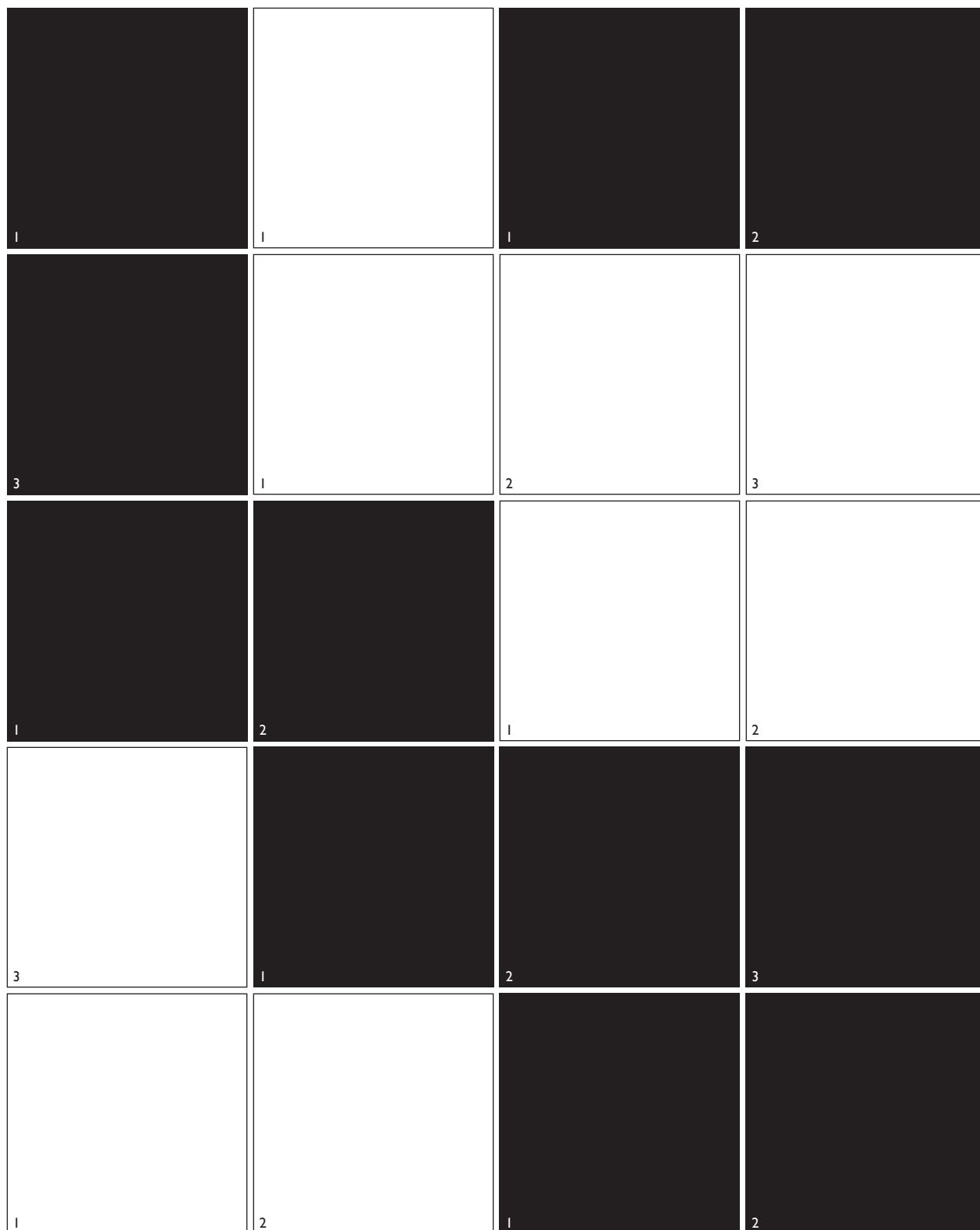




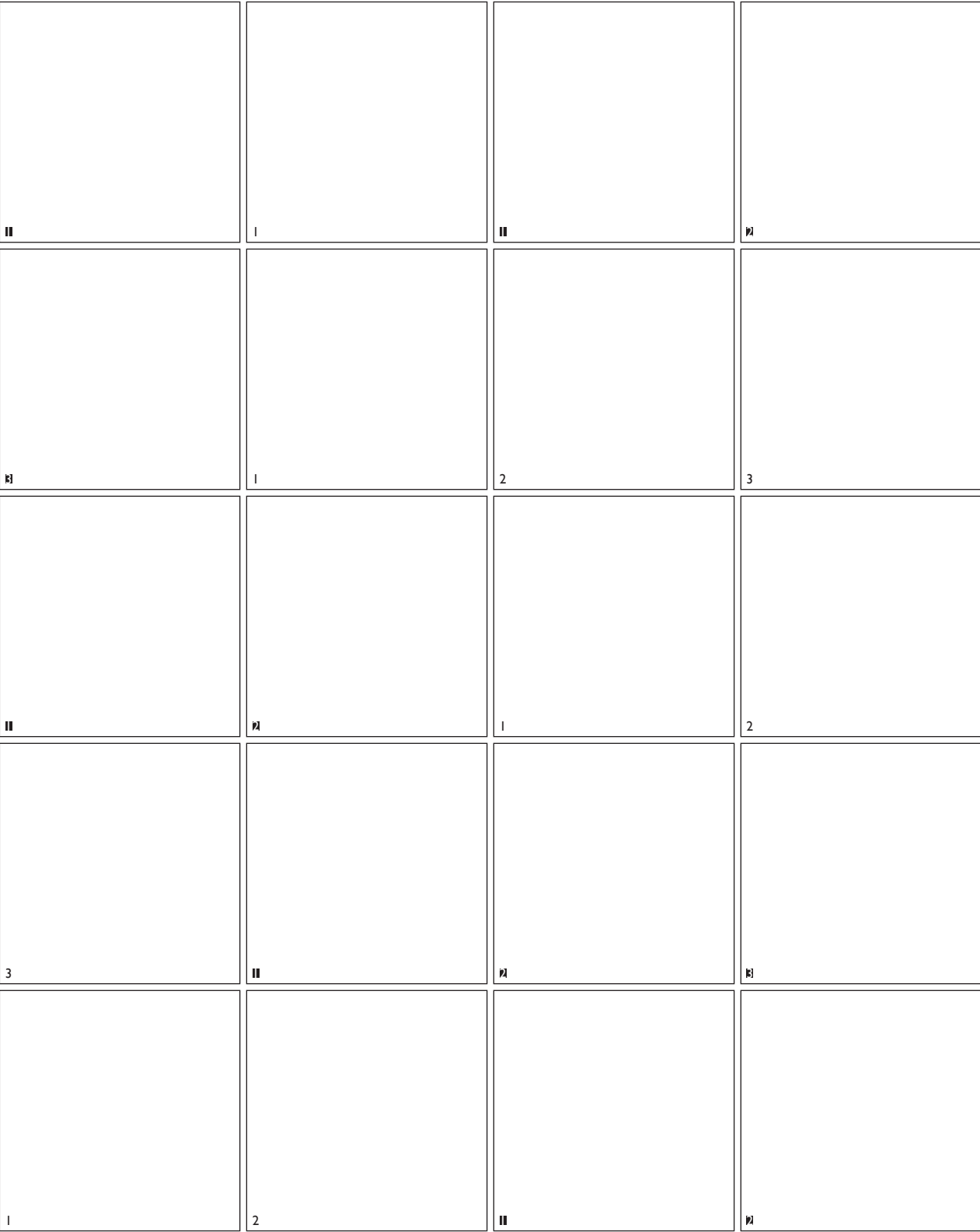
TACTILE STORYTELLING USING A TRANSMEDIA APPROACH

AT EMILY CARR UNIVERSITY OF ART + DESIGN

FROM SEPTEMBER 2017 TO APRIL 2020

HAOLIN LIU

3



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PREFACE

Abstract	2
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Abstract

This project aims to gain an understanding of storytelling using a transmedia approach. Throughout the research, I explored how knowledge is generated using a multi-stage process that moves from poetry writing to tapestry weaving, and then to audio recording. My primary objective has been to use a transmedia approach, considering how different media formats interact, to open up and explore how my personal story is interpreted between myself and the audience. By using a transmedia approach, this research project allows me to create an immersive sensory experience for the audience in a way that provides an example for future design research. By designing, encoding, and studying of artifacts created using the TC-2 Digital Jacquard Loom, this research aims to investigate how woven tapestry can help people visualize and experience emotion. As a result of this research, I have created the media formats of tapestry, poetry and audio using a creative transmedia storytelling process, as well as "Hands-on weaving" workshops to provide opportunities for everyone from non-designers to experienced weavers to conduct personal material exploration. What I have found is that it is possible for emotions to be elicited through weaving by employing a transmedia approach causing a synergistic understanding between the storyteller and audience.

