Connective Architecture -- Exploring Relationships between Tectonics of Weaving and Spatial Tectonics of Production and Display

by

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Abstract

An extended sense of the warp of a fabric is the fiber or essential, a foundation or base.

This thesis sprouts from a fascination with the structure of fabric and the loom. On one level, it deals with the tectonics of the woven fabric. On another, it deals with an environment for both process and product (production and display) – a programmatic arrangement of independent industries but not associated with large scale displays. This thesis explores these two tectonic environments and weaves a series of spaces to create and celebrate the sari – a stretch of fabric that is simultaneously utilitarian, empowerment, cultural, social and art object.

The various elements explored in the research included the heritage of the sari, the importance/image of the sari to women from various backgrounds, the structure of the loom and the methods involved with the process from conception to finish – spinning, spooling, dyeing, weaving, display and retail.

The program aims to create, for the growing South Asian community in Queens who are caught in a liminal space, a place to celebrate their culture and for visitors to learn more about it through the medium of one of the oldest crafts in South Asia.

Thesis Supervisor: Ann M Pendleton-Jullian
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Weaving, or the creation of fabric, is an ancient South Asian heritage. Traditionally, these small-scale industries are set up within the context of families/households. The roles/division of labor is as structures as the process of weaving itself, with the women/young girls preparing the thread starting from spinning to dyeing/drying to spooling into thread that could be used in a loom. The men, then, are in charge of the actual creation of the fabric.

Weavers' home – a contained industry

The most traditional means of sari production is handloom. The weaver first presses a series of foot pedals attached to levers which raise some of the warp threads. He shoots the shuttle across the loom and back manually to create subtle weaves.
The Loom

Warp in Fabric

The process is broken up into various steps. The setting up of what is to become the warp is an incredibly labor intensive process in an old fashioned loom where each strand needs to be passed through specific positions to produce a fine weave. The fabric is rolled up as it is produced, and the warp is set up on a semi-permanent basis so that one stretch/bolt of fabric can be woven continuously, and the entire process repeats itself for a fabric of different color/pattern. The warp is like a blank canvas, it gets worked on continuously to evolve into fabric. At the same time, it can also be said that it is the basis, receptor even, for all these processes.
Setting up the Pattern

During the simple crossing of warp threads and weft threads the warp threads merely have to be raised and lowered alternately. This is accomplished by means of two shafts that alternately open and close a shed – operated by the weaver – for the weft thread. For creating patterns, individual warp threads must be skipped. For complicated patterns, hundreds of sheds must be made. In this case, the principle of the punched card control (the Jacquard system) makes it possible to mechanically to produce patterns of any complexity.

In the case of smaller stretches of fabric, however, patterns were often drawn out by hand and stitched by the weaver manually in between the simple linen weaving. The weaver begins to have increasing control over the final product in this process.

It is easy to understand that fabrics with extravagant patterns were typically luxury articles, particularly if they were woven of silk.
Preparing the thread
Weaving
The warp, then, can be seen as a foundation or a base, a tightly regimented place or surface that can be manipulated in a series of ways to create patterns, forms and textures.

The warp can also be separated or layered to form a thickness, which can then be varied/manipulated in different degrees to create an even larger variation of textures. At this point the fabric is no longer planar but becomes three-dimensional.

Understanding the fabric as not continuous but a structural harmony of incredibly fine discrete elements leads to the understanding that openings or voids could be created in this surface by applying pressure in certain points, be it push or pull. The material then begins to reflect the nature of the force applied on it to create this void, at the same time maintaining its material “whole”.

(photo credit: CASE: Toyo Ito. Sendai Mediatheque)
One of the fascinating ideas about looking at a continuous solid as a series of increments is that, much like in traditional weaving, openings can be created pulling apart certain strands. Conversely strands can be pulled closer together to create enclosure. Spaces implied or created with this logic have no particular corner, or a multitude of corners.

By virtue of its semi permeability, the quality of such a space is private yet not exclusionary, intimate yet not claustrophobic, generic yet special.

In its very transformation and development of a volume while still retaining its tectonic quality the form(s) become incredibly fluid, and interdependent in sustaining each other.

It is then no surprise that fabric, a product of such an intricate process, shows such extraordinarily beautiful qualities when in motion.
A catalogue of fabrics and designs conveys nothing of the sense it brings to the wearers’ own bodies or the dramatic change that the fabric itself goes through.

