

SHAPING TEXTILES:
An investigation from two-dimensional
surfaces to three-dimensional spatial
organisations

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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PREFACE

By their history and daily omnipresence, textiles are both the vectors of traditions and the grounds for the latest research in material innovation. A broad and practical discipline, textiles encompass a quantity of materials, structures, processes and applications. Additionally, diverse technologies (from crafts to industrial) are used in the creation of textiles.

During the first years of my studies, I acquired essential knowledge in material construction. An international French student, I graduated with a Bachelor of Textile Design from La Cambre, Belgium. My studies were based in the exploration of technical skills in the textile making processes; a holistic approach to textile production was adopted. Exploration of materials and fabrication techniques (including knitting, weaving, printing and dyeing) led each practical project to an understanding of potential of structure and form making in textiles. Experimentations and explorations of material through textures, structures, rhythms and colours is the purpose of a textile designer's work. These processes are a means for both self-expression and for specific research in design with the aim of practical application.

Previous undergraduate investigations on textile history have reviewed influential designers such as Anni Albers (1899–1994). A particular emphasis has been placed on the importance of Albers' work due to its impact on the theory and practice of weaving. Albers is considered an iconic textile designer with a strong concept of the 'truth of material'. She built this concept in the 1920s while studying and teaching at the Bauhaus school¹. During this period, studies at the Bauhaus took the form of practice-based experimentation. It is this very approach that gave rise to Albers' concept of the 'truth of material', a concept that rests on the idea that artists and

¹ The Bauhaus school, based in Weimar, Germany, operated from 1919 to 1933.

designers should follow the characteristics of materials and ‘push’ their capabilities throughout the creative process. As Albers (cited in Danilowitz 2000, p. 72) states,

If a sculptor deals mainly with volume, an architect with space, a painter with colour, then a weaver deals primarily with tactile effects. (...) Qualities of the inner structure are as much part of a textile as are effects of outer tactile surface. The structure of a weaving, as well as the fibers chosen for the work, can bring about an interesting surface. There is an intricate interplay between the two. A knowledge of textile construction is thus essential for matiere effects, as it is for the organization of a weaving as a whole.

Unquestionably, the texture of a textile cannot be separated from the behaviour of its structures. From the choice of raw material to the final design outcome, touch perception is constantly present during textile fabrication; textiles are experienced through the senses, thus, tactility is a major part of the process. Bristow (2012, p. 45)² notes that the repetitive gestures and actions involved in making a piece, generates a close relationship between the maker, the machine and the material. In the experimental textile making processes, the maker’s body and its motions play a fundamental role in the construction of textile. The maker’s control over their tools in building the structure produces textured effects.

A study on the influence of Albers’ thoughts and methodologies on textiles and design formed the basis for my undergraduate research on weaving techniques. My previous investigations culminated in a practical collaboration with ‘Masters of Linen: the European confederation of Linen and Hemp’, which aimed at promoting linen in design. The initial stage of this project, entitled The Linen Project, focused on the examination of linen materials and their properties. Following a comprehensive analysis, this study explored the production of linen from raw fibres to cloths and experimented with weaving techniques. The focal point of The Linen Project was the partial de-construction of structures into their components with the intention of uncovering how they had been assembled.

² Maxine Bristow is an artist and academic. Her paper, ‘Continuity of Touch—textile as silent witness’ was originally presented at the ‘Repeat Repeat’ conference at the University of Chester in April 2007.