Keywords

Memory visualization, practice-based research, oral history, transmedia storytelling, TC-2 loom

Glossary

Seven-end satin:

A satin weave structure with 7 warps.

Satin weave:

Satin weave is a weaving pattern achieved by 'floating' the warp or weft yarn over four or more of the opposite yarn. The floating yarn is then passed under one of the opposite yarn before repeating the process again. Due to the long distance between the interlocking of yarns, the satin weave is able to create a smooth, lustrous sheen on the face of a fabric.

Sfumato:

A technique of fine shading and soft transitions between colours and tones.

Synergistic:

The combined effect of multiple activities exceeds the simple sum of that of each individual activity.

Weft-backed weaving:

The weft-backed structure uses one warp just for the binding, and multiple numbers of wefts. A typical weft-backed structure has a weft-faced structure for the front side of the tapestry, allowing specific wefts to float and be visible. As a result, the weft-backed weaving is able to present complex and polychromatic design on the surface.

Warp:

The longitudinal yarn held in stationary during weaving.

Weft:

The transverse yarn threaded through the warp using a shuttle.

Tapestry:

Tapestry is a hand-weaving technique where horizontal weft threads are tightly packed to cover vertical warp threads. Weft threads are woven into blocks of colour, forming images and patterns. The term however has come to be used to describe large-scale narrative textile projects.

Weaving shrinkage:

Weaving shrinkage in the context of my study does not refer to material shrinking after being washed, rather, it refers to the discrepancy between the original image pattern and the weaved tapestry, due to the difference in the fibre diameter of warp and weft, or due to the various number of shuttles used in weaving.

Loom:

A loom is a device used to weave cloth and tapestry. The basic purpose of any loom is to hold the warp threads under tension to facilitate the interweaving of the weft threads. The precise shape of the loom and its mechanics may vary, but the basic function is the same.

Morse code:

Morse code is a method used in telecommunication to encode text characters as standardized sequences of two different signal durations, called dots and dashes or dits and dahs.

Cis:

Ci is a type of lyric poetry in the tradition of Classical Chinese poetry. Ci use a set of poetic meters derived from a base set of certain patterns, in fixed-rhythm, fixed-tone, and variable line-length formal types, or model examples. The rhythmic and tonal pattern of the ci are based upon certain definitive musical song tunes.

Acknowledgement .- -. .- .- .- .- .- .- .- .- .- .- .- .-

To my thesis committee - Keith Doyle, Gillian Russell and Nithikul Nimkulrat for your mentorship of my research project, which will guide me a long way as an art designer.

To H  l  ne Day Fraser for your support and encouragement throughout my study at Emily Carr, which is the best gift an ECUer can hope for.

To Jen Hiebert and Hanna Haapasalo, for teaching me to weave. Thanks to you, when I am immersed in weaving, I feel my true self.

To the weaving artists who participated in my interviews, as Anita Moorjani puts it, "In the tapestry of life, we are all connected. Each of us is a gift to those around us helping each other be who we are, weaving a perfect picture together".

To Brandon Quaal and Heather Fitzgerald, for mentoring my English and proofreading my work. Next
peer's on me.

To my fellow MDes 2019 & MDes 2020 classmates, I am so fortunate to be able to spend time with both cohorts and to share thoughts, achievements, laughter and frustration with you.

To my family back in China, thank you for your unconditional love and support. No matter how far I am from you, you are always where my anchor drops.

To Hanchen, for obvious reasons.

I

CONTEXT AND FRAMING

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Storytelling through design ... - --- .-. -.--- - . .-.. .-.. .. -. ---.

We process the past and the present through narrative based memories, as our brain thinks in stories, remembers in stories, and transforms our experiences into stories (Schank, 1990). Stories are an important mode for storing knowledge and assigning meaning to our experiences (Schank, 1990). Storytelling has been used in all societies and cultures tracing back to cave drawings, where we first used visual stories to document and exchange information, possibly to warn, teach, and inspire within our earliest communities (Sova, 2006). Storytelling is the social and cultural activity of sharing stories through oral narration, but also through other media forms and techniques such as writing and narrative art, film, and comics or graphic novels.

Storytelling should not be seen as simply repeating a fully understood situation using words; rather, from the standpoint of the audience, storytelling is the revealing of journeys and emotions experienced by the storyteller. Equally importantly, storytelling is a process of discovery and exploration for the teller (Parrish, 2006). Ideally, storytelling should include bringing pieces of experiences together in the shared imagination to explore their interaction, as well as the interaction between the teller and the listener (Sametz et al, 2003). Through design, stories can be empowered to inspire imagination, evoke feelings, and eventually be narrated across diverse cultures and backgrounds.

Experience . -.-.- .---. .-. .-. .-. .-. .-. .-. .-

My mother worked as a fashion designer. Ever since I could remember, my mother has worked with fabrics of various materials and colours, which is why patterns became key, indelible components of my childhood memory. When I was a child, my clothes were hand made by my mother, who is skillful at various techniques such as weaving, knitting, and hooking. Now, even though she is retired, she still keeps the New Year tradition of fabricating new clothes for family members. According to her, this is the Chinese New Year celebration tradition: you get new clothes to commence the New Year. When I first arrived in Canada to pursue my graduate studies, I felt very excited and curious about

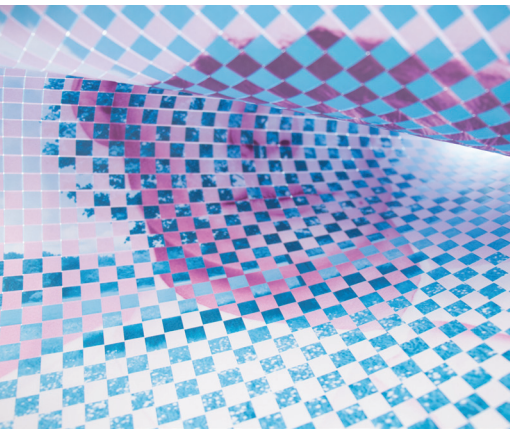


Figure 1: Weaving poster



Figure 2: Embroidery irises

Schank, R. (1990). *Tell me a story: A new look at real and artificial memory*. New York: Charles Scribner & Sons

Sova, R., & Sova, D. H. (2006). *Storyboards: a dynamic storytelling tool*. In *Proceedings of the 2006 UPA conference on Usability through Storytelling*.

Parrish, P. (2006). *Design as storytelling*. *TechTrends*, 50(4), 72-82.

Sametz, R., & Maydoney, A. (2003). *Storytelling through design*. *Design Management Journal (Former Series)*, 14(4), 18-34.

Galloway, F. J., & Jenkins, J. R. (2009). *The adjustment problems faced by international students in the United States: A comparison of international students and administrative perceptions at two private, religiously affiliated universities*. *NASPA journal*, 46(4), 661-673.

Wei, M., Heppner, P. P., Mallen, M. J., Ku, T. Y., Liao, K. Y. H., & Wu, T. F. (2007). *Acculturative stress, perfectionism, years in the United States, and depression among Chinese international students*. *Journal of Counseling Psychology*, 54(4), 385.

Long, G. A. (2007). *Transmedia storytelling: Business, aesthetics and production at the Jim Henson Company* (Doctoral dissertation, Massachusetts Institute of technology).

Parkinson, D., & Bohemia, E. (2012). *Designer storytelling*. In *DS 74: Proceedings of the 14th International Conference on Engineering & Product Design Education (E&PDE12) Design Education for Future Wellbeing*, Antwerp, Belgium, 06-07. 2012.

Beckman, S., & Barry, M. (2009). *Design and innovation through storytelling*. *International Journal of Innovation Science*, 1(4), 151-160.

Porter, L., & Sotelo, S. (2004). *Design by narrative*. *Design by Narratives*. *Congresco International ERRG*.

my new life. However, as the first semester started, I realized the language barrier could result in a gap between my expected academic life and the reality. For instance, I was afraid of participating in discussions in class and I was hesitant and reluctant to discuss with the professors after classes. Some researchers of education consider language barriers as one of the greatest academic issues hindering smooth adjustment for international students (Galloway et al., 2005). In addition, I gradually realized that the social and cultural discrepancies would be an even greater challenge for me to address: the stress of fitting in could potentially develop into academic pressure, feelings of inferiority, and even depression (Wei et al., 2007). Thus I felt the desire to communicate, share my stories, and express my nostalgic feelings.

