Hypothetical constructions

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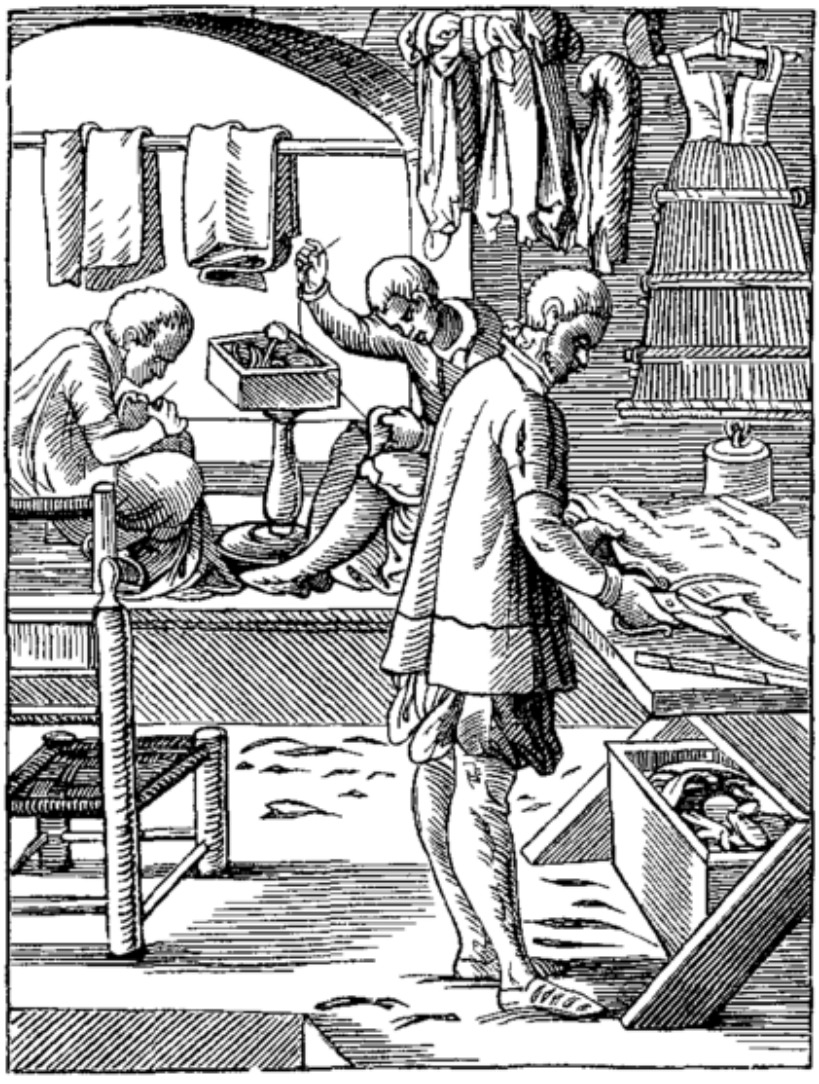


1. The tailor - woodcut illustration by Jost Amman (1539–91) from The Book of Trades published in Germany in 1568

Abstract

Hypothetical Constructions opens up a discussion about conventions, representation and perception of space by questioning the standard methodologies of creating interiors. It explores the possibility of creating interiors by using non-conventional methods (i.e. clothing pattern making). Architectural representation mediates the constructive process of a space. Moreover, the conformity of architecture representational techniques, such as drawings and models, render the space in a distinct and precise manner therefore limiting their descriptive power. Appropriating representational techniques from other disciplines might inform and give new meanings to the interior space. Analysing the methodology used in the process of creating a pattern for a garment and linking it to interiors one can begin to question how is it that the methods of construction and the characteristics of the pattern making can be employed in the field of interior architecture. My ultimate goal is to develop a system of working, a methodology of representing and creating interior space by borrowing techniques from the field of pattern making.

Index of terms

Pattern
A pattern is an instrument used to shape, construct or assemble a given object or material.
I am interested in patterns in the sense of stencils or templates related to clothing construction and I want to distinguish them from patterns as models of behaviour related to sociological studies, as analysis tool for urban planning or as decorative elements. In this sense a pattern is the diagram of a mapped body. It is used to transfer shapes onto fabric which are put together through the action of sewing prior to matching notations and reading symbols as if assembling a puzzle. (Erlhoff and Marshall, 2008)

Pattern making
It represents the process of creating a paper template for an item of clothing. It is also called pattern cutting due to the employment of cutting tools.
It entails two different methods: one is based on taking measurements of the human body to define the shape of the subsequent pattern and is called drafting; the other method involves pinning a muslin fabric directly on to a form and it is called draping.

Fold
In a material sense the action of folding implies that a given surface is bent over itself so that "one part covers another part". The reversed action is to unfold something which brings a surface "from a compact to an extended position" (fold, 2015).
In the Deleuzian sense of the term, the fold refers to subjectivity and denotes an antagonistic relationship between two concepts: "appearance and essence, or surface and depth" as Dr Simon O'Sullivan, proffesor of Visual Cultures at Goldsmiths, London (2006).

Pleat
A double or multiple fold in a garment or other item made of cloth, held by stitching the top or side.

Dart
Technical term, employed in any garment related field, the dart remodels textile fabric to accomodate the three-dimensional shape of the human body. Essentially a triangle shaped surface, the dart, is closed by stitching its sides on a symmetry line. It gives volume to a surface by taking in the fabric that overlaps.

Sloper/Block pattern
The development of clothing construction lead to the creation of standardised patterns for women and men. The specific terms used to define these patterns are sloper (home made) and block (industrial production). They are two-dimensional templates for creating a basic garment and can be altered to alternatively produce more elaborate styles (Fisher, 2009).

Toile
In the process of creating a garment, the tailor tests its pattern by constructing it from an inexpensive fabric than the final one. This draft versions of the final garment are refered to as toiles (Fisher, 2009).

Introduction

Introduction

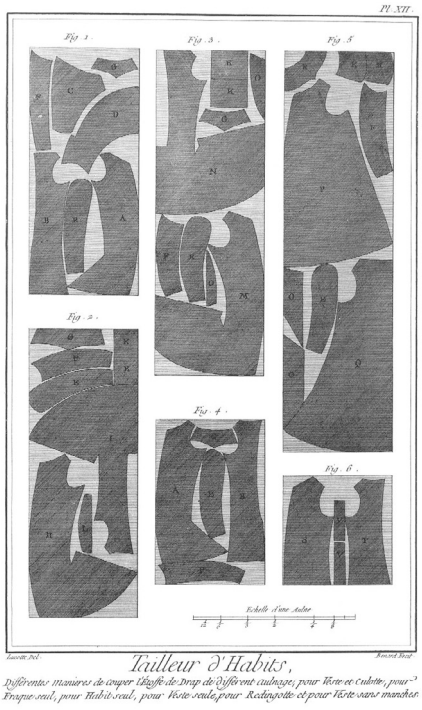
The relationship between fashion and architecture has been explored many times before and made visible throughout books and exhibitions in an attempt to connect the two disciplines from the points of view of style, surface, texture, techniques and materials. Moreover interior architecture and fashion have accompanied each other throughout history and share similarities in terms of aesthetics and style. A characteristic often emphasized is the textile's potential to become ornamental and its possibility to be used as architectural surface decoration.

