

## Post-Digital Neo-Baroque

### Reinterpreting Baroque Reality and Beauty in Contemporary Architectural Design

In the last few decades, a quantum leap in computing power and availability, flexibility and adaptability of computer-aided design (CAD) software packages has made computers indispensable to architecture. Digital and calculative processes are to architecture students and practitioners more than common fashion or cool gadgetry. 2D (two-dimensional) drafting tools, 3D (three-dimensional) modelling techniques and RP (rapid-prototyping) technologies, 4D (four-dimensional) animation and simulation protocols, as well as synchronized robotic systems lie at the core of the theorization (of aesthetics, for example) and the manifestation (of practice, for instance) of contemporary architecture.

In my own practice as designer, educator and researcher, I have embraced the digital paradigm shifts, too. In my design-research, and through research-led education, I attempt to contextualize the recent development of computational tools, digital fabrication technologies and simulation methods in architecture not in terms of subject matter or technique, but as cultural catalyst in altering the understanding of reality, beauty and design in present-day society. A society, which by now can be described as 'post-digital'. After the first infatuation with virtual reality, cyberspace and disembodied architectures, there is much more emphasis on the hybridization between digital, analogue, biological and artificial media, spaces and technologies.

The research presented here reflects on a key book about the Baroque published 100 years ago: Heinrich Wölfflin's *Principles of Art History* (1915), in which he studies and characterizes the differences between the Baroque and the Renaissance. One century later, it seems that a revived understanding of a Neo-Baroque idea of reality and beauty has been endorsed (e.g. Kaup, Ndalianis, Eggington, Lambert, Calabrese and others). This collection of essays, for example, provides evidence for the impact of a Neo-Baroque mentality and style across various disciplines. I would confidently state that post-digital architecture is also Neo-Baroque in essence. It puts principles against the tenets of Modernism similar to those Baroque values that Wölfflin presented against the Renaissance. For example, post-digital design presents formal (in Wölfflin's terms: 'decorative') and performative ('imitative') mannerisms (Wölfflin 227), that were unknown, alien, simply awkward or even horrific to Modernist aesthetics: for example figurative ornamentation, decoration by machinic fabrication and material intelligence by computation.

In order to elaborate on post-digital Neo-Baroqueness in more depth, I appropriate Wölfflin's five antithetical 'pairs of concepts' (Wölfflin 14) introduced to position and classify the traits of Baroque art and architecture as opposed to Renaissance classicism. All five concepts seem to intriguingly and accurately describe and comment on apparently similar present-day architectural changes and challenges in the 21<sup>st</sup> century: linear vs painterly, plane vs recession, closed (tectonic) vs. open (a-tectonic) form, multiplicity vs unity, and clearness (absolute clearness) vs. unclearness (relative clearness). Furthermore, I will link Wölfflin's pairs of concepts with more contemporary terms such as straight vs convoluted, 2D/3D vs 3D/4D, solids vs fields, collage vs gradients and order vs adaptability.

#### ***Linear vs. Painterly or Straight vs. Convoluted***

To Wölfflin, the classically aligned Renaissance representation used lines, contours, edges and boundaries to depict the world, whilst Baroque art represented its subject matter by appearance, focussing on vacillating surfaces, folds, volumes, masses, colour and light. The shift from analogue to digital drafting has enabled designers, architects and artists to predict materials, shapes and spaces with a much higher degree of feedback. CAD software packages can handle complex geometric, physical and atmospheric instances extremely well: whether it is about modelling a convoluted 3D form with very detailed surface ornamentation or about simulating photorealistic lights and textures.

Designers are no longer restricted to depict the outline, the silhouette of an object or building, but can control 'painterly' parameters such as textures, colours, reflectivity, transparency and so on.