I made several attempts to facilitate and overcome these challenges, such as daily meditation. As a result, I tried some exploratory design practices related to meditation. For instance, weaving poster and embroidering irises (see Figure 1, 2). As these projects progressed, I realized that the material practice of visualizing symbols for meditation opened opportunities for me to use a transmedia approach to set the conditions for comprehension, contextualization, and reflection. I hope to use the transmedia approach in which the various media types interact and contribute to each other throughout the storyline (Long, 2007). In other words, using various media modes to tell my story and contribute to the meaning of and reflection on that story. I selected fabric weaving as one way to tell the story of me and my mother, because weaving is also the media form that my mother worked with as a fashion designer. I also decided that writing poems and making audio recording, being two of the most conventional and fundamental ways of storytelling (Long, 2007), could also help me explore this story in other ways.

Rationale .-. .- - .. --- -. .- .-.. .

The motivation for my work is rooted in trying to understand how various media interact with each other during storytelling and how the interpretation or transmediation exists between the storyteller and audience. Many scholars share the idea that artefacts created by designers can tell stories (Parkinson et al., 2012). For example, Beckman et al., (2009) who examine storytelling within the business and organizational context, identify that storytelling plays a core role throughout the design process as the story “first frames the situation as it is, and then reframes it to make things better”. Porter et al., (2004) declare that all “designers, like all design objects, tell stories, sometimes deliberately, many other times without much degree of consciousness”.

In the digital era, multiple media approaches are frequently utilized in the storytelling and design fields. Even in engineer-design in the technical field, storytelling appears to be a central mechanism in the development of a common language amongst design teams, which could be an indicator

of good design (Lloyd, 2000). Thus it would be important to understand how to achieve a greater influence over the impact of the design artefact through the interaction and synergy of various media approaches.

Lloyd, P. (2000). Storytelling and the development of discourse in the engineering design process. Design studies, 21(4), 357-373.

Research question .- -.- .-.-.-. / ---.- ..- - .. --- -. .

My design research activities started by asking the question: “How can I use a transmedia approach to storytelling through design?” My research aims at designing a creative process to tell stories and proving the feasibility of such a process through practice-based research and weaving workshops. Through the research, my work examines and addresses several technical obstacles of using media forms to tell stories, also assesses any addition or omission of content when a transmedia approach is used to deliver the story, along with any information gained or lost in the perception of the audience. The scope of the project is focused on poetry writing, tapestry weaving, and audio recording and their application within the practice-based research. I should mention that the application within other contexts (e.g. commercial or business) is out of scope for this research project and will not be addressed in this study.

II DEVELOPMENT OF RESEARCH

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Methodology -- . - --- -.. --- .-.. --- --. -.-

Inspired by an exhibition

Textiles can be a strong tool to tell personal stories as well as preserve communal memories, especially in combination with other media forms. I became aware of its power in my visit to the “Torah Stitch by Stitch” exhibition at the Textile Museum of Canada in Toronto, Ontario (see Figure 3, 4). The project invited over 1,400 participants from all over the world to cross-stitch the Torah. The final versions of the Torah were exhibited alongside a documentary film that explored the history of tapestry. I was amazed with the multiculturalism expressed through this project, as it was completed by contributions from participants with diverse cultural and religious backgrounds. Also, during the exhibition, I was impressed and inspired by the additional media approach of documentary film to tell the stories behind the artefact. This project directly inspired my own research to explore various media types to tell stories.

Weaving entanglement

Among the many kinds of handicrafts practiced around the world, I chose weaving not only because I grew up around my mother who is familiar with weaving and its techniques, but also because weaving is inherently connected with storytelling: “Thought is a thread, and the raconteur is a spinner of yarns – but the true storyteller, the poet, is a weaver. The scribes made this old and audible abstraction into a new and visible fact” (Bringhurst, 2004). This metaphor by Canadian poet and typographer Robert Bringhurst makes great sense: “You tell a story like you weave a tapestry”. Repetition and pattern, moving the story along a path like a piece of thread you’re spinning, putting large pieces together, crafting small pieces carefully, to get things put together right. It’s art and it’s craft and it’s a valuable skill. As I was weaving using the loom, my mind and body became immersed with the rhythms of the tasks and these repetitive motions provided an ideal atmosphere to reflect on my childhood story. The progression of a tapestry is integrated into the rhythms of storytelling in a manner that induces an embodiment of narration. The integration and entanglement between craft creation and narrative has been observed by many scholars and is considered to be reflective of the importance of craft making in constructing identities, both personally and collectively (Rowley, 1997; Darlaston, 2013). I feel deeply connected with my mother through the shared movement of the loom operation and the gesture of weaving.

Workshops

Peer review

Usually weavers work in solo in pattern design as well as in the weaving process. Thus workshop offers an opportunity for participants to work in pair to discuss and to discover how weaving as a media type to tell their stories. Frame loom weaving is a weaving skill that people can learn fairly easily,

Bringhurst, R. (2004). *The elements of typographic style*. Vancouver: Hartley & Marks.

Rowley, S. (1997). “There once lived...”: *Craft and narrative traditions*. *Craft and Contemporary Theory*, Sydney: Allen and Unwin.

Darlaston, K. (2013). *The generative loom: Tapestry in the community*. *Craft Plus Design Enquiry*, 5.



Figure 3: Stitchers

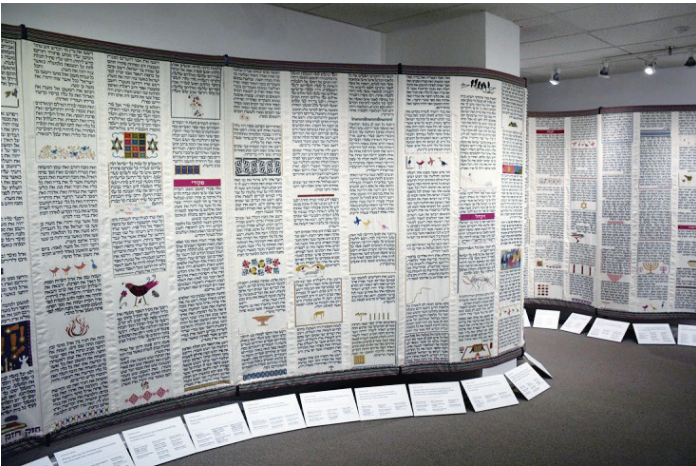


Figure 4: “Torah Stitch by Stitch” exhibition



Figure 5-1: Weaving workshop process #1



Figure 5-2: Weaving workshop process #2



Figure 6-1: Hands-on weaving workshop process #1



Figure 6-2: Hands-on weaving workshop process #2

even for those with minimal background knowledge in weaving. For that reason, I selected it as the media to be explored by the workshop participants (peers in the MDes 2019 class) as an attempt to gain observations of storytelling through weaving. At the beginning of the workshop, the participants were asked to weave the most impressive memory of their life. As shown in Figure 5-1, and 5-2, the participants worked in pairs to weave from the end sides of the frame loom toward the centre. An interesting observation was that the level of communication was maximized when the weaving from both sides met in the centre of the weaving piece.

Transmedia storytelling workshop

The second workshop was conducted to further study how multiple media types can be utilized in combination to form a transmedia storytelling approach. This workshop was organized for peers in the MDes 2020 class with the theme of “a day in our life”. Instead of being focused on only weaving, the participants were asked to create a transmedia storytelling approach to tell their stories using the stages of composing, weaving, writing and oral storytelling. This workshop was designed so that the participants can practice and explore the transmedia storytelling approach to express their stories. An interesting comparison with the single media approach in the first workshop is that during the transmedia approach, the participants engaged in communication and interaction throughout the process (instead of only near the end), from the selection of media types to the presentation of their stories using various media (see Figure 6-1, 6-2).

Interviews

Although I have preliminary understanding of weaving techniques because of the environment I grew up with, to conduct the practice-based research, it would be essential for me to gain more knowledge and perspective of weaving to fully explore its potential in storytelling. I conducted interviews with other professional weavers, as interviewing is a useful method for researchers to gain the perspective of others (Qu et al., 2011). In my current studies, up until the writing of this thesis, I have interviewed 10



Figure 7: Interview with Hanna Haapasalo

Qu, S. Q., & Dumay, J. (2011). *The qualitative research interview. Qualitative research in accounting & management.*

Candy, L., Edmond, E.. (2018) *Practice-Based Research in the Creative Arts Foundations and Futures from the Front Line. ISAST LEONARDO, Vol. 51, No. 1, pp. 63–69*

Malins, J., Gray, C..(1999) *The digital thesis: recent developments in practice-based PhD research in art & design. The Robert Gordon University.*

professional weavers (either face-to-face or video call) from various walks of life, nationalities, and sexual orientations. A standard script of questions was developed to guide the interview. The interview questions were designed to facilitate the understanding of the inner world of the interviewees, and the replies were interpreted as a channel of communicating ideas and concepts leading to in-depth, shared understanding. The interviews were focused on how weaving was used to tell their stories, express their feelings, as well as being a channel to communicate with their audience. That being said, during the interview, there were controlled flexible detours at times from the scripted questions as the interviews were conducted in a conversational format.

