



Te Rōpu Āwhina Whānau
Science, Engineering, Architecture & Design

VICTORIA UNIVERSITY OF WELLINGTON

TOI RARANGA

Awhina Summer Research 2012 - 2013

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Thank you .

Maori Whakatauki [Proverb]

Ma te tini, ma mano, ka rapa te whai --

By many, by thousands, the work is attained.

A reference to the success of working together --

Many hands make light work.¹

¹ Riley, M. (2005). Know your Maori Weaving; Plaiting, Weaving, Tukutuku, Whakatauki. Paraparaumu, Viking Sevensseas NZ Ltd.

Note

It must be stated that the use of the term Raranga within this report is used as referring to its specific weaving method and as a Maori term for generalising weaving as a whole concept. This is because of the varying terms used in reference materials to translate the art form of weaving into a Maori term. Hence the title of the research paper, “Toi Raranga” – the art of weaving.

In this research project I have reviewed the techniques of three weaving methods; raranga [plaiting], tukutuku [cross stitch], and whatu [weft twining]. I do acknowledge that there are many other forms of traditional Maori weaving [taniko, whiri, kete] but for the purposes of this research project was to learn as much from the most diverse of weaving techniques. Therefore, it is my intention to have only selected the three weaving methods for this purpose.

Toi Raranga

Toi Raranga is a research project conducted over the summer period of 2012 and 2013. It is an exploration into the importance of Raranga [weaving] to the Maori people and its possible contemporary relevance in today's interior environments.

This project will allow me to learn from well-know New Zealand weavers who have used weaving, both traditional and contemporary, to express themselves. Through research, I will review the many forms of traditional Maori woven art forms [Raranga, Tukutuku and Whatu] in order to develop a thorough understanding of the tikanga [key Maori concepts] that lay in the fabric of Maori weaving. While learning from these expert weavers, I will be conducting an independent study in the construction techniques of Raranga, Tukutuku, and Whatu to further understand the tikanga and processes required for these art forms.

Through my research, I intend to gain an understanding of my culture and use it to establish a design language that is derived from both my passions for architecture and fashion. I believe that this art form will enhance my knowledge of both professions while exploring my heritage and culture simultaneously.

The aim of this research project is to gain understanding of how traditional Maori weaving was used, why it was used, and how it can be integrated into an accessible acoustic product for today's interior environment. The intention of using Maori weaving with an acoustic system was to re-educate people on the importance of story telling through interior applications.

After the completion of the research project "Toi Raranga", it is both mine and my supervisor's intention on carrying this product development through to exhibition, both locally and internationally, while attempting to establish a possible business venture that will make this product available to the community.



*Plate II. Nani, a Maori girl of the Thames District
(North Island) N.Z., making a Taniko border
From a photograph taken by
Mr. A. W. F. Fuller, August, 1911.*

Figure 1. Photograph of a Maori girl weaving a taniko boarder in 1911²

² Roth, H. L. (1979). The Maori Mantle. Carlton, Ruth Bean.

Origins of Maori Weaving

Weaving was conceived out of necessity for our ancestors who first arrived to the shores of New Zealand, "to keep the body warm, to clothe it [and to survive]"³

Weaving was a technique of binding materials together through a series of overlapping, twisting, wrapping or knotting. It was brought over from the Pacific Islands where it was used for similar purposes as it was used in New Zealand. However, a change in climate conditions required our ancestors to reinvent the weaving process to do what they needed of it:

"A different environment with different material stimulated entirely new inventions or led to the adaptation of a known technique to new requirements or to a combination of both."⁴

The environment was cooler, the materials that was found was foreign and not what the Pacific Islanders were used to. So they innovated their knowledge of weaving and developed a series of weaving techniques that would be unique and more elaborate than what was seen before.

The techniques they have developed have been seen as uniquely New Zealand, it has some similarities to other weaving techniques around the world but the material use, specific twists and binding methods have not been seen replicated in any other cultures around the world.

Raranga [weaving], Tukutuku panels [cross-stitching] and Whatu [weft twining] all have a long lineage linking weavers to their ancestors and the deity, Hine-te-iwaiwa; Maori goddess of childbirth, cycles of the moon and weaving.⁵ Traditionally, women were the keepers of the knowledge of Raranga. Due to their close connection with the Maori deity of weaving and childbirth [citation] the gender association deemed them to take the role of weavers in their tribes. This seemed to be a continuing trait that transcended all tribes of New Zealand, even though most of these tribes may have not come into contact with each other.

Today, it is a common sight to see a man weaving amongst women. Founder of Kura Art Gallery, Judith Dodds mentions numerous prominent contemporary male weavers who exhibit their work through her gallery spaces. Many of whom have taken tutelage from kuia [female elders] who had been the keepers of the weaving knowledge and the importance of the tikanga associated with weaving.⁶

³ Riley, M. (2005). Know your Maori Weaving; Plaiting, Weaving, Tukutuku, Whakatauki. Paraparaumu, Viking Sevensseas NZ Ltd.

⁴ Hiroa, T. R. (1924). "The Evolution of Maori Clothing." The Journal of the Polynesian Society 33(129): 25-47.

⁵ Riley, M. (2005). Know your Maori Weaving; Plaiting, Weaving, Tukutuku, Whakatauki. Paraparaumu, Viking Sevensseas NZ Ltd.

⁶ Bartlett, J. (2013). Personal Interview with Judith Dodds. J. Dodds. Wellington, Jeffery Bartlett.

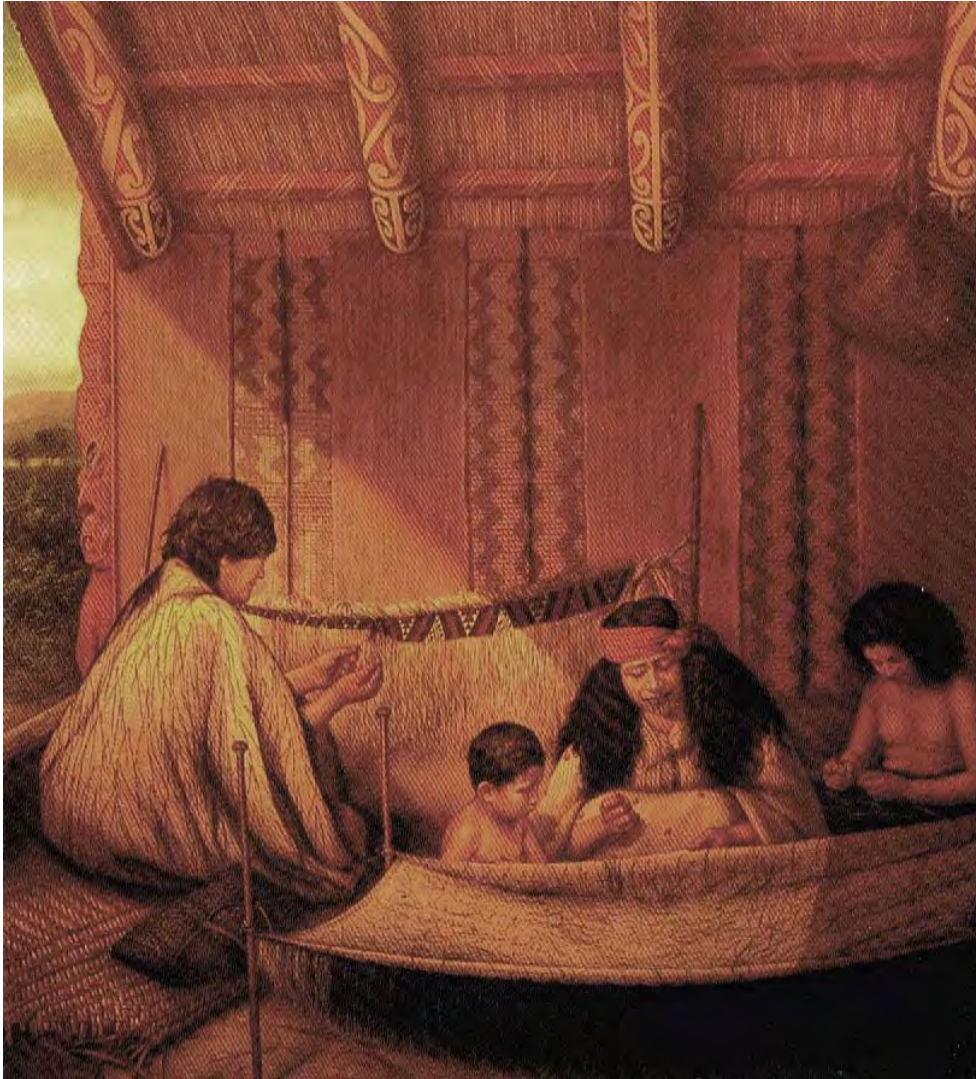


Figure 2. Maori women weaving in the porch of a Whareniui⁷

⁷ Riley, M. (2005). Know your Maori Weaving; Plaiting, Weaving, Tukutuku, Whakatauki. Paraparaumu, Viking Sevensseas NZ Ltd.

Importance of Tikanga

For Maori, everything has a life force. This was seen in everything both animate and inanimate. Anything that existed had a life and therefore was intrinsically connected to us as living humans in the same realm; “the connection between the physical and the metaphysical”.⁸

Tikanga is a concept of the Maori people that protected this life force. In terms of raranga, whatu and other forms of woven arts, the materials used to create a garment, interior installation piece, etc. needed to have come from, collected, processed and used in a particular manner which abided by traditional Maori customs and beliefs in order for the material, and therefore the product, was imbedded with mana and noa to protect the product and the creator.⁹

Generally, today’s weavers use non traditional materials to create their products and each designer/artist have developed their own interpretation of tikanga in relation to the newly introduced materials to the traditional art form.

Annabelle Buick is an emerging contemporary weaver who uses the art of raranga in her work. She is well-known for her pieces using modern materials such as ribbon, cotton tape, synthetic webbing just to name a few. When asked if the concept of ‘tikanga’ came into play with her contemporary work, she had this to say, “Yes - my contemporary work (using non-traditional materials) observes tikanga primarily to observe the practical aspects [such as] keeping the work space clean from interior products [by having] no food or drink around artwork.”¹⁰

The contemporary artists who may use traditional methods of weaving as their medium may chose to develop a sense of tikanga in the production of their art piece. Much like Annabelle, this could derive from learnt aspects of cleanliness to maintain a respect for the art form.

For me, this means that I need to develop my own tikanga in relation to the material being used, the product being developed and my understanding of Maori principles, protocols and rituals that will imbed my designs and products with the mana that all Maori art and designs retain.

⁸ Hakaraia, D. (2011). Te Reo Tataki o te Ringa - Maori narratives and contemporary technology. School of Design. Wellington, Victoria University of Wellington. **Masters in Design: 8**.

⁹ Puketapu-Hetet, E. (1989). Maori Weaving. Auckland, Pitman Publishing.

¹⁰ Bartlett, J. (2013). Personal Interview with Annabelle Buick. J. Bartlett. Wellington, Annabelle Buick: 3.



Figure 3. Raranga whariki [floor mat] with patterns.¹¹

¹¹ Pendergrast, M. (1984). Raranga Whakairo; Maori Plaiting Patterns. Auckland, Coromandel Press.
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Raranga

Raranga is a form of plaiting which consists of a series of two directional components that are perpendicular to each other. These components can be either diagonal or vertical/horizontal. Usually "there are a large number of these components in order to create a flat, inter-woven piece of fabric.

