

# Shape and Transformations

Marcela Carolina Franco  
Mathematics and Design Laboratory  
Faculty of Architecture, Design and Urbanism  
Pavilion III, University City  
University of Buenos Aires, Argentina  
E-mail: marcelafranco@fibertel.com.ar

## Abstract

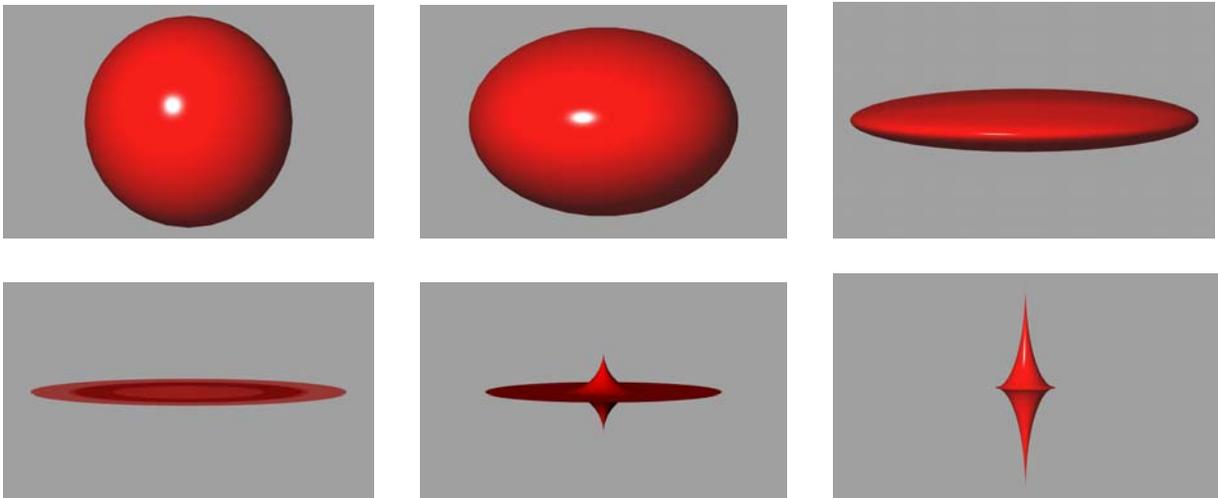
This paper consists of a presentation of two animations. Its basic objective is to investigate the design of continuous transformations, be it from a unique figure or from a set of figures.

The first design is the transformation of a “sphere into a pseudosphere” by means of applying contraction – stretching. The second design can be thought of as a “faceted cube”, and it is made of square frames which are rotated to create an “exploding” view of the cube.

## Introduction

The design stems from the basic concept that shape is transformation, see R. Doberti [1]. In these cases the language or the basic elements of design may be anything from the application of isometries to tearing, stretching, expanding, contracting, etc. assigning value to the visual aesthetic obtained and the multiplicity of meaningful instances.

### Design of a Continuous Transformation from a Unitary Figure

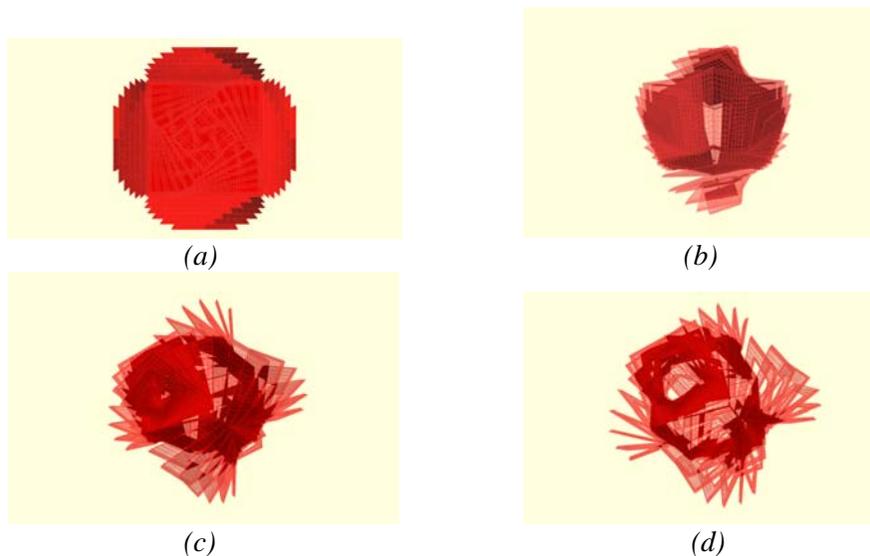


**Figure 1:** *Continuous transformation of a sphere into a pseudosphere.*

Continuous transformation of a sphere into a pseudosphere. The latter has the characteristic of having a constant negative curvature. The transformation was obtained through sequential and gradual acts of non-uniform scaling (along the vertical axis only) of the volume. The meaningful instances of: sphere, ellipsoid, disk and pseudosphere stand out.

The first action applied to the sphere is the “contraction” of the volume, only in the vertical direction, and keeping the original diameter in the horizontal direction. Thus it gets transformed into an ellipsoid, until it becomes a disk. The second action applied is a “stretching” of a point from the geometrical center, where the pseudosphere begins to appear. It is generated by the revolution of the tractrix curve around an axis.

### Design of a Continuous Transformation from a Set of Figures



**Figure 2:** (a) frontal view; (b), (c) and (d) perspectives.

A faceted cube formed by a set of figures constituted by square frames parallel to the faces of the cube; which, through rotations and translations, have varying relationships between them, creating different meaningful spatial instances.

This set of figures rotates from its geometrical center, trying to form virtual helicoids. Then, gradually, they become hollow and vary their angular and structural relations. The shape of the hollow precedes or preannounces the rotation of the next plaque.

These designs belong to advanced morphological studies where it is understood that the shape is an instance in a transformation sequence, see R. Doberti [1].

### References

- [1] C. Breitenstein, M. Casalla, R. Doberti and others, *Variaciones del Habla*, Chap. *El Decir de la Forma*, Section 4 Art. 1, Editorial Altamira, Buenos Aires, pp. 175-188. 2004.