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The Bartlett School of Architecture

RE-CODING AND MULTIPLYING: ANCIENT TEXTILE PRACTICES THROUGH NEO–BAROQUE ‘FOLDING’

In the past decade, there has been a shift towards rethinking materials, digital tools, and fabrication methods, leading to a post-digital approach. Post-digital implies that the computational tools are interwoven with sociocultural and situated environments, pushing for new cultural and material forms. To generate new cultures, it is crucial to develop hybrid design methods where computational tools work in synergy with materiality and can express cultural significations. Textiles have become the medium of exploration due to their long historical links with architecture, their capacity to create complex, adaptable, and multi-material structures, and direct connections with computation. The paper explores how the process of generating textile patterns through re-enacting ancient fabrication processes can lead to re-coded textiles through adopting the theory of Neo-Baroque ‘folding’. The resulting studies showcase the promising potential for creating complex, topologically controlled, three dimensional narrated textiles.

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INTRODUCTION

This paper investigates how ancient textile pattern practices can be reimagined to create hybrid, sensuous, dynamic, and visually tactile architectures. It explores the re-coding of textile configurations drawing upon the fabrication techniques of Greek mythological patterns to create hybrid storytelling textile folds. The strong association of Ancient Greek textile designs with the loom's tectonics and narratives are key qualities of interest. To merge old practices with new mediums, the work adopts DELEUZE's theory of the baroque *'fold'* as a creative principle.

It looks at the extension and expansion of one medium into the other. Baroque 'does not invent things'; rather, it 'gathers all kinds of folds coming from the East, Greek, Romanesque, Gothic, and Classical folds and twists and turns them to infinity' (Deleuze 2006). Further it offers 'radical rethinking of historical time and a rethinking of familiar history. It permits a liberation from periodization of linear time' (Farago 2015, 43).

Several academics across disciplines (e.g., Ndalianis, Calabrese, Lambert) have investigated the rebirth of baroque to a neo-baroque notion of reality and aesthetics throughout the last several decades. It is believed that post-digital is also neo-baroque, particularly in architecture (Colletti 2006, 307).

As such, a neo-baroque narrative method is used to permit representations of the past while also offering and testing future possibilities. Where twisting, expanding, folding, adapting, skewing, and re-translating mythological patterns can enable new architectural modes and significations. The aim is not to create a new form, but to keep and re-code existing ones to investigate dynamic and adaptive architectures. Two–dimensional narrated textile patterns are re-created and transformed into 3D spatial studies.

TEXTILES AND ARCHITECTURE

The relationship between textiles and architecture dates to the construction of the first shelters, where branches and plant fibres were woven. KRONENBURG states that such shelters and constructions were the first forms of buildings that indicated a relationship between human–textile architecture and further extended to an expanded relationship between the landscape, inhabitation, and materiality (Kronenburg 1995, 9–10).

Central figure in the discussion of textiles and architecture is the theorist and architect GOTTFRIED SEMPER. According to SEMPER, architecture is based on four distinct elements derived from the arts: clay, wood, textiles, and stone, with each element being inextricably linked to material, method, and form. He has a strong interest in textiles and textile processes and, according to his 'theory of Dressing', fences for animals and woven branches were the early man-made partition wall, thus the first space definer (Semper & Mallgrave 2007).

During *BAUHAUS*, ANNI ALBERTS examined the relationship between material and structure in weaving as well as how such principles can be translated to architecture. For her, the close relationship between material properties and form was a fundamental design principles (Albers, 1965). Further relationships between textiles, technology and culture have been explored in literature through books, journals, and exhibitions: *ARCHITEXTILES AD* (Garcia 2006), *EXTREME TEXTILES DESIGNING FOR HIGH PERFORMANCE* (McQuaid, Becker, & Beesley 2005), *TEXTILE ARCHITECTURE* (Krüger 2009) and *TEXTILE TECTONICS* (Spuybroek 2011).

However, textiles in architecture have frequently been overlooked as high-performance materials that could be used on a larger construction scale. Yet, due to advancements in textile engineering, material science, and fabrication technologies over the past decades, they could be an excellent platform for exploring and improving contemporary conceptions of fabrication, materiality, and aesthetics. (McQuaid, Becker, & Beesley 2005, 6).

