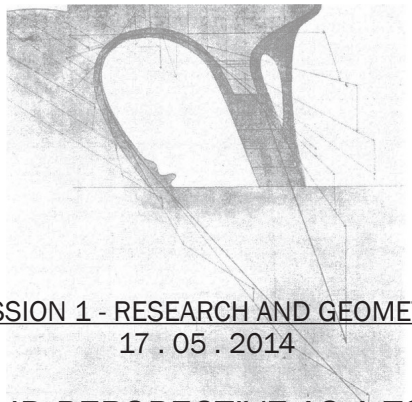
ASSOCIAÇÃO DOS PROFESSORES DE DESENHO
E GEOMETRIA DESCRITIVA
Escola Artística Soares dos Reis.
Rua Major David Magno 139
4000-191 PORTO



ISCTE - INSTITUTO UNIVERSITÁRIO DE LISBOA
Edifício II - Auditório B203
Av.ª das Forças Armadas
1649-026 LISBOA

SESSION 1 - RESEARCH AND GEOMETRY
17 . 05 . 2014

SOLID PERSPECTIVE AS A TOOL FOR THE GENERATION AND THE STUDY OF QUADRIC SURFACES

Riccardo Migliari, Federico Fallavollita

ABSTRACT

It is common knowledge how the projection from a central point onto a plane can be used to generate conic sections as transformations of the circle. And how these transformations can be carried out, in graphic form, with a simple and repetitive procedure. The creation of the conics as plane sections of the cone requires a more advanced level of knowledge and graphic ability, since it involves the use of descriptive geometry. With the advent of the information technology and the ensuing possibility of constructing virtual spaces of three dimensions, the technology offers today to the researcher and the teacher the possibility to extend the above said constructions to the space. In this paper, we first describe the solid perspective in its theoretical basis and in its workability. In particular, we determine the bi-univocal perspective relationship between two spaces: the real space, isotropic, and the contracted and anisotropic space of the solid perspective. Francesco Borromini's Palazzo Spada Gallery is taken as case study to highlight how this perspective machine is capable of transforming architecture of regular shapes into the three-dimensional scenography of the same, and vice versa. We then present a sphere, studying its projective transformations into ellipsoid, paraboloid and hyperboloid. These transformations are finally examined from the canonical point of view of the projective geometry. Nowadays, thanks to the digital representation, it is possible to experiment directly in space the projective genesis of the ruled quadrics. Given two sheaves of planes corresponding in a perspectivity in space, these determine a surface which is a ruled hyperboloid or a quadric cone. It is possible to untie the two sheaves and freely move them about in space observing that the projectivity is preserved and that the two projective sheaves, in their new positions, determine a new ruled quadric.

Riccardo MIGLIARI, Full Professor at Sapienza University of Rome, Italy (riccardo.migliari@uniroma1.it)
Federico FALLAVOLLITA, Assistant Professor at University of Bologna, Italy (federico.fallavollita@unibo.it)