Below is the dictionary definition of the term taken from the Maori dictionary *Te Aka*¹²:

Raranga

1. **(verb)** (rangaa, rānga) to weave, plait (mats, baskets, etc.).
2. **(noun)** weaving.

Te Rangi Hiroa describes Raranga or plaiting in the following:

"In plaiting, the elements all start and end parallel. After being fixed to form a continuous beginning edge for the length of the proposed article, the elements are interlaced by bending one set to the right and the other to the left. Although the elements cross one another at right angles, they move diagonally across the surface of the article. At the side edges, in mats, they are turned back into the body, and function in the opposite direction. At the end they finish parallel with the beginning, and are fixed in a variety of ways."¹³

Traditionally, this technique was brought to Aotearoa New Zealand by the first inhabitant who arrived from the Pacific Islands. Raranga was used for the construction of mats [whariki], eel traps [hinaki], and even in the weaving of clothing, just to name a few.

There are a number of well-known contemporary artists who engage with raranga as their medium. Some of these artists include Annabelle Buick, Shona Tawhiao, Sonny Hau, Anna

¹² Moorfield, J. (2011). *Te Aka Māori-English, English-Māori Dictionary and Index*. Auckland, Pearson: 468.

¹³ Hiroa, T. R. (1924). "The Evolution of Maori Clothing." *The Journal of the Polynesian Society* 33(129): 25-47.

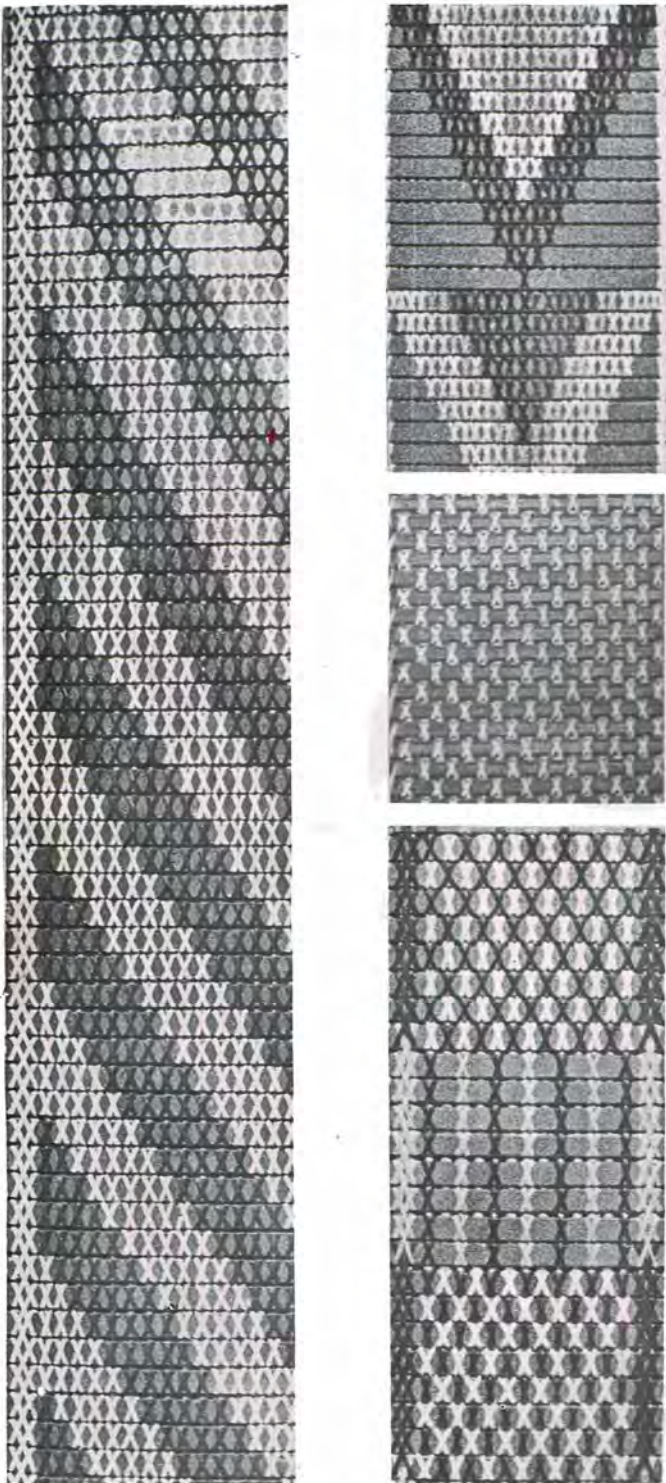


Figure 4. Tukutuku panel designs¹⁴

¹⁴ Retimana, M. (1967). Tukutuku and Kowhaiwhai; the art of the Maori instructional booklet. Wellington, A. R. Shearer.

Tukutuku

Tukutuku [or Arapaki] are highly decorative latticework that traditionally adorned the interior walls of the Wharenui [meeting house].

“[they] form an important part in the decoration of carved meeting house and as they produce, through the distinctive patterns used, echoes of the past, they add to the meaning conveyed by the carvings. In the few meetings houses without carvings, the panels are used as the sole means of reiterating the past and bring dignity and beauty to the interiors of the houses.”¹⁵

Like most traditional Maori art forms, the tukutuku panel was a communicative tool that incorporated the local narratives and shared it with those lucky enough to experience them first hand. In the designs and intricate patterns that covered the panel lay important local stories of the past; educating the next generation in the whakapapa (genealogy) of the people of that particular tribe.

Like most Maori fibre art, tukutuku panels were created by the women of the tribe. The tukutuku panel required the co-operation of two skilled weavers, “to work the design on to the panel a person (controller) is needed in the front while another (assistant) works at the back [of the panel].”¹⁶ The tukutuku panel ends up being a art work that depicts the dialogue between the two weavers along with the narrative in the design on its surface.

A contemporary artist that is well known in constructing tukutuku is Kohai Grace.

¹⁵ Ibid.

¹⁶ Ibid.

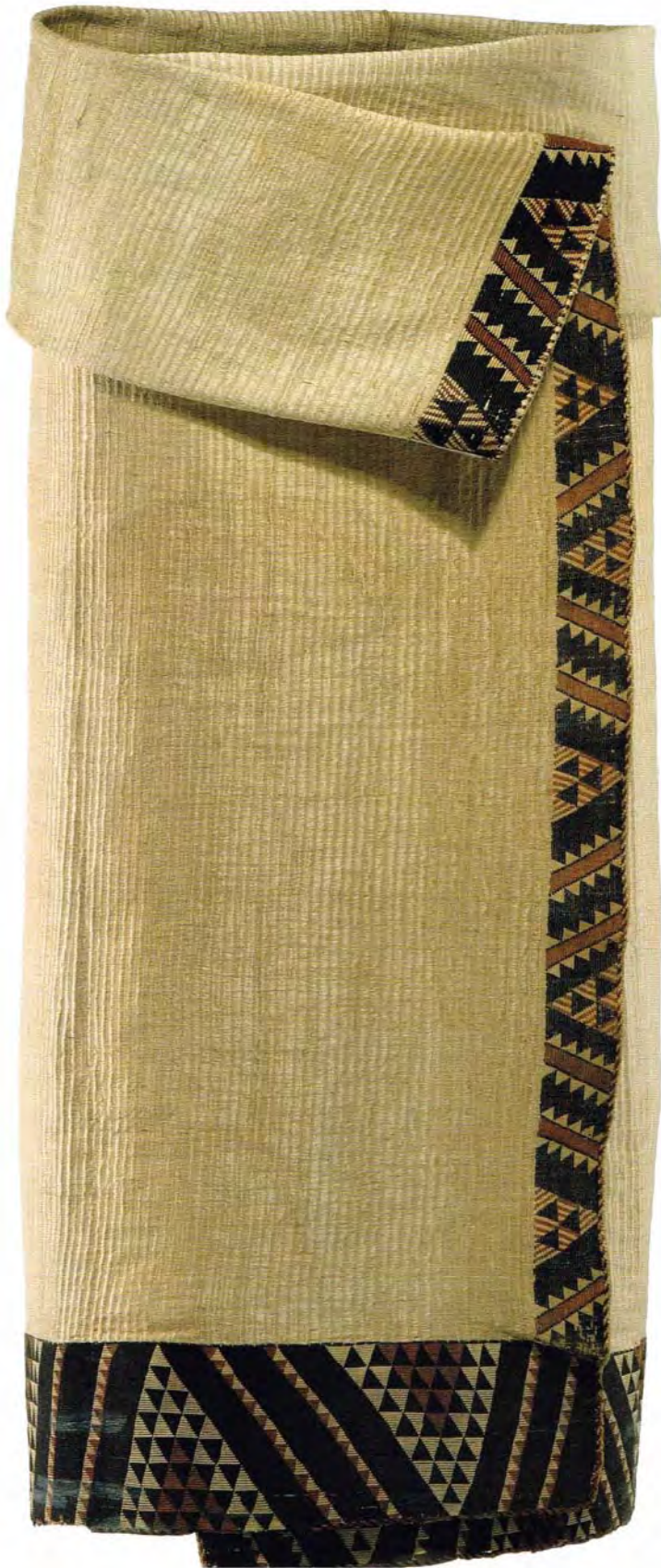


Figure 5. Kaitaka Paepaeroa [Maori cloak].¹⁷

¹⁷ Tamarapa, A. (2011). Whatu Kakahu; Maori Cloaks. Wellington, Te Papa Press.
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Whatu

Whatu is a method of finger-twining that when combined, creates a fabric that can be rigid or easily draped. This form of weaving is used to construct the prestigious Kakahu [Maori cloak]. Traditionally, this form of weaving was only produced by the most highly skilled of weavers who were held in high esteem amongst their iwi [tribe].

Whatu consists of two directional elements; the aho [warp] which runs horizontally from left to right, and the whenu [weft] which runs vertically top to bottom. A series of twists is incorporated into the aho between whenu to bind the material together. The material used was harakeke [New Zealand flax] which was processed to expose its strong inner fibres known as 'muka'. "This, combined with feathers and other surface ornamentation, produces warm, practical and beautiful garments. Traditionally, muka garments were all produced without needle, spinning wheel or loom."¹⁸ Creating a kakahu was a time consuming process, and this was visible on the surface of the garment when worn.

Kakahu were only given to people that traditionally was used as a clear status symbol to the community as to who were highly ranked within their society. Kakahu are also symbols of an individual's mana, or more so in contemporary context of a group of people's mana, that has been bestowed upon them from their whanau [family] and iwi [tribe]. These garments have come in many forms, styles and sizes but follow a similar construction technique called whatu [weft twining].

There are a number of well-known contemporary artists who engage with whatu as their medium. Some of these artists include Kohai Grace, Garry Grace, Maureen Lander

¹⁸ Puketapu-Hetet, E. (1989). Maori Weaving. Auckland, Pitman Publishing.



Figure 6. Whero Panel - Taki Rua weave by Annabelle Buick¹⁹

cotton tape, synthetic webbing
1220 x 405 x 40mm

¹⁹ Buick, A. (2010). Whero Panel. Weaving. Wellington, Kura Art Gallery.