TEXTILES, MYTHOLOGY, AND STORYTELLING

Narration of stories through textiles has been playing an important cultural role in many ancient civilisations; as textile patterns and myths were used to pass stories, create bonds and cultural values from one generation to another. In Greece there are multiple examples where the weaver, fibres, pattern, and loom narrate untold stories or express female voices and response to events. For example; PENELOPE, a character from Greek mythology, weaved, as an action that binded her with time and expressed her oath to society. Another mythological character ARACHNE's textile expressed her dissatisfaction towards the power of Olympian Gods (Kruger 1998).

Textiles in ancient Greece were also used to illustrate myths during key social events. One key example is the weaving of Peplos for Goddess ATHENA for the ceremony of Great Panathenaia (it was held every four years in Athens, and the aim was to honour goddess ATHENA). During the ceremony, the cloth (*peplos*) was displayed around the city on a ship mast mounted on wheels. It is understood that it was then hung in the temple until the next ceremony. The peplos is described to have woven figures of ATHENA and ZEUS leading the Olympian gods to victory in the battle of Gods and Giants (E.J.W. Barber 1992). Further to this, it also suggested that key historical-social moments and figures were also woven into the cloth (E.J.W. Barber 1992). Thus, they expressed both mythical stories and historical – local events. The culture of weaving and mythology is reinforced by the analysis of RICHARD HOWELLS exploring the relationship between creativity and the creation of mythology through Navajo design. Navajo textile*s* and poetry are presented to 'serve and connect the past, present and futures in ways that are unfamiliar to the contemporary notions of history'

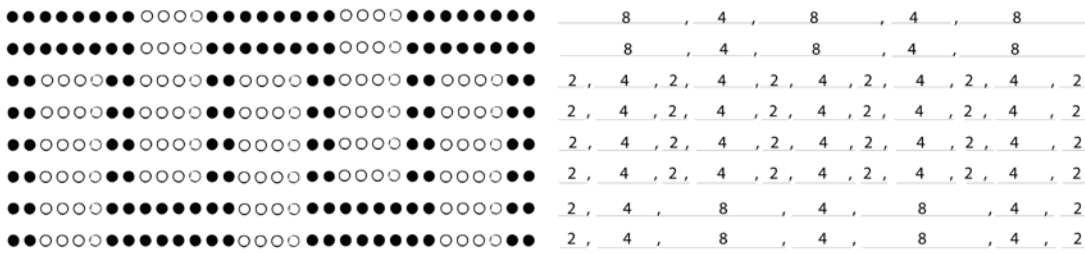

FIG. 1 — Nikoletta Karastathi, A Traditional fret pattern, based on Anthony Tuck's diagram, Singing the Rug, 2006

(Howells 2015). Myths are a sophisticated social representation that can indicate and reveal complex relationships between history, reality, culture, imagination, and identity (Howells 2012, 72).

TEXTILES, RHYTHM, PATTERN, AND CODE

To further explore the relationship between pattern – storytelling – fabric it is important to investigate the methods of fabrication exploring the close semantic and technological relationship between weaving and narrative (Nosch 2014, 92). Several studies suggest a close relationship between narrative, song, rhythm, pattern, and textile fabrication (Tuck 2009; Nosch 2014). Additional studies conducted in Northern India and Central Asia indicate that weavers compose textiles through mnemonics and rhythmic chants and relate to narration (Tuck 2006; Howells 2015, 67).

According to Tuck, the woven patterns are synthesised by repeating phrases. The numerical sequence of the pattern requires to be expressed vertically and horizontally across the loom and and its complexity and combination need to take into account the relathionship between other patterns (Tuck 2006). The numeric sequences are thought to be mnemonic devices communicating the information of the pattern and expressing the relationship of rhythm, pattern, and fabrication. Furthermore, textiles patterns have a direct relationship with the digital environment, as each knot can be translated directly into it (Popescu et al. 2018; Tamke et al. 2021; Narayanan et al. 2018).

This direct link between physical and digital and the use of rhythm as the basis of the creation of the pattern is the basis of re-coding and expanding old practices through current computational methods.

RE-CODING PATTERNS THROUGH NEO-BAROQUE FOLDS

To synthesise and re-code practices of the past the paper draws upon the method of folding explored in Baroque and Neo-Baroque. The baroque fold according to DELEUZE is extended through 'fluid media and figural transformation,' in which mediums, places, spectacle, and spectator merge. There is an accumulation and multiplication of 'new' and 'old' media, with multimedia 'reality' folding into one another (Ndalianis 2003, 367).