Figure 1. *The Linen Project*, weaving structures

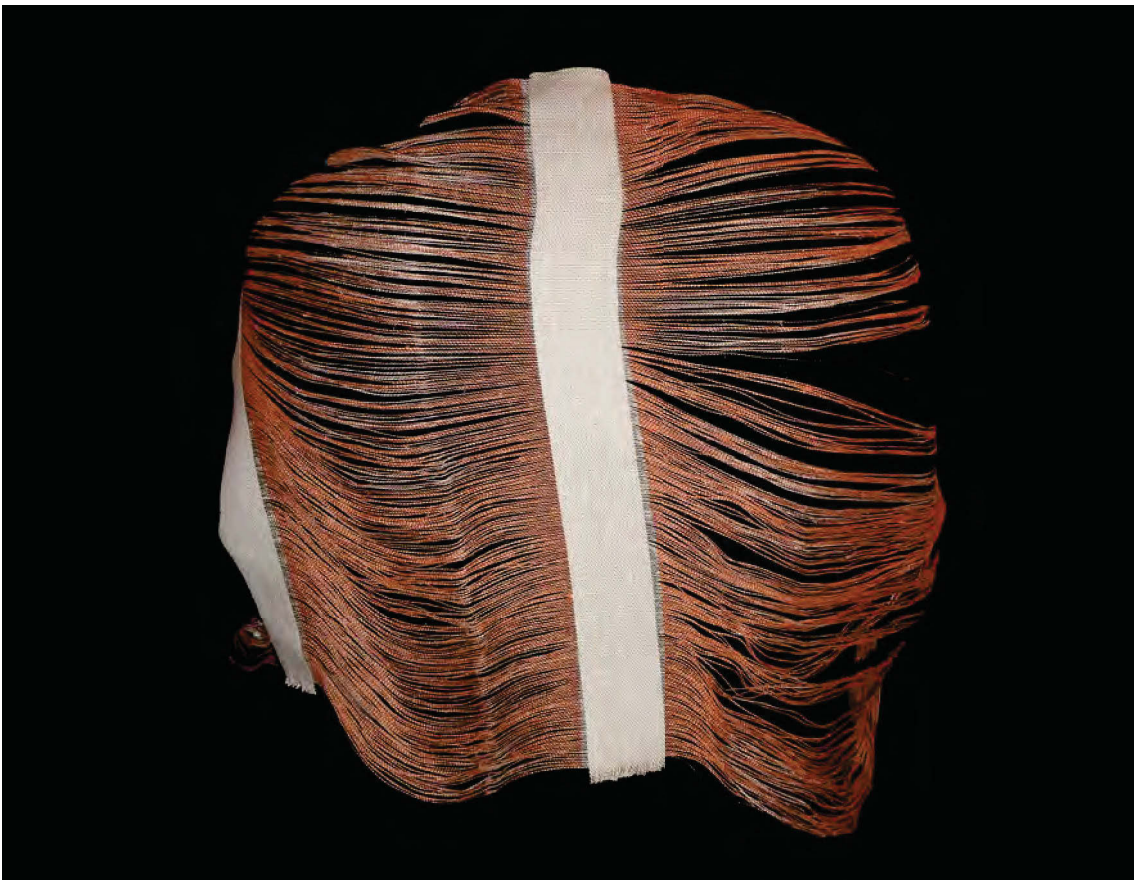


Figure 2. *The Linen Project*, weaving structures

The knowledge gained from this study was instrumental in my developing an understanding of textile construction. The Linen Project, as illustrated in Figure 1 and 2, included manipulations of woven textiles and explored the possibility of textiles addressing and communicating the human form. As Hamlyn (2012, p. 149) states,

Fabric acts to conceal and cover objects and persons, while at the same time, disclosing them - hinting at their presence (...) Fabric is malleable. It lends itself to wrapping, draping, and swathing. It restricts direct access to the naked object, but it also has the ability to suggest, enhance and draw attention to what it covers over and adorns.³

As shown in Figure 1 and 2, the work within the structures aimed at visually associating weaving and the human silhouette. Different types of ‘body skeletons’ were created through the use of contrasted tight and loose materials. Consequently, the networks of yarns highlight the features and proportions of the body’s form while challenging the viewer’s perception and relationship to it.

The consistent use of defined methods of assembly and disassembly pushed weaving to its boundaries and facilitated my comprehension of the different structures and networks of yarns. Experimenting directly with textile production gave me a better understanding of the creative process and the interplay between material construction and final design outcome. Additionally, it provoked my curiosity in relation to textile structures and their three-dimensional capabilities.

In turn, the use of a logical approach, to procure a broader knowledge of textile materiality as a designer, structured my postgraduate research. Ultimately, this inquiry led to an exploration of the depths of knitting in this study.

³ This quotation was extracted from an article entitled ‘Freud, Fabric, Fetish’ that was published in the first issue of the academic journal *Textile: The Journal of Cloth and Culture* in 2003. Its author, Ann Hamlyn, was trained as a sculptor and has a doctorate in visual culture.

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ABSTRACT

The research investigates the interactions between the materiality of textiles, body and space through an expanded field in their application for spatial organisation. The exploration of knitting techniques enables the study to examine through material thinking and practice, the possibilities of how textiles can be applied to spatial form making with and without the influence of the body. By defining textiles as stand-alone structures, the research offers through practice, methods regarding the evolution of two-dimensional geometric surfaces and their transference and construction into three-dimensional forms. The practical work explores technical processes in working with textiles and chemicals, flexibility and rigidity that initiate new concepts for form finding. The experimental methodology adopted for the research initiates processes of rethinking how textiles can build new relationships to the human body and its motion. Here, the notion surfaces where textiles can metaphorically be described or accustomed to being ‘performers’ able to metamorphose through the forces of the body and its movement. The outcome of this study seeks to build relationships between body and movement, textiles and form towards formulating spatial applications for knitted structures. As a result, the research is an experimentation with and without the body, which situates textiles between surfaces and forms.

