

Phase 1: textile fabrication

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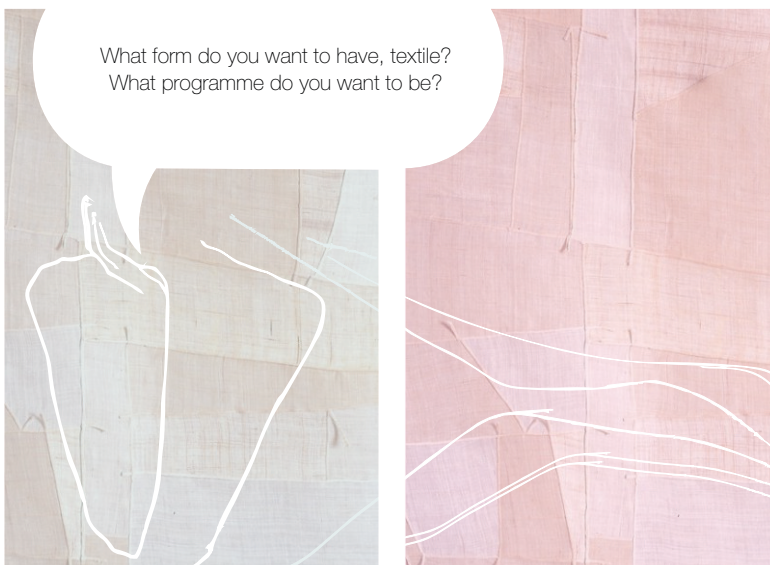
Knowing through knitting

4.1 Introduction

The rationale behind using textile as a material for investigation was described in section 3.3 and 3.4. In the manner of Louis Kahn, the investigation set out to determine what form and programme the textile wants to be.

The first step to answering this was determining a suitable method by which textiles can be made by hand in order to explore their properties and fabrication. Textiles are manufactured by weaving, knitting, or felting. Felting is a method whereby wool or synthetic fibres are pressed together to form a textile. Weaving uses two sets of yarns that interlace at right angles, whereas knitting results in yarns that follow a meandering path that forms a symmetric loop. Arm-knitting (where the maker's arms replace the function of knitting needles) was chosen as the most appropriate process to follow, as the method is quick to learn, no tools are required, and the scale is such that a large enough artefact can be made to assess within a shorter period.

"Architectural design is not about having ideas, but about having techniques, techniques that operate on a material level. It's about making matter think and live by itself."(Lars Spuybroek)



Secondly, the possible programme identified was based on Broughton's analysis of textile functions in the landscape (2012:28-34) (see figure 10). In a Pretoria context, geotextiles infused with herbicide can inhibit damage by tree roots to structures and paving. However, the textile is hidden and thus the investigation will not be appropriate. Another real-world issue applicable in Pretoria is soil erosion. Geotextiles that stabilise slopes are a solution commonly used in landscape architectural practise. These are visible and have the potential to be an aesthetic yet functional feature in the landscape. The final possibility is shade cloth, providing protection from the sun in areas where trees can't be planted or when shade is instantly required. The material used to construct the textile was based on yarn or rope commonly used in the landscape. Furthermore, in order for these textile elements to be functional as well as spatial, one must be reminded of spatial design principles, such as those described Francis D.K. Ching (2007) (refer to figure 12). These will help reveal the potential of the artefact as space-defining element.

4.2 Process of discovery: hand-knitting

Sample 1 was created using 3mm polypropylene twine, a commonly used agricultural yarn, which was warp-knit based on 10 garter stitches. 100m of twine was used to create a sample with an area of 0.378 m². The elastic properties of the sample cause irregularities in shape; there is expansion at points of restraint and contraction in areas with no contact to external support. Furthermore, the twine is too thin to provide sufficient shade, and the sample is weighed down at its centre of gravity, it appears drooping and malleable. In addition, the yarn-to-surface ratio is small.

The subsequent response to these observations was to use thicker twine for a sturdier sample and smaller stitch sizes to increase shading capacity. The opportunities provided by the sample are that it can have poetic and dynamic movement and shadow-casting properties on the overhead plane, and that it can be draped (see figure 10). Despite this, the question of how the sample is more appropriate than conventional shade structures presented itself, as the functional properties of shading are



Figure 10: Possibilities of applying sample 1 as spatial element (Author 2016)

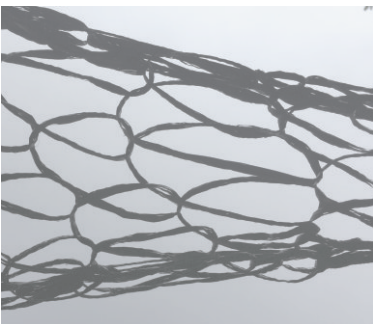


Figure 11: Sample 1 (Author 2016)