Contemporary Interpretation

The Collins dictionary states the definition of the word contemporary as:

Contemporary (adjective)

1. Existing or occurring at the present time.
2. Living or occurring in the same period.
3. modern in style or fashion.²⁰

An interview with an emerging contemporary weaver, Annabelle Buick helped reflect what weavers deal with in their work and how they deal with the pressures of retaining the tikanga and essence of traditional weaving:

As an emerging contemporary weaver, have you had much experience/exposure to 'traditional' maori weaving?

Annabelle : Yes - Initial introduction to Raranga was at my first year at Whitirea Community Polytechnic in Porirua. My tutor was Tracey Huxford (Horowhenua). My end of year submission was a large wall weaving - from whom I sought technical help from Veranoa Hete-Hauwaho.

Flax weaving of this size has been my last. I soon discovered after I had *hapene* (softened) many strands, I suffered an allergic reaction from the resin in the flax causing facial eczema and scaling of the skin. This was the catalyst for me to source alternate materials to continue my journey with weaving.

What do you think makes contemporary Maori successful contemporary design?

Annabelle : The market (consumer) wanting innovative design to reflect ones style & personality

What direction do you think contemporary Maori design is heading?

Annabelle : More likely an International market

What is your opinion on using traditional Maori craft as a source of inspiration for an interior installation?

Annabelle : It should be the benchmark when researching designs for interior installations that have a brief for Maori influenced designs.

Are there any consistent elements in contemporary Maori design that you have noticed?

Annabelle : Yes, fundamental principles of design

Where would you like to see contemporary Maori design in the next 5 years?

Annabelle : New Zealand based for export

²⁰ HarperCollins (2005). Collins English Dictionary J. Crozier, Grandison, A., McKeown, C., Summers E. & Weber, P. Glasgow, HarperCollins Publishers.

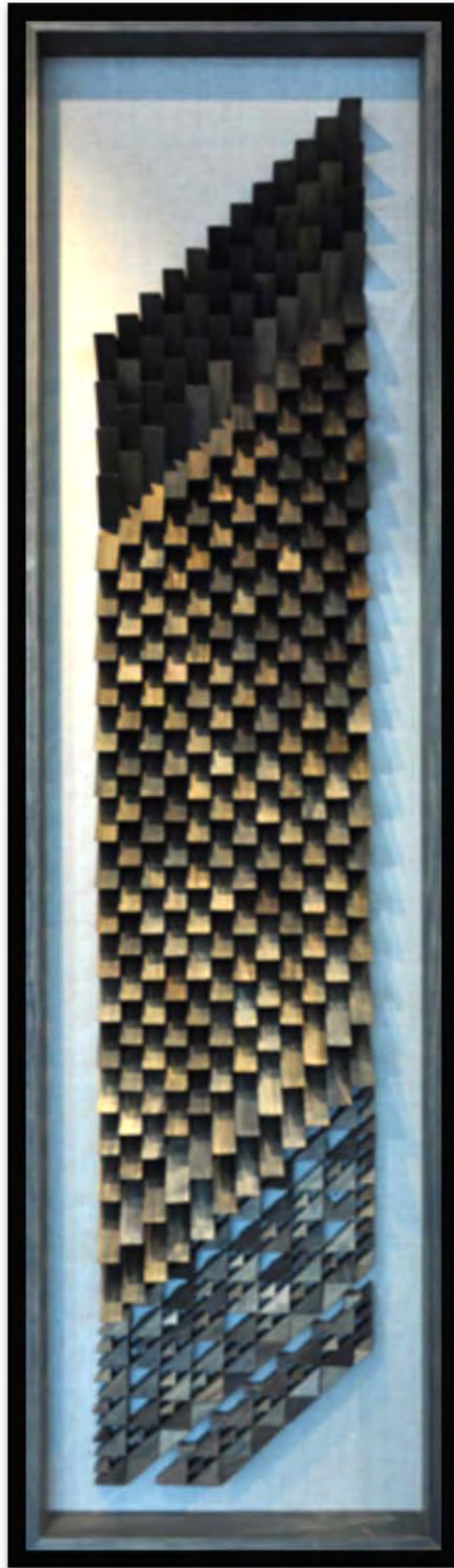


Figure 7. Korowai by Annabelle Buick²¹

stained pine blocks, linen canvas, stained frame
1430 x 370 x 70mm

²¹ Buick, A. (2011). Korowai. Sculpture. Wellington, Kura Art Gallery.

What are your sources of inspiration for your art form?

Annabelle : Maori weaving, tessellations and M. C. Escher and Pop art.

Have you had any experience with the Maori community to establish your point of view of a weaver, or does your work express you solely as an individual, or both?

Annabelle : Formal training through raranga courses. For me, my work is about trying and expressing new ideas. I like the challenge of being innovative by transferring traditional weaving skills, techniques and materials into works that reflect the environment I live in now.

Can you explain your design processes in dealing with Maori components?

Annabelle : I research a weave pattern and find ways to express the idea in a contemporary way. This may be just the selection of colour (modern colours) to suit interior trends. Or morph a traditional pattern to a new pattern to convey a concept of change. Or manipulate a traditional pattern to convey a theme just to name a few.

What cultural elements are involved in your design process?

Annabelle : Primarily the pattern and its meaning.

Do you use Maori motifs? How/ where are they sourced from?

Annabelle : Yes I have used Maori Motifs for an exhibition themed 'Matariki'. I used various woven star formations that have been used in raranga.

What are your thoughts on Maori appropriation in contemporary design?

Annabelle : I am at ease with appropriating as my work is about stretching the boundaries in regards to the limitations that raranga presents for weavers.

How do you approach the idea of Maori appropriation in your designs?

Annabelle : I research the traditional design and look at ways to better express the pattern or design a story to help viewers understand what maori design is about and how much scope it can have in our contemporary interiors.

Do you think there are ethical and moral responsibilities to maintain in relation to the Maori heritage of your art form? Can anyone undertake this craft?

Annabelle : Yes, I believe being Maori gives integrity to the work produced.

Do you feel that there should be strict guidelines when dealing with Maori inspired designs?

Annabelle : No. There are copyright and intellectual property laws to protect designs.²²

²² Bartlett, J. (2013). Personal Interview with Annabelle Buick. J. Bartlett. Wellington, Annabelle Buick: 3.



Figure 8. Reverse side of a kahu kiwi exposing the whatu and taniko²³

²³ Tamarapa, A. (2011). Whatu Kakahu; Maori Cloaks. Wellington, Te Papa Press.
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Project 1: Whatu Panel

For me, creating the Whatu panel was something that was required of me to do in order to understand and fully appreciate the complexity of creating a whatu weave. I wanted to incorporate all the elements that I found interesting in whatu weaving and push the boundaries on what could be done.

Constructing the frame

To construct the tukutuku panel, a frame needs to be constructed to hold the vertical and horizontal elements in place. The process of frame making was repeated for all three woven study samples [raranga, tukutuku and whatu].

For the purpose of this project, I wanted to use a material that had natural faults on its surface. This informed me to use rough sawn, low grade pine which had a series of knots and natural defects remaining on its surface. Since the pine was of a low grade and roughly sawn, it needed to go through the Planer machine to ensure the timber pieces were parallel. This was further refined using the Leveller, which made the wooden planks truly square.

Once the timber pieces have been made square, parallel to its opposite side, these were cut to lengths for the frame; 750 long by 40 wide for the sides of the frame and 375 long by 40 wide for the top and bottom pieces. When cut to length, the longer pieces need to be cut, with a fair amount of care, to 45 degrees from the most farther corners angling in to the centre of the frame.

Using a Mortise Jig to cut the angles into the ends of the wooden frame pieces, this will create the 45 degree cut angles into the remaining ends of the shorter frame pieces. However, when cutting these pieces, much care needs to be taken as this is a crucial step to ensure the frame is assembled square and true. So, I advise practising on scrap material to ensure your frame is perfect and assembles with ease. The cut is only made as deep as half of the thickness of the material being cut. For example, if cutting a 30mm thick timber only cut as far as 15mm into the piece. This process is repeated in the longer pieces that have a 45 degree angle cut into the ends, but with the Mortise Jig, cut from the base of the angle cut perpendicular to the length of the timber.

Once all these have been cut, sized and checked, the assembly of the frames can taken place. Having two longer pieces and two shorter pieces at hand, place them together butting the two longer pieces on the side edges and the shorter at the top and bottom. Use polyvinyl acetate adhesive [PVA] on the areas where the adjoining pieces touch. This adhesive is best used as it binds into the grain of the timber used for a stronger hold. Remove any excessive PVA with a damp cloth before it sets. The assembled frame now needs to have pressure applied to the adhered corners with clamps and left to rest while the PVA sets. Ensure use of a tissue or a thick fabric is used if applying direct clamp pressure to the surface of the frame to avoid dents appearing from excessive pressure.

Once the adhesive has set, remove the clamps or pressure devices from the frame corners and strengthen the connections with staples. This will help with any movement that the frame may incur when used in the weaving process. It is best advised, if desired, to finish the timber at this point as the frames are now prepared for the weaving materials to be attached.

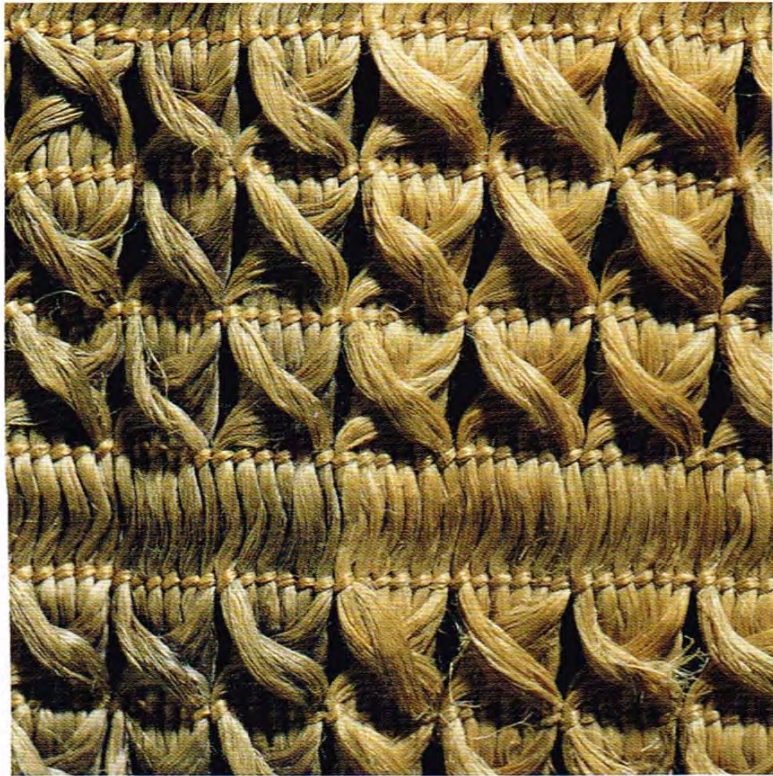


Figure 9. Mawhitiwhiti [cross-over patterning]²⁴

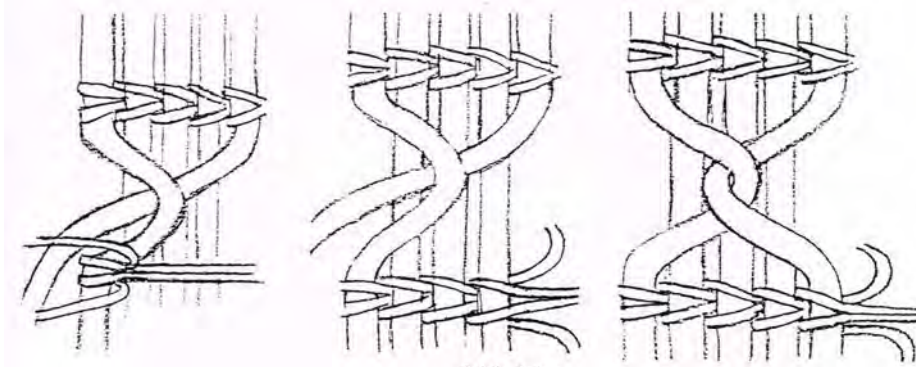


Figure 10. Mawhitiwhiti technique by Diggeress Te Kanawa²⁵

²⁴ Ibid.