THE RESEARCH DICTIONARY

Chemical treatment: ‘General term for processes in which chemicals other than colorants are applied to textiles’ (Tortora & Merkel 1995, p. 110).

Coating: ‘Finishing process in which the application of some substance’, such as resin or latex, ‘coats the fabric on one or both sides’ (Tortora & Merkel 1995, p. 123).

Construction: ‘Describes the details of structure and quality of a fabric or a yarn’ (Tortora & Merkel 1995, p. 133).

Elastomeric: A material that presents elastic properties.

Fabric: ‘A flexible sheet material that is assembled of textile fibers and/or yarns that are woven, knitted, braided, netted, felted, plaited or otherwise bonded together to give the material mechanical strength.’ (Tortora & Merkel 1995, p. 208)

Fabric construction: ‘A general term that includes types of weaves, knits, or other methods of assembly’ (Tortora & Merkel 1995, p. 208).

Fabric geometry: ‘The three-dimensional structure of a fabric’ (Tortora & Merkel 1995, p. 208).

Fabric stretch: ‘The ability of a fabric to extend substantially under tension and to recover, rather than remain rigid’ (Tortora & Merkel 1995, p. 208).

Flat (single bed) knitting machine: ‘A weft knitting machine with needles arranged in straight lines in one or two flat plates called beds. The yarn travels alternately back and forth, and the fabric may be shaped or varied in width, as desired, during the knitting process’ (Tortora & Merkel 1995, p. 224).

Fibre: ‘The fundamental component that is used in the assembly of textile yarns and fabrics’ (Tortora & Merkel 1995, p. 214).

Float: ‘1. The portion of a yarn in a woven fabric that extends or floats, unbound, over two or more adjacent ends or picks. Warp and/or filling yarns are floated in a prearranged plan to produce the pattern in many fabrics (...)
2. In knitting, that portion of yarn that extends for some length across wales without being looped into the fabric’ (Tortora & Merkel 1995, p. 226).

Jersey (single knit): ‘A plain knit fabric made on a single set of knitting needles; all the knitted loops are pulled from the face side to the back side of the fabric so the two sides look different’ (Tortora & Merkel 1995, p. 309).

Knit: ‘General term for process of interlooping yarns either by hand or machine; also the fabrics made by this process’ (Tortora & Merkel 1995, p. 309).

Knitting: ‘A method of constructing fabric by interlocking series of loops of one or more yarns’ (Tortora & Merkel 1995, p. 310).

Spandex: ‘A synthetic elastomeric fibre composed largely of polyurethane’ (Oxford University Press 2000).

Spatial organisation, in the context of this research refers to the underlying geometrical and spatial appearance of knitted structures. Through the exploration of textile geometries evolving into structures and multidimensional forms, spatial organisation is defined by the three-dimensional relationship between the elements of knitted structures. More specifically, in the way the structural components are spatially arranged and connected to each other.

Structure: ‘The arrangement and organization of mutually connected and dependent elements in a system or construct’ (The Oxford English Dictionary Online 2000).

Stitch: ‘Basic unit of construction in knitted fabric, consisting of the loop of yarn formed by the knitting needle’ (Tortora & Merkel 1995, p. 545).

Textile: ‘1. A broad classification of materials that can be utilized in constructing fabrics, including textile fibers and yarns. 2. Designates the constructed fabric including woven, knitted, and nonwoven structures as well as lace and crocheted goods’ (Tortora & Merkel 1995, p. 572).

Texture: ‘A term referring to the appearance or hand of a fabric and especially such features as structure, coarseness, openness’ (Tortora & Merkel 1995, p. 573).

Vulcanisation: ‘A process for making rubber or similar polymers harder and more durable by treatment with sulphur or sulphur compounds (typically accompanied by heat); the hardening or toughening produced by this process’ (The Oxford English Dictionary Online 2000).

Weft knit fabric: ‘The most common type of knitted fabric, with one continuous yarn running widthwise across the fabric and forming all of the loops in each course’ (Tortora & Merkel 1995, p. 626).

Yarn: ‘A continuous strand of textile fibers that may be composed of endless filaments or shorter fibers twisted or otherwise held together’ (Tortora & Merkel 1995, p. 641).

Yarn count/number: ‘A measure of the fineness or linear density of a yarn. May be expressed in indirect units (length per unit of weight or mass) or direct units (weight per unit of length)’ (Tortora & Merkel 1995, p. 642).

Yarn geometry: ‘The three-dimensional structure of a yarn’ (Tortora & Merkel 1995, p. 642).