Using Organic and Curvaceous Forms as a Reference Point for New Product Development

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Abstract

Throughout history it is possible to map how the form of products has been influenced by particular styles and movements in art and design at that time. Previous styles have been adapted or re-interpreted and there is now a range of mixed styles used in contemporary product design. The overriding influence now may be that of brand and corporate style rather than fashion. In particular, Organic design is regaining interest and with integration of new technology and greater interaction with human emotional feelings, a closer link is being established with nature. An organic and curvaceous shape is the most recognisable and ubiquitous genetic shape found within natural life forms. From a historical perspective, this paper looks at the evolution of styles that have influenced the forms of man-made products and in particular organic designs that draw inspiration from the natural world. We have developed a methodology to establish the relationship between product forms and the aesthetic association and emotional feelings that can be evoked from perceiving these forms. This will contribute to establishing a product language system from the aspect of addressing product style. In this paper we have also showcased some of the designs of MP3 and CD players, completed by product design students at Southampton Solent University, with reference to the 'organic' and natural world.

Keywords: form, shape, curvaceous, organic, emotions, nature, product design.

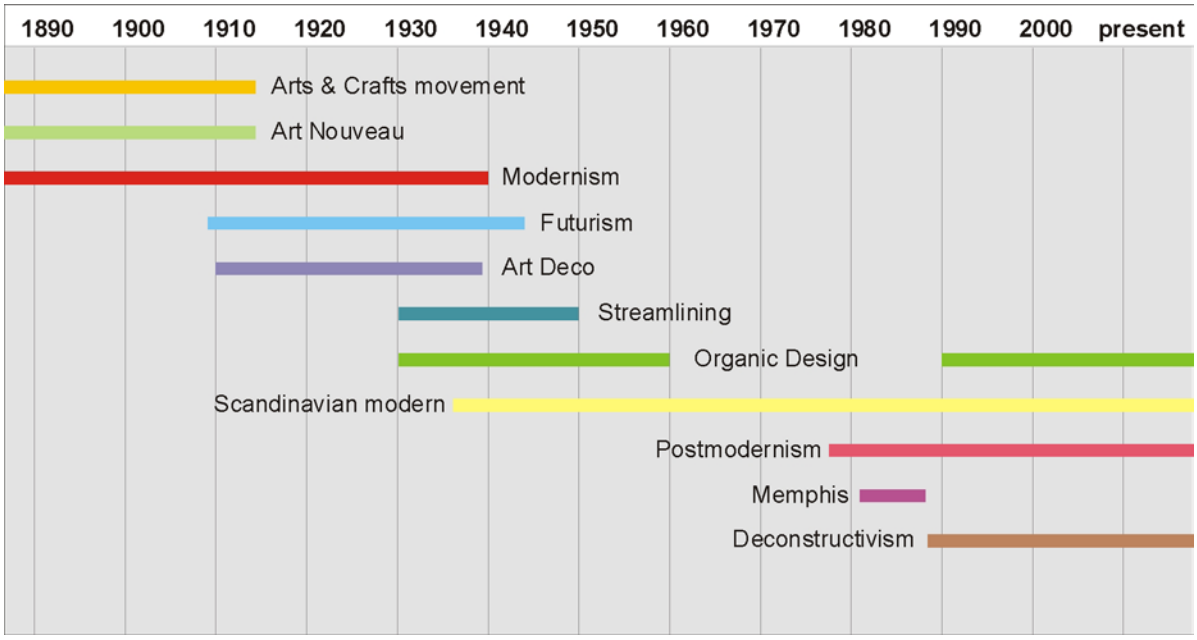
1. Evolution of the styles of product forms

Any artefact is formulated and recognised by its form. A product consists of a number of elements such as colour, shape, material, texture, proportion, size etc, all of which contribute to the overall form and perception of that product. The interrelationship of these key elements and the combination with the physical presentation affects how people perceive and respond to a product.

Historically, artists and designers have shown great ability to adapt and evolve the form of a product or artefact in line with the style/movement of that era. For instance, Modernism, Art Nouveau, Art Deco, Streamline, Organic design etc, see the

illustration in Table 1. If we look at how style is originated, one of the differences between artists and designers lies in that, artists may create works according to their personal experience and passion; whilst designers, particularly industrial product designers of today, need to apply more rational thinking about the form of the product and style in relation with the product context, target market, manufacturing economics, and people's perception.