*Figure 1. Digital Delicatessen II, Foldsteria (2012)*

*Design: Marjan Colletti  
Digital media*

This 3D drawing of a convoluted wall – *Digital Delicatessen II, Foldsteria* (figure 1) – explores an archetypical digital design item: a smooth and continuous geometry. (Deleuze and Guattari) In this post-digital rendition, the complex geometry of the topology matters more than the smoothness and the outline of the wall, which could be a simple rectangle. The object has been designed as a continuum, but with three degrees of folding in mind to break the readability of the geometry towards a Neo-Baroque vacillating surface: macro folds depict the geometry, regular folds construct shelves of various sizes and micro folds describe the surface's texture.



*Figure 2. Molly Wally (2010)*

*Design: marcosandmarjan*

*Collaborators: Hubert Ducroux, Sébastien Tabourin, Camille Tenart, Tze-Chun Wei  
Flipped-milled foam with notched MDF structure, approx. 4200/3000/1800mm, exhibited at the 350th Royal Society's Summer Science Exhibition, Royal Festival Hall, and the Slade Galleries, UCL London UK*

*Client: the ICE group, London Centre for Nanotechnology & Department of Chemistry, University  
College London UCL  
Fabrication: Grymsdyke Farm  
Sponsoring: Grymsdyke Farm  
Photography: Marjan Colletti*

A major contribution of the Baroque to architecture was the introduction of dynamism to the geometric and tectonic vocabulary of the discipline; for example the curve, the ellipse, the sinuous line. Such improved understanding of complex geometries becomes evident in typically Baroque anamorphic projections and folded topologies. Similarly, digital design embraces the potentialities of CAD software packages to construct and animate flowing NURBS (non-uniform rational B-Splines), meshes and polygon geometries. The exhibition wall and a table *Molly Wally* (figure 2) echo this aim to produce such dynamic forms by fabricating a series of thick, volumetric folded membranes out of several layers of foam attached to a Medium-density fibreboard (MDF) structure. The mere material volumetry of the piece propels the installation into a Neo-Baroque post-digital realm beyond thin and weightless digital predecessors. In addition, the client requested that the design recalled ice and snow formations. We responded to such 'painterly' wish by trying to achieve snow-like smoothness and softness out of the white foam, as well as recreating within the folds the light blue coloration typical of glacial crevices.

#### ***Plane vs Recession or 2D/3D vs 3D/4D***

Wölfflin argues that in contrast to the classical construction of perspective by static, stratified, parallel planes (to each other and to the picture frame), the Baroque acquires dynamism and depth. It achieves this by exaggerating diagonal, 'forward and backward relations' (Wölfflin 73), colour and chiaroscuro zones. I would argue that 2D, 3D and 4D CAD techniques similarly evade the flatness and planarity of traditional architectural drawings: the computer, which offers a significantly more immersive virtual space, has replaced the drafting board. Compared to a sheet of paper, the computer-generated space is dynamic. It allows the user to navigate it by constantly changing viewport, panning, rotating, zooming in and out – comprehending in much more depth all the interior and exterior facets of the design. Orthographic drawings (plans, sections, elevations) have been superseded by 3D models and 4D graphical algorithm editing, scripting, coding, Building Information Modelling (BIM) techniques and physics simulations. In addition to space, programmes can now adding more depth to the models by integrating time-based parameters and by including material and atmospheric parameters in the settings.



*Figure 3. Digital Delicatessen II, S-Cannelures (2012)*

*Design: Marjan Colletti  
Digital media*

The 3D drawing *Digital Delicatessen II, S-Cannelures* (figure 3) plays with exaggerating the helical Solomonic (or Barley-sugar) column, twisting and accelerating its s-curved cannelures (the grooves running lengthwise on columns). Focussing on a dynamic interior space, the eye is drawn up (or into) a receding and immersive space. Its geometric complexity would be impossible to be represented two-dimensionally; it requires a CAD programme to be conceived and represented.