Interested in the associations made between fashion and architecture I wished to explore deeper their prevalent elements in order to go beyond the already established commonalities. My fascination lies within the material and technical realm of clothing construction along its conventions and forms of representation. Influenced by the essay Corner and darts written by architect and book editor Lois Weinthal I began to think about interior spaces differently. Her essay summarizes two investigations on the representation of furniture, clothes and architecture based on the idea that their conventional notational systems allow the development of hybrid constructions manifested in the shape of a "winged chair" and "muslin wallpaper tailored to a door" (2009, p. 327-329).

2. Similarity between fashion and architecture in terms of decorative pattern

This thesis explores the overlapping areas between interior architecture and cutting patterns.
The common element both disciplines evolve around is the human body for which both offer protection and privacy although they also share characteristics within visual representation. Any type of garment is represented by employing a two-dimensionaldrawing, akin to architectural representation which unfolds interiors on flat surfaces. Even the tools and materials used for these depictions are similar: white paper or tracing paper is used as supportive surface, while pencils or ink liners are used to draw with. Starting with a two-dimensional proposal, both fields goal is to manipulate them in order to conceive space and volume.

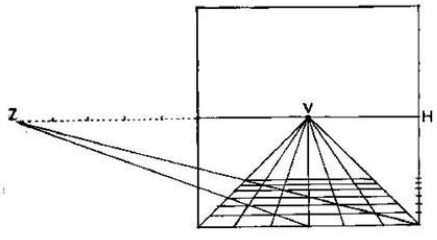
3. Lois Weinthal, *Winged chair,* 1993



4. M. de Garsault, Cutting patterns for different garments , 1767

Each discipline has developed its own methods of construction and systems of notation, establishing conventional forms of representation within their own practice. Historically the depiction of both practices has relied on geometric constructs. In 1435, guided by his geometrical knowledge in the field of optics, Leon Battista Alberti has formulated the theory of perspective which became the indispensable instrument of representing space. In a sense, one could argue that this was the starting point of setting up the conventions of architectural drawing. Although, employing geometrical shapes for centuries, the construction of clothing took a longer time to achieve the same consolidation. It was just in the nineteen century, with the invention of the tape meter, that tailors begin to use the same unified reference system to guide the construction process of garments (Kraft, 1998). These two moments mark the inception of a universal language governing both professions.

As a newly formed discipline interior architecture has adopted representational techniques from other fields of practice. In the article *Art of borrowing*, architect Ro Spankie argues that there is no such thing as representational techniques specific to interior design and that all techniques used are borrowed from other disciplines. Moreover he suggests that appropriation of these methods "might open up new representational possibilities that may be used not just to represent a space butto design them as well" (Brooker and Weinthal, 2013, p. 440). Thus, to speculate on a form of production within the interior does not only alter the standard techniques but as well influence thinking and making (Ibid.).



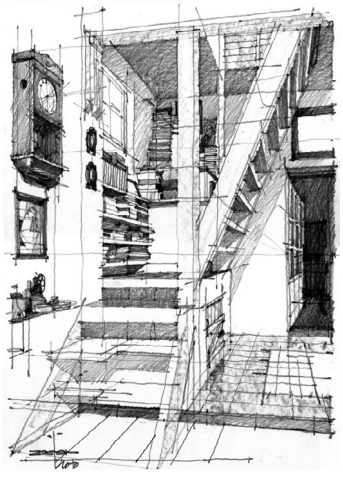
5. Leon Battista Alberti, *The prince of rays,* 1435

Motivation

Expanding on the aforementioned thought this thesis follows an analysis of pattern making's constructive process, of its visual characteristics regarding notational and representational conventions and tries to establish connections with similar form of representation within the field of interior architecture. Moreover, it aims to question these conventions and the way they influence the design development of interiors.

By employing a construction process borrowed from another discipline I wish to subvert the role of the representational tool within the interior. Therefore I propose a shift in approaching the production of space and I wish to shed light on the idea of using a different methodology. Is it possible to alter the present understanding of interior drawings - merely representations of space - to becoming the space itself? Could I create a new technique by grafting two methodologies? My aim is to challenge the role of spatial organization by addressing the standardization of interior dimensions through the inclusion of clothing pattern's components and its cutting process.

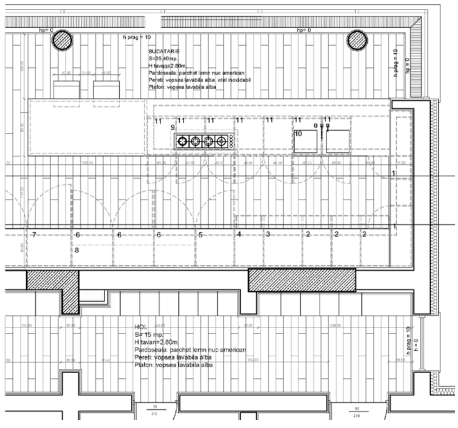
"To propose a new attentiveness to notation in architectural representation is not to propose another paradigm shift – a simple substitution of one way of working for another – but rather a proposal to enlarge the catalogue of techniques available to the architect working in the city.
Stan Allen



6. Andrei Raducanu, *Interior,* 2004

Research questions

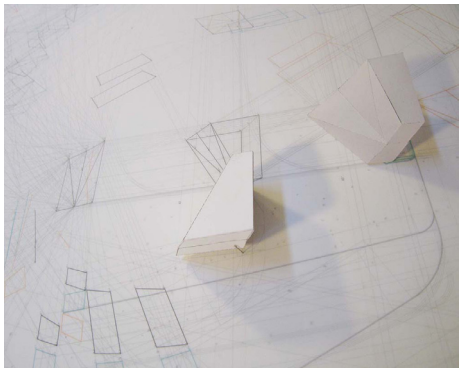
The methods of rendering the multiplicity of layers building up an interior space influence and shape our perception of it. My fascination lays in the capacity of representation to dominate our understanding of interior's spatial characteristics. I am interested in subverting interior architecture's conventional techniques of representation in order to create a different understanding of the interior. Therefore, I would like to approach the idea of formulating a new methodology overlapping the means of representation from two different fields of practice.