Table 1 Styles that have influenced the form of products over time
(Reference from [1], redrawn by author)



In general, a product or artefact that is created will not only reflect the style and influence imposed by any art and design movement of that time, together with other influences and ideological values, but will also reflect and be limited by the available technologies (for example, the material and processing technology).

Let's take radio design as an example, and give a brief overview of its form evolution influenced by the styles over time, illustrated in Figure 1.

Radio waves were discovered in 1888. Guglielmo Marconi was the first person to have the capability to apply radio waves in communication and propaganda in 1896. Since then, the radio design has evolved for more than a century. From the end of 19th century to the beginning of 20th century, the *Art and Crafts movement* and *Art Nouveau* peaked in popularity. The purpose of *Art and Craft movement* was to promote the ideals of traditional craft production and craftsmanship, advocated simplicity of form. It was featured by using simple, linear shapes with inspiration from natural plant and animal forms (either concrete or abstract) in line with the union of form, function and decoration. On the other hand, *Art Nouveau* is characterised by highly stylised, flowing, curvilinear designs often incorporating floral and other plant-inspired motifs. However, it was not until 1920s that radio had been put into commercial production. These two movements had passed by 1914, and had little

influence on the design of radios at that time. Nevertheless, we can still slightly glimpse the marks of Art Nouveau style by looking at the second radio sample from the top of Figure 1.

Modernism, as the leading design movement in the twentieth century, emerged due to the growth in industrialisation that occurred from the 19th to the 20th century. With emphasis on function, modernistic design was usually seen in the form of simplicity such as geometrical shapes with straight lines, sharp edges and corners, cubic bodies. Although modernistic notion was afterwards questioned by *postmodernism* that germinated in1960s, the style of modernism had been extending all through to late 20th century. We can see that most of the radio samples in Figure 1 from 1930s through to 1980s took a regular geometrical shape.