The notion of fabric becoming something more than just fabric -- becoming alive through seeing it as it would be used is embedded in this thesis. Be it through manipulating its form, letting it waft in the breeze or blow in the wind, bathing it in light or letting it interact with the human body: this phenomenon of a plane taking body, is what the thesis explores -- the phenomenon of fabric.

The sensuality of fabric comes in how it can wrap and engage the body. It flows, liquid like, and takes the form of that which it covers.

**The Sari.**

The sari wearer sees herself as engaged in a constant battle to make her ‘second skin’, that six yard piece of rectangular cloth, move, drape, sit, fold and swirl in a manner obedient to her will. What victory gives her is a remarkable flexibility, but this requires a constant, though unconscious, responsiveness to the way the sari moves with every gesture that she makes. The sari, in stark contrast to stitched clothing, forces a continued engagement, a conversation, between a woman and her garment (The Sari, pg 27).
The sari is a stretch of fabric, between 5 and 6 meters long, that is one of the garments most widely worn by women in South Asia. Without the wearer’s body interacting with the sari, it is simply a piece of fabric. It is when it comes into contact with the human body and is manipulated by the wearer that it comes alive – it at once begins to take on a life of its own, and become a second skin to its manipulator/wearer. It worn -- wrapped around the body – in a number of different ways, and these different ways are indicators of the wearer’s locality, class, experience in wearing the garment and even confidence. All these ways, however, have one common theme – using folds and pleats in ways to accentuate curves of the body and covering in such a way as to allow for mobility.

The personal pleasure of draping this unstitched fluid garment over and around the body, adjusting it with little tucks and pulls to suit one’s own particular form, is sensuous. It creates a picture of flowing grace that conceals as much as it reveals. Though the sari is simply a rectangular piece of fabric, it nevertheless divided into parts conceived as a form when it is finally shaped around the body. Each of the divisions has a defined purpose, distinct but completely integral to the whole.

(Photo Credit: www.sara-japan.com)

The sari as an object in itself can take up a multitude of identities/meanings, and those identities are what make the sari such a significant object in South Asian culture.
Asset/wealth: To the weaver the sari is his livelihood, the product of his labor. He creates bolts in rolls and does not physically interact with it after it is actually made.

"It is the work we have been doing all our lives—my father and my grandfather before him"

-- Weaver in Tangail

A power tool: To an urban working woman who has mastered her control over the sari, displaying her effortlessness in wearing one without a pin, that gesture is power and confidence.

Skin: To the woman who wears it every day the sari is skin, no longer so distinguishable from the rest of her body.

"The relationship between a woman and her sari is a bond one cannot break—you wear it when you give birth, when you get married, to your funeral pyre—it is an indestructible bond."

-- A sex worker in Kolkata
- Romance: To a young girl not yet old enough to wear a sari every day, the sari is the symbol for a coming of age.

- Cultural object: To those who live in two worlds a sari represents identity, even nostalgia.

- Art object: To an outsider, the sari is simply an art object, an expression of the weaver's skill and perhaps an object to be admired from a distance because of its beauty and foreignness.

1. The Sari, pg 135
The purpose of this exploration is twofold: On one level, this project looks at fabric as a product of increments, and studies the tectonics of its conception. It looks at the processes and methods associated with the ritual of weaving, as well as the characteristics of textile at every point in its evolution to a finished product. It chooses to focus, in particular, on the sari as an emblem.

On another, this thesis explores the sari as a cultural symbol, and studies its phenomenon as a fabric as well as its embedded meanings in the ritual of wearing, its perception by others, and its interaction with the body. With the understanding that the sari is an object of incredible cultural relevance comes the idea that a program that celebrates such an object is also one that celebrates culture and evokes a sense of belonging. For a displaced or migratory community, such a space almost becomes an identity, a familiar place, a comfort zone. By proposing a sequence of spaces where a community can get together, relive and learn about a certain aspect of their culture as well as share that information with those unfamiliar, this program becomes a portal both for heritage and knowledge. This then becomes an architecture that is at once an identity and a connector, through celebrating a rich history and the process of its production -- a place to produce and bring it alive.
The Site:

The site is in Flushing Queens; a narrow left-over space in a busy block near the Jackson Heights subway stop, an area that is now very heavily commercial/retail, with a large number of retail dedicated to popular culture paraphernalia that are almost kitsch – costume jewelry, clothing, pre-packaged imported food, and quick restaurants. Inhabitants of this area mostly by new immigrants, both involved in commerce in the area or living in the area because of relatively inexpensive living costs.

