I, Azmara Asefa, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture (Master of).

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Wearable Environments: Post Crisis Response Architecture

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ABSTRACT

Due to environmental disasters, human rights violations, or civil unrest, refugees are plucked from their homes, shipped around, stripped of value or identity, and reduced to their physical bodies. How can clothing as the most intimate form of shelter respond psychologically and physically to these traumatized bodies by: 1. offering a feeling of safety, 2. reconstructing the trauma story, and 3. connecting the individual to the community?

Clothing-making techniques of weaving, wrapping, stitching, fastening, and folding extend into architectural space while providing solutions to typological issues of refugee shelters like multifunctionality, portability, space-saving, and adaptability and conceptual issues of body as site like fusing skin and bones, identity, and rehabilitation.

Crisis assumes many forms destroying and displacing the lives and livelihoods of those affected. Crisis is tangibly illustrated in the scenario of disaster, the refugee and the refugee camp, where “the crisis” is the disaster, or catalyst for displacement and drastic change, the refugee is “those affected”, and the refugee camp is the “rehabilitative system” operating post-crisis. The post-crisis system and namely the relationship between spatial environment and users of that system are the focus of this thesis.

Firstly, analogous architectural site studies will be conducted on a hypothetical human body, which is the site of wearable environments. Though, different cultures treat, dress, and perceive the human body differently. In instances where the analysis requires cross-cultural input, a sampling of different cultures will be analyzed according to Edward T. Hall’s studies on proxemics in respect to the specific method of analysis. Sex and gender differentiation will be discussed according to the respective cultural norms, the common practice of the UNHCR, and Mary McLeod’s “Undressing Architecture, Fashion, Gender, and Modernity.” However, trauma is the unifying relationship between refugee bodies, and therefore, the unifying element in wearable environments.

The evolving etymology of and the theoretical discussions around shelter will be addressed. The current applications of shelter in normative and in crisis situations will provide a benchmark for contemporary solutions through the lens of the theories of Gottfried Semper and the practices of nomadic societies. Ultimately, wearable environments shelter the traumatized body, offering the flexibility and function of shelter through methods of clothes-making while initiating the process of rehabilitation.
ABSTRACT

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INTRODUCTION

A crisis in a regional, national or global sense arises from an escalation of a worsening series of pain, distress, and disorder. Succinctly, it operates as a critical turning point in a worsening situation. Crisis assumes many forms destroying and displacing the lives and livelihoods of those affected. Perhaps no other situation tangibly illustrates crisis more effectively than the scenario of disaster, the refugee and the refugee camp, where “the crisis” is the disaster, or catalyst for displacement and drastic change, the refugee is “those affected”, and the refugee camp is the “rehabilitative system” operating post-crisis. The post-crisis system and namely the relationship between spatial environment and users of that system are the focus of this thesis.

Natural disasters, civil conflicts, and economic instability displace large groups of people and force them to live in temporary settlements. However, these temporary settlements are often unhygienic, sedentary, inefficient, and impersonal. The crisis reduces the refugee to a single body, plucks her from her home, ships her around regions, removes her from personal relationships, and strips her of identity and value. The refugee is homeless, without place.

However, this post-crisis response, while providing for basic needs of shelter, food, and water, ignores the alienation of the refugee, of the displaced body, and further perpetuates the crisis by relocating the refugee from the location which is of the crisis to another location which is about the crisis. The rows of white tents close off interaction between the community of the displaced. The tent exudes an impersonal relationship between the dwelling and the individual. Light, air, and tactile comfort do not interplay within the spaces of dwelling. These spaces impair the refugee from flexibility for living style or preference. These spaces remind the refugee that she is only a body removed from her home and now forced to live in a place, which refuses to transform into home. According to the UNHCR the average stay in a refugee camp lasts 8 years—hardly temporary.

3. Erin K. Baines, Vulnerable Bodies: Gender, the UN and the Global Refugee Crisis (London: Ashgate Publishing: 2004), 1
4. Erin K. Baines, Vulnerable Bodies: Gender, the UN and the Global Refugee Crisis.
Other methods of shelter exist. In some situations refugees are allowed to create their shelters with their traditional construction methods. For example, if trees are available, refugee families are allowed to construct shelters from this material.\textsuperscript{5} However, the lack of resources limits the feasibility of this system. More recently, designers, with leaders like Architecture for Humanity and Shigeru Ban, created shelters addressing more refugee related issues beyond basic needs.

Yet, these shelters, the white tent, the refugee-designed structure, and the designer interventions overlook the significance of the body. At the least, the infamous white tent fails to consider the situation of crisis. At the most, some of the designer shelters are location-- or situation-- focused. While the site is approached as landscape, geographic coordinates, or location of the place about the crisis, the end result isolates the individuals and confines them to a specific space defined by the limit of the material they receive. The permanence ties the bodies to land over which they have no ownership creating a stagnant state of entrapment. In doing so, however, the shelters offer efficient-- and occasionally mass-produced solutions-- to immediate basic needs.

This thesis acknowledges these land/site considerations but focuses on the refugee and his or her body. The site, the focus of the design, is the body. By distinguishing the body from the crisis, the design elevates the refugee from the crisis and creates a flexible boundary from which the refugee can live, dwell, arrange his environment and engage with other bodies.

*The term \textit{body}, in this thesis, refers to the physical body as the environment of the self,\textsuperscript{6} seeing the physical and psychological construction of the body equally important in the design.

\textsuperscript{5} Loescher, Gil \textit{et al.} \textit{The United Nations High Commissioner for Refugees: The Politics and Practice of Refugee Protection into the Twenty-first Century} (New York: Routledge: 2004), 17

Jill M. Appel’s Masters thesis, *Clothing as Architecture*, explores the correlation between architecture and clothing through a series of parallels between the two fields. The boundary investigation is particularly important to the theory behind wearable environments. As “architecture and apparel are created objects of form...and our bodies interact with these forms,” the body-to-form boundary condition becomes a point of interest. Formalistic boundaries are perceived in two ways: the “actual cubic feet of space and the additional space that the imagination supplies. One is measurable, the other an awareness of the void.”⁷

Likewise, wearable environments assess boundary as a nuanced culmination of the physical and psychological determinants of space based on perception. Individuals have different memories, preferences, and overall psychological make-up that cause differences in perception. It is important that wearable environments offer flexibility and customization that current disaster relief shelters lack. It is also pertinent to abide by current principles such as size and materiality that are physically measurable and functional to disaster relief situations.

Diller and Scofidio’s book, *Flesh: Architecture Probes*, questions the meaning of architecture through deconstructing personal projects and the projects of others and using the body as a site and an integral part of program. The projects concern the position of the body in society.⁹ The focus is on the titled “flesh,” which is discussed as the “outermost surface of the ‘body’ bordering all ‘relations’ of ‘space’.”¹⁰ The projects range from Muybridge’s studies of human motion to manuscripts from film— each asking what the role of space making plays. The concept of an intimate study of the body

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informing design is akin to the emotion of this thesis.