7. Drawn by author, Interior floor plan, 2009

According to architect and theoretician Stan Allen, architecture is a material practice in the sense it transforms reality and creates new forms of matter through "intermediary codes such as projection, notation or calculation" (2009, p. xiii). Thus, the medium through which interiors are perceived can influence the design process. Linking pattern making to interiors one can begin to question how is it that the methods of construction and the characteristics of the first discipline can be employed in the field of interior architecture? Could this approach create a shift in the way we perceive interior spaces?

To understand how architectural representation controls the development of a design I have directed my attention to different employments of geometrical constructs in depiction of architectural concepts. Although, these methods have created fascinated outcomes my goal is to subvert them by introducing different forms of representation and notations. Therefore, is it possible to change the representational conventions of our discipline?



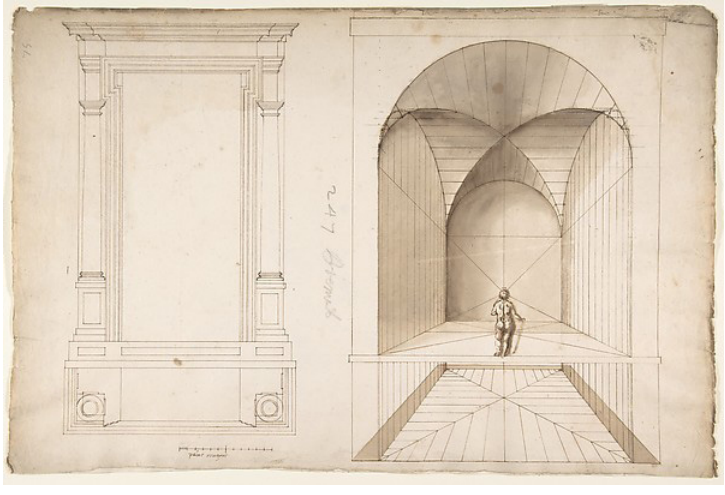
8. Karla Lopez, *Material lines*, 2015

Can this change be made by bringing together two methodologies in order to graft a new one? And if so could the new tools of representation influence the process of conceiving an interior space?

Interior architecture, and pattern making work with

two-dimensional surfaces. As I will further explain these surfaces act as maps - in interior architecture the orthographic projections (elevations and plans) are used for representing the space; in pattern making, although used for representation, the template of a garment (i.e. pattern) is used for determining and controlling the construction process. What I wonder is whether interior architecture representation can attain a second meaning and be employed as an instruction set.

Furthermore, is it possible to look beyond the standardization of interior space dimensions and reinvent the representation of space? Could reinterpretation of the tools shed a light onto the limitations of conventional representation? By exploring the characteristics of patterns I will try to incorporate applicable elements of the surface and actions of the tailor to develop a methodological approach for interiors. In conclusion, the representation tools are re-evaluated and given the role of active factors in the process of designing interiors.



9. Unknown author, *plan, elevation and perspective study*, 16th century

Methodology

This thesis takes into consideration the representational methods, tools and notational systems of two different disciplines, compares their inception and examines their historical development in order to graft a new methodological approach to constructing interiors.

The inquiries this thesis is trying to respond to have framed a methodological approach through material experimentation as well as artistic research. Artistic research is "a combination of artistic practice and theoretical approach while aiming at the production of knowledge" (Balkema, Slager, 2004, p. 70). The artistic research consisted of: analysis of design references as well as an investigation on pattern making in terms of process and final product. Throughout the development of this thesis parallels between interior representations and patterns are created in terms of the roles they fulfill: tool of representation, conventional languages, maps of bodies, geometrical constructs and so on.

The theoretical context of my graduation project is based on the analysis of geometrical construction methods related to architectural representation and clothing pattern drafting. The theory gave structure for a comparative analysis between the two disciplines and assigned meaning to the hypothetical claims I am making, As a result of these analyses related themes such as mapping, deconstruction and topology emerged and influenced the process.

The techniques and actions of the tailor were the starting point of my material experimentation and became tools aiding the formulation of my methodology. The aim was to investigate the sequence of actions that guide the construction process and to translate them into operations applied to the fabrication of interior spaces.

The design proposal is a visual research and experimental approach to depict interior space based on my own methodology which consists of: a series of actions to be performed, a medium onto which the performance is made and tools of representation used as a set of conventions.

To sum up, throughout the content of my thesis theory and practice guide each other, therefore my methodology needs to be understood as a circular process where design cannot be regarded in absence of theory.

Theoretical research

The theoretical chapter of this thesis addresses the role of conventional representation within architectural space and pattern making. Willing to redefine the traditional means of representation I would like to open up a discussion about the conception of space by making an overview of geometric constructs employed in architecture and an analysis of their material and visual characteristics suggesting a comparison with clothing patterns. Subsequently, I will continue with an exploration on questioning the representation of space, how its conventions and processes can become a powerful mean to create a different understanding of space.

Part 1 Representation of space

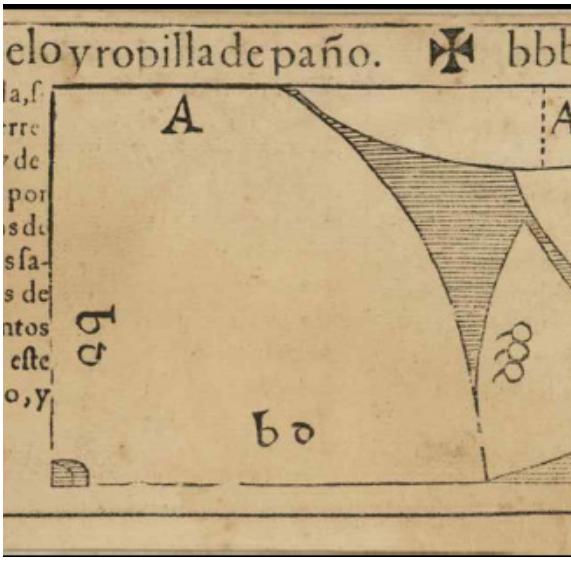
Geometry of space and body

The origin of the word geometry comes from the Greek words geo-, meaning earth and -metron, meaning measurement. The etymology of the word space also brings us back to ancient Greece, to the term stadia which defined a fixed standard of length. In this sense the notion of space is employed to measure and quantify the world which is to be understood as objective and abstract (Gigli, 2007). Thus, in Ancient Greece, geometry was concerned with "the ratios and qualities of lines, areas and angles" (Evans, 1995, p.). To display this great interest Euclid, a 4th century B.C. Greek mathematician, has put together, in a book called *Elements*, a collection of definitions, axioms, theorems and constructions and their mathematical proofs.