The interview script and photos taken during the interviews are presented in the Appendix page 50. I would like to highlight one interview with a Vancouver-based Jacquard artist Hanna Haapasalo. Hanna’s inspiration comes from both the natural and urban environments, and in much of her work, she brings the two elements together. During our interview she provided a technical explanation of shrinkage, visible in the platform clock (see Figure 7): note the difference with a “perfect” red circle, due to the variance between the thickness of warp and weft, which proved the importance of conducting material shrinkage testing prior to commencing the actual weaving.

In this interview, Hanna passed on other technical advice, as a professional weaver, such as selection of thread material, techniques of operating the TC-2 loom, as well as the creation of a mesmerizing sfumato effect. However, the most inspiring part of the interview was Hanna’s perspective on storytelling through weaving: “Compared with photo or video recording, I prefer utilizing tapestry to narrate my memories, as the amount of emotion expressed through an artefact is in some way proportional to the duration it was created.” (Personal communication, August 22, 2019)

Theoretical framework - --- .-. . - .. -.-. .- .-..

The theoretical framework consists of practice-based research, transmedia storytelling, weave code technology, and morse code. These theories were used to build a foundation for my selection of research methods and to identify the scope of my research.

Practice-based research

Practice-based research is defined as “an original investigation undertaken in order to gain new knowledge, partly by means of practice and the outcomes of that practice” (Candy et al., 2018). Practice-based research requires the researcher to work within a defined framework and to take a participatory role to engage in observation, reflection, and evaluation and finally to disseminate the knowledge gained (Malins et al., 1999).

The key components of my thesis research are practice-based, exploring how to tell stories using a transmedia approach. The research started with exploring tactile storytelling through various media types, but after conducting interviews and workshops, I found the format of writings and audio recordings could also be utilized to create a synergistic effect on the original story.

Through the practice-based research, it is expected more meaning and knowledge will be gained through learning various artefact creation practices, as well as exploring how the creator will interact with the materials and tools over time. As Nimkulrat et al., (2019) concluded in a study examines the collaborative practice between an analogue and a digital craft practitioner, "A creative endeavour rooted in material practice simultaneously considers fabrication limitations and opportunities, the history of the material, its specific origins, the references that are inferred by its surface and form". In addition, although my personal story is to be used to demonstrate storytelling, the practice-based research is not designed to express my own feelings and emotions, but rather to explore storytelling through design and to unveil possibilities of materials. Ultimately, the design researcher should ensure artifacts created "to be understood and used in terms of their capacity to provoke conjecture and facilitate connection, linking ideas and people" (Day Fraser, 2017).

Transmedia storytelling

Various media types were utilized to tell story related to my mother and I via weaving, text, and sound. This transmedia storytelling approach is used instead of adapting one single type of media to retell the story (i.e. adaptation) because it offers multiple channels of communication with the audience and provides a degree of freedom in terms of choosing how or where to enter a story (Long, 2007).

Transmedia storytelling, as its name reveals, is not only the process of telling stories via various media types but, more importantly, having these media types interact and contribute to each other throughout an entire storyline (Long, 2007), which is the key distinction between the method

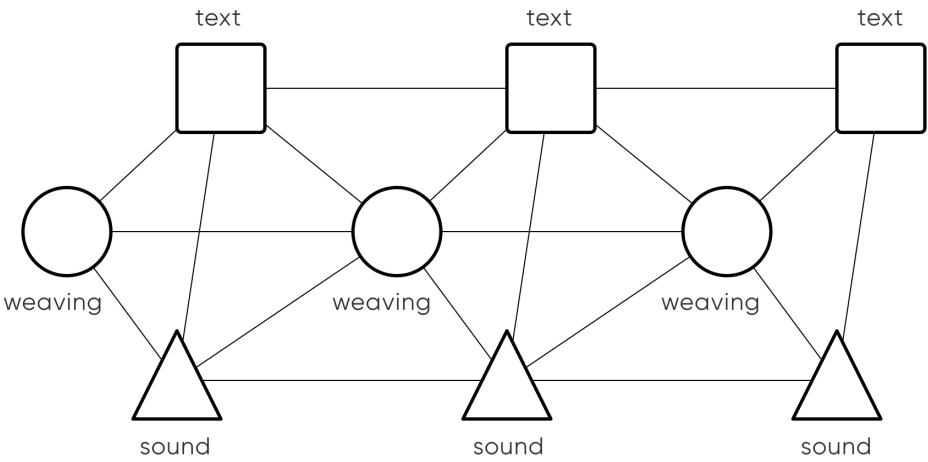


Figure 8: Transmedia narrative diagram

Nimkulrat, N, Oussoren, A, Day Fraser, H and Doyle, K (2019) Collaborative craft through digital fabrication and virtual reality. In: RTD2019 Method & Critique – Frictions and Shifts in RtD, March 19–23, 2019, Delft, The Netherlands. Available at <http://openresearch.ocadu.ca/id/eprint/2658/>

Day Fraser, H. (2017). Ambiguity at play: Open-ended making used in mixed material-participatory research practice. *Cogent Arts & Humanities*, 4(1), 1396647.

Long, G. A. (2007). *Transmedia storytelling: Business, aesthetics and production at the Jim Henson Company* (Doctoral dissertation, Massachusetts Institute of technology).

Apperley, T. (2004) 'Getting Stuck on Level One: Designing a Research Method Appropriate to X-box' University of Melbourne, Melbourne, Postgraduate Seminar, Available at: <http://members.optusnet.com.au/christydena/MultichannelResources.htm>

Jenkins, H. (2006). *Convergence Culture – Where Old and New Media Collide*. New York University Press.

Dena, C. (2004). Current State of Cross Media Storytelling: Preliminary Observation for Future Design. Delivered by Monique de Haas at 'Crossmedia communication in the dynamic knowledge society' networking session, European Information Systems Technologies Event, The Hague, Netherlands, 15 Nov, 2004.

Xin, B., Hu, J., Baci, G., Yu, X. (2011). Development of Weave Code Technology for Textile Products. *FIBRES & TEXTILES in Eastern Europe* 2011, Vol. 19, No. 2 (85) pp. 33–35.

Seo, J. (2015) *Jacquard Weave for Interior Design: Valuing Arts and Crafts through Encoding Emotion and Information*. Ph.D thesis submitted to The Royal College of Art.

of “transmedia storytelling” and “multimedia storytelling” or “cross-media storytelling”. Many scholars consider transmedia storytelling encouraging and promising as through the process of the assemblage of disparate media, the audience is able to experience the sense that each product is “part of a wider mediated universe” (Apperley, 2004). Henry Jenkins, an expert on transmedia storytelling, recognizes that from a business perspective, transmedia storytelling “reflects the economics of media consolidation, or what the industry observers call ‘synergy’” (Jenkins, 2006). This “synergistic” effect could potentially result in the optimization of reflection and comprehension compared with the simple “addition” of the multi-media process (see Figure 8). To achieve such a synergistic effect in the transmedia process, each form of media, although being accessible by itself, should be able to reference each other and interact with each other while making its own unique, yet essential, contribution to the narrative system as a whole (Apperley, 2004; Dena, 2004).

Weave code technology

Weaving is an ancient and systematic technology which interlaces the horizontal weft through the longitudinal warp, fixed on a loom, to form a piece of fabric. With the advancement of weaving engineering, fabrication is no longer limited to simply meeting the basic human need for cloth. Nowadays, weaving can be used to make fabrics for either aesthetic purposes or for a combination of other purposes such as waterproofing, bulletproofing, fireproofing, among others.

Each weave reveals a two-dimensional arrangement of warp and weft intersections, which can be represented mathematically by a binary matrix: 1- stands for warp on weft; 0 - stands for weft on warp (see Figure 9). The density of mathematical information can be increased by using yarns of multiple colours and even multiple materials. The expression ‘weaving coding’ was first used by V. Milasius in 1988 within the context of computer-aided textile design software (Xin et al., 2011). In digital jacquard weaving, designers input their design and a computer transfers the images to pixels and then designers create structures, namely the ‘weave code’, with a textile Photoshop program (Jimin, 2015). Compared with manual weaving, the digitized weaving is more efficient to transfer from design to output, and it makes the integration of complex structures in a woven fabric design feasible.