The “body as site,” though not explicitly used in this way by Tessot, is a core principle of wearable environments. Tessot, by situating the body within society--within space--says that the body is a space itself. Therefore, as a space, it can be designed for much like a site. The flesh, or the skin, as a boundary as Tessot describes, is a tool for communication with space exterior to the body. The boundary of skin will later be discussed as it relates to wearable environments. However, this boundary much in the same tone of Tessot, is a critical element to discussing the body in its environment.

The Fashioned Body by Joanne Entwistle theoretically discusses the relationship between fashion and the body. Criticizing previous fashion theory for disembodifying fashion and body theories that ignore dress, Entwistle emphasizes the essential correlation between the two. She establishes a framework of sociological theory on the dressed body. The concept of body as cultural object acknowledges the body as a “natural object” but also as a “social object”. This idea stems from Mary Douglas’ work in Natural Symbols:

“The physical experience of the body, always modified by the social categories through which it is known, sustains a particular view of society. There is a continual exchange of meanings between the two kinds of bodily experience so that each reinforces...the other.”

The method in which the body is dressed, as an extension of the body, is then physical as well as a construct of social pressures. Codifications for what is acceptable are embedded into the social fabric. As this relates to crisis situations, there is a disruption in the social framework of a culture. Previous rules are not enough to or are no longer appropriate to handle the current situation. The body is in shambles as a result of crisis so the way in which it is dressed, the manner in which it is sheltered, changes accordingly.

Using Foucault’s theories on the body and power, Entwistle’s analysis creates parallels between the power/knowledge and the body, and by implication, dressing. While Foucault perceives the body as an object for power and knowledge to control, he does not discuss the body as an active

role, but rather, a passive, identityless receiver of control. Bodies in refugee situations are controlled by organizations from their placement, food, water education, and healthcare. These bodies are completely powerless. The clothes they receive are second-hand donations and the generic shelters perpetuate the concept of a powerless and dependent body.

Merleau-Ponty’s position on Embodiment, in addition to Foucault, gives a richer understanding. Merleau-Ponty discusses the body as dualistic. “…our bodies are not just a place from which we come to be seen in the world, but it is through our bodies that we come to be seen in the world.” 13 Spatial relations between the body, object and others are critical in the body’s perception. Entwistle develops the theory further to relate to issues of dress. If human experience derives from our bodies position within the world, then dressing, as an extension of the body, orients our bodies within situations. They express “our intent” as our bodies too “are the visible form of our intentions. Nothing about our bodies is more visible than the dressing.

However, Entwistle’s analogies between the body and dress fall short in relation to Merleau-Ponty. In her analysis dressing is reduced to the passive object to be viewed. In the case of the refugee, dressing as an extension of the body, becomes a means for identity of self and the relationship to the community to be shaped. The disempowered body traumatized by crisis can temporarily find solace and empowerment through the manner in which it is dressed, how it is perceived by other bodies, and most importantly, how affective the dressing is in creating opportunities for exploring and interacting with the surrounding environment.

Literature in the field spans disciplines from architecture and clothing, architecture and flesh, or design and the body. The sources call for an awareness of the interrelation of architecture and much of our physical and metaphysical world. In exploring these similarities, new progressive ideas flourish and advance the discussion of the definition and meaning of

13 Joanne Entwistle, The Fashioned Body; Fashion, Dress and Modern Social Theory, 29.
architecture.

Specifically for this thesis, the literature guides the theoretical framework of the body and, from this, the ideation of traumatized body as site emerges. Wearable environments for refugees in the Horn of Africa seek to clothe and shelter bodies in the initial stages of disaster relief. The traumatized body as site encompasses both the psychological and physical body. The design methodology of wearable environments responds to the integration of body systems, referred to later as the fusion of skin and bones.
“There is an obvious fact about human beings. They have bodies and they are bodies.” (Turner, 1986).

“The body is the environment of the self.” (Entwistle, 6).

The environment of self, both physically and psychologically, assumes the role of site for wearable environments.

With the Horn of Africa chosen for the design exploration, the principles for wearable environments are intended for any geographic location with adaptation to culture. The concept approaches the site in a different manner than a traditional architectural site analysis. Typically, a specific geographic world location is selected and analyzed physically, experientially, climatically, culturally, historically, and socially.

However, the site for wearable environments is the body. Analogous studies will be conducted on a hypothetical human body. Throughout this analysis, the words site and body will be used interchangeably. Though, different cultures treat, dress, and perceive the human body differently. In instances where the analysis requires cross-cultural input, a sampling of different cultures in the Horn of Africa will be analyzed in respect to the specific method of analysis. Sex and gender differentiation will be discussed in the design exploration as women and children constitute 27% and 52% percent, respectively.\(^{14}\) Wearable environments do not seek to satisfy all cultures, but seek to satisfy displaced bodies.

Boundary is the primary condition of the site. Boundary is defined in this context as “something that indicates or fixes a limit or extent.”\(^{15}\) The boundary conditions of the site are analyzed in the following categories:


boundary of an individual *body*, boundary of a small group of *bodies*, and boundary of a community of *bodies*. The proxemics studies of Edward T. Hall are analyzed to create a framework of cross-cultural proxemics.

Skin is the physical exterior limit of the human body. It, along with muscles and the skeleton, encases and protects all of the organs and systems within, flexibly stretching, contracting and twisting to the movements of the *body*. Gross anatomy provides a framework to discuss the structural and formal qualities of the *body*. Three systems in particular, skeletal, muscular, and integumentary (skin), represent fusion or integration of structure and surface functions. Each system contributes to the overall morphology of the *body* while operating as individual entities. The principles in the site’s structure, connections, and form inform the design of the wearable environment.

The skin as Jean Querzola describes “it is a border defining within and without, a protective frontier, the envelope of flesh, the *body*’s armor—skin separates and isolates. An interface of pains and pleasures (‘erogenous’ zones) – skin is both armament and armor. Blushing, blanching, sweating..., skin is also a means of communication.” Skin is both a representation of the *body* and a tool for the *body*. Skin sends signals to the world; others perceive it. Simultaneously, skin acts as a receptor for information to the *body*, a container and a protector. The wearable environment, too, acts as a “skin”, a protector. It will be perceived by others and ought to portray the *body* appropriately.