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²⁵ Kanawa, D. T. (1992). Weaving a Kakahu. Wellington, Bridget Williams Books.
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Whakapapa construction

The creation of the whakapapa [the body of the kakahu] is a timely process that requires a great deal of concentration to complete. This process is best done consistently and with tenacity as leaving the project for a lengthy period of time will require a reset in learning the techniques of weaving the individual threads and staying focussed on the task at hand.

Weavers, both traditionally and contemporary, can be seen weaving horizontally from left to right. However, attempting this method in my samples is rather difficult and strains ones hand easily. This could be due to the smaller scale version that I am working on, as opposed to the much larger versions of the kakahu construction without a tensioned frame to hold the weft strands in their vertical placement.

However, I found it to be a lot more easier and efficient [at least in weaving the samples in the frame] to weave vertically with the lower ends of the strand towards the weaver. This method allows for the aho [weft] to be easily woven in a straight vertical line but can create some complications with handling the weft strands which are left hanging.

Techniques used in the whakapapa

The whakapapa utilises the Whatu aho rua [two-pair weft twining] technique which uses two pairs of aho [weft] threads inter-twining each individual whenu [warp] threads together in a tight and secure weave which is uniquely seen only in Aotearoa New Zealand weaving. Each of the weft threads are spaced at 20mm intervals.²⁶ On a kakahu, this would allow for the garment to have a degree of flexibility and comfort for the wearer as the spaces between the aho loosens up the rigidity of the fabric. However, depending on the material being woven, the spacing between aho should not become too large as it will loose its shape and become difficult to weave the individual whenu.

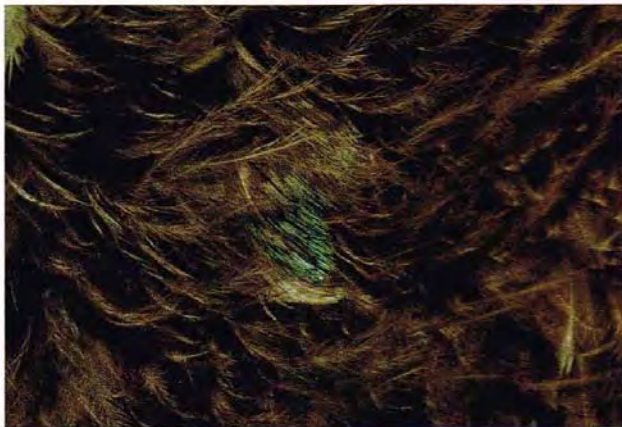
The second technique used is a one derived from Diggeress Te Kanawa's technique called Mawhitiwhiti [openwork weft twining]:

"Mawhitiwhiti is done in lots of 5 whenu[4 for my whatu panel]. The first an the fifth whenu loop through each other, forming a smocking-like pattern. With all my korowai I have the first row Mawhitiwhiti. The grouping of 5 whenu helps later when counting spaces for arranging feathers or Hukahuka. Whatu the first white whenu. Begin [the Mawhitiwhiti by using a whenu] and whatu it, leaving it with a small loop. Bring across whenu number 5 and thread it behind and through. Whatu the next 3

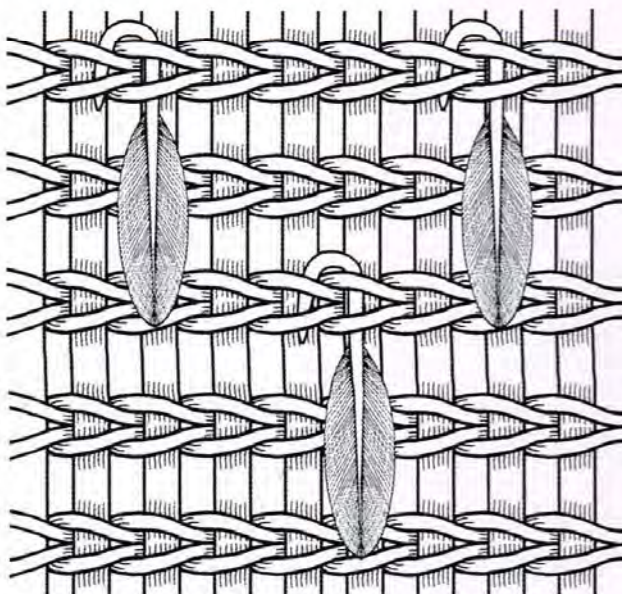
²⁶ Tamarapa, A. (2011). Whatu Kakahu; Maori Cloaks. Wellington, Te Papa Press.



Feathered border edge, including the white throat feathers of the tūi.



A kākāpō feather among the lush kiwi feathers.



The attachment of feathers.

Figure 11. Feather attachment on a Kahu kiwi²⁷

²⁷ Ibid.

whenu, then bring this fifth whenu back across and whatu it to complete a pattern. Continue in this way across the [panel] until you reached [your desired end].”²⁸

Attaching feathers

The attachment of feathers, tassels or any other ornaments all have specific requirements of them as to design, direction of attachment and effect it has on the design overall.

In my whatu study sample, I have attached brown feathers each ranging from 40 to 60mm in length, with a 2 to 3 weft strand spacing between each feather attachment on each row.

This method of attachment is derived from the traditional approaches seen in the

Diggeress Te Kanawa describes the method used in her book *Weaving a Kakahu*:

“to put in a feather (a prepared feather may contain as many as 3, joined at the base with either flax gum or soap), place the feather over the top of a whenu thread. Both the stem of the feather and the whenu will be enclosed as you whatu the aho. On the next whenu, twist up the stem of the feather and whatu. This completes the placing of the feather in the ara.”²⁹

²⁸ Kanawa, D. T. (1992). *Weaving a Kakahu*. Wellington, Bridget Williams Books.

²⁹ Ibid.



Figure 12. Whatu Panel by Jeffery Bartlett



Figure 13. Detail of Mawhitiwhiti

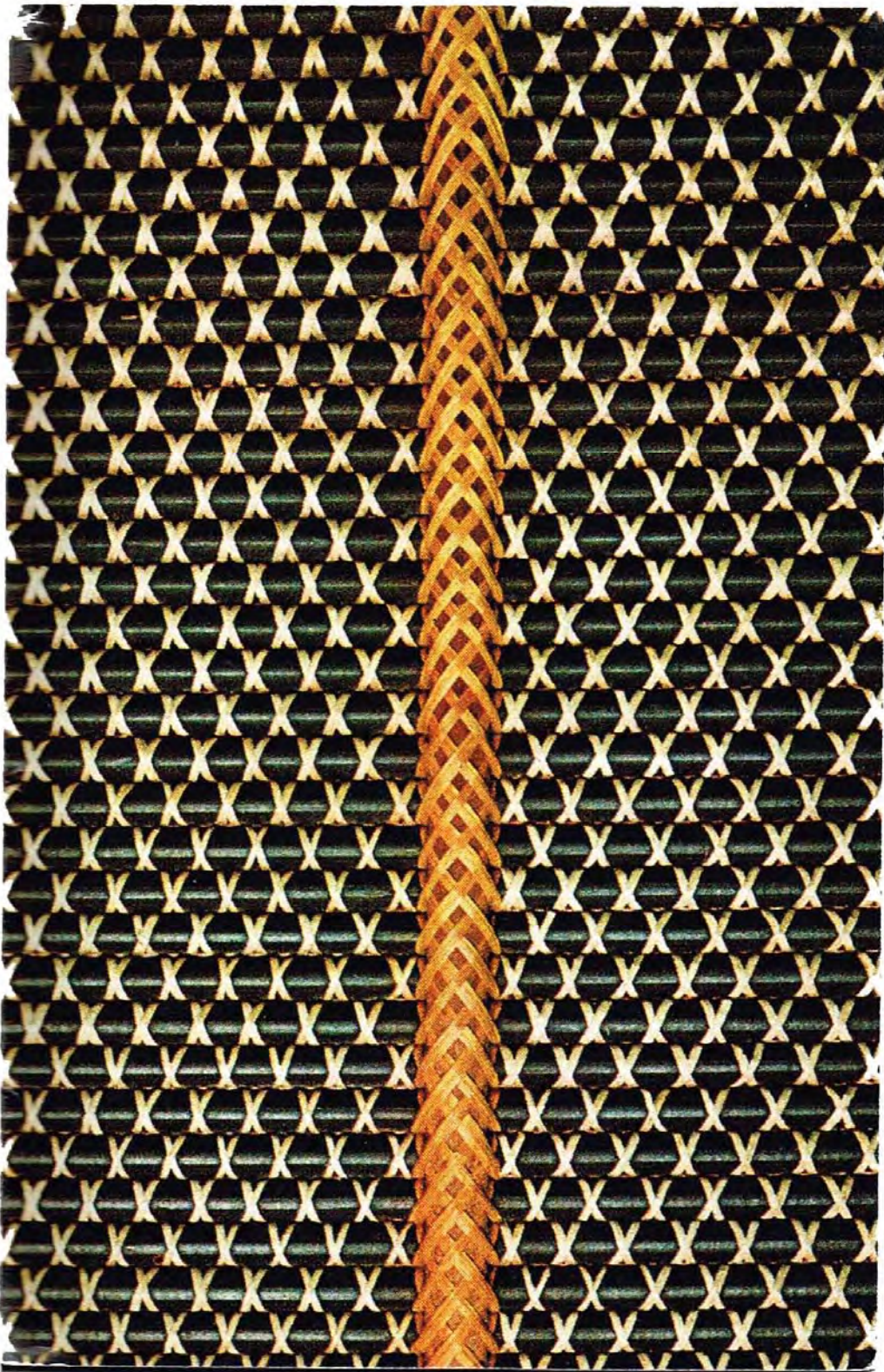


Figure 14. Mangoroa pattern, after Te Mangaroa, "The long shark"³⁰

³⁰ Riley, M. (2005). Know your Maori Weaving; Plaiting, Weaving, Tukutuku, Whakatauki. Paraparaumu, Viking Sevensseas NZ Ltd.

Project 2: Tukutuku Panel

The art of the tukutuku panel conceals most of its complexity and only shows off an effortless ease to the observer. In my attempt of a contemporary tukutuku panel, I intend to expose the complexity that goes into the construction by exposing the back of the panel where the artist takes most care in the securing of ties to the grid.