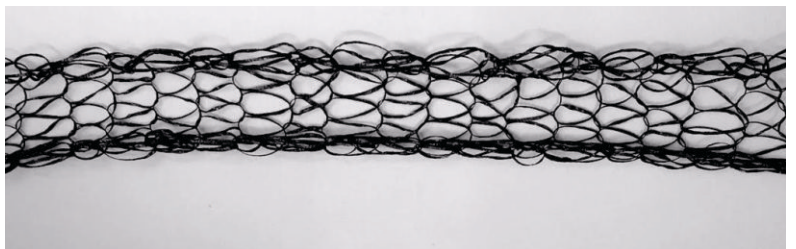
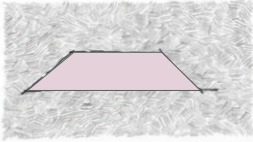


Figure 12 (following spread): Space-defining elements (after Ching 2007)

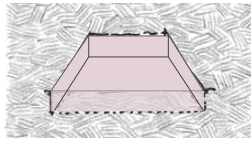
horizontal elements

base plane



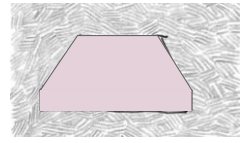
"A base plane is a spatial field defined simply by a horizontal plane or figure placed on a contrasting background. Perceptible colour contrast, texture or tonal change between a surrounding area and a surface can define this spatial field. The boundaries of the spatial field do not block the flow through the zone" (Ching 2007:103-105).

depressed base plane



The lowered portion of the base plane creates an isolated area. "This lowered spatial zone is distinctly different from its surrounding context. The vertical elements formed by the depression create visible boundaries" (Ching 2007:112-117).

elevated base plane



"An elevated portion with the base plane and delineates a specific territory. The level change defines the boundaries of the spatial zone and interrupts the spatial flow. The boundaries can be accentuated by means of colour or material change. This separates the spatial zone from its surroundings" (Ching 2007: 106-111).



Silva, by Fernando Caruncho (1997).
Madrid, Spain. (Suet 2012)

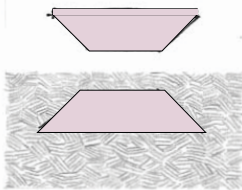


Moses bridge, by RO&AD (2010).
Halsteren, The Netherlands. (RO&AD 2010)



Dymaxion Sleep, by Jane Hutton & Adrian Blackwell (2009-2012). Quebec, Canada.
(Hutton & Blackwell 2009)

overhead plane



"A plane that establishes a spatial zone through the invisible boundaries created by its edges. The formal qualities of the spatial zone is determined by the height, shape and size of the overhead plane" (Ching 2007: 118-123).

hard space:



Pergola of the Deserter, by Reudi Baur (2009). Cologne, Germany. (Bild 2009)

pergola

pavilion



Serpentine Gallery Pavilion '09, by SAANA (2009). London, England. (Baan 2009)

soft space:

canopy



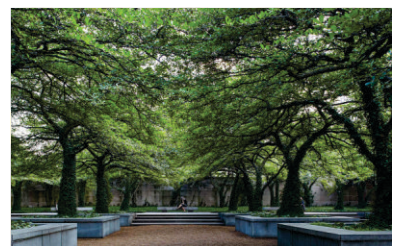
Littman Kulturprojekte, by Renate Buser (2008). Basel, Switzerland.
(Littman Kulturprojekte 2008)



The Umbrellas, by Christo & Jean-Claude (1984-1991). Japan & USA.
(Volz 1991)

umbrella

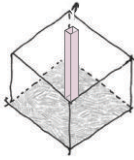
vegetation



The Art Institute of Chicago South Garden, by Dan Kiley (1967). Chicago, USA.
(Harris [S.a.])

vertical elements

vertical linear



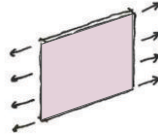
"A vertical linear element... establishes a point on the ground plane and makes it visible in space. Standing upright and alone, a slender linear element is non-directional except for the path that would lead us to its position in space. Any number of horizontal axes can be made to pass through it" (Ching 2007:126).