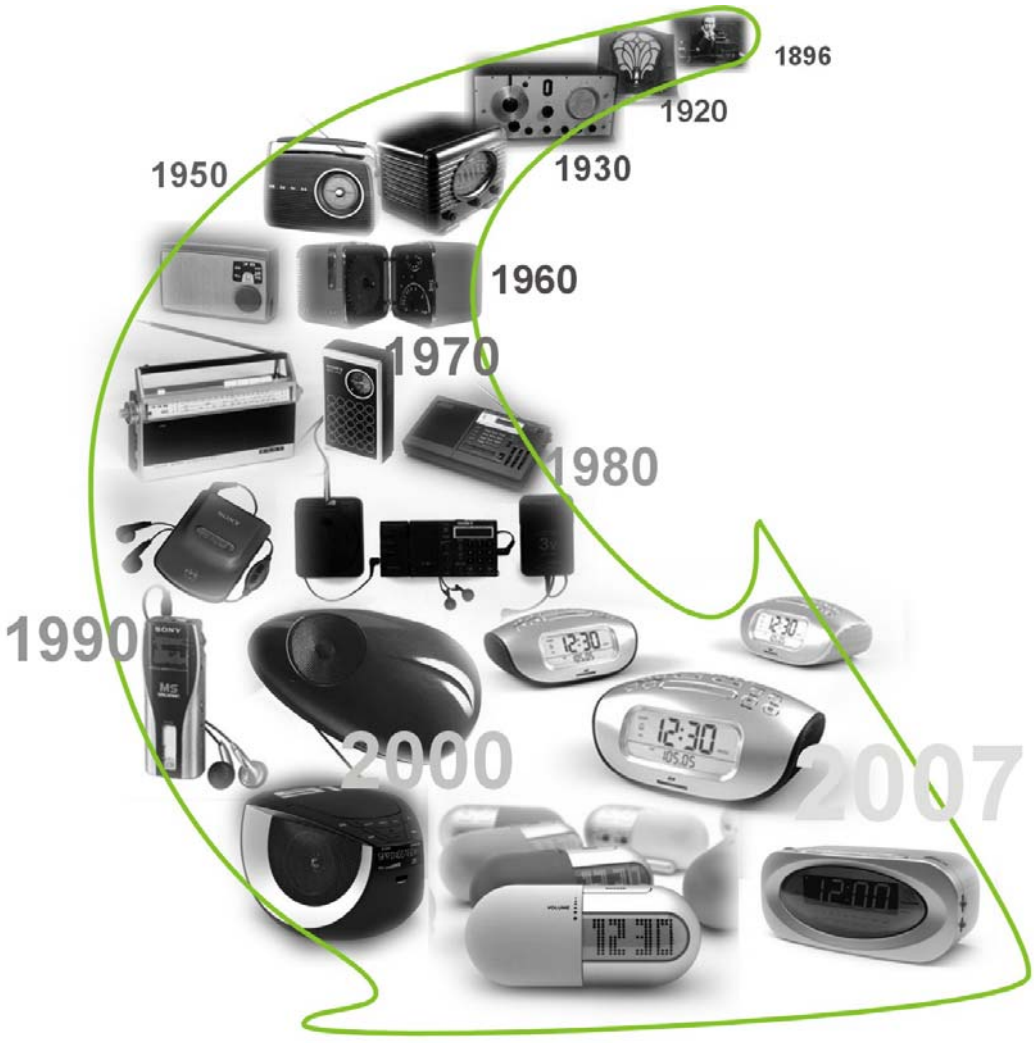


Figure 1 Examples showing the evolution of radio design throughout history

Art Deco is an international decorative style, firstly emerged in France during the 1920s. It is featured by the use of geometric and stepped forms, however, usually with reflective surfaces, sharp edges, rounded corners and expensive materials. However, the style of Art Deco in radio design seems less obvious. As the trend for

modernism evolved, the distinctive Art Deco style of the late 1920s was overtaken by *Streamline* Modern design. Sharp stepped sides of skyscrapers softened into curves, while 'boxy' trains and automobiles were replaced with sleek, fluid lines that created the illusion of speed and motion. Streamlining was a popular style from 1930s to 1950s and even became a symbol of technological progress. We can see two or three radios from 1930s to 1950s in Figure 1 that show such streamlining characteristics, although it was not over used. One of the advantages taken by streamlining was the Phenolic plastic, which later became a symbol of progress and modernity. The Streamline Modern style was perfectly suited to cast phenolic resins because the plastic easily flowed inside a curved mould, which facilitated shiny surfaces, curves, waterfall fronts etc. One of radios in Figure 1 has the facades that look like car grills. Streamline style lasted until World War II.

Organic design centres round the belief that individual elements such as a piece of furniture should connect in harmony with their surroundings (interior). Usually a product with organic style takes soft, flowing lines and sculptural forms. However, as organic design was initially rooted from the concept of organic architecture, it did not influence consumer product design to the same degree in the early stage. It is difficult to find examples of radios in Figure 1 that show this style. It is since the end of last century and now in 21st century that we can see many of modern radio designs emerging with this particular style.

It should be pointed out that, in parallel to changes in style, the function of the radio also evolved with the integration of additional functions since early 1980s. For example, Sony Walkman with the integration of radio and cassette was ever popular in 1980s and early 1990s. Today, the new digital technology and nanotechnology, smart technology has totally brought large innovation to radio design, with regard to colourful displays, subtle tactual materials and textures, miniaturisation of size, high resolution and quality of sound, and integration of radio into other digital devices such as MP3, MP4, computer and internets etc.

Today, it is noticeable that most of former styles are continually being revived, but with an injection of merits of contemporary features [2]. In particular, Organic design has returned with increasing frequency, being used across almost all design areas from architecture to furniture, interior to 3D product design. One of the most influential designers advocating organic design currently is Ross Lovegrove. Figure 2 shows some of his wonderful designs with so smooth and soft contours. Current trend seems to be the mixture of different historical styles with new technology to provide a fresh approach.