Materials

“Traditional panels are made of wood and *kakahu* (the stalks of the flowers of the *toetoe*) and these are lashed together with *kiekie* (a climbing vine) or flax (dried and prepared) or *pingao* (a sand grass growing near the sea). The *Kakaho* form the vertical stakes, while wooden slats are used as the horizontal rods and the *kiekie*, *pingao* or flax is used for making the patterns of the panels.”³¹

The material selection for the tukutuku panel is a response to a need to contemporise my approach to the traditional methods of weaving. By doing this, I was able to develop a method of working with the new material with a conscious need to develop a tikanga around my approach to working with it; I chose to work with wire.

Wire was selected because of its malleability and ease to work with while retaining the strength required to bind the frames together. It also had the fine appearance that I was looking for in the material I wanted to bind the tukutuku panel with.

Construction of the Grid

The construction of my panels consisted of using wooden quarter round slats; each 18mm wide for the horizontal members. I found these to be the best as it was cost effective and came in a variety of sizes that could have been used dependant on the size of the panel. Cut the slats just short of the width of the frame [approximately 330mm]. This will allow for the pieces to be concealed within the frames when assembled. For the vertical members I used dowel 3mm in diameter cut just shy to the height of the frames [approximately 700mm].

It is best to use rounded material for the grid of the tukutuku panel, as it was constructed traditionally for Wharenuī. This is because of the material that is to bind the vertical and horizontal elements making it easier to manipulate the individual strands when threading through the grid and gives a much better appearance, not only to the grid, but to the woven material.

Attaching the dowel rods to the frame that will sit on the back of the panel. These will need to be positioned with care as the rods need to be vertical and run parallel to the sides of the frame to ensure it is square. It is advisable to begin placement of the rods in the centre and

³¹ Retimana, M. (1967). Tukutuku and Kowhaiwhai; the art of the Maori instructional booklet. Wellington, A. R. Shearer.



Figure 15. Tumatakahuki [overlapping wrapped-stitch]³²

³² Ibid.

work your way to the edges, this positions the rods in a vertical position much easier. Once placement has been determined, each rod needs to be spaced 1mm to 2mm from each other. This spacing will allow for binding material to pass through the grid with ease. I made use of 2mm diameter nails to use as spacers between the rods and help keep the dowel in place. Once all the pieces have been positioned these need to be either nailed down, glued or bound to the frame as long as the rods are firmly fixed into place.

A similar approach is taken with the slats which will become the face of the panel. Prior to attaching them to the frame, if a design is intended that requires altering the slat colour or texture, it would be best advised to do that before being fixed in to place on the frame. I painted half of my slats black and left the remaining natural. This created a contrasting visual that gave the panel a degree of interest that I needed from the slats. Once the slats have been finished in the method desired, then attachment to the frame can begin. Following the instructions given for the placement of the rods, the process is exactly the same however you work horizontally rather than vertically.

Once all the rods and slats have been attached to their respective frame, you can begin to bind them together.

Connecting the frames through binding

Now the frames have been assembled, the slats and rods are all attached to the frames, and the design for the tukutuku panel is settled; it is now time to bind the dowel rod frame to the slat frame.

To begin with, I attached the frames together temporarily by binding the frames together at the corners. The binding thread will later be removed when the binding of the tukutuku panel design has been completed.

Once attached, I create two Tumatakahuki [overlapping wrapped stitch] running vertically down the sides of the panel.

“Begin at the left of the panel by placing the [wire] behind the first dowel and threading the strand on the left, down and across 2 slats. Bring the right strand down and across 2 slats and thread the strands through... Thread the strands through these gaps and the assistant at the back of the frame will push them back through the space, between the first and second slats. The same procedure of threading is repeated down and across 2 more slats, crossed at the back and then threaded through the spaces marked as seen in figure 15. Continue stitching this way to the bottom of the frame and tie the ends at the back of the frame with a reef knot. Repeat the same method of stitching at the left of the panel.”³³

³³ Ibid.



Figure 16. Two weavers working on a tukutuku panel³⁴

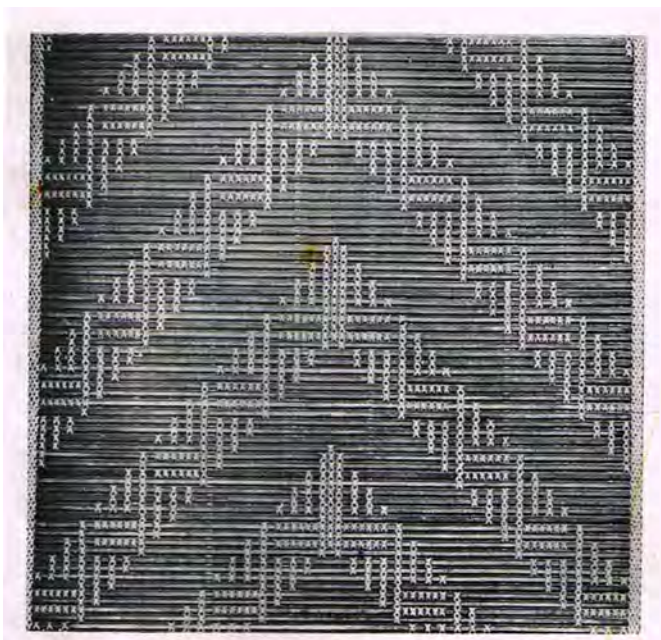


Figure 17. Kaokao tukutuku panel design³⁵

³⁴ Ibid.

³⁵ Ibid.

Not only do these stitches secure the slat frame to the dowel frame, but it also frames the piece to be implemented in the space between. In my tukutuku panels, I used a mixture of black coated wire and brass wire. These were selected to contrast with the colour of the back slats and create a sense of continuity to the piece. For the Tumatakahuki I bound using a double layer of wire carefully threaded to maintain a flat face on the front and back of the panel. A double layer was an aesthetic choice which emphasized the importance of the Tumatakahuki in this piece of work; it holds the individual pieces together.

Threading the Whakapapa

I refer to the centre design as Whakapapa because much like the whakapapa of a kakahu, the tukutuku panel's whakapapa lies in the centre of the piece which is surrounded by a boarder. This may not be the technical term used for tukutuku panels but through my research, I have not found a term which refers to this area of the panel.

Traditionally, there were two main types of stitch that was applied to the body of the tukutuku panel; the cross stitch and the single stitch. "Cross stitch [is applied when] the threads are crossed over one slat and one upright dowel or kakahu and then continued across the panel. Single stitch [is applied when] one thread crosses one slat and one upright."³⁶ It is encouraged to explore the limitations of each technique and to develop new and innovative designs to continue the art of tukutuku.

For my design, I required the use of the cross stitch to implement the design commonly known as Kaokao. "Kaokao [human ribs or arms is an] abstraction and symbolism, to the point where the human element is difficult to recognise, is believed to represent the interfusion of the spiritual and temporal life of the Maori."³⁷ Through my design of the tukutuku panel, I translated this concept through to the importance of the hands to a weaver and the role reversal of genders in Maori weaving.

³⁶ Ibid.

³⁷ Riley, M. (2005). Know your Maori Weaving; Plaiting, Weaving, Tukutuku, Whakatauki. Paraparaumu, Viking Sevensseas NZ Ltd.