> 'The baroque refers not to an essence but rather to an operative function, to a trait. It endlessly produces folds... The baroque trait twists and turns its folds, pushing them to infinity, fold over fold, one upon the other... to be multiple because it contains many folds. The multiple is not only what has many parts but also what is folded in many ways' (Deleuze 1993, 3).

NDALIANIS further contends that Neo-Baroque artists employ techniques similar to the dynamism of the Baroque art movement of the seventeenth century, but express and explore it through various forms of technology and interactions with the audience (Ndalianis 2003, 25). Thus, the design process employs Neo-Baroque 'folding' by using narratives, stories, and rhythms, as well as the merging of historical practises with modern media and technology. It seeks to create new narratives through the process of folding rhythm, narrations, and the narrators. To do this, it employs computational approaches related to both the translation of rhythm to pattern and the manufacturing constraints and logic of textile creation. Computational media are utilised to a) translate a rhythm to a textile pattern, b) synthesise and fold the textile patterns, and c) simulate the 3D fabricated textiles, drawing on the technique of coding rhythm into the design and the fabrication logic. Through this practice, the intention is to re-enact the process of creating processes that relate to rhythms, patterns and sounds through computational tools to explore 'folded' architectural aesthetics. It further explores the translation of rhythm – stories to a coded textile through computational methods. The idea of creating a patterned textile based on recorded stories and having them re-synthesised in a spatial fabric is explored.

Houdini is used as the computational tool to facilitate the translation from rhythm – to pattern – to fabrication. The process is based on recording a short sentence and translating sound to a grided pattern . Each box represents one stitch (2D) and follows the principles of the construction of spacer textiles (2.5D) simulating the fabrication (3D) of such pattern (Figure 2). The process takes place in two steps.

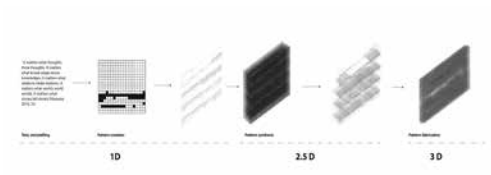

FIG. 2 — Nikoletta Karastathi,
Workflow of rhythm — pattern — fabrication

STEP 1: FROM TEXT — NARRATION TO PATTERN

The first part of the process used the text below as a placeholder to create the knitting pattern through Houdini.

> 'It matters what thoughts think thoughts. It matters what knowledges know knowledges. It matters what relations relate relations. It matters what worlds world worlds. It matters what stories tell stories' (Haraway 2016, 35).

The text is recorded and re-translated through Houdini. The output is a video with the exact mapping of the rhythmic patterns translated to a gridded pattern textile. The video is then used to extract stilts to visualise the rhythmic pattern of the narration (Figure 3).

STEP 2: FROM 2D PATTERN TO 2.5D COMPOSITION OF THE TEXTILE

The knitting patterns extracted from Houdini are re-composed in their existing sequence in three textile panels. Each panel represents the pattern of a flat knitted fabric in 2D. In order to transform the two-dimensional flat textile panels into a 3D structure, the logic of spacer fabrics is applied and explored. Spacer fabrics are structures that consist of two separately produced fabrics which are joined together by an additional yarn or yarns that interweave the two, resulting in a 3-dimentional structure (Ray 2012). Spacer fabrics are manufactured according to the yarn's function and properties. The structure can be adjusted by using different types of yarns and different ways of interlacing the two (Spencer 2001). The same fabrication logic is applied to this digital prototype. Three flat