*Figure 4. aRC(2)himera (2012)*

*Design: Marjan Colletti, Guan Lee, Tea Lim, and Pavlos Fereos, with students of Bartlett MArch GAD  
RC2, UCL*

*Milled foam and notched lasercut Perspex structure, approx. 5000/2700/1700mm, produced for and  
exhibited at By All Means – Analogue/Digital Experimental Settings at the Haus der Architektur, Graz  
Austria*

*Manufacturing: Grymsdyke Farm  
Sponsoring: Mrs. M. Lim, Grymsdyke Farm  
Fabrication: Grymsdyke Farm  
Photography: © thomasraggam.com*

In Greek mythology the Chimera was a monstrous fire-breathing creature. She had the body of a lioness, a tail ending in a snake's head, and a goat's head arising on her back at the centre of her spine. In genetics, biology and botany a Chimera represents an animal or plant with genetically distinct cells from two different zygotes or genetically different types of tissue; the resulting organism is a mixture of tissues, and of different sets of chromosomes. From its distinct sets of digital chromosomes and analogue chromosomes evolved *ARC(2)himera* (figure 4): a 'monstrous' mix-up of various design approaches that went from developing skin morphologies, structure anatomies, ornamental textures, coral growth scripts, steampunk aesthetics and flocking simulations. Potentially outrageous and horrific to a modernistic eye – as it is neither linear nor pure, nor truthful or correct (process-wise), such a monstrous Frankensteinian approach, the relative grotesqueness of the piece and the excessive complexity of assembly (if completed, it stopped at 80%, it would have been made of 7200 knots, 600 triangles, 90 m2 skin, 20 pieces of Perspex, 7200 mini laser bits, 1200 joints, 350 rubber bands and 14400 metal pins) are quintessentially Neo-Baroque.

### ***Closed (Tectonic) vs Open (A-tectonic) Form or Solids vs Fields***

In Wölfflin's understanding the Baroque open form is a 'limitless form'. Rather than posing in a 'self-contained' composition, this form is intentionally, or casually, framed and cut out of the larger, visible world. (Wölfflin 124, 127) If we extrapolated this scenario to the figure of the contemporary digital architect, we would encounter a character that truly believes in the advantages, and necessities, of inter-disciplinary work: whether it relates to infiltrating and borrowing from philosophy or mathematics, chemistry and biology, architecture in the 21<sup>st</sup> century spills over and beyond its frame. Consequently, architecture has widened its vocabulary beyond tectonic Platonic Solids and architectural orders.



*Figure 5. Digital Delicatessen I, Metallika IV (2010)*

*Design: Marjan Colletti  
Digital media*

*Digital Delicatessen I, Metallika IV* (figure 5) 'simulates' such dynamic 4D field. It is generated by a bespoke 3,5D modelling techniques that approaches and simulates, albeit not resulting from, 4D dynamic systems. In its open form, it flirts with digital and post-digital geometrical formations, such as fields, blobs and metaballs, vector fields, parametric topologies, NURBS surfaces, tessellated meshes, fractal geometries, recursive scripts, particle flows, agent-based systems, fluid dynamics and growth simulations and highly articulated textures that are more open and formally a-tectonic.



*Figure 6. Algae-Cellunoi (2013)*

*Design: marcosandmarjan and Guan Lee, with Richard Beckett*

*Collaboration: Olivia Pearson, Emu Masuyama, Jessie Lee, Keith McDonald, Jonas Brazys, Cullum Perry  
Milled foam and soft 3D Rapid-prototyped algae vessels wall installation, 4000/2000/165mm,  
produced for and exhibited at 9th ARCHILAB - Naturalizing Architecture, FRAC Centre, Orleans France*

*Algae technology: Marin Sawa with Nixon Group and Hellgardt Group (Imperial College); Richard  
Beckett (UCL)*

*Sponsoring: Bartlett School of Architecture UCL; Grymsdyke Farm; Innsbruck University*