Figure 18. Tukumuku Panel by Jeffery Bartlett

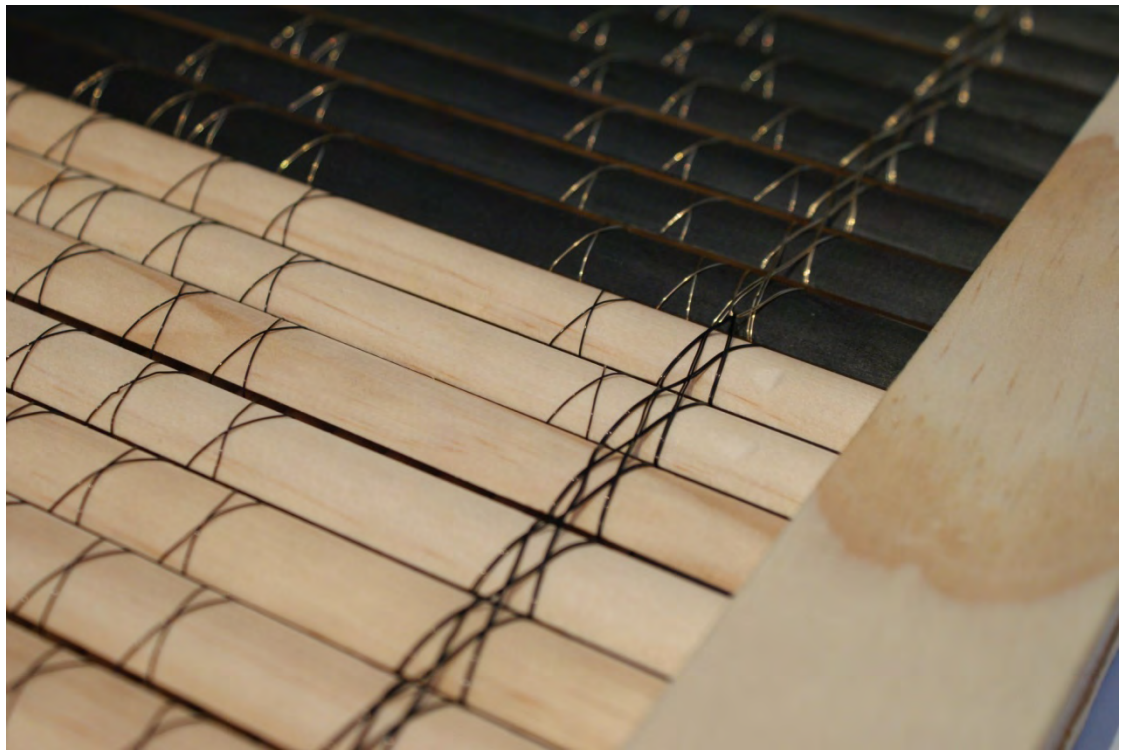


Figure 19. Detail of Tumatakahuki and the cross stitch

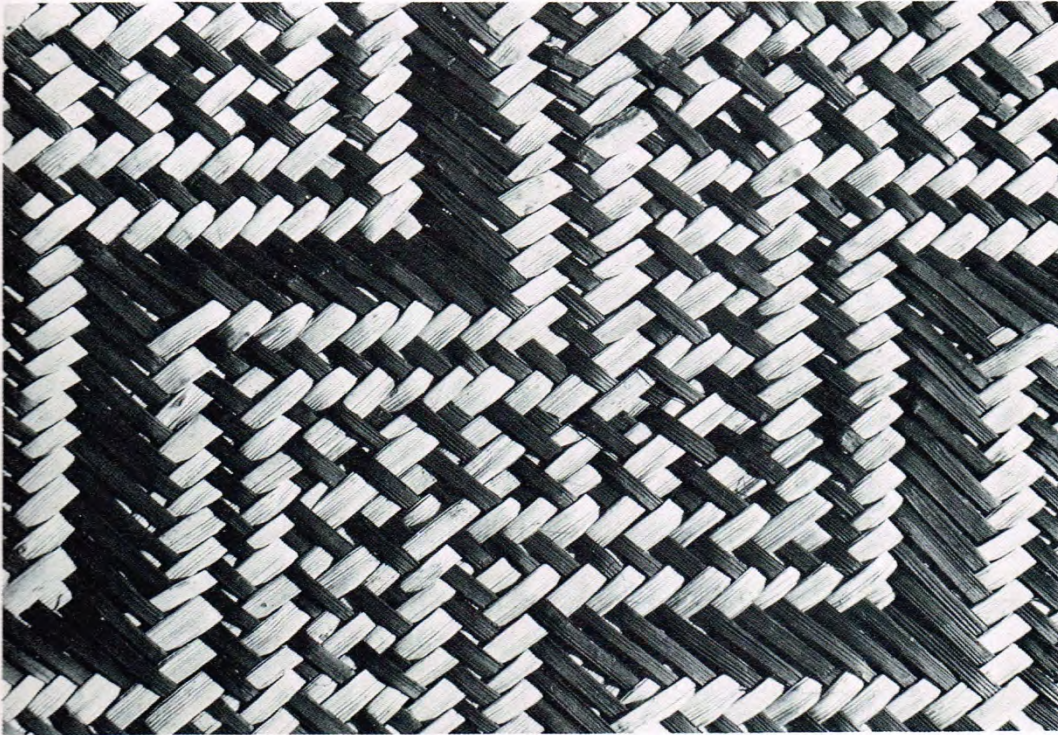


Figure 20. Raranga Whakairo³⁸

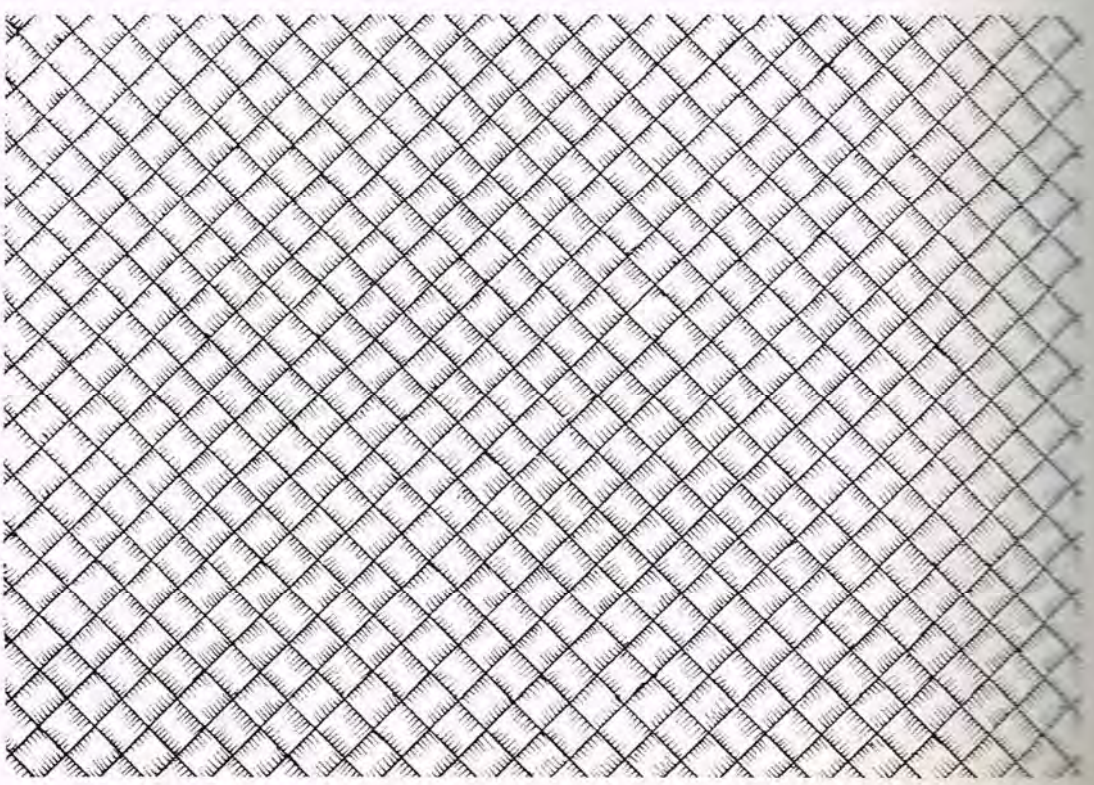


Figure 21. Takitahi [checkerwork]³⁹

³⁸ Pendergrast, M. (1984). Raranga Whakairo; Maori Plaiting Patterns. Auckland, Coromandel Press.
Page 7

³⁹ Ibid.
Page 11

Project 3: Raranga Panel

The final weaving technique that I studied was Raranga [plaiting]. I found that this was the fastest form of weaving that I would recommend to most people who were interested in learning about Maori weaving. The pattern quickly reveals itself to the weaver which is relatively satisfying to a beginner.

Materials

Through the use of brightly coloured ribbons, I attempted to create something that was reminiscent of tukutuku panels but using the raranga technique to recreate it. I attempted to weave using a variety of materials, ranging from raffia [a dried leaf strand] to metal wire. However, I felt that for my initial raranga piece, a material that was closest resembling the traditional material used [harakeke] was best; Ribbon.

This worked to my benefit as the ribbon was very easy to work with, required little maintenance and retained its lustre and vibrancy that I wanted from it.

Colours

Orange and white are the two colours selected for the raranga panel. This was chosen for its vibrancy and contrasting visuals that I wanted from it. This piece is intended to be eye catching and to draw the spectator in. Through the raranga piece, I wanted to explore a colour scheme that was not fully traditional, but remained within the colour spectrum of the colours used in Maori weaving while appealing to a contemporary audience.

Pattern

The pattern used on the raranga panel was a cumulative design that incorporated the main techniques used in the raranga weaving process.

Takitahi [checkerwork] is the most basic form of raranga. "The basis of plaitwork wherever it is practiced is checkerwork, the simple over one, under one check plait called takitahi by most Maori plaiters."⁴⁰

Twilled work is another form of raranga that is widely seen in more decorative pieces. "In twilled work each strip passes over and under a set number of strips. In twilled twos each strip will pass over two and then under two. In twilled threes it passes over three and under three, The twill may be arranged either vertically or horizontally. Torua is the name given to twilled twos in many areas. The horizontal twill is torua whakatakoto. When it is vertical it may be called torua whakatutu."⁴¹

⁴⁰ Ibid.

⁴¹ Ibid.

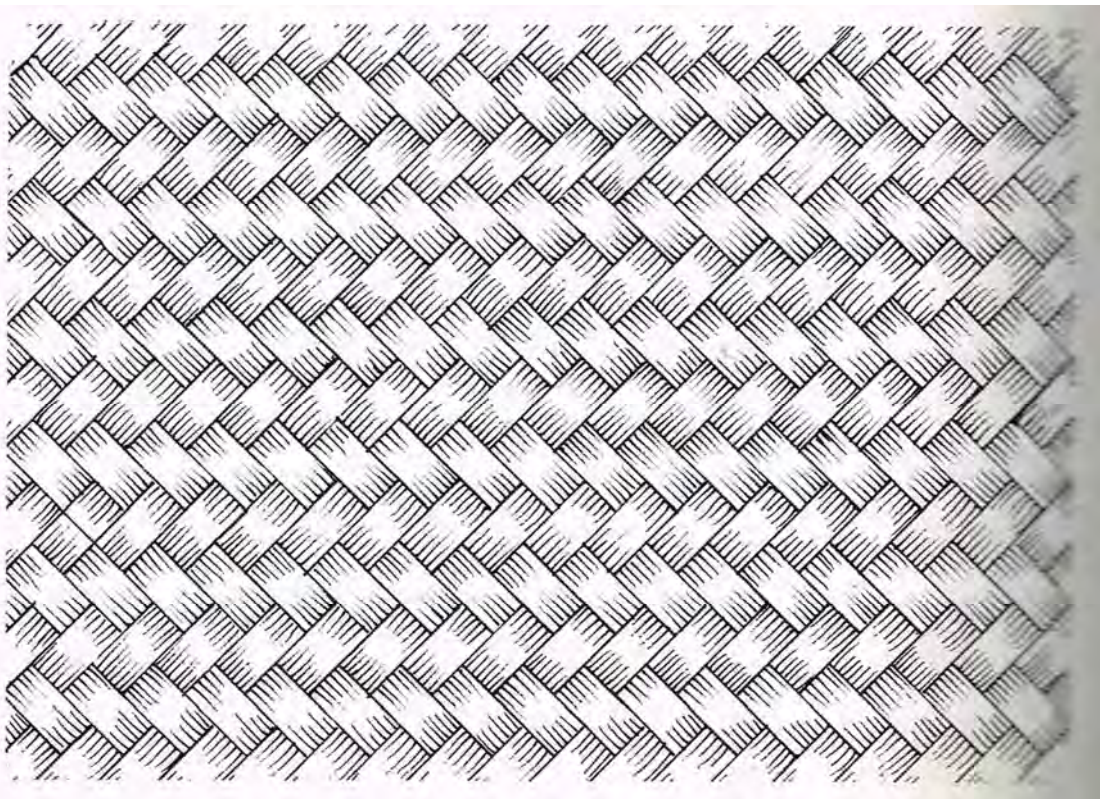


Figure 22. Torua Whakatakoto [twilled work]⁴²

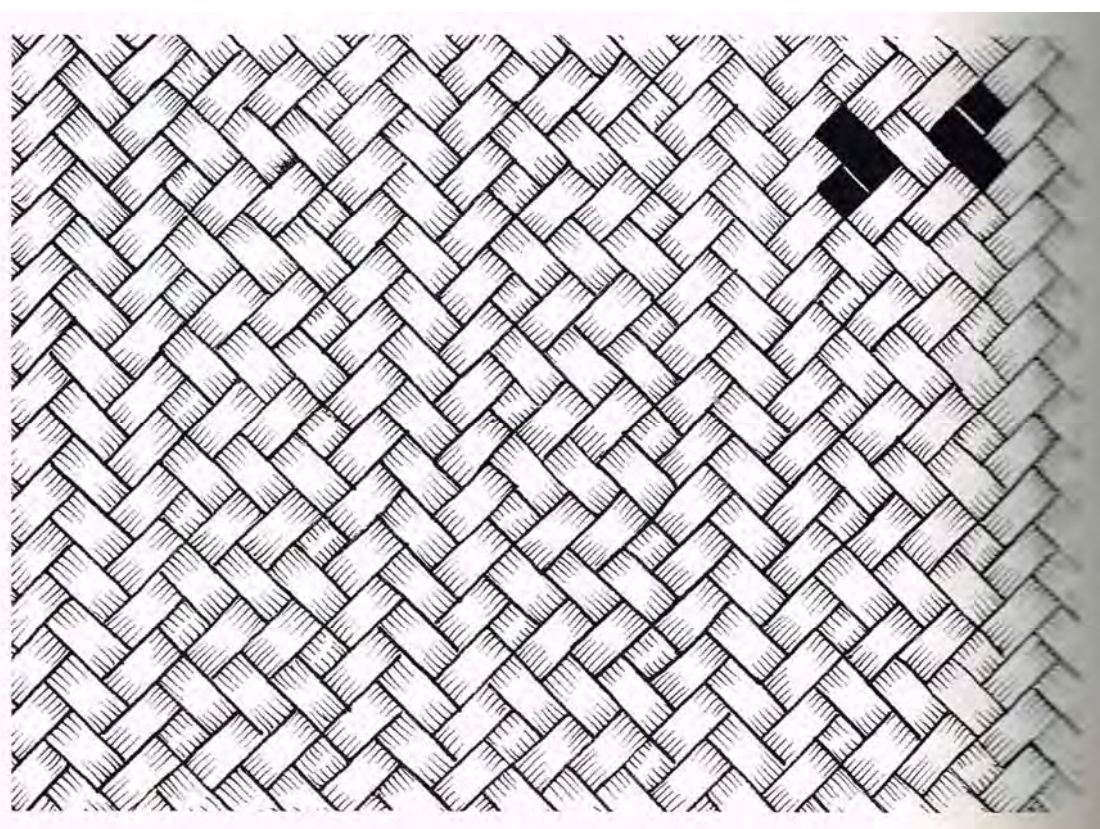


Figure 23. Mahitihi Whakatutu⁴³

⁴² Ibid.