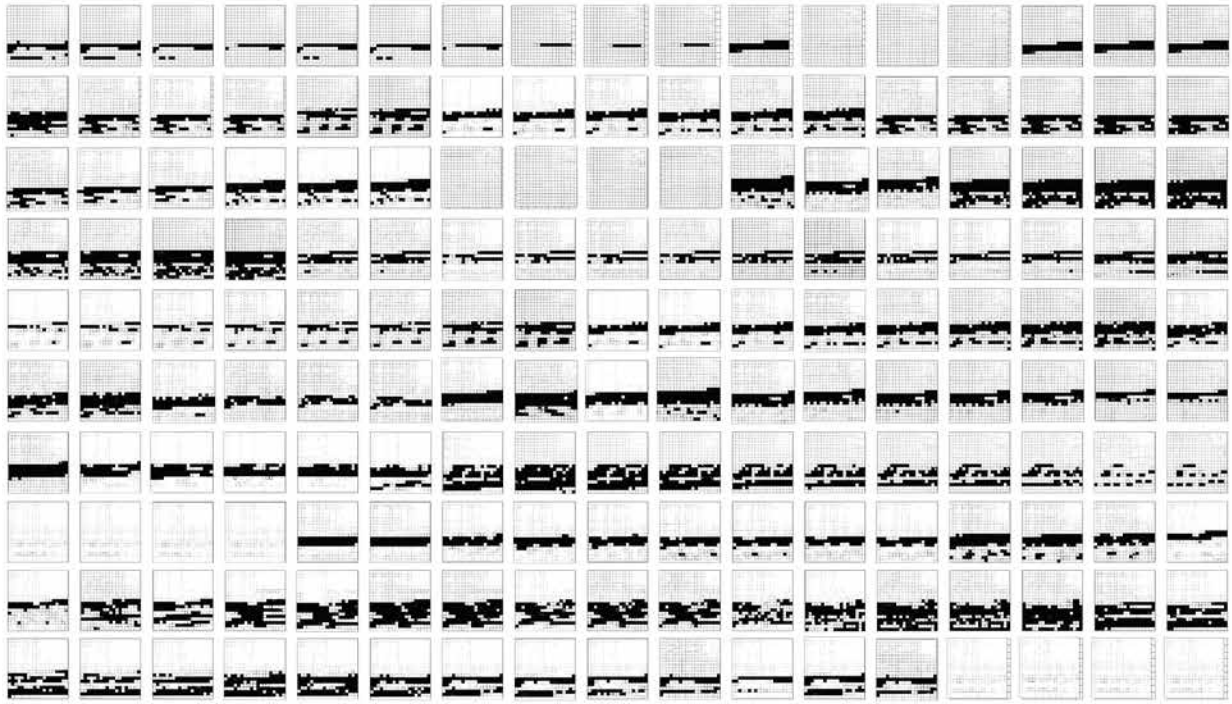

FIG. 3 — Nikoletta Karastathi, Recoding text into a textile pattern

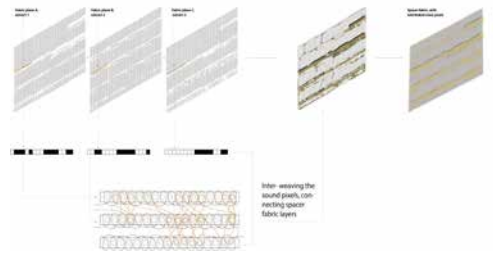

FIG. 4 — Nikoletta Karastathi, Fabrication principled of the three dimensional textile in response to the pattern

patterns are produced following the translation of sound to pixel. The 'sound pixels' are identified as the knots where the interlacing interloping would take shape. Thus, the three flat panels are interwoven through the pattern of 'connecting voices', resulting in a variable performance of the knitted fabric.

The workflow created allows for scalability of the patterns and adjusting the sound translation to pixels depending on the required final dimensions. Further, the inlay interweaving between the pixels can result in multiple formal explorations depending on the material used. It has also been tested as part where the yarns are unravelled.

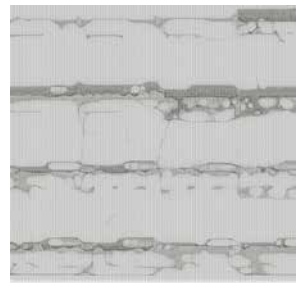

FIG. 5 (LEFT) — Nikoletta Karastathi, Front view of the knitted spacer fabric — exploring the flat knit and the interwoven 'voice pixels'
FIG. 6 (RIGHT) — Nikoletta Karastathi, Three dimensional exploration

CONCLUSION

The developed workflow explored the re-coding of ancient textile fabrication processes through 'folding'. Three-dimensional simulations of textiles were produced through hybrid methods translating re-corded narrations into 2D patterns and synthesising them into a three dimensional textile. The folding and re-folding are used to compile and merge the rhythms and voices through fabrication methods. Future steps will further explore the relationship between narrator – narrations and folding. Drawing upon the Neo-Baroque narrative context, I would like to explore the role and relationships between multiple narrated voices. where the participants become active agents providing multiple potentials, timeframes, and cultural realities folding in each other, resulting in single continuous complex rhythmic textiles. Multiple media, narrations, and perspectives merge to explore a Neo-Baroque aesthetic with dynamic and evolving compositions.