*Fabrication: Grymsdyke Farm; DMC London*

*Photography: Marjan Colletti*

*Collection: FRAC collection*

*Algae-Cellunoi (figure 6)* is an ornamental wall structure designed for external use. It is composed of a field of numerous cellular foam components with multiple patterns, gaps and crevices. The overall layout results from a computational Voronoi pattern<sup>1</sup> that determined the size and complexity of each cell. A sequence of lofted surfaces follows a gradient of punctuated lines and indentations. They vary according to the geometric inclination of each surface (similar to growth layouts in sea barnacles and shells) and the digitally controlled and manipulated machining milling path of each cellular component. The prototype represents a framed piece of larger, visible façade system that would interface architecture with nature. A variety of Objet 3D RP printed flasks host liquid algae, but if installed outdoors each cellular component would be seeded with terrestrial algae (*Neochloris texensis*, a soil based algae of the *Neochloris* genus and *Trentepohlia*) that grow in the ridges between the components.

### ***Multiplicity vs Unity or Collage vs Gradients***

Modern and Postmodern architecture (Deconstructivism included) achieved spatial complexity by means of collaging multiplicitous independent parts. On the contrary, 1990s and 21<sup>st</sup> century digital geometries liquefy. The transitions between tectonic entities melt down into continuous, smooth, liquid, fluid topologies and geometries. Columns become (in very Deleuzian terms) walls that turn into ceilings that merge with roofs that branch out into pathways that fuse with the topography. Increased elegance, smoothness and liquidity, but also grotesqueness, roughness and permeability is achieved by gradients, which help define continuous transformation from one condition to another, for example by coloration, patternization, texturization or fenestration (rather than from the 2D design of the façade). Here, as in the Baroque, 'the part, as an independent value, is swallowed up in the

<sup>1</sup> In mathematics, a *Voronoi* diagram is a partitioning of a plane into regions based on distance to points in a specific subset of the plane. [https://en.wikipedia.org/wiki/Voronoi\\_diagram](https://en.wikipedia.org/wiki/Voronoi_diagram)

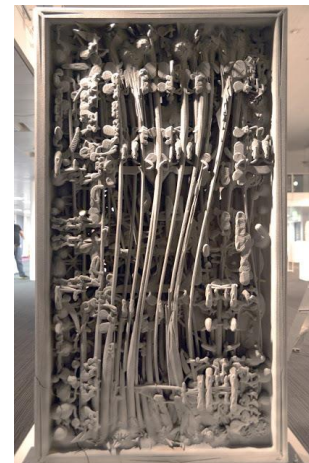
whole'. (Wölfflin 125) On another level, it is argued that digital design is targeting and rediscovering a globalist approach in aesthetic as well as commercial terms: a global, international style very much like the Baroque – the first style to have had worldwide impact. (Schumacher)



*Figure 7. Digital Delicatessen, Metallika III – DigiRokoko (2011)*

*Design: Marjan Colletti  
Digital media*

The rendering in *Digital Delicatessen, Metallika III – DigiRokoko* (Figure 7) explores how pluri-symmetric aggregation and agglomeration can result in semi-ordered formations. The 3D drawing depicts a 2,5D metallic gate, where the ornamental form becomes the object. Such liberation of ornamental features from their host surface (i.e. stucco from a wall) suggests late Baroque or almost Rococo features. The metal implies the fascination of architecture with steel, and of the decorative arts with gilding.



*Figure 8. The Plantolith (2013)*

*Design: Marjan Colletti  
3D silica sand print 1700/1000/200mm, approx. 250kg, produced for and exhibited at the 3D  
Printshow 2013 at The Business Design Centre, London UK  
Sponsoring: ExOne Digital Part Materialization  
Fabrication: ExOne Digital Part Materialization  
Photography: Marjan Colletti*

In geometric terms, plants and monoliths stand at the opposite sides of the spectrum. The first are growing, complex, multi-layered and convoluted systems, whilst the latter are static, homogeneous, heavy objects. Digital modelling techniques and 3D printing technologies allow the hybridization of the two. *The Plantolith* (figure 8)

represents such a possible geometric hybrid. The complex, multi-layered geometry imitates, simulates and mimics natural processes, not collaging but blurring the boundaries between tectonic elements and natural forms. At the same time, due to fabrication constraints, all multiplicitous elements must be fused together to achieve a printable file to be processed by a large-scale 3D RP machine, which chemically binds material, gradually and layer by layer, into the final uni-material monolith out of silica sand.