The design and function of the skin are attributed to its interaction with other systems of the *body*: The innermost layer of skin, the hypodermis connects the skin to muscles and bone and contains blood vessels and nerves. The next layer, the dermis, acts as a padded layer protection incorporating several other systems within it. Nerve endings, hair follicles, sweat glands, and blood vessels exist within this layer. The epidermis, the outermost layer,

acts as a barrier of protection. The keratin in this layer allows skin to maintain fluids within the body and prevents chemicals from entering.\(^\text{17}\)

The skeletal system primarily acts as structure for the body with the vertebrae working as the fundamental load bearing and load-distributing member. The vertebral column "carries and positions the head, brace and maneuver the upper limbs, and transmit forces through the pelvis to the lower limbs."\(^\text{18}\)

The vertebrae consist of 33 different bones. The top seven are the cervical vertebrae effecting the support and motion of the head. The next twelve are the thoracic vertebrae from which the bones forming the ribcage branch and the shoulder and shoulder blades connect to these vertebrae as well. The five lumbar vertebrae “…support the posterior of the abdominal wall” and are the largest. The sacrum is a fusion of five vertebrae at the base of the spine forming a triangular shape and connected to the pelvic bone. The coccyx terminates the vertebrae with "three or four fused bones. The skeleton overall operates on a system of members and joints, or areas here two bones meet.\(^\text{19}\) However structure of the body requires the interplay of bones, joints, and muscle.

The muscular system is comprised of layers of muscle types. The skeletal-muscular system contributes to the form, structure and movement of the body. These muscles attach to bone through tendons. The muscles’ elastic

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\(^{19}\) Richard Drake, et. al, Gray’s Anatomy for Students, 26-29.
quality allows for the body to stand upright and move by causing the bones to rotate at the joints.\textsuperscript{20} With the skin to bind these systems (and additional systems), the human body form is achieved.

The average physical parameters of the body, or site border, equal the farthest most standing height from the bottom of the foot to the top of the head, the head diameter, the shoulder-to-shoulder distance, and the measurement from the chest to the back. Intermediate measurements like waist and hip circumference, and limbs are more detailed. The average height of the human body varies cross-culturally and between the sexes. The average male standing height ranges from 6’1” in the Netherlands\textsuperscript{21} to 5’2” in Indonesia.\textsuperscript{22} The significant height difference of 15% is due to genetics, lifestyle, and nutrition. Developing countries produce shorter people. Women’s height range from 5’7 ½” in the Dinaric Alps\textsuperscript{23} to 4’10” in Indonesia,\textsuperscript{24} a 13.5% difference, supporting the trend in heights internationally.

The other measurements mentioned above operate proportionally to the given standing height of a body. Therefore, shoulder width on average is 19” for men at 6’1” and 16” for men standing at 5’4.” In women 5’7 ½”, 17 ½” shoulder widths are common, 15” in women with a height of 4’10.” (ratio is

\textsuperscript{20} Richard Drake, et. al, \textit{Gray’s Anatomy for Students}.
\textsuperscript{24} Elizabeth Frankenberg, \textit{Self-Rated Health and Mortality: Does the Relationship Extend to a Low Income Setting?}, 23.
Men’s heads from the back of the head to the tip of the nose range from 7.1” to 8.4” and 6.6” to 8.4.” The chest to back diameter ranges from 10” in tall standing height extreme and 8 ½” in the short extreme in men. For women the range is 9 ¼” to 8.” The other measurements of the body fall within these limits.²⁵

These measurements are for a standing body. No body is a permanent state of standing; thus, the site needs to be physically analyzed in terms of boundary in the fullest limit of extension—arms and legs. A single body in motion cannot exceed these extremes. The series of diagrams above illustrate possibilities of full body extension.

The boundary of a body is not confined to its physicality. The second measure of boundary analysis investigates the body’s perception of intimate, personal, and social boundaries. Using Edward T. Hall’s theory of proxemics, the aim is to compare cultural differences while discovering unifying humanistic similarities. He divides the types of spaces into intimate, personal, social, and public distances.²⁶ Intimate distance ranges from 0 to 18 inches and defines distances where contact is easily made and details of another body in this zone are highly visible, audible, and olfactible. Though, visual distortion of objects occurs in this zone. It is within this range, that wearable environments enter the dynamics of space.²⁷

Personal distance ranges from 18 inches to 4 feet. In Western cultures the idiom ‘an arm’s length away’ denotes the personal bubble. The senses’ ability to read an approaching body or object in this zone remains clear. Visual perception is more accurate. Interactions between sites in a family exist in

²⁷ Edward T Hall, The Hidden Dimension, 117-118
personal distance. Daily routines like receiving food rations, introduce larger groups of unfamiliar bodies into a given body’s personal space. The unfamiliar bodies refer to other members of the refugee camp.

Hall selects German, English, French, Japanese, and Arabic cultures to study for variances in acceptable proxemics. At extremes, Germans tended to appropriate anything within their gaze as personal space whereas Arabic people believed that even while nearly touching another body, personal space was not in violation. These invisible boundaries depend on a relative relationship between what qualifies as culturally acceptable.

The interaction of multiple bodies, or sites, creates a condition of mixing, merging and diverging boundaries. Depending on the scenario of the bodies meeting, the boundary modifications can be conducive or harmful to the individual sites. In Hall’s theory, these are social and public distances. The senses of the body: touching, seeing, smelling, hearing, tasting work in tandem to facilitate perceptions that occur during these interactions. Kinetics of the body expedite interactions. Contraction of muscles and rotations of joints allow the body to move through space and interact with different bodies and objects within space.

28 Edward T Hall, The Hidden Dimension, 119-120.

29 Edward T Hall, The Hidden Dimension, 131-137, 154-158
However, refugee bodies are atypical. Having experienced some form of trauma, the refugee perceives internal space, or self, and external space differently. In a refugee experience, individuals are in a fragile psychological and/or physical state. The appropriateness of community interactions and boundary modifications, significantly alters the condition of the individual and, by extension, the community. The crisis affecting the refugee manifests itself in negative states of being or “conditions of existing” including: [estrangement], loneliness, missing, longing, guilt, shame, separation and loss, sorrow, language degradation, value degradation, inferiority, non-identity, rootlessness, suspicion, prejudice, and the [sense of being a] scapegoat. These in turn, result in physical and psychological disorders of: anxiety, apathy, back and shoulder pain, lack of concentration in relationships, hysteria, fatigue, alcoholism, depression-induced insomnia and nightmares, morbid panic, obsessions of death, and physical abuse (Andersson, 83). The refugee body is one of unraveling, deterioration and erosion of self.

The shelter in which the refugees dwell has the opportunity to repair the unraveling body, physically, psychologically, and psychically. In psychotherapy, a three-part system is imparted to rehabilitate a victim of trauma. First, one must establish safety. Secondly, the trauma story must be reconstructed. And lastly, the connection between the survivors and their community must be restored.


Environmental condition is the second method of analysis. Generally in architectural site analysis, the area is assessed in terms of temperature, sun orientation, precipitation, wind patterns, and vegetation. Like the boundary investigation, there is an analogous relationship between the typical site and “the body as site.”