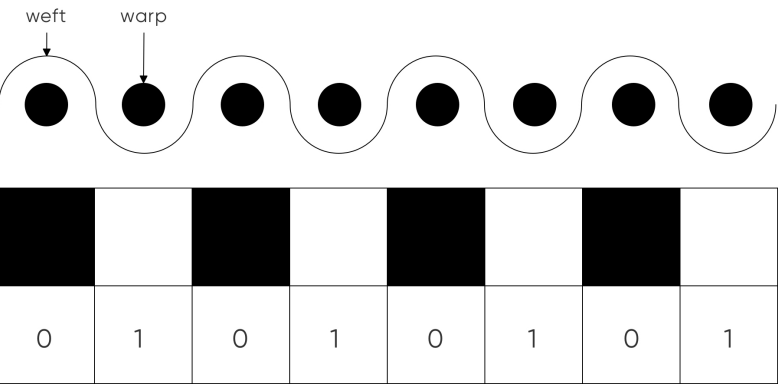


Figure 9: Binary status of yarn interlacing

As a theoretical grounding, I used weave code technology to explore the potential ability to express my story through digitization. There are numerous warp-weft combination possibilities in the weaving structure matrix, thus it opens opportunities to select certain combinations are able to endow information. This can potentially contribute to storytelling at a detailed level.

Morse code

The coding system I decided to work with to create my weave code was morse code. Morse code is a method used in telecommunication to encode text characters as standardized sequences of two different signal durations, called dots and dashes or dits and dahs. Both morse code and the warp-weft combination can easily be interpreted as binary systems, enabling me to encode my story with a weave code. This section demonstrates how the morse code (Table 1) is embedded in the design of the weaving structure. The morse code structure I employed is based on the following international morse code timing rules (Gilbert, 1969):

- 1. The length of a dot is one unit.
- 2. A dash is three units.
- 3. The space between parts of the same letter is one unit.
- 4. The space between letters is three units.
- 5. The space between words is seven units. (since only the initial letters of the first words are coded, the space between words is of no concern)

Gilbert, E. N. (1969). How good is morse code?. *Information and Control*, 14(6), 559-565.

Morse code represents the earliest form of digital communication, and since its invention, there have been occasions when morse code is applied in the art realm. For instance, morse coded tempo has been used in hiding messages in Steglbiza music (Szczypiorski, 2016). Morse code may also be used to embed messages in needlework as Monica Ferris (2010) wrote in her novel *A Stitch in Time*.

Szczypiorski, K. (2016). Stegibiza: New method for information hiding in club music. In *2016 2nd International Conference on Frontiers of Signal Processing (ICFSP)* (pp. 20-24). IEEE.

Ferris, M. (2010). *A Stitch in Time*. Penguin.

Letter	Code	Letter	Code	Letter	Code	Letter	Code	Letter	Code	Letter	Code	Letter	Code
A	._	B	_...	C	_._.	D	_..	E	.	F	.._.	G	_ _.
H		I	..	J	._ _ _	K	_._	L	._..	M	_ _	N	_.
O	_ _ _	P	._ _ .	Q	_ _ . _	R	._.	S	...	T	_	U	.._
V	..._	W	._ _ _	X	_ . _ _	Y	_ . _ _	Z	_ _ ..				

Table 1: International morse code - letters

III DESIGN OUTCOMES

Creative process	20
Composition - English poem	20
Weaving	21
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Audio	28

(Lewis, 1999). Weaving tapestry is essentially a two-step process which includes artistically designing the pattern and meticulously realizing the pattern using a loom, thus it can be seen as a mixture of art and science. In addition, the detailed weaving structure can possibly be explored for other meanings.

Weaving is the process of perpendicularly interlacing warp and weft yarns (i.e. filling) with each other. There are a near endless number of combinations of interlacing warp and weft, making the fabric structure versatile and dynamic. Since each individual warp-weft combination is too small to be viewed by the naked eye, it is necessary to zoom-in to show an enlarged demonstration of the warp and weft profiles of a woven fabric to understand the structure. For single layer fabrics, the drawing of these profiles is relatively easy. Figure 10 shows the warp and weft profiles of a five-warp by five-weft woven fabric structure in a single layer fabric.

I chose to use the Thread Controller 2 (TC-2) loom, a very modern digital jacquard loom in the textile weaving step of storytelling. The TC-2 loom is a tool that can be used during the innovative or the creative phase of weaving and is designed primarily for sampling (Digital Weaving Norway 2019).

I will not dive into the technical details of weaving using the TC-2 loom in this paper; instead, I followed the key steps as outlined in Chapter 11 of *The Woven Pixel* (Schlein et al., 2006) to weave the image:

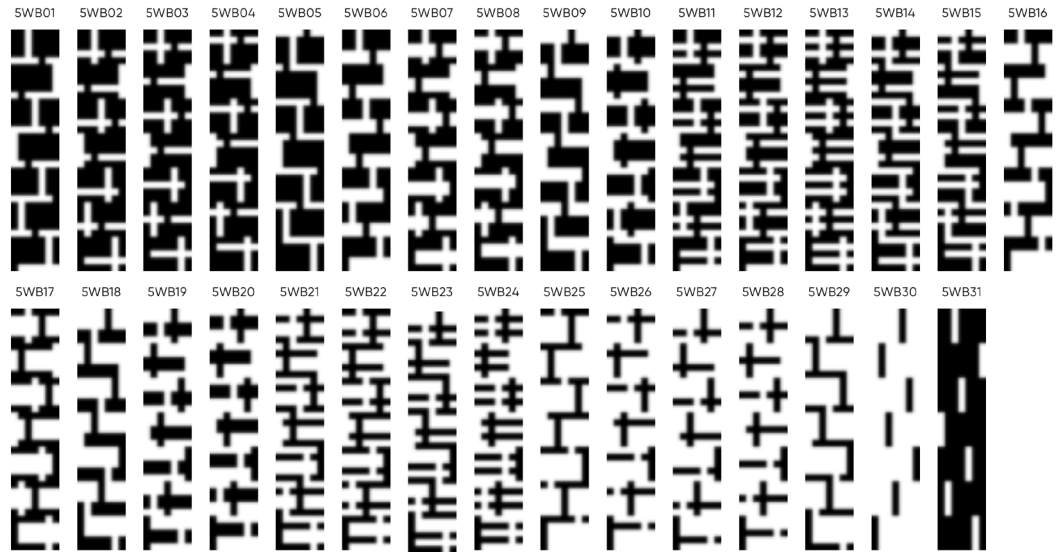


Figure 11: Thirty-one combinations realized by a 7-end satin 5-weft system

Colour presentation in a 7-end satin 5-weft weaving structure

Satin weave is a weaving pattern achieved by ‘floating’ the warp or weft yarn over four or more of the opposite yarn. The floating yarn is then passed under one of the opposite yarn before repeating the process again. Due to the long distance between the interlocking of yarns, the satin weave is able to create a smooth, lustrous sheen on the face of a fabric. In weaving, a

Lewis, S. (1999). *The rhetoric of power in the Bayeux Tapestry* (p. xv169). Cambridge University Press.

Digital Weaving Norway. "TC-2 Loom: Digital Weaving Machine." Digital Weaving Norway, 2019. www.digitalweaving.no/tc2-loom/.

Schlein, Alice, and Bhatki Ziek. *The Woven Pixel: Designing for the Jacquard and Dobby Looms Using Photoshop*. Bridgewater Press, 2006.

Five weft systems				
Preset number	Number of weft	Top weft system	Back wefts	Face structure
5WB01	5	1	2, 3, 4 & 5	1/6 stain
5WB02	5	2	1, 3, 4 & 5	1/6 stain
5WB03	5	3	1, 2, 4 & 5	1/6 stain
5WB04	5	4	1, 2, 3 & 5	1/6 stain
5WB05	5	5	1, 2, 3 & 4	1/6 stain
5WB06	5	1 & 2	3, 4 & 5	1/6 stain
5WB07	5	2 & 3	1, 4 & 5	1/6 stain
5WB08	5	3 & 4	1, 2 & 5	1/6 stain
5WB09	5	4 & 5	1, 2 & 3	1/6 stain
5WB10	5	1 & 5	2, 3 & 4	1/6 stain
5WB11	5	1 & 3	2, 4 & 5	1/6 stain
5WB12	5	1 & 4	2, 3 & 5	1/6 stain
5WB13	5	2 & 4	1, 3 & 5	1/6 stain
5WB14	5	2 & 5	1, 3 & 4	1/6 stain
5WB15	5	3 & 5	1, 2 & 4	1/6 stain
5WB16	5	1, 2 & 3	4 & 5	1/6 stain
5WB17	5	2, 3 & 4	1 & 5	1/6 stain
5WB18	5	3, 4 & 5	1 & 2	1/6 stain
5WB19	5	1, 4 & 5	2 & 3	1/6 stain
5WB20	5	1, 2 & 5	3 & 4	1/6 stain
5WB21	5	2, 3 & 5	1 & 4	1/6 stain
5WB22	5	1, 3 & 4	2 & 5	1/6 stain
5WB23	5	2, 4 & 5	1 & 3	1/6 stain
5WB24	5	1, 3 & 5	2 & 4	1/6 stain
5WB25	5	1, 2, 3 & 4	5	1/6 stain
5WB26	5	1, 2, 3 & 5	4	1/6 stain
5WB27	5	1, 2, 4 & 5	3	1/6 stain
5WB28	5	1, 3, 4 & 5	2	1/6 stain
5WB29	5	2, 3, 4 & 5	1	1/6 stain
5WB30	5	1, 2, 3, 4 & 5	None	1/6 stain
5WB31	5	None	1, 2, 3, 4 & 5	6/1 stain

Table 2: Five weft systems

satin is a collection of warp threads considered a single unit. In my project, I decided to use a 7-end satin (i.e. 7 warps in black colour) system is considered to be the smallest satin giving adequate floats for hiding multiple wefts. Depending on the number of visible wefts floating on top of the warp, the 7-end satin can possibly have six face structures: 1/6, 2/5, 3/4, 4/3, 5/2, and 6/1, amongst which the 1/6 represent 6 wefts being on top and visible while only 1 warp is visible. I selected the 1/6 face structure as the template of future design for the following considerations:

- 1. It has the largest number of wefts floated and visible, thus it is able to present more profound colour effects.
- 2. The 6 floating units are inevitably continuous, making it possible for further maneuverability using a morse-code approach.