Historical Context

This area has a long history of migration that starts from the 17th century, when real estate prices in Manhattan started increasing drastically. Queens started developing initially as an area for weekend retreat, an identity that was soon lost with the development of a large number cemeteries resulting from them being banned out of Manhattan. Population started increasing steadily and Queens became a borough of affordable housing accommodating spillover from its neighboring overcrowded borough, and homes for new immigrants/low income groups working in Manhattan. Flushing today is an area largely inhabited by Asian and Latin American immigrants. The area, thanks to its diverse rotating population, has an incredibly rich cultural heritage. At the same time, it is a busy commercial neighborhood, with a large number of retail/commerce thinning out into small single and multi-family housing.
The Dutch settle in Queens 1637

Astonia is the first officially founded village within Queens

Immense cemeteries in Queens due to banning of burial grounds from Manhattan

Queens population: 30,429

New York consolidated into city of five boroughs

Queensboro Bridge

Interborough service reaches Hunters Point

Brooklyn Rapid Transit Co builds elevated line in S. Queens

1909

1683

London government divided the New York crown colony into ten counties.

1790

The nation's first census recorded only 5,363 inhabitants in what is today Queens

1882

Flow of population leads to Ozone and Morris Parks

1908

Flow of population leads to Ozone and Morris Parks

Pennsylvania Railroad runs Long Island Railroad through Queens

Corona

1510

Peralis Tunnels under East River

1917

Pennsylvania Railroad

1936

Triboro Bridge, Grand Central Parkway

1939

LaGuardia Airport

1950

Flushing country-squares replaced by mid-rise apartments

A Brief Migratory Timeline of Queens
Culture

The area, for all its diversity, lacks any particular sense of identity or belonging. Due in part to an ever rotation population and in part to efforts in acclimatizing, this area does not reflect any of the great value to be gained from sharing such an array of knowledge and culture.

The inhabitants are in a constant state of liminality, making everyday transitions and moving back and forth between one culture and another, meandering intricacies of coexisting ideas and backgrounds. On one hand this is an incredible platform for exchange and learning, and on the other, a potential site for a degree of dilution or dissipation. While there is a degree of intrigue in this osmosis, there is also a tremendous value in understanding the unique qualities of each. Understanding culture as an identity, an entity that can be shared, upheld and celebrated, this thesis looks at providing a community with a platform of communication and education. In this case the community is that of South Asian immigrants in the Flushing area. The project is a place to celebrate their heritage, remember and inform each other and others of a very important aspect of their culture. The idea here is that this program can become a platform for exchange on various levels – educational, informational, emotional and cultural. The object chosen to operate on all these levels in this case is the sari, an object that comes with a multitude of meanings in itself.
- Commercial and Office
- Mixed-Residence
- Multi-Family
- 1 & 2 Family Residential
- Open space
- Public facilities
A Need for Identity

This specific lot was chosen because of its proximity to the commercial hub, with a façade that opens itself up to one of the main entrances of the subway as well as the primary traffic route (Roosevelt Ave). The concept is that this building presents itself as a point of calm or stasis amidst this chaotic environment and at the same time reads as a storefront, a display window, a showcase that invite passersby to walk in. The shape of the site brought up the idea of an infill; much like fabric in a loom, letting elements play within a set framework. The site’s L-shape also brought up interesting possibilities of distributing components of program, which was a relevant issue in a set of regimented programs as this.
Concept:

Initial studies dealt with experimenting with and understanding the concept of a single continuous element, and how it can be manipulated by being passed through channels or obstacles, and how the framework can set the bare bones for spaces to be woven within and around it.
That exercise led to a closer examination of the interstitial spaces between the strands. That led to the observation that in a fibrous tensile structure, openings can be created by manipulating each strand and not necessarily puncturing or trimming, thus retaining its structural continuity, flowing like liquid to gather and part. In a volume of uniform density/porosity, spaces created in this way are devoid of edges, or are full of corner conditions. The spaces then become fluid and infinitely mutable. Every point of the space thus created is special; there is no hierarchy of experience.
A different way to manipulate these filaments would be not pulling but pushing, in which case a more rigid continuous form can situate itself within this density to create space.