⁴³ Ibid.

Some colour combinations of the twilled work have been noted as being so striking that they have earned their own names from their visual interest.

For my raranga panel, I mainly focussed on the technique called Mahitihiti. "The mahitihiti group of patterns is known over a very wide area by such dialectical variations of the name as mawhiti, Mawhitiwhiti, kowhiti, kohitihiti, etc, and sometimes has an additional descriptive term to differentiate between horizontal [whakatakoto] and vertical [whakatutu] arrangements. The pattern is formed by changing the stroke from that of vertical twill to horizontal twill. The changeover is sometimes referred to as 'one-two, two-one'."⁴⁴

⁴⁴ Ibid.

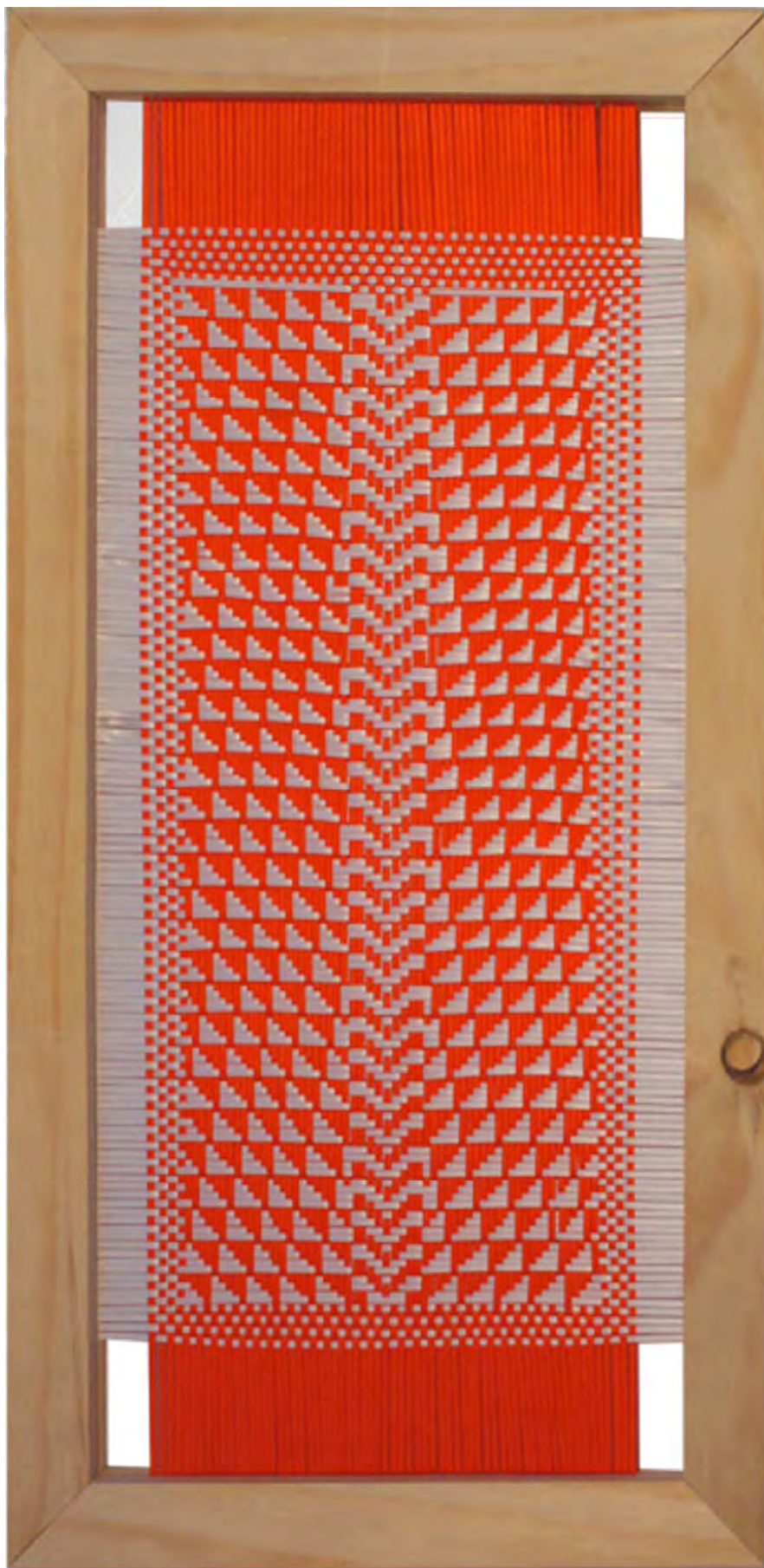


Figure 24. Raranga Panel by Jeffery Bartlett

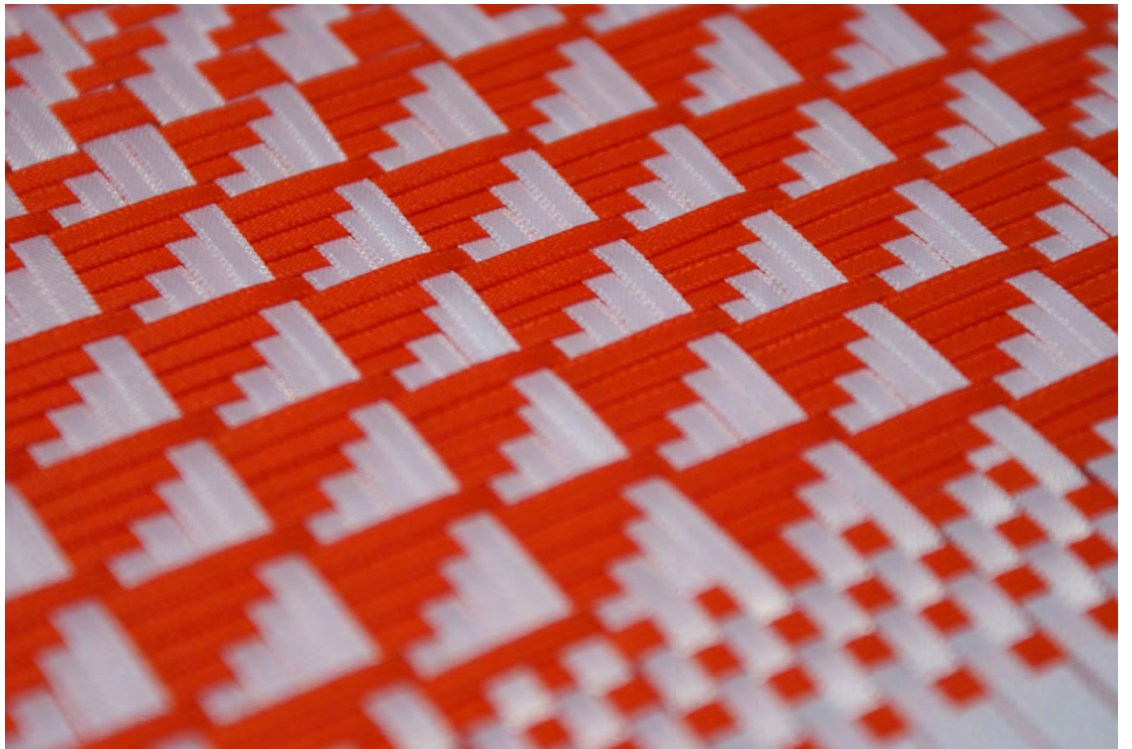
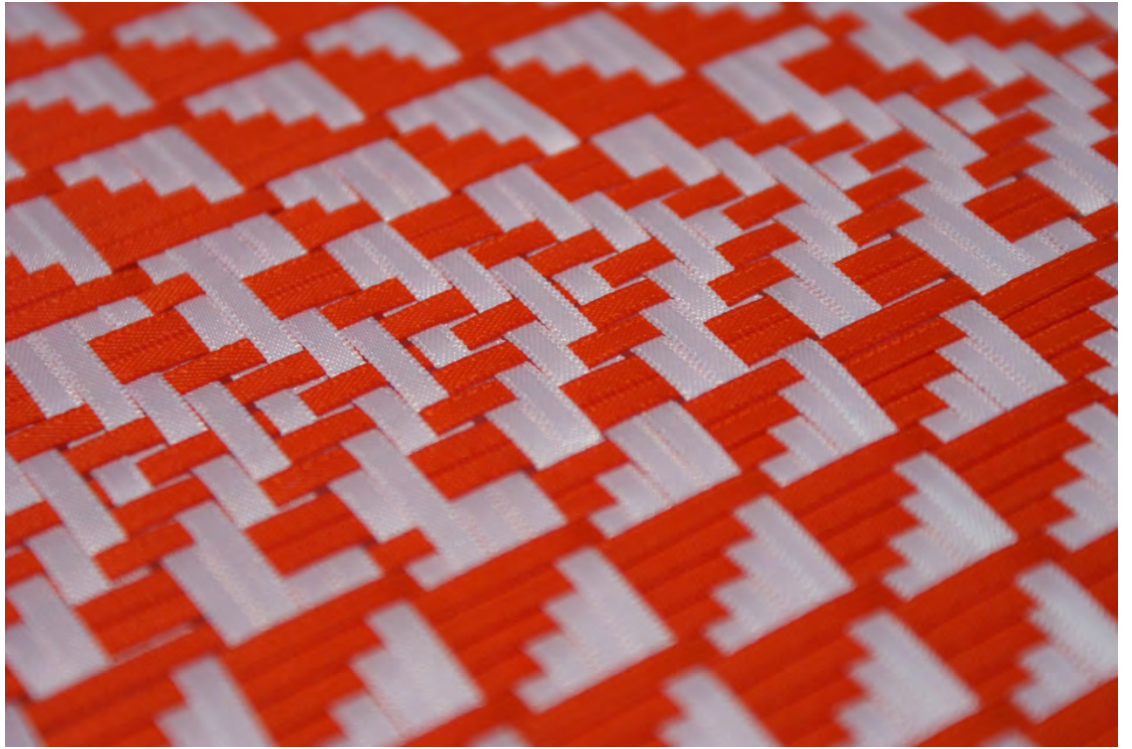


Figure 25. Details of the Torua and the Mahitihihi pattern



Figure 26. Novotel Hotel Auckland Airport restaurant room divider⁴⁵

⁴⁵ Mahoney, W. (2011). Novotel Hotel Auckland Airport. Auckland, Warren and Mahoney.
<http://www.warrenandmahoney.com/en/portfolio/novotel-hotel-auckland-international-airport/>

Translating Weaving into an Acoustic form

The weaving knowledge that once was imbedded in the daily lives of our ancestors is rarely seen in modern society. However, local architectural projects have demonstrated that there is a desire for a resurgence of indigenous art forms to be integrated into contemporary interior environments again; making the culture more accessible to those who inhabit the spaces.