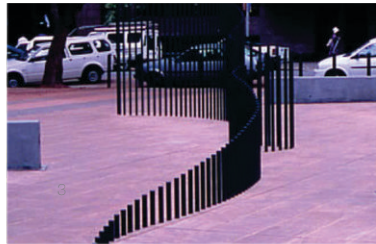
Geyserville Residence, by Andrea Cochran (2012). Geyserville, USA

(Brenner 2012)

single plane



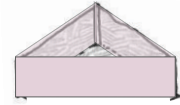
"A vertical plane has frontal qualities. Its two surfaces or faces front on and establish the edges of two separate and distinct spatial fields... The plane by itself can establish only a single edge of the field (of space). To define a three-dimensional volume of space, the plane must interact with other elements of form" (Ching 2007:134).



Eagle at SA Eagle Plaza, by GREENinc (2001). Johannesburg, South Africa

(GREENinc 2011)

triangular configuration



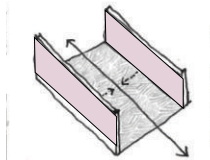
"The triangle signifies stability. When resting on one of its sides, the triangle is an extremely stable figure. When tipped to stand on one of its vertices, however, it can either be balanced in a precarious state of equilibrium or be unstable and tend to fall over to one of its sides" (Ching 2007:40).



Shin-Yatsushiro Monument, by Kumiko Inui (2004). Yatsushiro, Japan (Kivinen 2008)

enclosing elements

parallel configuration

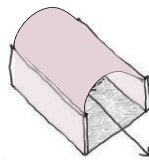


"A pair of parallel vertical planes defines a field of space between them. The open ends of the field, established by the vertical edges of the planes, give the space a strong directional quality. Its primary orientation is along the axis about which the planes are symmetrical. Since the parallel planes do not meet to form corners and fully enclose the field, the space is extroverted in nature" (Ching 2007:134).



Pavilions Parc des Rives, by Localarchitecture (2007). Yverdon-les-Bains, Switzerland (Localarchitecture 2007)

free-form



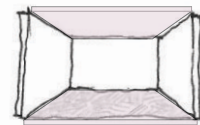
Similar to the parallel configuration, the free-form enclosing structure has fluid qualities in terms of spatial definition. In the landscape, this is commonly found in groves. "The fluid quality of curved surfaces contrasts with the angular nature of rectilinear forms and are appropriate for describing...nonloadbearing elements of enclosure" (Ching 2007:43).



Trellis at Marula Game Ranch, by GREENinc (2015). Windhoek, Namibia

(GREENinc 2015)

four planes



"Four vertical planes encompassing a field of space is...certainly the strongest type of spatial definition in architecture. Since the field is completely enclosed, its space is naturally inverted... Well-defined, enclosed fields of space can be found in architecture at various scales, from a large urban square, to a courtyard or atrium space..." (Ching 2007:156).



The Birdhide, by CMAI Architects (2007). Thesen Islands, South Africa.

(CMAI Architects [S.a.])



Figure 13: Sample 2 (Author 2016)

mostly lacking in this sample. It will thus have only space-defining characteristics on the overhead plane, either creating space or acting as a threshold, and not act as a shading element.

As a response, a thicker yarn was used to create the sample 2. Flat polyethylene braided ski rope created a sample of only 0.08 m². The sample was untidy in appearance and unravelled easily due to the texture of the rope (see figure 13). However, it can have robust qualities on ground plane due to its thickness, as illustrated in figure 17. It is also sturdy enough to act as a vertical plane element, and is relatively opaque, creating a stronger edge when used as vertical space-definer.



Figure 14: Sample 3 (Author 2016)

Sample 3 was made using jute braided rope, which was thinner than the yarn used for sample 2, but thicker than sample 1 (see figure 14). It also had better gripping qualities, making it more sturdy than sample 1 but more transparent than sample 2. It lets light through, creating pattern not only as a spatial element, but also by the shadows cast when used on an overhead plane. The opportunity of this sample is that it can be used as an overhead element that acts as a threshold.



Figure 15: The arm-knitting process (Author 2016)