In terms of temperature, the body has a targeted-consistent internal meter of about 98.6 degrees Fahrenheit. Exterior environmental factors, physical activity or extreme outdoor temperatures, can increase this internal temperature. The body responds by sweating or contracting the skin to create cutis anserine (goose bumps) if it is met with warmer or cooler conditions respectively. Here again, the skin acts as a tool for the body and is part of the body. In a physically non-healthy body, the internal temperature rises as a result of fighting sickness. When the body loses complete control of its internal temperature, the body is suffering from illness.

Psychotheraputic and Related Support Work, 38.

The body and sun orientation operate in the same manner as a geographical site and solar conditions. The sun rises and sets diurnally affecting activities of the body. Depending on the geographic location of the body, the period of time for which the sun occupies the day is different. Cloud cover differs as well. Yet, the body/sun relationship is similar cross-culturally. When the sun rises, the body is summoned to wake from slumber. As the sun traverses the sky, the body is alert to carry out routines. These routines differ. As the sun sets, the body, having been active for many hours, carries out more activities. When the sun has left the sky, the body winds down and eventually returns to slumber. The cyclical pattern of the sun influences the cyclical patterns of the body and gives a sense of temporality. The site’s solar conditions connect with the body’s overall health as well. “When the sun’s UV-B rays hit the skin, a reaction takes place that enables skin cells to manufacture vitamin D.”  

The skin — the outermost physical extent the body — acts as a tool.

Processes of the body be they a daily routine or vitamin D production, affirm the need for bodies to react with the sun. Wearable environments should foster this relationship by acting as an additional tool in absorbing the benefits of the sun and providing flexibility of movement so as to not hinder the movement of the body through daily routines.

The issue with refugee bodies — these unraveling bodies — is the lack of routine and conditions like insomnia which are noticeably present amongst refugee communities. The wearable environments ought to foster more normative behavior and wellbeing.


13. Daily Routine
The third form of analysis is history. The relationship of time and the body is both timeless and temporal. Much like a landscape has evidence of eternality and temporality, the body exhibits its history. There are physical and psychological demarcations of history a refugee body can exhibit. The trauma endured by refugees varies, and so the physical markings of past events vary. A tortured and imprisoned body might have scars from lashing and electrocutions visible on their skin and impairing significant layers of muscle tissue. A starving body has a gaunt, concave frame. The skin is dry and taught. The posture wilts. A war fighting body might have loss of limb or full mobility. The list of demarcations of history is limitless, and the probability that these scars or wounds affect refugee bodies is significantly higher than in an average population.

Timeless demarcations of history are seen through generational transference of physical traits like genetics, mannerisms, and language. These elements are not linked to a certain person or a certain time, but to a network of multiple bodies and exchanges that transcend time. Facial features, height, weight, skin coloring and texture, and hair are unique to the individual body in combination, but these physical genetic cues express the history of the body beyond the time of the site’s existence. Mannerisms and languages are learned from the site’s interactions with other sites. Groups of sites residing within certain areas form shared eternal histories.

Psychological markings manifest themselves in behaviors and actions. Bodies that suffer refugee related trauma usually have at least one of the following behaviors or disorders: anxiety, apathy, psychosomatic back and shoulder pain, depression, drug abuse, hysteria, insomnia, manic depressive personality disorder, obsession, panic, psychosis, and suicidal tendencies. Childhood experiences before the crisis also add a level of complexity to the historical marking on the site. Psychological eternal history markings occur in attitudes, cultures, and shared histories.

The reality of the situations is that individuals tied to a specific culture are relocated. These individuals carry individual memories, beliefs and experiences under a similar cultural experiences. The crisis unites them, but...
does not define them. Individual bodies contain gender, age, and experiential differences than can and should be accommodated in refugee camps.

“Gender...a key relational dimension of human activity and thought informed by cultural and individual notions of men and women—having consequences for their social or cultural positioning and the ways in which they experience and live their lives.” 36

In terms of gender, caution is reserved, not to single out women as vulnerable bodies, but to notice and design for relational differentiation of masculine and feminine vulnerability. Accepting and designing for smaller groups of individuals based on these differences provides opportunities for personal safety, retelling of individual’s trauma story, and reconnecting with smaller communities of traumatized bodies and eventually the larger community of refugees.

The role of gender in refugee camps is often ignored and it was not until the mid-1980’s that the UNHCR organized a committee focused on women’s needs and, even then, tension exited on the method in which women should be accommodated. “The UNHCR was founded on the principles of universal humanism.”37 The refugee camps were designed for the universal man, as all humans were equal. Accepting and accommodating differences contradicts the principles of universality and interjects Western norms into a culturally relative foundation of gender and gender roles. While this argument validates UNHCR’s universality, it naively places the UNHCR in the position of being so universal that it does nothing. The danger arises when refugees are portrayed as “human masses, devoid of history or individuality.”38 However, people are not homogenous masses.


37 Erin K. Baines, Vulnerable Bodies: Gender, the UN and the Global Refugee Crisis, 63.

38 Lissa Malkki as quoted by Erin K. Baines, Vulnerable Bodies: Gender, the UN and the Global Refugee Crisis, 64.
In the Horn of Africa, gender differentiation is apparent in the activities, spaces of dwelling and working, and clothing of men and women. By the age of seven, girls are expected to assist mothers and sisters in domestic duties, while young boys work on family farms. There exists a difference between the feminine space of the confined, packed mud house or grass huts and the masculine space of the open farm fields. Gender neutral spaces include markets and schools. Open air markets allow men and women to sell produce and goods through stalls open to wide streets. Boys and girls, though far less girls attend school as they become older, share classrooms oftentimes arranged around a courtyard. In the gender neutral spaces, closed and open environments intermingle providing a variety of spatial qualities that reference feminine and masculine space. As a note, in some highly traditional Islamic practices in the Horn of Africa, women must be accompanied my a male family member when out in public.

The majority of refugees in this region are women and children. Violence against women is an issue in refugee camps, and one in which the UNHCR, fights to prevent. The spaces of wearable environments seeks to create space that provides a sense of safety while empowering those, especially women and children, in refugee situations.

Thus far, the body had been analyzed as a dependent, isolated entity.
However, the *body* is never naked in reality. Even in cultures where nudity is acceptable, the body is still dressed; it is still adorned. “The social world is of dressed bodies.” 39 Dressing the body is a social construct. As the body is both a physical and social entity, the dressing of the body is inseparable from the body. “All people(s) dress the body...be it through clothing, tattooing, cosmetics, [perfume], or...painting.” 40 On a larger scale dwellings project a formal dressing for the body, or rather multiple bodies.