Using five wefts of various colours (red/copper, maroon, white/silver, blue and navy) were then utilized to interlace with the 1/6 satin, resulting in 31 combination possibilities. Table 2 shows these combinations while Figure 11 is an enlarged demonstration of the structures in a 7-end satin 5-weft system. I selected 11 combinations amongst the 31 total to realize the image through weaving. Among the 11 combinations, 2 are black or white and 9 use colour. The colourful 1/6 satin patterns are presented in the top portion of Figure 14 (original colour 1 - 9). In addition, I also selected 3 more colour combinations (i.e. different levels of greyness, as demonstrated as "grey 3, 2 & 1" in Figure 13-2) to include more combination possibilities, realizing different degrees of greyness.

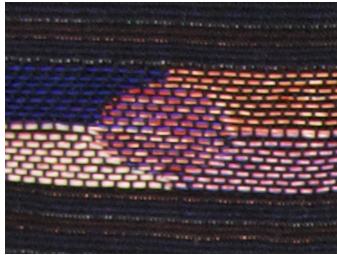
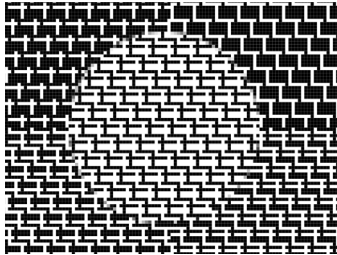


Figure 12-1: Shrinkage testing



Figure 12-2: Shrinkage testing

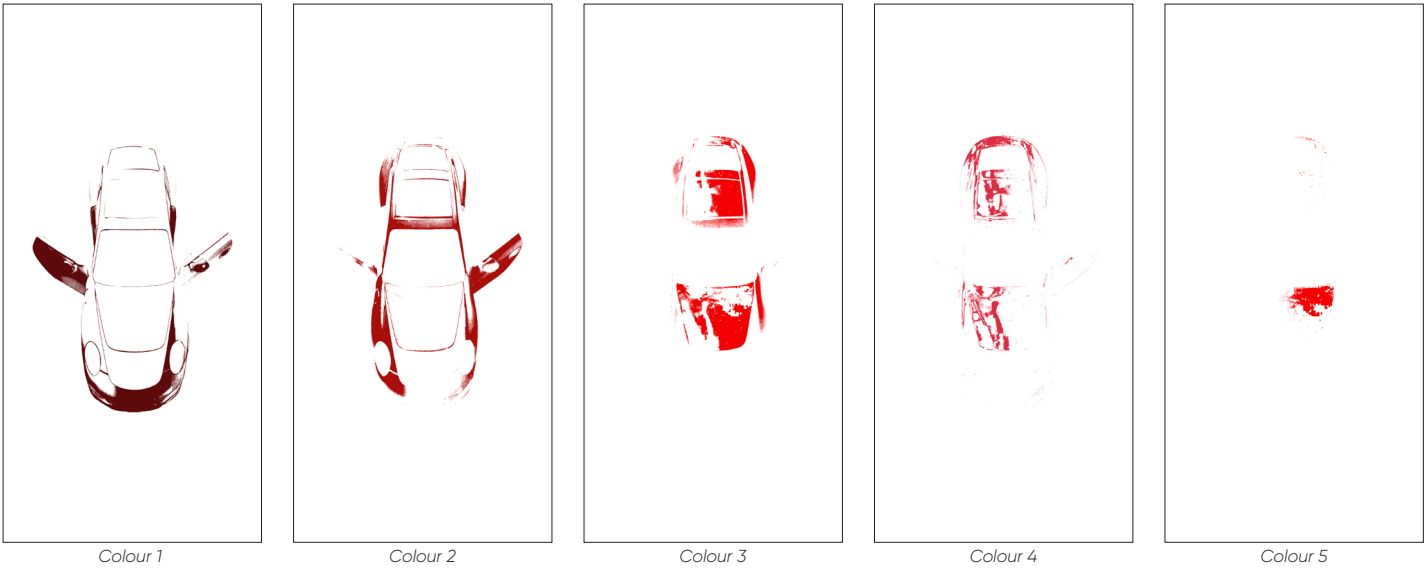


Figure 13-1: Nine layers with colour

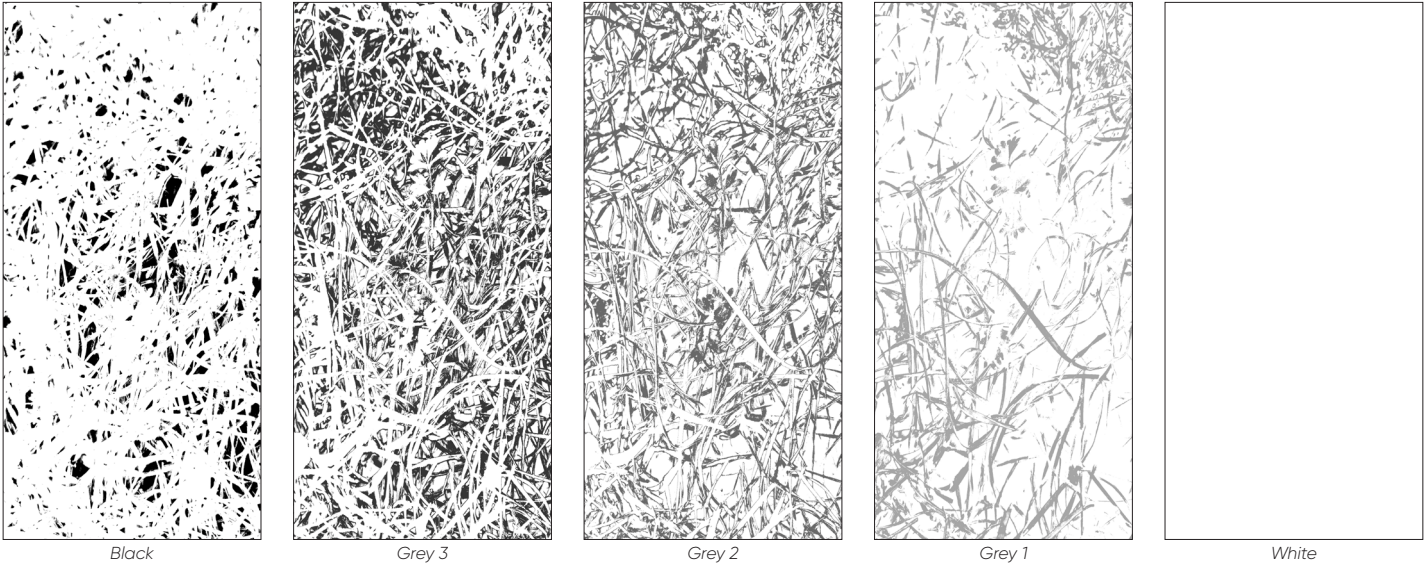


Figure 13-2: Five layers with black, white and grey

Shrinkage test

Due to the fact that the thickness of the warp is not identical to that of the weft, as well as other factors such the variation in tension of the warp and the weft density, the woven piece cannot be an actual 1:1 reflection of the original image, resulting in “shrinkage”. Consequently, the shrinkage effect should be offset by adjusting the width/length of the original image. This is done through weaving some sample images, determining the ratio of shrinkage between weaving and the original image, and then offsetting this ratio by adjusting the original image through Photoshop. To put it into the perspective of my own work, during the shrinkage test, an image of a “perfect circle” (top of Figure 12-1) resulted in the woven product of a “flattened” ellipse with minor axis to major axis ratio of 0.55 (bottom of Figure 12-1). Correspondingly, to achieve a weaving product of the intended image pattern (left of Figure 12-2), the original image has to be “elongated” by a ratio of 1/0.55, or 1.82 (right of Figure 12-2).