***Clearness (Absolute Clearness) vs Unclearness (Relative Clearness) or Order vs Adaptability***

The Baroque 'avoids the acme of clarity', writes Wölfflin, underlining that 'beauty no longer resides in the fully apprehensible clarity at all'. (Wölfflin 198) Forms 'look like something changing, becoming'. (Wölfflin 222) Deleuzian philosophy and its frequently baroque informed logic has been of paramount influence on digital theory and conceptual processes such as 'becoming', 'smooth spaces', and 'rhizome'; it is the infatuation with open forms but also unclear, indeterminate, approximated, uncertain, vague or 'anexact' (Lynn 141) yet rigorous forms, systems and models that characterize digital and computational architecture. But these concepts do not proclaim the death of form; rather, they propose a new, more flexible, adaptable and performative version of it. In the words of Umberto Eco, form becomes '*a field of possibilities.*' (Eco 102-3)



Figure 9. Digital Delicatessen II, 3D Arabesque (2013)

Design: Marjan Colletti

Digital media

*Digital Delicatessen II, 3D Arabesque (figure 9)* depicts a fuzzy space: only partly defined enclosures, open boundaries, approximative structural volumetric elements that may or may not be accessed, vague definitions of a x/y/z coordinate system to identify verticality and horizontality, indeterminate materiality, and ambiguous geometries. It is Neo-Baroque in its 'unclearness' and expanding openness, and also in its attempt to give shape to Deleuze's concept of becoming.





Figure 10. Xenobaroque: Stereoscopic? (2013)

Design: Marjan Colletti

3D Selective Laser Sintered print 300/300/300mm, exhibited at the 3D Printshow 2013 at The Business

Design Centre, London UK

Sponsoring:

Fabrication: DMC London

Photography: Marjan Colletti

*Xenobaroque: Stereoscopic?* (figure 10) endeavours to push 3D RP to its limits. In fact, no other technique or technology could materialize (make become) such a convoluted shape. The alien form, at first value totally random and unclear, has been created by lofting a single surface through a series of shape-defining circles positioned in space. The geometry is repeated twice for structural reasons – to have the 3D arabesques intersect and lean upon each other – but also in order to play with the (here faked) doubling-up effect known from 3D movies, hence the title *Stereoscopic?* Furthermore, this strategy vaguely borrows and re-interprets some of the classical ornaments and embellishments in music, such as the ‘Appoggiatura’ [from Ital. *appoggiare*, to lean upon], the ‘Acciacatura’ [from Ital. *acciaccare*, to crush], the ‘Glissando’, the ‘Schleifer’, trill, the mordent, the turn, which were extensively used in the Baroque period.

Neo-Baroque post-digital possibilities are plentiful: foremost such paradigm shifts in architecture are not only reactive to changes in society but are proactive towards the production of cultural transformations such as the way we design, produce and place buildings into the environment. My own theoretical and design work featured here is an endeavour to promote architecture not as technical studies, but as one of the most contemporary, dynamic and synthetic models of intelligence; Neo-Baroque in essence but stylistically and formally distinctive and independent from the Baroque per se. Hence, I am not arguing for an eclectic pastiche, collage and recycling of Baroque elements, but for an upright radically new phase of post-digital architectural production that can capitalize on 30 or more years of research on digital mannerism and formalism. Neo-Baroque post-digitality may possibly be a whim, a *capriccio*, but to me it is truly a spectacle, a *meraviglia*.

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