The built context of the body will be analyzed with clothing as intimate building space. Clothing and small dwelling spaces of the respective cultures will be compared cross-culturally. Proximity, boundaries, and ergonomics, and materiality will be assessed through sections and elevations. The following diagrams explain this analysis.

The animal kingdom offers many examples of species utilizing

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16. Nomadic Building Types
Sections
wearable environments. The tortoise inspired the idea behind this thesis. This ancient reptile has evolved over 200 million years ever more depending on its shell to provide shelter and protection. As one of the oldest animal species, its anatomical ingenuity, despite its slowness and other shortcomings, is a testament to its fitness of survival. The shell is integrated into its skeletal system. The carapace, or upper shell, consists of a fusion of 50 bones including the ribs and vertebrae. The bottom shell known as the plastron fuses the clavicles, bones between the clavicles, and parts of ribs. The shell is coated with a layer of keratin (keratin also seen in human skin) and arranged in patterns called scutes staggered over the bones to create rigidity. The tortoise head and legs retract under the shell as a form of refuge.

The concept in nature has proven to be a successful method of protection and survival. The lightweight structured shell—the tortoise’s wearable environment—presents design cues. The wearable environment ought to be lightweight, conform to the body, and offer a sense of protection. Here, the fusion of skin and bones is not merely figurative, but literal. The spine is connected to the shell as one structural and protective entity. Skin affixes itself to the bone in the human body at specific points, though the connection and interplay in tortoises is more apparent to the function and form of the animal. The theme of integrated systems in anatomy lends itself to the design of the site/built response of wearable environments.

Gottfried Semper, a nineteenth century architect and architectural

theorist, hypothesized that textile arts directly correlate to architecture. First, Semper postulates that “the beginning of building coincides with the beginning of textiles.” 42 If it is assumed that “the use of coverings for encampments and spatial enclosures” proceeds the “art of dressing the body,” 43 then the technique of making these enclosures, which are formally expressed as walls, relied on weaving and binding principles for making tools. Early man built walls through weaving “grass and natural plant fibers.” 44 This led to more sophisticated weaving processes, which allowed the resultant textile to be worn on the body. The aesthetic of the textile walls created patterns.

These patterns, in turn, signified enclosure, or specially defined barrier. The remnants of this signification manifest in the patterns of walls throughout history. The staggered stonewall, the brick and mortar wall, the tiled wall all harken the initial woven wall. Symbolically, textiles and architecture are intrinsically linked.

Semper also discusses the role of tattooing in the development of


architecture. He writes that the entry points of the fences of the native New Zealanders are decorated in bright colors in the same patterns of the tattoos that adorn their bodies. The interiors of their homes use these colors and patterns to articulate key elements. The patterns of the tattoos "display accurate knowledge of the location and function of muscles under the skin..." and graphically represent them.

Tattoos and clothing address the body as site, designed to respond to qualities of the body while protecting it. As Entwistle writes, the body is always dressed, and this dressing takes many forms. Over time these crafts of dressing the body evolved into more formal dressings for multiple bodies, such as the hut, ger, or a tent. These dressings express structure and form of the source of inspiration-- the body-- and the tectonics of the materials and technologies of execution (textiles, wood, etc). As a study for wearable environments, Semper’s primitive hut fuses the technique of garment production, weaving, with the construction of walls and the technique of tattooing with the decoration and articulation of enclosures.

Anthropological precedents also support the concept of wearable


46 Gottfried Semper, ‘Style in the Technical and Tectonic Arts or Practical Aesthetics,’ 172.
environments. Pastoral nomadic cultures like Bedouins, Somalis, and Kazakhs carry, transport, and rebuild their shelters. Similar to the histories presented in Semper’s writings, these nomadic societies transfer the methods of creating a garment for the person to the enclosure for multiple people. Remnants of garment making are physically evident in the structure and construction.

Bedouins “desert dwellers” reside in multiple Middle Eastern countries. The black tent, “al-bayt sha’r” meaning “house of hair” serves as the dwelling fixture for Bedouin culture. The women of the tribe weave the cloth of the tent (originally from goat hair). Clothing is woven in the same manner with the same materials.47 That which shelters multiple bodies also shelters a singular body in the form of clothing.

Somalis weave mats from grass to form the domed walls of their temporary huts known as hamlets. The woven mats are piled on to the structure in a layered manner much like the layered clothing worn on the body. Again, production through weaving is a transferable between clothing and huts. Specific to Somali culture, the layered approach to dressing the body is transferred to the style and construction of the hut.48

The yurt is the temporary dwelling of Kazakh nomads. It is “erected


on wooden poles and covered in felt. Woven carpets line the interior space. Mongol clothing also utilizes the insulating properties of felt. The material selections endure cold climates. Women control the prevailing weaving culture that informs both what individuals wear and the livable space for families.

Nomadic cultures cross-culturally evolve traditional clothing into larger structures that can be inhabited by other members of their respective groups. Clothing is the enclosure of a body. Architecture is the enclosure of a body as well, but it has the capability to be enclosure for multiple bodies as seen in nomadic cultures.

Issey Miyake, known for his sculptural garments and material


innovations, created a patented series in 1993 called Pleats Please. He created structure and form by manipulation of the material. The pieces suggest that the body is secondary and is barely needed to evoke the structure while still celebrating the body for which it was made. This allows the body to occupy the garment with visual protection and privacy, a cocoon expanding personal space, and ease of movement within the clothing.

The first step in the process is cutting the piece of cloth. Sewing this material is the second step. Miyake uses complex geometries and unusual patterns to achieve the sculptural qualities of the clothing. Finally, the pleats are formed and material is manipulated using a slightly novel remake on a pleating machine. The steps appear to be out of order, yet as illustrated in the diagrams, the forms are exact and intentional (fig on page 26).

By creating a new fabrication method, Miyake has accomplished a few things. He established a material that is self-supporting by pleating the fabric to create more stiffness. The stiffness also allows for a pliable form that is supported by the material. The intensity of the compact pleats, the gathering and flaring, express tactile patterning on the form and offer a comfortable surface for the wearer to feel and a pleasing surface on which to gaze.

The hybridization of structure and surface harkens the fusion of the tortoise spine with its shell. The integration of "skin" and "bones" is also seen in the form of the body though not as overtly as the tortoise. However, the gesture of integrating systems in clothing as a nod to the body befits disaster situations also as a method of combining and reducing the need of extra resources.