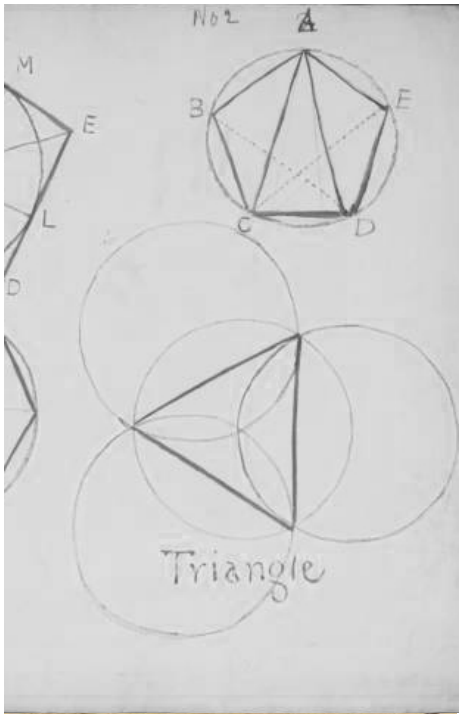
Referring to William Ivins book of *Art & Geometry: A Study in Space Intuitions*, Robin Evans, architectural historian and theorist, states that Euclidean geometry might be thought of as a geometry of touch due to its properties which preserve length, angle measure and the shape of the geometric object while projective geometry is a geometry of vision due to its preoccupation with the deformation of figures according to the point of view (1995, p. xxxii).

Comparing both types of geometry in the depiction of architectural space, Evans affirms that architectural composition is defined as *a metric organization judged optically* (1995, p. xxxiii). He is conveying that architectural space is constructed based on measurements and represented through geometrical projections (plan and elevations). Granted that geometrical constructs define architectural space as a metric organization judged optically, pattern making should receive an equivalent definition to further be able to make a comparative description and parallel analysis of both disciplines.

Thus, thinking of geometry as embedded to pattern making construction, I would suggest that plane geometry was



10. Juan de Alcega, *clothing pattern*, 1589



11. Euclid's Elements

the base of cutting clothes before the rationalization of thinking which understood the body as a whole composed of different parts.
Using Euclidean geometry, pattern makers of the sixteen century tried to render the topography of the human figure by abstracting its shape into plane geometrical figures as seen in figure 10.

In the field of tailoring, an example for the employment of geometry is given by the oldest known book on patterns and it even lays within the title: *Libro de geometria practica y traca* written by Juan de Alcega, a Spanish tailor in 1589. The book is first of its kind with "diagrams showing how to lay out a pattern on a given width of cloth" (Hyatt Mayor, 1942).

Representation of three-dimensional space in two dimensions was an issue which preoccupied artists for a long period of time. To be able to abstract space in order to render it accurately in pictures, they developed methods of working based on geometrical constructs and conventions. During Renaissance a breakthrough in developing new methods of architectural representation took place when Rafael wrote a letter to Pope Leo X, concerned with the conservation and recording of ancient Roman buildings remains. He describes how to construct drawings of plans and elevations but most importantly he defines what keeps them together. Rafael thus defines orthographic projections and points out that the parallel lines preserve the true measure and join together the corresponding parts (Evans, 1995).

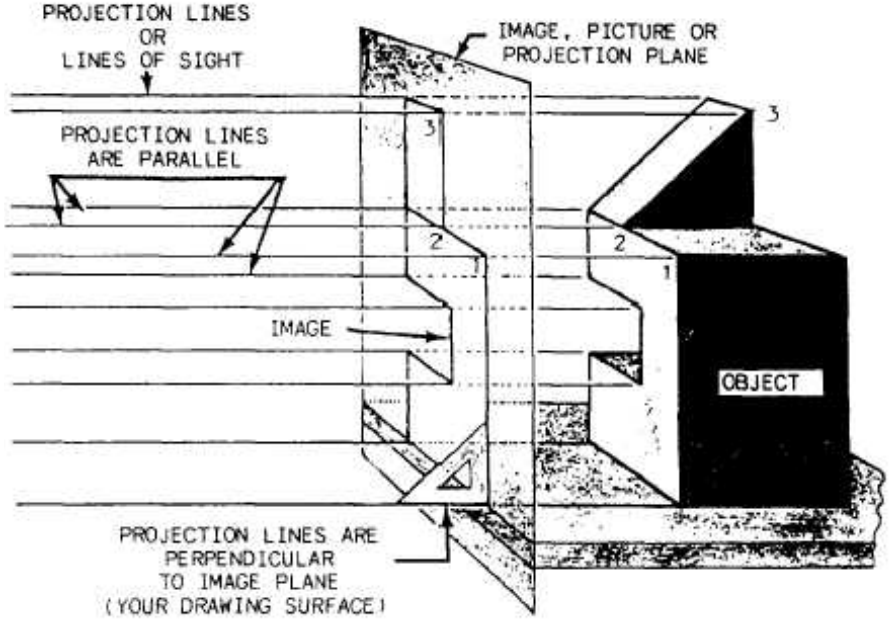
Representing an interior space using orthographic projection takes it apart and projects its surfaces onto three separate planes, therefore destroying the composition of the whole form. In the article *Towards a semantic notion of space*, product designers Helga Lannoch and Hans-Jurgen Lannoch, argue that this separation provides "three independently quantifiable images" (1989).

In the same sense, pattern making takes apart the body and creates separate pieces according to the point of view: front,back; and according to the parts of which is made of: arms, legs, torso.

Not only representation of space through geometrical constructs was on the mind of the Renaissance man, but as well reproduction as a means of achieving a perfect copy of reality. Albert Dürer's perspective machine, a device invented to help better draw in perspective was composed of a gridded wooden screen through which the fixed sight of the artist passes and maps the representation onto the framed grid. Matching the divisions of the screen on a piece of paper, the artist can now accurately recreate the image (Vam.ac.uk, 2015).

"The perspective projections of the painter and the parallel (orthographic) projections of the architecture both bring space into pictures.
Robin Evans

Evans argues that architectual representation developed from describing an object per se using plane geometry, to describing images of an object thus using projective geometry (1995). Although both disciplines decomposed the three-dimensional space and body into a two-dimensional surface using plane geometry, architectural representation developed further once Raphael's formulated the mechanism of orthographic projection. Pattern cutting developed slower and the understanding of the human figure as a measurable shape which could be accurately representated only took place with the advent of the tape measure, in the nineteen century (Kraft, 1998).



12. Basic orthographic projection

Challenging the role of geometry

In the introduction of his book, *The projective cast*, Robin Evans brings forth the idea that through architectural drawings geometry induces meaning to, otherwise seen, plain lines. He states that geometry has always been the foundation of architecture, providing it with honest support and this is why in order to achieve "firmness and stability" architects search for manageable geometric constructs. And by manageable, Robin Evans refers to inert, dead geometry: "dead things are easier to handle than lived ones". The foundation of geometry, Euclid's Elements such as triangles, circles and rectangles is the dormant geometry he refers to, identifying their employment in architecture as obsolete. To emphasize his thought, Robin Evans states that "dead geometry is an inoculation against uncertainty" (1995, p.xxvii).