A few initial studies of these “feather conditions” led to a couple of interesting observations: that when a grid of vertical tensile elements are manipulated horizontally in one direction, view remains more or less unobstructed while sculptural undulations begin to form on the other. Also, every movement within this loom is interdependent, such that every force reflects on every strand. Different possibilities for openings depending on need began to surface.
Also, beginning from the understanding of the warp as the foundation or base which gives rise to or supports the weft and hence the weave, grew the idea of layered verticals that are "tied together" by some form of horizontal element, and by this back and forth motion are created pockets of spaces, still dynamic and fluid, but in a different language from the study engaged in above.
Design:

The above ideas/observations were the starting point for a language to articulate the program.

The intervention, or center for cultural identity, situates itself in a site that is slightly removed from the chaotic heart of the area but still in a position to be noticed from heavy traffic locations. It presents itself as bursts of color, a blank canvas for the saris to play in. It is a simple yet sensitive gesture that relates to the scales of its surrounding buildings yet sets itself apart in its tectonic feel. Much like the saris that it houses, this building hides and reveals selectively, encouraging passers-by to walk in for a second look.
The building situates itself in a narrow L-shaped site, and the program is divided into two sections: production and display. The production space is compact, interconnected, and navigable in sequence or in fragments.

Movement through the production space talks about the sequence of weaving: starting from processing the thread, dyeing, drying and spinning to actual weaving of the fabric. At certain strategic points the production sector slips into the display area that is a vertical experience that allows for interaction with the product – the sari in its entire length, a context that it is rarely displayed at, from its conception to sale at stores. This space talks about the tectonic environment of the loom and relates it to the tectonic environment of interaction and display.
The program stems from the idea the sari can be understood within the context of its production as well. This place calls to attention the skill and perseverance required to produce a sari. At the same time, the layout distances exhibit and production, clearing any confusion about creating a display out of the producers – the weavers. The “loom rooms” or weaving spaces enjoy privacy where weavers, hobbyists or enthusiasts can practice their art without being constantly put on display themselves. That being said, the two sections are visually connected at certain points in the journey.
The nature of the building is infill; it *situates* itself in this in-between and spans itself across the existing boundaries. The production segment is a compact stacking of program by function and position in process sequence. The floors are simple spans between the two existing walls. The Northern wall functions as a light well, connecting the floors both visually and experientially, through play of light.
The exhibit space presents itself to the streetscape through a layered façade that is almost opaque in its density, providing privacy to its visitors during the day. During exhibit hours, the experience is decidedly introverted. Light pours in from a largely transparent roof to illuminate the “loom” and the fabrics suspended in and amongst it. The double façade allows for air to permeate through, activating the hanging lengths of sari.
At night, the outer screen opens up, revealing the gallery to the outside, becoming an art object in itself. The role is reversed; during the day the gallery is a container, providing the atmosphere for the saris to flourish and play. At night, the space and the saris are one, and the interaction is remote and purely visual. It is as if for those few hours, the exhibit is preserved within this glass loom.
The interior façade responds to the inside environment and the exterior to the outer. The outer layer is a continuous porous surface, which opens up at one point to create an entrance into the building. In a similar language, the internal face opens up at one point to open up into the loom gallery. This is experienced in the second journey described above, where one can inhabit the space between the two layers that respond to two very different conditions.
The dynamic vertical elements of the exhibit space that form this experiential density allow for a number of spatial iterations that are accommodating to various programmatic needs. They can part to form a number of small niches, forming spaces that the sari or the human body can occupy. In cases of larger exhibits/events, one central cocoon opens up...
Interiors
Interiors

[Images of interiors and warehouse settings]
Conclusion

This thesis aimed to explore a number of issues, all connected with the notion of weaving. Starting from the premise of an old craft based industry that functioned on a community level, this exploration moved from understanding the people that engage in this activity to the product and its mechanics, and understanding its cultural significance as a whole. Then, with the realization that the product has inherent emotional as well as economic value associated with it, attempted to use this age-old tradition as a platform for gathering, celebration, reflection and education. The short duration of a semester was perhaps not enough to fully understand and explore the network of such intricate and tenuous relationships. Nonetheless, this exploration was extremely fascinating and fulfilling, and reached a level of resolution of the various associated social and design issues that I feel passionate about.
Precedents:

Jesus Raphael Soto: First White Writing

Photo Credit: Soto: A Retrospective Exhibition

Antonio Manuel: The Ghost

Raimund Abraham: The Austrian Cultural Forum
Tod Williams & Billie Tsien: American Folk Art Museum

Toyo Ito: Set Design for Cholon
Bibliography of Readings:


*Soto: A Retrospective Exhibition* Solomon R Guggenheim Foundation, New York, 1974

Photo Credit: *Soto: A Retrospective Exhibition*