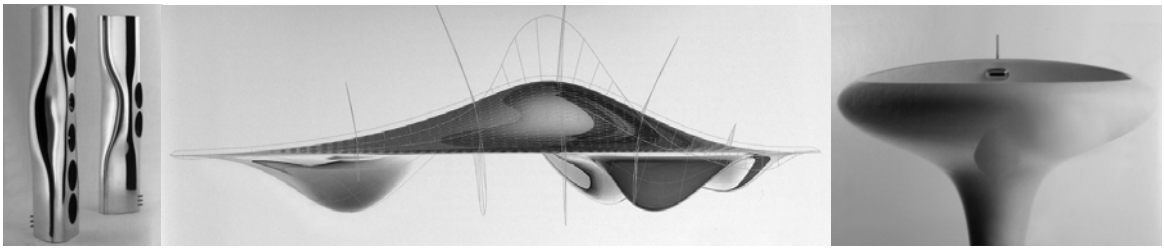


Figure 2 Organic designs by Ross Lovegrove

2. New organic design with inspiration from nature

It is easy to see that organic shapes are widely found within the natural world and objects, such as seashells, flower petals, water drops, flowing liquid, insects, animals, and humans per se – the human body. See figure 2.

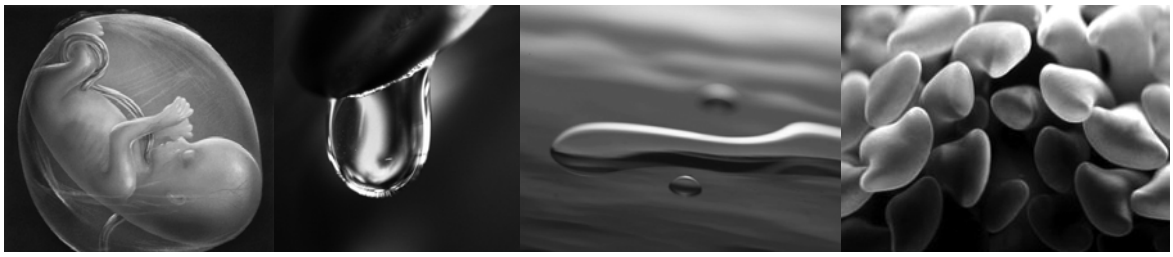


Figure 3 Organic/curvaceous forms found in human and nature

The human body is appealing with its curvaceous forms. The only obvious parts of the body with sharp shapes and edges are the teeth and nails. Nails and teeth can be regarded as the tools for protection (grabbing) and survival (chewing food). In addition, considering our senses, physiologically, we experience a soothing sensation when our eyes see round and curvaceous shapes; we feel comfortable when our hands touch smooth surfaces; we feel pleasure when we listen to melodic and harmonious sounds; we feel happy when we smell mild and fragrant flavours; and we experience delight when our tongue tastes delicate and delicious food etc. It would be difficult to imagine all of these positive feelings, regardless from which sensory channel, if they were connected with sharp and harsh forms. Cognitive psychologists have explored the processing facts of human brain to multi-sensory stimuli. Results show that, 'in the brain at least, your hands are connected to your ears, which send signals to your mouth, which takes information from your nose, which depends upon your eyes to tell it what it's sensing. A product that looks appealing doesn't just seduce the eyes. It can make the mouth water and the hands expect' [3].

What we advocate here is that we need to give sufficient concern in design to the natural, original design and intention of life forms, towards creating great harmony between human (including artefacts and activities) and our natural environment. We can learn from nature and obtain inspiration to look for the most natural, comfortable but also the most powerful forms and mechanisms for our man-made products, so-called biomimetic design. Biomimetics is the concept of taking ideas from nature and implementing them in another technology such as engineering, design, computing, etc [4]. The concept is an old one as humans have been learning from nature since the ancient. For example, the Chinese tried to make artificial silk 3 000 years ago. However, it is only now that biomimetic design has entered a new domain due to the following aspects:

1. It has not been until recent years that scientific research has facilitated a closer exploration into the details of nature and its translation into industrial and commercial application [5];

2. Advances in new materials and manufacturing technology now enables the various formal aesthetic features (such as shape, colour, texture, sound etc) to more closely resemble natural forms;
3. People are getting more aware of the importance of harmony with nature, and have an aspiration of belonging to a green and comfortable living environment;
4. The platform for enhancing collaboration between biologists, engineers and designers is being actively developed.