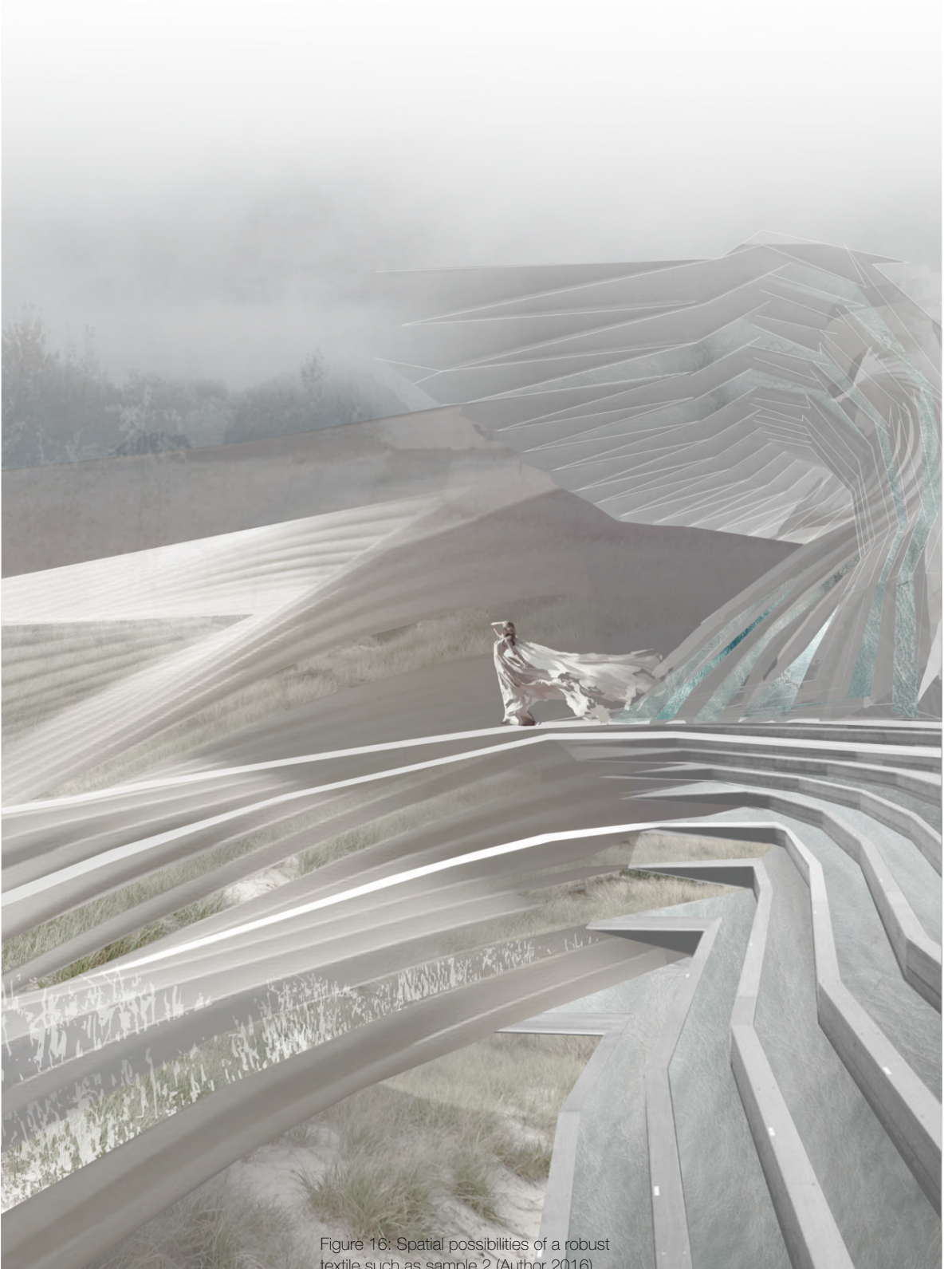


Figure 16: Spatial possibilities of a robust textile such as sample 2 (Author 2016)



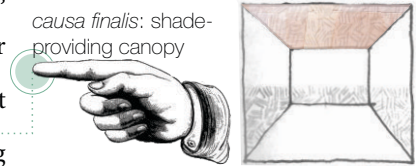
Figure 17: Spatial possibilities of sample 3
(Author 2016)

4.3 Reflection and revised plan-of-action

The *causa materialis* was evident in all three samples, where the knitting process, and thus construction method of the artefact itself, was made visible through scale and repetition. The *causa formalis* of textiles differs depending on the yarn used: malleable and soft, or rigid and stiff. Thirdly, the *causa finalis* of the samples differed depending on the yarn used.

An overhead planar element implies a three-dimensional space underneath it, whereas a vertical plane implies only a single edge of a field, and not a three-dimensional space (refer to figure 12). Due to the planar qualities of the samples created, a more suitable programme for the next round of investigations is the canopy, which will be functional (providing shade) as well as spatial (implying three-dimensional space).

causa finalis: shade-providing canopy

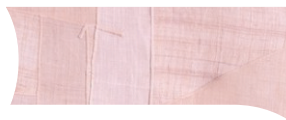


The conclusion of the knitting experiments was that knitting required a large amount of yarn to create a sample. The next phase of investigations will focus on determining a more relevant way to create space with textiles.

eliminated: knitting as *causa materialis*



What form do you want to have, textile?
What programme do you want to be?



Depending on my composition, I can be malleable and soft, or rigid and stiff. I do well as a shade element.





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