Zaha Hadid's Burnham Pavilion in Chicago, Illinois juxtaposes the

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PLEATS PLEASE
ISSEY MIYAKE

24. Issey Miyake, Pleats Please
Images from Issey Miyake by Marie-Andrée Jouve, diagram, self
surrounding rectilinear city high rises as a white organic form in Millennium Park. The temporary pavilion commemorates the Chicago city planning achievements of Daniel Burnham in the early 1900s. A curved system of undulating steel ribs creates the blobbed form. Fabric is then stretched over the ribs and zipped together along the rib, accentuating the presence on the structure on the exterior as an expressed seam in the fabric (Designboom).\(^{52}\)

Techniques of building construction and techniques of clothing construction interplay to create dynamic space. In the process, the final pavilion dons anthropomorphic qualities. The ribs, the architectural construction of structure, harken human bones. The skin, the clothing construction of fabric expressed as enclosure, is akin to human skin. The fastening mechanism of the zipper directly borrows from garment-making practices, while enhancing the architectural techniques. This thesis concerns the processes of garment-making in the realm of architecture as a means to express space for the human body.

Hussein Chalayan is an experimental fashion designer. His Coffee

Table Dress functions as clothing and furniture. During his 2000 collection, models don furniture slipcovers that after unfolding and fastening transform into dresses. The final piece of the collection transforms from a wooden coffee table into a tiered, wooden skirt.

The rings of the circular coffee table formed each successively smaller tier until the center tier attached to the model’s waist. The legs of the table operate on a spring system so that when no gravity is acting upon the legs as a table, the legs spring up into the underside of the bottom tier. There is a reversal of technique and function. Rather than garment-making techniques informing the process of construction of a form, furniture techniques are applied to a clothing form.

The Coffee Table Dress represents the desire from within design industries to discover interdisciplinary connections to further innovation. Clothing and architecture, or in this situation, clothing and furniture have properties of proportion, texture, and scale which relate to or reject the human body.

Part of technique includes the materials selected for execution of the

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28. Coffee Table Dress Process
Hussein Chalayan

29. Coffee Table Dress Plans
design. When discussing clothing or mobile space in close contact with the body, textiles are often an appropriate solution. However, the type of textile for the specific project is influential in the process of making it, and therefore the outcome of the design.

The Portable Light Project by, architect, Sheila Kennedy innovates textile technology. Flexible photovoltaic panels embedded in the weaving of the fabric store the sun’s energy throughout the day. LED lights in the fabric transfer this energy and light at night. Portable Lights assist people in developing countries allowing them to perform activities like reading in dark space.54 The lights are made for the developing world where electricity is not consistently available. A refugee camp has similar issues.

The projects selected either innovate the building type or set the

standard of refugee and homeless shelters. The UNHCR, United Nations High Commissioner for Refugees, tents set the standard rules for proper shelter that address basic needs. The 405 foam domes in Turkey following the 1970s earthquake innovate the building type. Shigeru Ban created two notable relief shelter designs: the Emergency Paper Roll Tent, for the UNHCR, the series of Log Paper House and Emergency Shelters, and a modular design for recent earthquake in Japan. Parasite by Michael Rakowitz works closely with displaced bodies and customizes homeless design.

In these cases, the refugee shelter is the contemporary “primitive hut” applied to a crisis situation, where the basic needs of refugees are met by the basic structure of the tent. This investigation will not discuss the history of tents, and but rather the history of formalized shelter for displaced bodies.

In the twentieth century organizations emerged to intervene in
global crisis situations. In 1950 the UNHCR was established as a temporary organization in response to the displacement of Europeans after World War II. Offering comprehensive support, food, protection, and shelter, the agency became a permanent fixture in disaster situations. The shelters provided to refugees became regularized, generic, and efficient to distribute. The UNHCR, white, tarp tent aligned in orderly rows became the icon of a refugee camp.

The UNHCR provides white tarps and sets standards for shelter in refugee situations as the overarching institution involved in refugee situations. The tarps are held up my aluminum poles and usually assembled by the refugees. Standards change from each disaster area to the next and enforcement of standards is difficult. The standards for the transitional shelters for the tsunami in 2004 were $500 per unit. “Each unit comprises a minimum floor area of 200 square feet” and “the height of each unit should be 6’8.” Additionally, the shelters ought to: be structurally sound, waterproof, secure, durable, and well vented.

1. Establish Safety: The UNHCR establishes safety by providing stable, and universal materials and occasionally tent systems. However the universality of the tents does not accommodate different cultural perceptions of safe space.

2. Retell the trauma story: Generally, standard UNHCR and NGO tents do not allow for flexibility of space for those who must live in them. There is little design or creative input through which refugees can express their “stories.”

3. Re-connect with the community: The standard tent does not facilitate communication between families or groups of people. The tents create borders block the flow of communication.

Shigeru Ban’s Emergency Shelter for the UNHCR in 1994 addresses the issue of appropriateness of materials. Generally, the UNHCR provides


refugees with aluminum poles and tarp to make tents. An issue arose when refugees sold the aluminum and chopped down trees to create poles. Hardly sustainable, Ban established a system of connected paper tube rolls for structural support. The UNHCR tarp draped over the frame to create the habitable space.57

While materials are important, Ban solved an issue of sustainability, but fell short of qualitative issues of shelter. The space created still embodies the problems inherent in a tent for displaced bodies. For his material intention, Ban succeeded. However as an architect, he had the opportunity to create meaningful space for those who were forced to inhabit it.

Improvements were made in his Paper Log Houses in Japan, Turkey and India. The paper rolls, which were used only for structure in the first example, are now used for walls. Specifically in India, rumble from the destroyed buildings made the foundations. The roof was made by a structural later of bamboo, a layer of woven cane, and an outermost tarp to protect from rain. Small holes in the woven mat ventilated the unit while not allowing insects to enter.58 Here, materiality is used for environmental sustainability but also to create a pleasant living condition for those forced to live within its walls.

Shigeru Ban’s latest disaster relief shelters are his most successful in terms of sheltering the traumatized body. The earthquake in Japan forced many out of their homes and into shelters and local gymnasiums. People slept on the floors of these crisis centers with hundreds of others in one large open room. Privacy was nonexistent.

After many iterations in response to this crisis, Ban created a modular system of “two sizes of cardboard tubing, plywood, ropes and while curtains.”


ARCHITECTURE INTERVENTIONS TO UNHCR NORMS:

The gymnasium floor is lined with cardboard boxes and/or plywood. The cardboard tubing act as columns and beams, and white curtains hang from the cardboard tube beams.

The families choose the size of their shelter and decide which zones have curtains to provide privacy. Allowing the traumatized body to make decisions provides potential for empowerment. Using Andersson’s three step rehabilitative process for trauma victims to evaluate the success, Shigeru Ban’s shelters do the following:

1. Establish Safety: The shelters provide safety by providing the option of privacy. The curtains are translucent so light and figures can be seen from within or without. There is no roof, again providing a sense of openness without the feeling of being exposed.

2. Retell the trauma story: The families came to the gymnasiums with little belongings and due to the initial surrounding, had little choice in how these were arranged. The Ban shelters allow for the belongings of the families to have a place, to tell part of a story. The families can reveal their openness or solitude through how curtains are open or closed. The shelters offer a medium of expression.