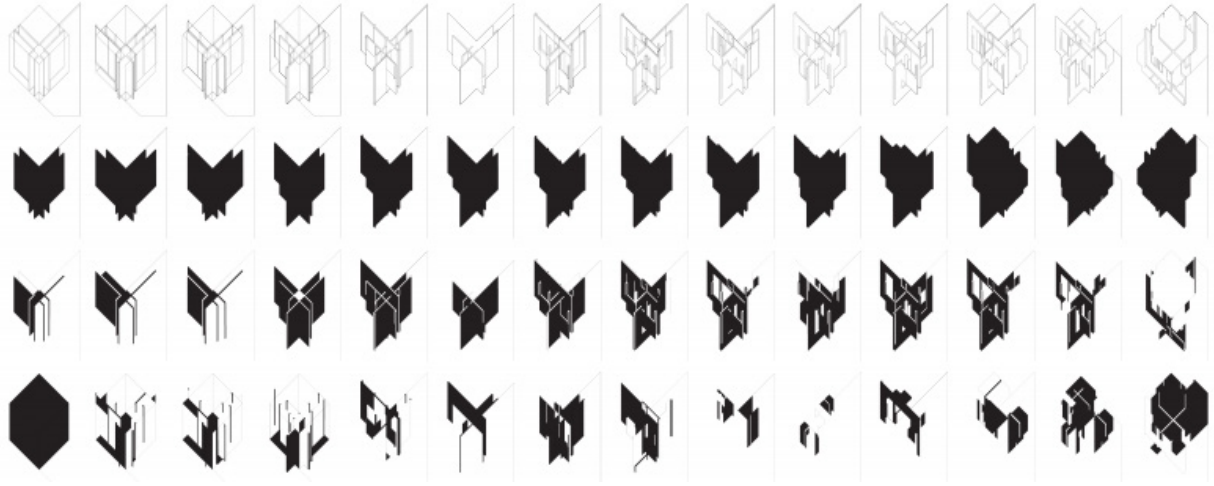
He goes on, saying that geometry is always seen in the shape of buildings and sometimes in the drawings of buildings which are categorized as dormant geometry but the territory where we should look for geometry is placed in between our imagination, drawing and building. This space in between, essentially a gap, is fundamental. Describing it as "the blind spot between the drawing and

13. Albrect Dürer, *Draughtsman Drawing a Recumbent Woman,* 1525

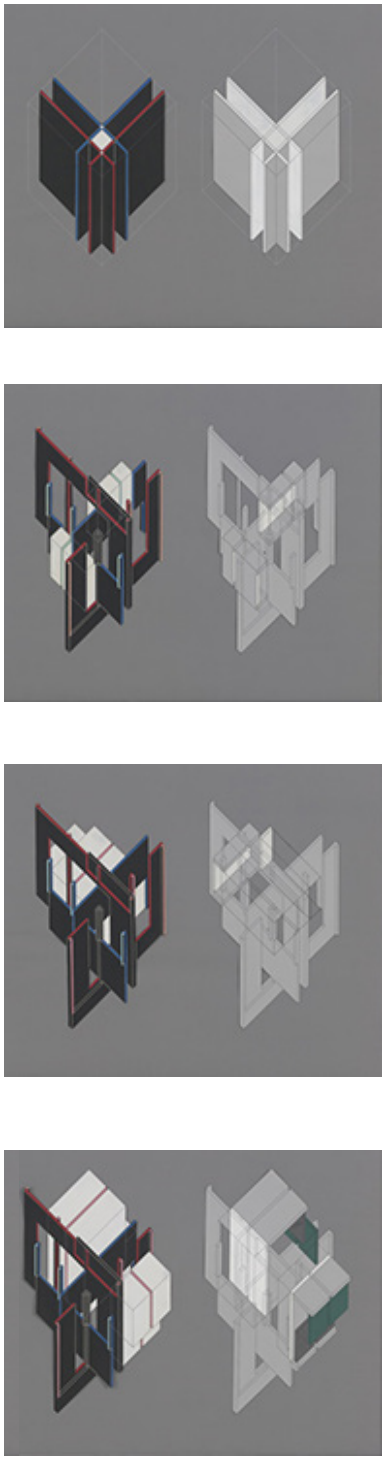
its object", Evans underlines that inside this gap there is an active geometry. He talks further about projections and processes we use to visualize architecture as zones of instability (1995). Through these mediums, architecture is seen as a discipline of translation and mediation, allowing for the production of creative space within the conventional means of representation (Ibid.).

Working along the space in between architecture's disciplinary mediums, Erin Besler, graduate of the Southern California Institute of Architecture, explored in her project, *Low Fidelity*, the possibility of reestablishing this gap. Her study is based on Peter Eisenman's House VI which is a transformative manipulation of a grid that can be seen as a "record of the design process" (Perez, 2010). Although the project consists of two-dimensional drawings which flatten and abstract the architectural object, Erin doesn't go back to standard practices as projective drawings. Her work inverts those standard models and undermines architecture's traditional practices by moving through translation and abstraction to create distance and difference within the authenticity of object and their representations (Besler, 2012).

What intrigues me regarding this project is the method of working employing two-dimensional drawings and transformative processes in order to subvert architectural conventions. Likewise Erin Besler, I believe that moving along the gap between the object and its representation,



14. Erin Besler, *Low Fidelity, Transformation toolpaths,* 2012



15. Peter Eisenman, *House VI*, 1975

identified by Robin Evans as a place for active geometry, it can spur a dialogue concerning the scope of architecture's disciplinary mediums.

Following the idea exposed by Evans, I would like to argue that the use of geometrical constructs can be challenged by bringing along another method of representation and therefore construction. I consider clothing pattern constructions as projections of the human body equivalent to the elevations and floor plans of buildings. Through their similarities I am putting forth a new way of seeing space. Likewise Evans, I see geometry being alive exactly along the threshold between representation and our imagination.
Illustrative for the challenging role of geometry in architecture is the project *Parallel Lines*, an introduction to architectural drawing in Woodbury University's Graduate program which used descriptive geometry and skiagraphy to ingeniously expand on the Euclidean principles. Based on Euclid's *Book Three of Elements* the students developed a series of drawings which bent the relationship between two and three dimensions. Using skiagraphy (the use of shading and the projection of shadows to show perspective in architectural or technical drawing) as a transformational process the two dimensional drawings acquired consistency and linked the "seemingly weightless and abstract world of Euclid to the phenomenon of light" (Ericson, 2015).