Deconstructing the image

The picture of the red toy car (Figure 13-1, previous page) is processed in Photoshop. The “Indexed Colour” mode of Photoshop is used to deconstruct the image into 9 colour elements. Then the “Magic Wand Tool” is used to separate the image into 9 layers, each layer representing a single colour.

Weaving the image

The weaving structures are then overlaid onto each layer to reconstruct the red toy car image. The image with the overlaid weaving structure from the previous steps can then be exported as a monochromatic bitmap image and utilized as the template for weaving on the TC-2 loom. The original and enlarged image after overlaying are shown in Figure 15 (opposite).

Implementing morse code

Based on the morse code system, the initial letters of each line of the poem: “F”, “W”, “I”, “N”, “L”, “M”, “S”, “A”, and “W” is represented by ·--·, ·--·, ··, ··, ·--·, --·, ··, ··, and ·--·, which has 9 unique dash-dot combinations. Each combination is then assigned to match one colour based on similarities with the weaving structure. Taking the letter “F” as an example: In the original colour pattern #1, the first shuttle is used as the “blank template”, then its morse code of “·--·” is applied to the first shuttle, resulting in the replacement of Satin #2 & Satin #4 with the floating weft. To better visualize this code, refer to colour 1 in Figure 14 to see how the morse code of “F” (i.e. ·--·) is reflected in the red-white bitmap. It is also visible that due to the limited number of satin weaves in total, the right-most dot (·) of the morse code of “F” cannot be integrated into the 7-end satin pattern. However, it is the coding approach most close to the original morse code achievable

in the 7-end satin. The same coding approach is repeated using morse codes of other letters to the other colour weaving structures, as demonstrated in the “morse coded” portion of Figure 14.

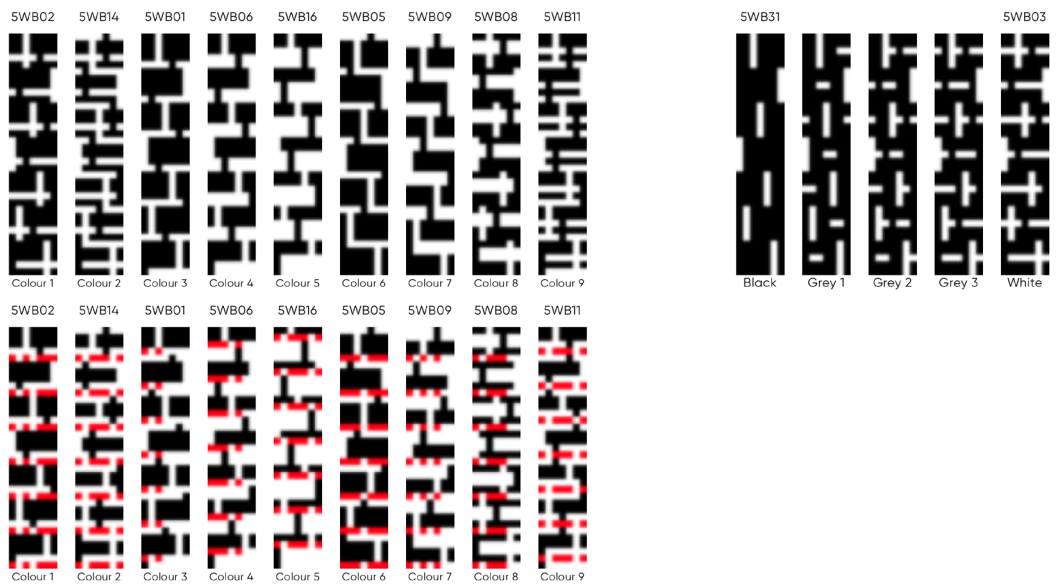


Figure 14: Nine coloured (before and after morse coded) and five monochromatic weaving structures

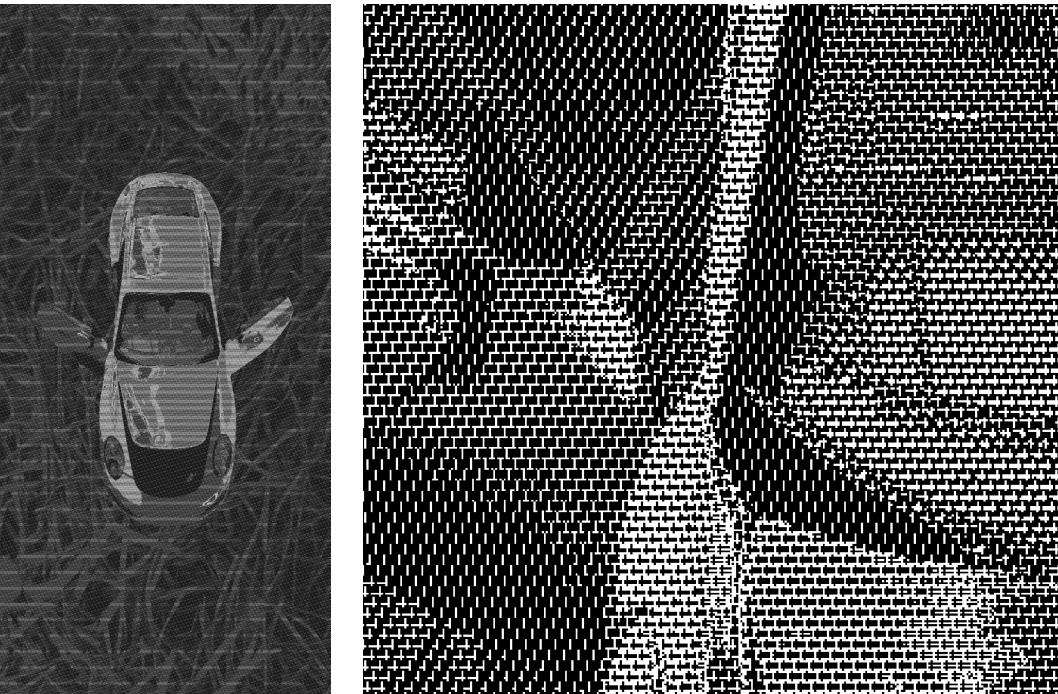


Figure 15: Original overlaid image (left) and enlarged showing details of weaving structure (right)

Composition – Chinese poem

Upon the completion of the tapestry, the next stage of storytelling was performed by using a form of classical Chinese poetry – regulated verse. The writing of the Chinese poem was dictated by the following considerations:

- 1. In Chinese regulated verse, the even lines are strictly rhymed and the tonal profile of the poem (as the Chinese language is tonal) is regulated according to certain fixed patterns. Due to the regulated protocols and the nature of the Chinese characters, this form of poetry is highly rhythmic and condensed with energy and emotions.

2. Writing a Chinese poem became a meaningful approach for me and I came to know it as the reflective writing stage, in the sense that I am reflecting on the story with my mother in my mother tongue. The reflective writing process resembles the journey of exploring the unknown world while maintaining my own identity.

Three stages were employed in creating the Chinese poem: recollection, reflection and transformation. In the recollection stage, I reviewed my tapestry and also my daily reflection journal that I had been recording throughout the creative process. In the reflection stage, the key moments, as well as the key decisions made during the creation process, were critically analyzed. In the transformation stage, my renewed feelings and emotions, combined with my previous childhood memories and new thoughts, emerged from the creation and the direct viewing of the weaving piece were then transformed into the Chinese poem below, which became the reflective writing of the weaving piece. The spelling of the poem using Hànyǔ Pīnyīn (the Romanization system to spell Mandarin Chinese) was enclosed following the Chinese poem, which demonstrated the regulation of rhythm and tonal sounds.

西江月 寄居

年少寄居乡下，慈祥祖母相依。野村少有童年趣，寂寞难寻友谊。
阿母怜余寂苦，赠予汽车玩具。红色车身满欢怡，慰藉童年回忆。

Xī jiāng yuè jì jū

Nián shào jì jū xiāng xià, cí xiáng zú mǔ xiāng yī.

Yě cūn shǎo yǒu tóng nián qù, jì mò nán xún yǒu yí.

Ā mǔ lián yú jì kǔ, zèng yǔ qì chē wán jù.

Hóng sè chē shēn mǎn huān yí, wèi jiè tóng nián huí yì.

Audio

In today's visual-dominated world, audio is unusual, but it is still important in storytelling. Compared with images, sound pulls the audience to a deeper level: “whereas sight situates the observer outside what he views, at a distance, sound pours into the hearer” (Ong, 2013). The power of audio to convey, or even influence emotion, originates from its quality to “affect”, which means the ability to express one’s emotional state to another through the pitch, the pace, as well as the content in audio storytelling. From the standpoint of the audience, they receive sound and have the ability to interpret feelings absorbed through the sound, especially when the sound acts as a reminder of past events from their own history (Street, 2014).

