Paper-folding and digital systems: a new approach to architectural logic and structural design

Sílvia Calretas 1, Mário Ming Kong 2 and Pedro Januário 3

1 Faculty of Architecture - University Lisbon, Researchers Master Degree
2 PhD Architect, Professor Lisbon University - Faculty of Architecture, Researcher and CIAUD-permanent member of the Research Centre for Architecture, Urban Planning and Design FA-UL
3 PhD Architect, Professor Lisbon University - Faculty of Architecture, Researcher and CIAUD-permanent member of the Research Centre for Architecture, Urban Planning and Design FA-UL

Abstract. How does an architect use a sheet of paper and a digital system?

Paper is a two-dimensional support on which the architect carries out the creative drawing process. However, if we fold the paper, the architect is now able to begin to manipulate and even create space.

A digital system, to put it succinctly, uses “electronic technology to manage, store and process information” allowing its user to work quickly and flexibly.

So what is the relationship between these two tools? At first sight, none, as they exist independently. However, the fusion of the two has powerful consequences, as can be seen in the work of the architect Michael Hansmeyer who manages to incorporate all the beauty of the action of folding through a digital sheet with the help of a computer, where the final result is a shape that approaches a real application at an architectural level – Proto-architecture.

Paper-folding, or origami as it is usually known, can be taken out of its original role and turned into a digital language.

This paper is part of wider ongoing research which takes in paper architectures, morphogenesis and parametric design. In our previous articles (Kong 2014, and Kong & Calretas 2014), we identified the role of paper-folding as a tool in the creative process of architecture. Taking this one step further, we now intend to focus on the relationship between paper-folding and digital systems, treating it as a methodology in a new approach to architectural logic and structural design.

Keywords: paper folding, origami, digital systems, generative design, parametric design, morphogenesis, proto-architecture.

1. Paper, digital systems and the architect

How does an architect use a sheet of paper and a digital system?

Paper is a two-dimensional support on which the architect carries out the creative drawing process. However, this is not its only use. If we fold the paper, the architect is now able to begin to manipulate and even create space. After all, by folding we transform one surface into several, and thus achieve threedimensionality.

So the architect as a professional who controls the exploitation of space through drawing and other representational systems must be attentive to advances in technology, and to what these can provide. It is an inherent characteristic of digital systems that they can amplify any ability, so the training of a present-day architect must ensure that he or she is proficient in the use of the hardware and software tools at his or her disposal.