Robin Evans states that geometric projection is a two way mechanism. On the one hand, through a process of mental spatial transformation, an imagined geometric figure is rendered on paper. On the other hand, a real space is described as an image through drafting projections on paper. Thinking of the translation of objects into geometrical constructs one generically describes them as images. Architect Ching-Pin Tseng argues that image is directly linked to space in the sense that "image may represent spatial construction on the one hand and architectural space can be transferred or reconstructed through image on the other hand" (Tseng, 2008). Thus, both convey the idea that images are translations of imaginary or real spatial constructs employing the action of translation.

I find that the idea exposed by Evans and Tseng concurs with the thoughts exposed by Jonah Rowen although the later mentioned author makes a difference between two types of architecture that emerge from the two methods of representation. There is on one side the architecture of image emerged from perspective drawing and meant to be experienced, consumed and on the other side there is the architecture of thought developed through methods such as orthographic projection, which makes no attempt to approximate reality therefore interrogating the architectural discourse (Rowen, 2013).

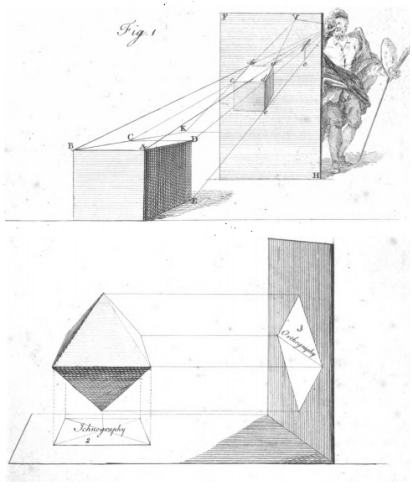
A project that investigates this potential is *2.8D* of architect Chao Yan. He based his research on the interpretation of drawings as "both representation media and geometrical generator to provide fully three-dimensional information for architectural form". The traditional spatial operations through which the form of architecture is constructed were altered by "turning parallel projection into spherical projection for the translation between drawings and objects". The result is a "three dimensional object created through orthographic projections based on a two-dimensional, three-dimensional relationship" (Yan, 2014).

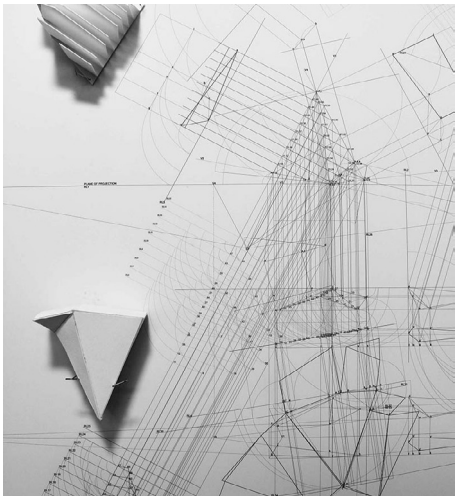
In an attempt to "create a new DNA for architecture" Julian Rui Huang proposes to work with a combination of two processes (pattern making and form making) into one single method. Preoccupied with the subversion of architectural conventions, the project *Visual Occlusion Pop* by Julian Rui Huang questions the spatial relationships in architecture through manipulation of surface and form. Using a volumetric grid to cut the initial structure in modular parts and applying a graphic pattern onto them "distorts the reading of the parts but unites it into a new whole".

This project presents interest for my design research because it engages with formal manipulations such as slicing, shifting and stretching applying these transformations on fragments of a single house. Subsequently ,the elements are multiplied into groups which begin to expand and build up the house transforming it into a larger entity. The action of multiplication is connected to the process

> "*Geometric projection transports images because we also talk of projection as a psychological colonization of the real... (projection) transports the properties of the unreal triangle in the mind out into things.*
> Robin Evans