3. Re-connect with the community: The large open room created an intimidating environment to meet others. The lack of privacy prevented people from relaxing. These shelters behave as a communication method. Open curtains can invite others in without people worrying about intruding on others’ privacy.

The modules of the shelters physically demonstrate personal and social spacial boundaries as discussed by Hall. Shigeru Ban used notions of proxemics for Japanese culture to create physical expressions of personal and public. Through this, Ban achieved spaces that are conducive to the refugees who use them.
Lucy Orta, a contemporary French artist produced the series Body Architecture in the 1990s. Lucy Orta designed the Body Architecture series to address issues of social identity. She and her husband, Jorge, also a designer, see art as a “functional utopia” where art begins to unravel questions of social concerns. The goal of the Body Architecture art installations sought to mediate the conflict of social exclusion and isolation with inclusion, community, and relocation. Through the iterations Body Architecture, Orta manipulates the forms of “wearable tents, mobile shelters, and protective sleeping bags, and transformable survival kits” to encourage community building and rethinking social identity.

This project series attempts to create place for the placeless. Though, these tents and suits do little to address the needs of the homeless body by placing it in odd immobile clothing. Large installations have taken place in New York City, Paris and London. However, the materials and forms do not vary from climate or culture. These projects were more of a social statement than a more social study. People selected to be part of the exhibitions were not necessarily homeless but were acting as homeless. As a thesis precedent, the concept of creating meaningful spaces and community for displaced bodies through use of our most intimate external dwelling, clothing, and manipulating that space into communal space or communal dwelling is a take-away.

However the material choices and the forms ignore both user comfortable and cultural concerns. If these pieces were to be used in crisis situations, they would fail to address the needs of a traumatized body.
1. Establish Safety: “Body Architecture” does not establish safety; it draws attention to the body in order to make a statement.
2. Retell the trauma: It does express a trauma story; however the story is prescribed by the artist and not the traumatized person.
3. Reconnect with the community: Different iterations of Body Architecture physically connect individuals together, yet these physical connections separate the individuals by distances at personal at social space. The bodies face away from each other preventing communication.

61 Lucy Orta & Courtenay Smith, Lucy Orta: Body Architecture, 27.
The 405 foam domes sent to Turkey after the 1970 Gediz earthquake exhibit the complex nature of disaster mitigation architecture. The town lost half of its population and its entire infrastructure. A German chemical company distributed these domes to surviving families based on a lottery system. Planning initially derived from officials, however, the placement of the domes changed as families moved the domes and clustered them about the city. The portability of the domes empowered the residents to organize their spaces of dwelling. The clusters created courtyards and other special designs similar to previous cultural spaces of significance. The domes remained for seven years and continued to be used as shelter for animals or as shelter in the winter.62

However, the foam domes failed in a few aspects. The domes were an awkward shape for furniture and the insulating properties and small openings made the spaces hot in the summer. The case study addresses the informal quality of planning and shelter in disaster mitigation. As a relatively successful project, the domes suggest opportunities for this thesis to anticipate cultural and climatic response and acceptance.

1. Establish Safety: The domed or bunker form alludes to safety shelters, or indigenous shelter types, harnessing the protection quality of these older forms of shelter. The foam was sturdy and durable, which contributes to a

sense of security. The ability to create openings allowed the individual families the opportunity to create transparency that was comfortable. However, the interior condition of the domes might have proven claustrophobic to the families who were accustomed to a different housing type.

2. **Retell the Trauma Story:** The domes stood as a narrative of the trauma for generations after the crisis. The domes were slightly customizable, but the standard dome did not reflect individual stories, but rather a collective story of trauma and displacement.

3. **Reconnect with the Community:** The community connection during the crisis seemed to be apparent through community engagement in transporting domes for other families. The design of the domes, however, does not appear to enforce community interaction.
ParaSITE by Michael Rakowitz is a series of customized homeless shelters for individual homeless people. Rakowitz attaches the plastic form to expelled HVAC air from buildings. He uses recycled materials like garbage bags and plastic sandwich bags, sews them together and the form expands into a livable space once attached to HVAC. He treats the homeless as clients and incorporates their values into each design. As one client told Rakowitz, “… homeless people don’t have privacy issues, but they do have security issues. We want to see potential attackers, we want to be visible to the public.” Lights, opening and transparency prevent threatening barriers for those who encounter the ParaSITE from within or without.

ParaSITE expresses and addresses the needs of displaced bodies. Security is the main concern. The thin boundary of the transparent plastic delineates personal space while creating a message of openness. The mobility of the paraSITE’s assists the homeless in his or her transient lifestyle. The environmentally sustainable component of the projects reuses HVAC air and old plastic bags and transforms the two into a livable environment. Wearable environments do not have the potential to be as customizable due to the number of bodies involved in refugee related crisis. Yet, the attention to the needs of these bodies in ParaSITE serves as a good model for this thesis.

1. Establish Safety: The shelters provide a boundary of personal space, enough transparency to see others and for others to see what was occurring within their field of vision.
2. Retell the Trauma Story: The clients express their desires for their shelters and Rakowitz provides them with a customized solution evidenced in the design and layout.
3. Reconnect with the community: The homeless are stigmatized in contemporary urban society. These shelters provide enough openness and explicit honesty with the intention, that the homeless occupying these spaces are less contemptible.

DESIGN

Wearable environments provide clothing and shelter to refugees during the first 30 days after crisis. The recent drought in the Horn of Africa is the specific scenario for design investigation. The design will be discussed in two sections: concept and program. The concept is a fusion of “skin and bones” or of surface and structure. The design strategy of wearable environments supposes three forms: individual clothing, the family dwelling, and the community space.

Concept:

Fusion of skin and bones

The concept of the fusion of surface and structure emerges out of site investigations of the body, whose complex physical and psychological systems work integrally to generate the form and overall perception of an individual. Wearable environments, as an extension of the body, integrate surface and structure using techniques of clothing-making and architectural fabrication, while providing a comfortable and intimate environment for a traumatized body to dwell after disaster. The goal of the design fosters a nurturing environment for the possibility of rehabilitation utilizing principles of the three step process of: 1. providing safety, 2. retelling the trauma story, and 3. reconnecting with the community.

Design technique

Wearable environments use techniques of clothing-making and architecture through the fields of tessellated origami (fold) and pre-fabricated (copy). These techniques borrow from cultural designs in the Horn of Africa. Tessellations are the use in paintings and architectural tiling for both Christian and Islamic faiths in the region. Pre-fabrication is used in the making of huts, nomadic and permanent. The Somali nomadic huts, for example, are made from saplings bound to create a gridshell structure and pre-made woven grass mats. Combining these applications with modern advances and innovative use of materials produce rigid yet flexible environments combining skin and
bones. The folding surface creates structure and folding is also a metaphor for memory, a key component to the psychological traumatized body.

