Bvlgari's design language is developed. Using the suggested shape grammar, a new design is developed, and then validated by referencing it with other Bvlgari's existing designs to demonstrate the applicability, value and advantages of the approach.

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