16. Daniel Fournier, *The principle of Parallel Projection*, A treatise on the theory of Perspective, 1761



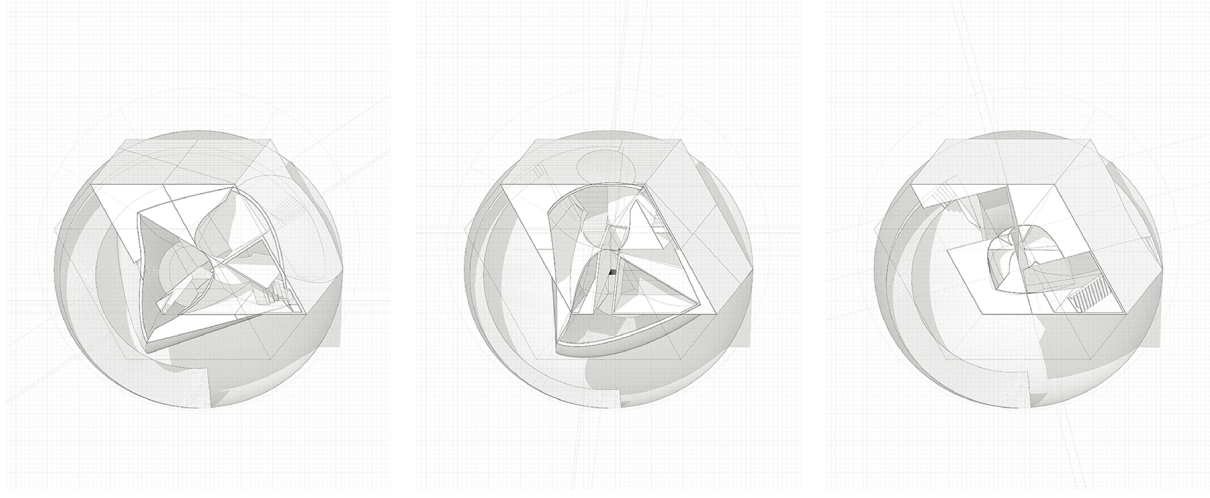


17. Laura Kazmierczak, *Parallel Lines*, 2015

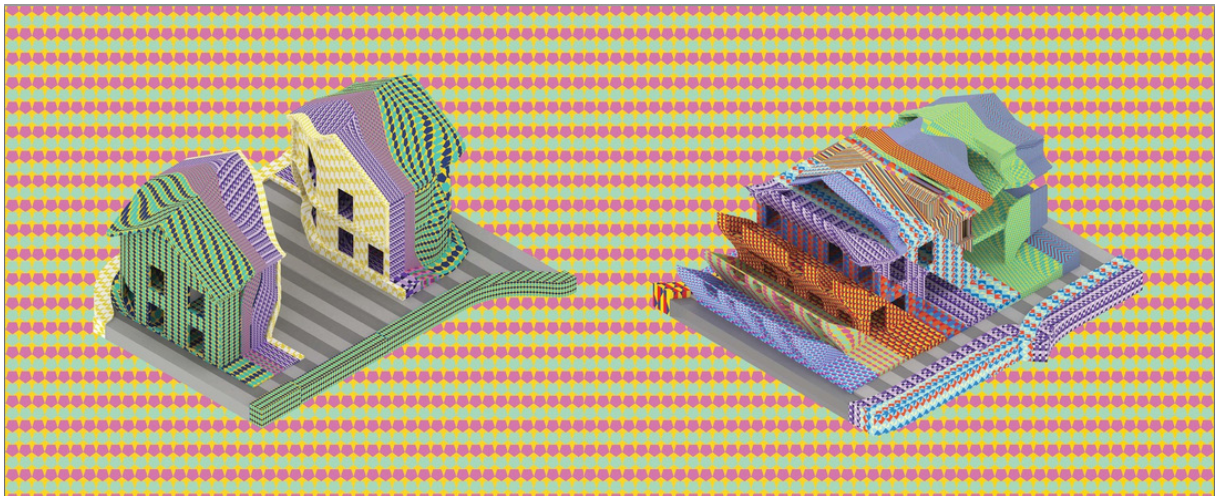
of patterning clothing, a characteristic of paramount importance for its development. The ability to perform transformations on a basic shape creates an advantage for pattern making from the point of view of its constructive process.

I believe that making use of the standard medium of representation in a conventional manner has become obsolete. Undermining the process by introducing a sequential transformation, as seen in the previous examples, has the potential to challenge our discipline.

Placing myself along this lineage of thinking I would like to suggest that my project builds up new architectural forms of representation by investigating depiction of space through the use of orthographic projections. Further on, adopting elements and transformations from the discipline of pattern making has the opportunity to add up new qualities to the architectural space. The geometrical method is employed to re-read architectural space giving it additional interpretations which are able to create heterodox shapes.



18. Chao Yan, *2.8D*



19. Julian Rui Huang, *Visual Oclusion Pop*, 2015

The role of architectural drawing

Interior architecture has inherited architectural norms of construction and representation from architecture. Although architecture's standard conventions includes drawings, models, perspective and other hybrid mediums I will further refer only to orthographic projections. I give significant attention to this type of drawing due to its particular characteristics of rendering space objectively by displaying its true measure. Furthermore it is similar to the representation of the body - i.e. patterns - by decomposing three-dimensional space into two-dimensional surfaces. The orthographic projection's conventional elements makes it easier to be understood and manipulate.

The development of architectural representation during Renaissance contributed immensely to the perception of space. From this moment on classical architecture is accompanied by the descriptive triad of the plan, elevation and section which according to Robin Evans is "maximum descriptive power obtained at minimum price - a good bargain" (1995, p. 119).

In the first page of his essay *From Drawings to Buildings*, Evans is setting up the premises of what will further become an investigation on the role of drawing in architecture. He starts off with what is most likely to be a conclusion, stating that the drawing's power to be distinctive and unlike to what it represents is paradoxical (1997). One would imagine that the technical drawings made prior to the beginning of constructing a building are identical to the final image of the realized work. But that is not necessarily true. What Evans is trying to convey is that through the means of translation the drawing into the final work, meaning is lost and instead of the expected similarities between drawing and building one can identify a paradoxical distinction (Ibid).

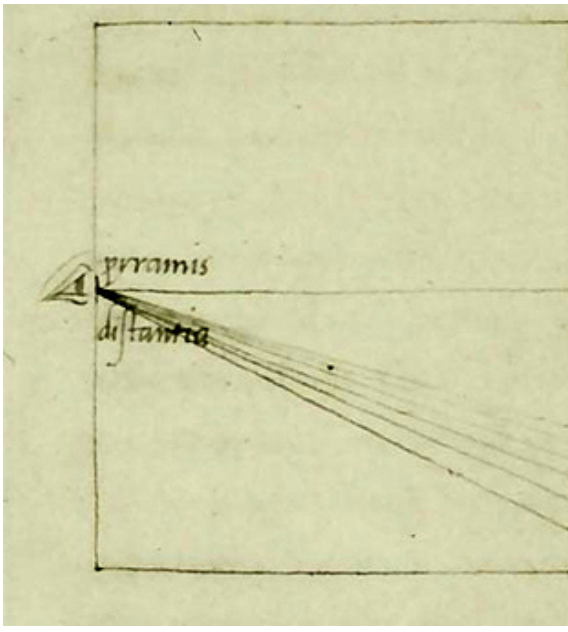
According to Walter Benjamin, philosopher and cultural critic, drawing has occupied a marginal position within

the realm of art which is consistent with Robin Evan's view regarding the "disadvantage under which architects labor" in opposition to sculptors or painters (1997, p. 156). This segregation between architect and his work made Benjamin state that architectural drawings do not "re-produce architecture" however "they produce it in the first place" (Benjamin, 1988 cited in Vidler, 2000, p. 7). Historian and critic of modern architecture, Anthony Vidler, refers to the drawing as an artefact which does not reference an existing object in the real world, but is preceding the building and therefore is viewed as an addition to the course of a building's design (Vidler, 2000).

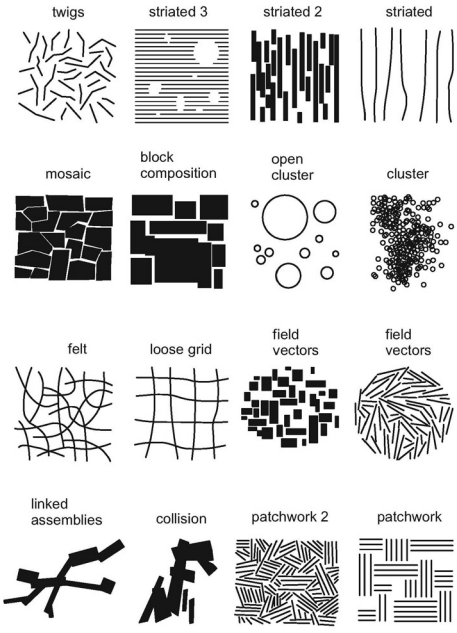
Another point of view on the idea of drawing being a communication medium is made by architect Johan Rowen in the article *In praise of the orthographic projection*. He puts forth the idea that the drawing employing orthographic projection can never be faithful to its subject and viewer therefore the drawing becomes an object in itself. He builds his opinion on the idea that orthographic projection flattens all depths of architectural space and renders it in an abstract way (Rowen, 2013). Moreover, there might be a disconnection between image and space due to the subjectivity of spatial imagination says architect Ching-Pin Tseng.

Stan Allen opens as well a discussion about architectural representation. In his article *Mapping the intangible*, he writes about drawings as being "often thought of as scaled-down pictures of buildings" and agrees further on the relative representational role that it pervades through scale. According to him, the built form is in a sense a mimetic translation of the initial drawing (Allen, 2009).