*Concept, technique, and typology must perform the following in order to initiate rehabilitation of traumatized bodies:*

1. provide safety
2. retell the trauma story
3. reconnect with the community

**Design typology**

The functionality of disaster relief shelters requires the wearable environments to be flexible, temporary, and portable. The technique of folding accommodates for compacting and transporting wearable environments. Folding also accommodates for multiple ways of wearing and assembling the environments are in a kit of parts, assembled on site by the refugees to promote self-building and power in the creation of building. Simple connections and assembly are crucial to the success of the environments. Allowing the refugees to assemble the pre-fabricated kit of parts continues the process of making after and empowers them to create spaces.

<table>
<thead>
<tr>
<th>DESIGN CONCEPT</th>
<th>DESIGN TECHNIQUE</th>
<th>DESIGN TYPOLOGY</th>
</tr>
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<tbody>
<tr>
<td>FUSION OF SKIN AND BONES</td>
<td>FUSION OF BODY DRESSING AND SHELTER MAKING</td>
<td>FUNCTION OF DISASTER RELIEF ARCHITECTURE</td>
</tr>
</tbody>
</table>
Program

As a relief shelter that transforms into three different environments, the program of these spaces must also be flexible enough for the lifestyle of those using them. The individual clothing requires one space for the one site for which it is built. Remember the site is the body, but these site considerations include, the external air flow, precipitation and solar paths and how these elements interact with the site within the space.

The family shelter combines the material and spaces from the individual site shelters through a series of fastening. The larger space encompasses multiple bodies, an average of 4, and is divided into private space, for sleeping, and semi-public space, for daily activities. Circulation of air, precipitation, sun and multiple bodies factor into the space configuration. The community spaces operate in the same manner. However, the entire space is public space with a large central space and smaller semi-private spaces for meetings. The lack of function assigned to this space intentionally allows the bodies to gather, occupy, and decide the function for their collective situation.
Psychological model- uses newspaper clippings and chicken wire as a narrative of the stripping of identity caused by the stories/memories of crisis, which is, then, perpetuated by media creating a suffocating sense of feeling trapped.

[estrangement], loneliness, missing, longing, guilt, shame, separation and loss, sorrow, language degradation, value degradation, inferiority, non-identity, rootlessness, suspicion, prejudice, and the [sense of being a] scape goat
The next two models represent systems of the physical body that generate the formal qualities we perceive of other bodies and our own. These are the skeletal, muscular, and integumentary systems.
The final model is a representation of the psychological body and the interdependence of physical systems of the body -OR- the “fusion of skin, bones and memory” (surface and structure through folding). This is the impetus for design!
ORIGAMI

1. TESSELATIONS
2. MODULAR

TESSELATIONS

MODULAR

PRE-FAB

1. PATTERNS
2. PORTABLE

55. Patterns: Sketches and Pattern Magic
58. Dorze hut http://multiply.com/mu/2020ethiopiantours/image
59. Gojjo Bet in stone, self
60. Mud-packed House, self
61. Concrete New Construction, self
63. Gojjo Bet (hut) http://web.worldbank.org
64. Harar clothing http://www.farhorizons.com Bet in stone, seli
65. Somali Men’s Clothing http://www.alannabooks.com
68. Eastern Ethiopia http://selamta.net
69. Ethiopian Christian wedding http://www.arkreligion.com
70. Gondar women’s dress, seli
CULTURAL CONTEXT: PATTERN

71. Orthodox Priests at Timket, REUTERS, Wolfgang Rattay
72. Orthodox Cross Motif http://www.lojsociety.org/handbags.html
74. Scarf Edge Patterns, Moseb Restaurant, Flickr
75. House painted in diamond patterns, John Gould
CULTURAL CONTEXT: SKETCHES

76. Patterned-Based Cape
77. Modular Origami Cape
78. Tesselated Origami Shawl
79. Patterns: Wood veneer on Calico inspired by work of Eliza Storyzk, waterbomb pattern
80. Wood veneer on felt, waterbomb pattern
81. Wood Veneer on Canvas
82. Pleats in butcher paper
83. Waterbomb pattern in butcher paper
TYVEK

PLYWOOD

FELT

FINAL MATERIAL SELECTIONS
DESIGN STRATEGY

1: Modular Lattice System
20’ x 20’ x 10’ cardboard temporary structure

2. Frestanding System
**A** TRANSPORTATION: shipped from supporting NGO

**B** DELIVERY/SORTING: delivered in flat, pre-folded stacks

**C** DISTRIBUTION: 2 units given to each refugee
A RELOCATE: select a location to set-up

B UNPACK: separate the 2 units and expand

C UNFOLD: separate the 2 units and expand

D WRAP: wrap 1 or 2 units around yourself
*2 prototypes

OR

*to be replaced by real photos
A WEAR: wear individual unit

B CONNECT:
connections of folding and tying fasten individual units together

C COMBINE:
combining 4 or more units creates a fully enclosed tent

*to be replaced by real photos
CONCLUSION

Wearable environments prompt the discussion of the interrelation of clothing and building in terms of enclosure. Stemming from the conjectures of Gottfried Semper in Textile Arts, and “body” theorists from Foucault to Entwistle, wearable environments are a working physical manifestation of the interstitial space between clothing and building.

This ideation is applied to crisis situations, and the design exercise of this thesis is located within the current drought in the Horn of Africa. Wearable environments seeks to shelter refugees in the first 30 days post crisis. First, the site of the traumatized body (the refugee) is analyzed and dissected, using architectural site study methods. From this, the concept of a fusion of “skin and bones” drives the design intention. The function of wearable environments encourages rehabilitation of the individual traumatized body, through 1. establishing safety, allowing the refugee to 2. retell her trauma story, and 3. reconnect with the community.

The design concept of the fusion of skin and bones is achieved through methods of origami. Through folding, surface becomes structure. Folding creates opportunities for multitudes of ways in which space can be created from one material and reduces the need for multiple materials and systems. These environments can be worn as a single article of clothing or connected to others to create larger environments, essentially tents.

Two systems emerge for the assembly of wearable environments. The first system is a system of hanging. An overhead lattice system spans a large area and attachment points for individual wearable environments to group together. The second system is a system of anchoring. Cardboard pads serve as the floor of the environments. Pre-made holes allow for rods to be placed in them. The wearable environments rest on the spokes through a system of weaving the create the overall space.

Both systems will be tested for ease of assembly, efficient use of materials, portability, temporality, and adherence to the aforementioned rehabilitative steps. The goal of this thesis is to generate conversations about disaster mitigation practices and the interrelation of clothing and architecture to develop innovative solutions for crisis response and further evolve interdisciplinary design in general.

http://portablelight.org/about

http://www.cbc.ca/news/background/refugeecamp/


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