One of the greatest designers in our history, and renown for seeking inspiration from nature, is Luigi Colani. For Colani, the natural world particular the sea life, has been a continuing resource of inspiration. Over the years, Colani has cited flies, whales, and a wide variety of insects as the inspiration for his design works. Figure 4 shows a motorcycle model, an aircraft and tableware designed by Colani, which reflect his passion to the aerodynamics inspired by nature.

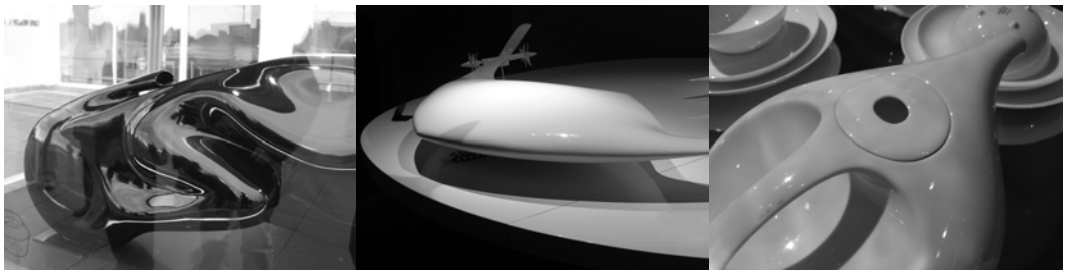


Figure 4 Colani's designs inspired by nature

3. What we are doing and what to do next

Design is no longer simply a matter of form and function, it is not only to deliver a physical service, but also brings to people an experience, either pleasure or displeasure, a sort of emotion and a process of interactive participation. On the whole, it is a language to communicate with people and our surroundings. It can be hypothesised that the language of human, the language of man-made products, and the language of nature can and should have something in common, which enables the smooth flowing of information during the dialogue between people, artefacts and environment, despite the dialogue might be mute.

We have been developing a methodology addressing the product language, which our design students are currently using to manipulate and evaluate a product form in line with particular aesthetic associations and application contexts. We have introduced a dual directional method.

Method 1: starting from a given group of verbal descriptors that are relevant to the design topic, students collect a number of visual images that can be perceived as an interpretation of the verbal description. Initial preliminary ideas are sketched together with a selection of materials, colours and textures to align with the descriptors. Students then develop ideas into a final solution, which closely reflects the verbal description. (Perception process from verbal to images.)

Method 2: students gather a number of visual images that reflect the essence of a particular target group they are given. The images are shown to a group of people, who are asked to give verbal description of how they feel and perceive. Following this, they move ahead with the preliminary sketch ideas, choosing materials, colours and textures to closely match the descriptors. Chosen concepts are then developed into the final design. (Perception process from images to verbal.)

Both methods are about establishing the correlation between visual image and vocabulary (language), used to describe these images. The methods differ in that they operate in opposite directions. In order to examine the extent to which the designs have matched both the relevant visual images and the perceived description, evaluation of the completed designs have been conducted in both cases. Based on this information, we then categorise this vocabulary according to the topology of products, of contexts, and of topics in aesthetic association etc, which will contribute to establishing of a product language system, that will inform practice through identifying elements and features that will be necessary ingredients in formulating the product style.

As examples, we showcase here some of the student designs following both types of the methodology.

Method 1: verbal description → visual images → design

In this unit, students were asked to design a MP3 with speakers in line with particular topics of aesthetic associations, each topic being represented by a group of verbal descriptors. One of these groups is: *curvaceous*, *organic*, *fun*. The procedure is illustrated in Figure 5. After the designs were completed, we presented the models to a different group of students for evaluation with regard to whether the style and aesthetic perception of curvaceous-organic-fun has been successfully matched. Results show that an average percentage of 70% success was achieved in the form and aesthetics matched the topic. Therefore, method 1 is fairly effective in training students to manipulating a product form. Similar results have also been achieved for other style and aesthetic topics.