Architecture firm Warren and Mahoney worked alongside client Tainui Auckland Airport Hotel Ltd to create "a significant new landmark with an unmistakably New Zealand identity."⁴⁶

The building is would become a place where people first arriving to New Zealand would have an instant connection with the history, culture and its people through the use of architecture. "In keeping with the building's function as a resting place at the beginning or end of a journey, elements of the design take their inspiration from Aramoana, a taniko pattern symbolising the path of the great Tainui waka as it voyaged from Hawaiki and Aorangi."⁴⁷

This is one example of how tradition has been successfully integrated into contemporary environment, to tell its narratives without seeming out of place. I believe that for the acoustic form system to be as successful, the integration of cultural identity through weaving needs to have a relationship with the requirements of today's society and making the product desirable while accessible to the public.

⁴⁶ Barclay, A. (2011). Modern Heritage - Novotel Auckland Airport, Warren and Mahoney

⁴⁷ Ibid.



Figure 27. Acoustic form designs [from top to bottom; raranga, tukutuku and whatu]

Acoustic Form System

The acoustic form is a developing system which has been designed by Natasha Perkins in a previous research paper "Sound Concepts". This paper had a focus on acoustic forms that inhabit interior spaces and its possible interaction value with its inhabitants.

Possibilities for shapes

Once the study samples of the three weaving methods were completed, a series of acoustic forms were developed which were designed around their respective weaving technique. Creating the study samples provided me with the necessary knowledge to develop designs that were referential and synonymous to the aesthetic of Maori weaving.

Raranga Form

Raranga [plaiting] deals with the formation of rectilinear shapes, usually using one or two colours to create highly impacting visuals. Like most weaving techniques, the pattern generally tessellate to convey its story. These tessellating patterns can be very simple in design or quite complex. As an interior acoustic installation, it could be an active part of a space, creating movement, direction and pace when coming into contact with it.

The rectilinear acoustic form lends itself to be easily configured in ways that resembles any pattern that can be derived from the raranga weaving method.

Tukutuku Form

Tukutuku designs are portrayed using binding methods which reveals an "X", a series of overlapping "X's" of slanted strokes on the face of the panel. When combined with the horizontal rods, the dominating feature of these bound strokes are triangular in shape.

The triangular acoustic form design has been configured with a series of attachment holes on the bevelled sides. This will open up a degree of flexibility using the form to create a variety of tessellating shapes and designs.

Whatu Form

Whatu is a weaving method that is uniquely of Aotearoa New Zealand. The whatu weave is a repetition of twisting aho [weft] strands that bind whenu [warp] threads together. Twisting and tension is critical when performing this weaving method which became the key term for the acoustic form development.

This design was derived from a previous research project of Natasha Perkins entitled "Sound Concepts". This design attaches to three others to form a triangular shape with a void in its centre. The design best depicted the narratives of whatu as it is able to be manipulated in ways similar to whatu; twisting to create tension.

Material

Calvert Plastics acoustic forms are created using recycled material and are widely used throughout New Zealand.

"Made from 100% polyester and containing 60% post-consumer recycled material (PET bottle-flake) Calvert Plastics Ltd manufactures a range of wall and ceiling tiles

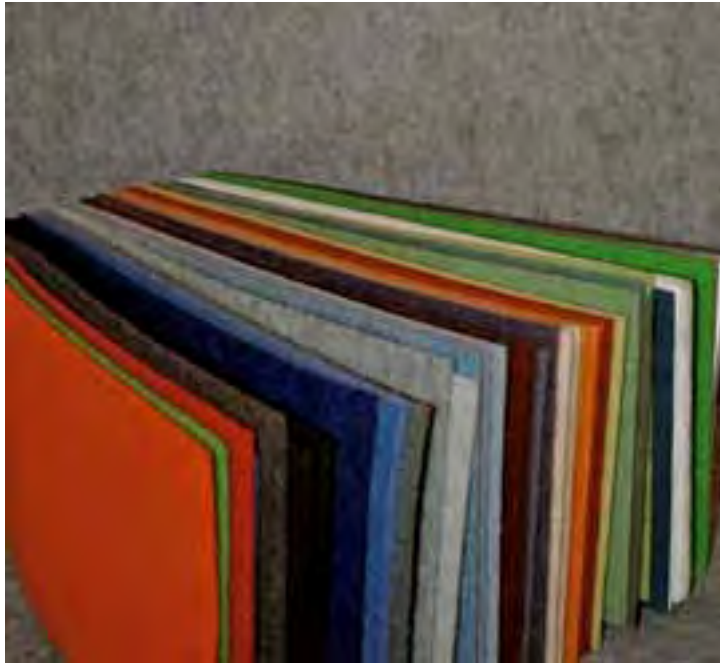


Figure 28. Material used by Calvert Plastics Ltd for their acoustic products

designed for the commercial interior market using two very different processes, hot formed and cold formed.”⁴⁸

Having tried and tested the products of this material it has proven to be durable, strong, light weight and easy to handle.

From a tikanga standpoint, this may not be seen as very appropriate material use to represent Maori weaving, as mentioned by Annabelle Buick the practical aspects of tikanga have guidelines of removing weaving from any food or beverages. Since the acoustic form is made from recycled plastic bottles, this may impede on some tikanga related issues but this will need further investigation.

Process

Much of my knowledge concerning the process of form making was generated through conversations with Natasha Perkins, who has had a great deal of experience working with the people of Calvert Plastics Ltd, creating her designs through acoustic form making.

The designs that were developed was restricted to a base size of 550mm by 550mm. This means that a number of acoustic forms are able to be positioned within this space, but for economical reasons it was best designed to use as much space to minimize wastage accumulating.⁴⁹

“Hot formed – Hot formed tile are expressive tiles, using simple shapes, folded edges that stand off the wall creating bold patterns. Heat and press!

Cold formed – Cold formed products are a “low energy” less for more manufacturing process that relies on detail design to create stunning effects. Design and hand cut.”⁵⁰

⁴⁸ Matthews, J. (2013). Calvert Plastics - Acoustic.

⁴⁹ Bartlett, J. (2013). Personal Communications with Natasha Perkins. N. Perkins. Wellington, Jeffery Bartlett.

⁵⁰ Matthews, J. (2013). Calvert Plastics - Acoustic.

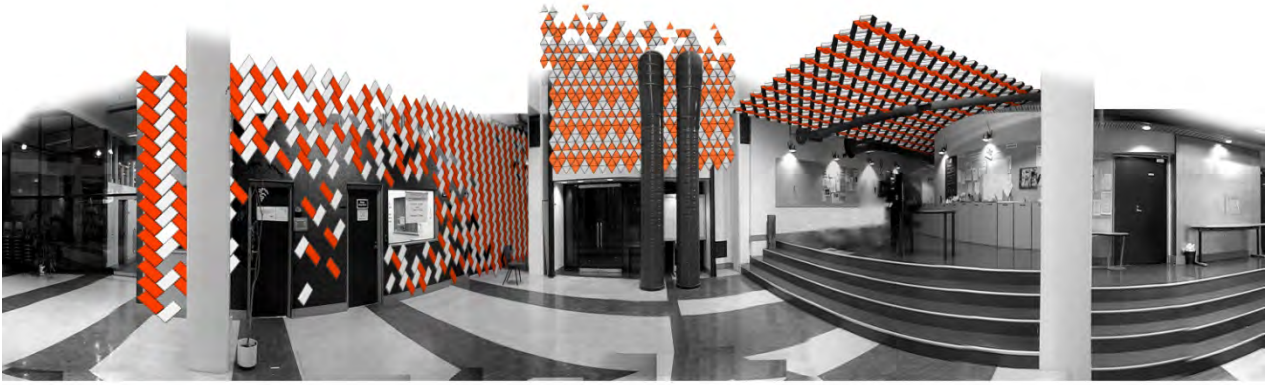


Figure 29. Rendered view of acoustic forms in an interior space

Future of the Acoustic forms

This research will inform the design the acoustic product which has an aim to reintroduce Maori weaving to a contemporary interior context. As stated previously, for this to be a successful relationship, between tradition and contemporary, a dialogue needs to be created that generates interest in product to ensure a future for the product.

Not only is this research trying to create a identifier with in an acoustic form, but its intention on reintegrating Maori narratives back into interior environments through decorative means is a major contributor to the use of Maori weaving in the design process.

This would make the product, much like its weaving counterparts, uniquely of New Zealand and hopefully give Raranga a new position in the interior installations of architecture developments around the world.

Glossary⁵¹

A

Aho	the weft [cross threads] strand in the weaving of a kakahu
Aho tapu	the 'sacred' first line of weaving of a kakahu
Aho whatu	the end of the woven line in the weaving of a kakahu
Ara	the line of weft in a woven kakahu
Awhirito	the two leaves on either side of the rito in a Harakeke [flax] plant

H

Harakeke	New Zealand flax
Hinaki	eel trap
Hukahuka	tassel from two strands

I

Iwi	tribe
-----	-------

K

Kaho tara	horizontal face members [slats] on a tukutuku panel
Kakahu	Maori cloak
Kaokao	side of the body, flank. A tukutuku pattern that was on mats used when high-born children were conceived.
Karure	tassel from three strands
Kiekie	a thick native to New Zealand vine which has long leaves with fine teeth crowned at the end of branches. Leaves are used for weaving.
Korowai	a type of Maori cloak which has tassels attached to the whakapapa
Kuia	elderly woman, grandmother, female elder.

⁵¹ Moorfield, J. (2011). Te Aka Māori-English, English-Māori Dictionary and Index. Auckland, Pearson: 468.

M

Mawhitiwhiti openwork weft twining in relation to whatu weaving. Refers to the change in weaving direction in raranga weaving.

Mana a supernatural force in a person, place or object.

N

Noa be free from the extensions of *tapu*, ordinary, unrestricted.

P

Pingao golden sand sledge, a native plant to New Zealand with golden-orange, polished, arching narrow leaves which grows on sand dunes. Its dried leaves are used for weaving.

R

Rito centre shoot, undeveloped leaves of harakeke

T

Takitahi single. Checkerwork pattern in raranga that displays its pattern through the series of over one, under one sequence.

Tapu restriction - a supernatural condition. A person, place or thing is dedicated to an *atua* and is thus removed from the sphere of the profane and put into the sphere of the sacred. It is untouchable, no longer to be put to common use

Toetoe a native plant to New Zealand with long, grassy leaves with a fine edge and saw-like teeth. The stems were used for tukutuku panels.

Whakapapa the body of a kakahu or a raranga piece.

Whanau family

Whariki floor covering, ground cover, floor mat, carpet, mat

Whenu the warp [lengthwise thread] strand in the weaving of a kakahu

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