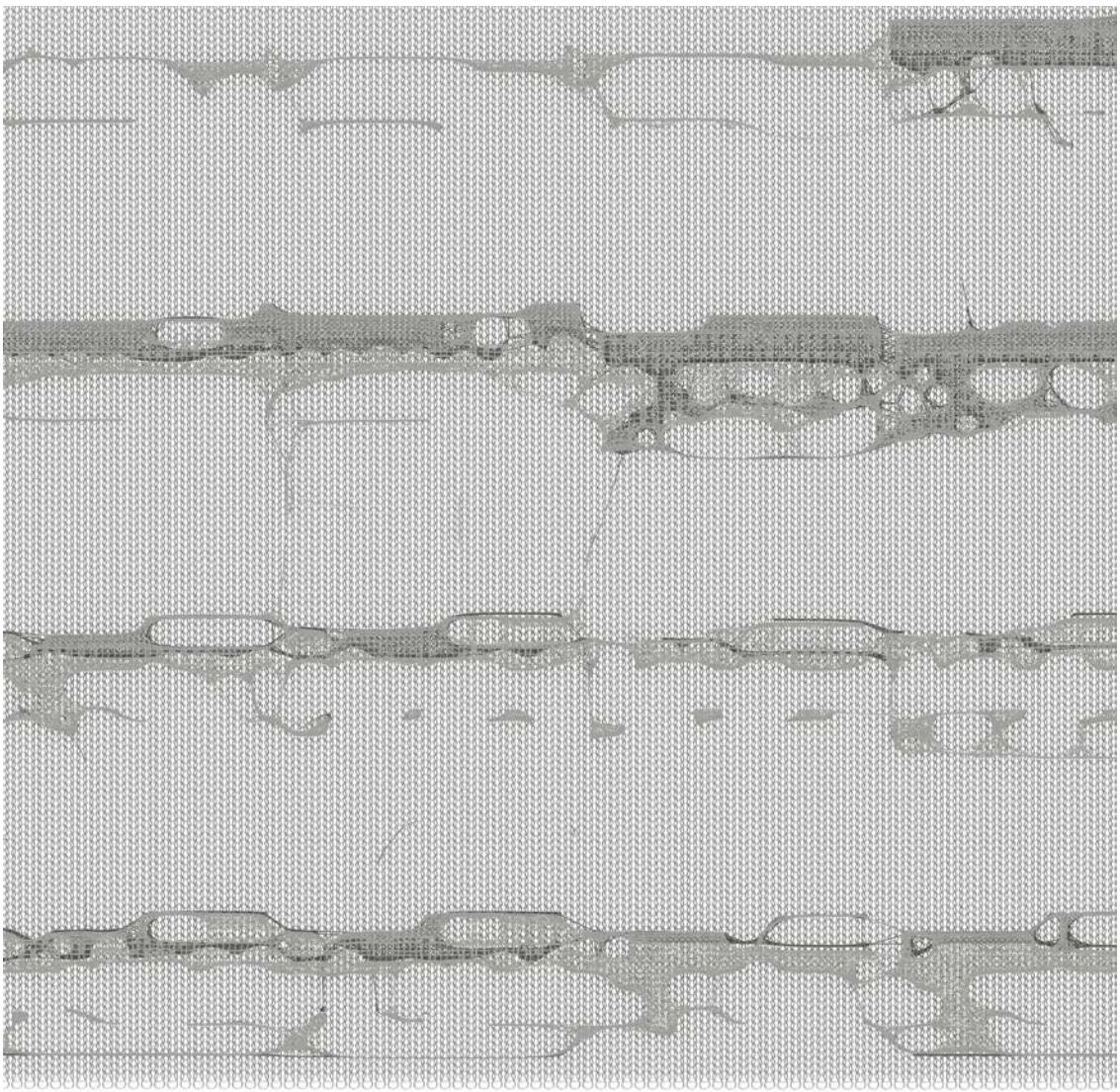

FIG. 7 — Nikoletta Karastathi, Front view of the knitted spacer fabric — exploring the flat knit and the interwoven 'voice pixels'

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