Figure 5 Illustration of the procedure of MP3 design following Method 1

Method 2: visual images → verbal description → design

In this unit, students were asked to design a CD player with speakers under two contexts: for 'an Alien species' and for 'Marine biologists'. They started by collecting a number of visual images that they perceived were relevant to the topics of Alien or Marine. These were presented in the form of a style board. Each student then conducted a survey by showing the style board to a minimum of 20 people for perception. People were asked to describe how they felt and verbal descriptors were recorded. The words that appeared with highest frequency were selected to help inform the development of design ideas through to the final form. The procedure is shown in Figure 6, which is for designing the CD player for a Marine Biologist. Figure 7 shows an example of a CD player designed for the Alien species. Evaluation of the designs with regard to whether the designs have matched the style and aesthetic topics (e.g., in the case shown in Figure 6, curvaceous-sleek-aquatic) is still undergoing by the time of writing this paper. Further results and comparison with those obtained in Method 1 will be reported at a later date.

Figure 6 Illustration of the procedure of designing a CD player for Marine Biologists following Method 2

In addition to developing a practical database of product language, i.e. the vocabulary according to the categorisation of product types, user information and contexts, etc, our next step requires a more detailed look at the features of natural life forms, shape, colour, textures etc. Following this, we intend to connect this information with three aspects in design: senses, forms, and emotions. We are going to explore the other sensory interaction such as touch. This will enable the methodology to go beyond deriving purely visual inspiration from nature. We also intend to look for material/finish techniques in relation to a natural surface textures.

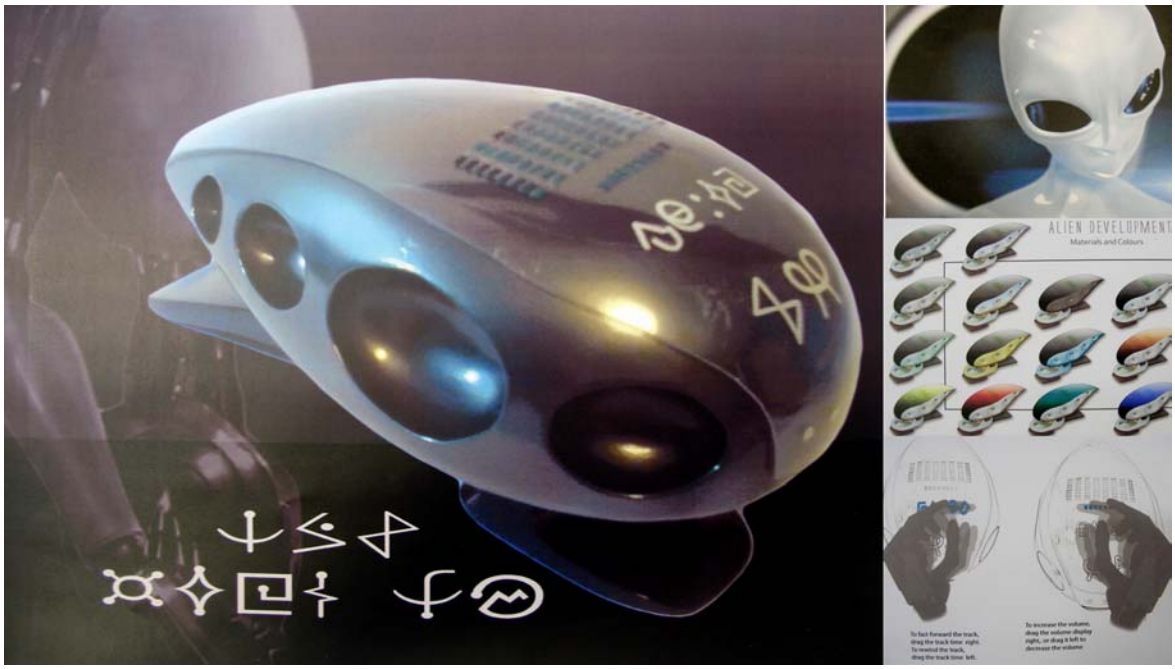


Figure 7 Example of the CD player designed for Alien species also following Method 2

4. Conclusions

1. The form of man-made objects historically was subject to influences and overriding styles within that particular era. Most previous styles have since re-emerged and been fused into today's design practice, which features a diverse multitude of styles.
2. Organic design has particularly revived, along with the new domain of Biomimetic design due to new technology and human expectation of building harmony with and returning to nature.
3. A methodology is being developed to build a product formal language system and to educate young designers to manipulate form style to facilitate an effective communication between people and product, perhaps also between product and nature.

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