Due to the unique features of sound wave mentioned above, I decided to record a soundtrack of

Ong, W. J. (2013). *Orality and literacy*. Routledge.

Street, S. (2014). *Ways of seeing, ways of saying: Review essay about ‘Poetry, Tx’ by Pejk Malinowski*. RadioDoc Review, 1. Retrieved June 5, 2014 from <http://ro.uow.edu.au/rdr/vol1/iss1/4/>

operating the TC-2 loom in weaving, in combination with the audio morse code of the English and Chinese versions of the poem as my third medium of storytelling. I expected that by combining the audio with the other media, the capacity of the audience to experience emotions and feelings will be synergized, as McHugh (2012) pointed out “if the sounds we hear—whether voice or ‘environmental’ sound—trigger an emotional response, we are more likely to absorb (be affected by) the content”. Both the sound of TC-2 loom operating and the audio morse code are rhythmic, which correspond to the literary feature of poetry, also they re-create the weaving process of the tapestry for the audience. From the perspective of the audience, sound of the TC-2 loom represents the repetitive motion of operating the loom and interlacing the warp and weft, and it is indicative of the time and effort my mother spent on hand making clothes for the family. The morse signal represents the connection between the weaving structure and the poem, and compared with oral reading of the poems, using the morse code delivers information through a more subtle way while creating an immersive experience for the audience.

McHugh, S. (2012). *The affective power of sound: oral history on radio*. *The Oral History Review*, 39(2), 187–206.



Figure 16: Audio demonstration

IV REFLECTION

Close-up tapestry	32
Further reflection	32

The process of designing the weaving, interviewing various weaving artists, and storytelling through weaving shaped my way of thinking and crafting art textiles – on the one hand I narrated my story via the manipulation of the material, on the other hand, I gained a deeper understanding of the characteristics of the material which, in turn shaped my technique of crafting the material. During weaving, some pieces of information in my story were embedded in the pixels of the warp–weft combination, but are not visible to the audience. Because of this limitation of the first tapestry, the knowledge I gained while creating it might not be apparent to others who view my work in an exhibition. Thus, I decided to weave a second piece of tapestry that would reveal the creation process, as well as visualize the weaving techniques as a supplement to the first tapestry.

Close-up tapestry -.-. .-.. --- -....- ..- .---. / -.- .---. - .-. -.-

In the second tapestry, I created a zoomed-in version of the original tapestry to facilitate reflection on behalf of myself as well as the audience. To me, this re-creation deepened my understanding of the practice-based approach by detailing the weaving structure, which also provided new thoughts for future designs. This new approach opens up more opportunities to present the audience a more visible representation of the weaving structures, and how these structures as an entity produce the overall picture.

To ensure consistency between the original and the magnified tapestry, I continued to use the five shuttles single layer weaving technique to create the second tapestry. In the lowest section I used thirty-one colour combinations in the 7-end satin 5–weft weaving structure (see Figure 17). The section above that is a shrinkage test demonstration. The section further above includes a representation of monochromatic and polychromatic patterns magnified (at the ratio of 5:1; 4:1; 3:1; 2:1 and the original). In the top section, I wanted to give the audience a demonstration of weaving, starting from a very loose weaving structure of 100–warp by 100–weft on the left to a very tight weaving structure of 1–warp by 1–weft on the right. Although it is a reflective piece for me, I hope audience can learn some basic weaving principles and gain a deeper understanding of the first tapestry. The second tapestry is reflective of the practice-based nature of the storytelling approach. The audience is able to see the details of the weaving structure, as well as the explorative process I experienced while creating the first tapestry. I hope through presenting the second tapestry which is composed with the various sections, it will add a more “dynamic” representation of the creation process, thus becoming an essential part of the transmedia approach.

Further reflection ..-. ..- .-. --.. / .-. ...-.-.-.. -.-. - .. --- -. .

My artistic thinking has been shaped by conducting this practice-based research regarding storytelling. Before commencing this research project, my instinct of crafting an artefact was to focus

on techniques, such as the technique of operating the loom machine, and selecting the colour of the materials. As I was conducting the research, especially through interviewing various weaving practitioners and reviewing literature, I came to the realization that the design of storytelling goes well beyond my initial understanding. For instance, creating and presenting an artefact can be regarded as a way to communicate with the audience. Thus it is essential to consider whether the audience’s interpretation of the artefact is consistent with the message I am attempting to deliver, as well as whether my creative process is informative to other weaving practitioners.

As I explored the various media approaches and means of documentation, I gained a deeper understanding of the transmedia approach: each media type does not work solo any more; instead, they work together and interact with each other to narrate my childhood story with my mother. At the end of the creative process, they became intertwined to inspire emotions and feelings in the audience.



Figure 17: Magnified tapestry

Result	36
Future	36

Result .-.-. .-. -

Using a transmedia approach to storytelling through design, I was able to utilize poetry writing, tapestry weaving, and audio recording, to create a synergistic effect between the mediums and narrate my story through their complementary interaction. If an analogy can be drawn between the story I was intending to narrate with a piece of uncut jade, then the English poem would be the first attempt to shape the jade and represent the story through the image of the red toy car. Then through weaving the tapestry, the jade material was finely carved, and the weaving structure was constructed with the morse coded poetry integrated, thus the tapestry was linked back to the poem at a more detailed level. The Chinese poem, as a reflection, can be seen as polishing of the jade to give it a further touch. Finally, the soundtrack of morse code mixed with the sound recording of the loom created an expansive and immersive environment when displaying the tapestry, which is similar to the fine adjustment of lighting ambient when displaying jade artefacts. The rhythm of the soundtrack also resembles the literary property of the poetry. Through this coordinated transmedia approach, the audience read the lines of the poem which depicts the story, love between the mother and son, and my nostalgic feeling. Then the audience can view the tapestry image representing the story and my feeling, as well as the thread of the weaving structure. Meanwhile they also hear the soundtrack which captures the movements of energy between the material and the narrator. The morse code is a key component in this storytelling process, because it connects the poem with the weaving structure, also it connects the tapestry with the audio. The second tapestry provides further detail of the explorative approach I took in storytelling, and it represents how the various media types are linked together to form a transmedia approach. All these contribute to a coherence in the storytelling, allowing the audience to perceive more wholeness in the story and its creative expression. Based on my practice-based research utilizing this transmedia approach, each media type plays an irreplaceable role in narrating the story. This transmedia approach is different than the simple multimedia approach, as all the media types utilized are interconnected with each other, and reference each other, while making their own unique contribution to the unfolding of the story (as shown in Figure 18).

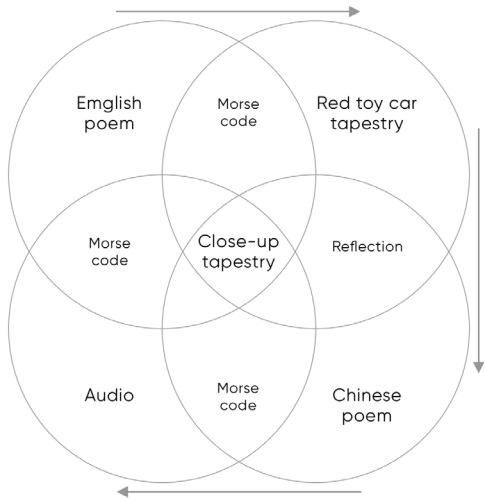


Figure 18: Process diagram of the transmedia approach

Future .-. .-. - .-. .-. .

In researching of weaving through storytelling, I, as the artist-researcher, may explore materials beyond cotton yarn or metal wire to study their characteristics, pushing my current approach to new bounds. From a weaving-technique perspective, I could explore using a number of satin ends greater than 7, so as to achieve more diverse colour combination possibilities, as well as to better integrate the morse code into the weave. For this research, morse code was embedded in the weaving structure in a way that is difficult to perceive and needs to be explained to the audience. Thus for further research, I am keen to explore more deeply into the detailed level of the warp-weft interlacing as well as explore how these warp-weft interlacing techniques can be utilized in telling stories and communicating feelings in a way which is more visible and tangible to the audience. More generally, I would like to explore representing writing in weaving, as well as weaving in writing. Since my access to the TC-2 loom after graduation will be limited, I would like to pursue such exploration using other loom options, such as a frame loom or manual loom. From the perspective of my own professional scope, this research provides me with a deeper insight in designing and artistic process, in terms that the media types should be examined and utilized in a manner to account for their strengths and limitations, as well as how they may interact when used simultaneously.



Figure 19: Exhibition of the transmedia storytelling

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