Orthographic projection has the ability to transmit technical information and to allow comparison due to its standardised system. It is the "primary language of the discipline of architecture" (Rowen, 2013). Therefore the decision to further expand on this type of drawing is maintained by the following concepts extracted from the prior theoretical research: orthographic projection is seen as an intermediary step in the design process, a medium of communication, an autonomous artefact and also it is



21. Leon Battista Alberti, *Perspective construction*

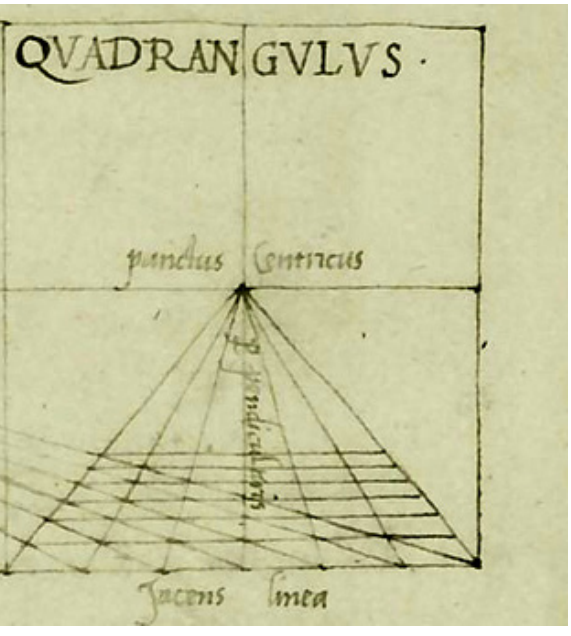


20. Stan Allan, *Diagrams of Field Conditions*, 1996

seen as a reflection of the subsequent building.
All of the above acomplished roles of the projective drawing makes it comparable to clothing pattern and allow for further investigation on their overlapping characteristics.

Notational systems

As underlined previously, the conventional means of architectural representation are constructed geometrically and their reading requires prior knowledge from the viewer.



Johan Rowen argues that orthographic drawings are the primary language of the discipline of architecture due to their attributions of comparing, understanding and explaining architecture. Even though this knowledge is now clearly understood it was not until the Renaissance period that the two methods of representation: the perspective projections and the parallel projections detached themselves from one another and became tools of labor employed by different disciplines. Raphael and Leon Batista Alberti have both attributed perspectival projection to the painters and orthographic projection to architects (Rowen, 2013). The point they are highlighting is that the two rendered projections transmit different information: the architect is conveying a measurable and precise abstraction while the painter is creating a descriptive, pictorial image.

The ''language'' of architecture is communicating qualities of spaces through thickness and types of line, hatches, symbols and standard dimensions. Stan Allen argues

that "architectural drawing is an assemblage of spatial and material notations" which needs to be interpreted as thought of a script or recipe (2009).

The medium through which one decodes these instructions has been shared throughout history by established conventions such as elevation, section and plan. Anthony Vidler proposes the same reading of the architectural practice putting forth the idea that the architect works with a code similar to musical scores or mathematical formulas. He argues that these "encodings of representation" have become more abstract and gained a "second level of difficulty", therefore sealing within the means needed for interpretation (Vidler, 2000, p. 7).

I suggest that there is a lot to be gained in terms of concept and substance within the field of architectural representation if architects would overlap other typologies of representational conventions. It might create a niche, opening up another field and establishing its own methodologies.

Mixing the codes

A quick look back through history gives us some examples of architects or other professionals who looked beyond their field of practice and borrowed methods of working or notational systems from other realms. I am mostly interested in those attempts to translate frameworks from other fields into methodological approaches to generate architectural forms. A rather often made connection is the one between music and architecture. Music and architectural composition are based on proportion, harmony rhythm, to name a few, and are employed to influence and involve the public.

Sound artist, Michael Fowler, brings front the similarity between composer's, John Cage indeterminacy process and the non-representational forms and the open-endedness of the architectural programs developed by Bernard Tschumi and Yago Conde. What interest me in this comparison are the parallels made between architectural design process and musical composition from the point of view of representation and process.

In his lecture *Composition as process* Cage delineated the methodological process of his work and identifies the compositional elements in his process of creating music: structure, method, material and form. He defines structure as "a division of whole into parts", method as "note-to-note procedure", material as "sounds and silences of a composition" and form as "morphology of continuity" (Cage, 1958). By introducing chance operations and impose objects upon musical instruments he changed the structure of music composition into an indeterminate musical discourse. In relation to the conventions of notation it can be said that he rejected intentional compositions and his scores are a list of instructions for the performers which do not references musical instruments or sounds. Cage defined the notion of indeterminacy as "the ability of a piece to be performed in substantially different ways" therefore allowing for multiple readings of his scores.

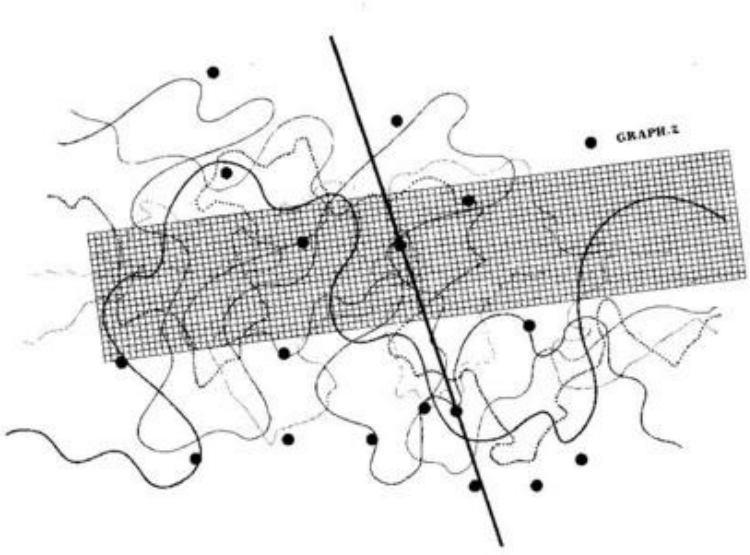
(Pritchett, 1993).
Fowler argues that by borrowing concepts as "architecture as event" and "architecture as indeterminacy" from Cage, Tschumi and Conde are both questioning the function of architecture in relation to site and have the capacity to move beyond "the codified nature of the modernist mantra form follows function" (2012). The overlaid elements in their architectural representations show the similarity of the creative process and design thinking between the two architects and the musical composer.

The drawings of Vila Olímpica de Barcelona (1988), designed by Yago Conde are a juxtaposition of the musical score, Fontana Mix, of John Cage, on top of the diagrammatic components of the village's site and as well a graphic deconstruction of its components (Conde, Hammond and Goller, 2000). In this sense the architect describes the overlaid diagrams as "a sort of taylors' pattern from which new figures are extracted."

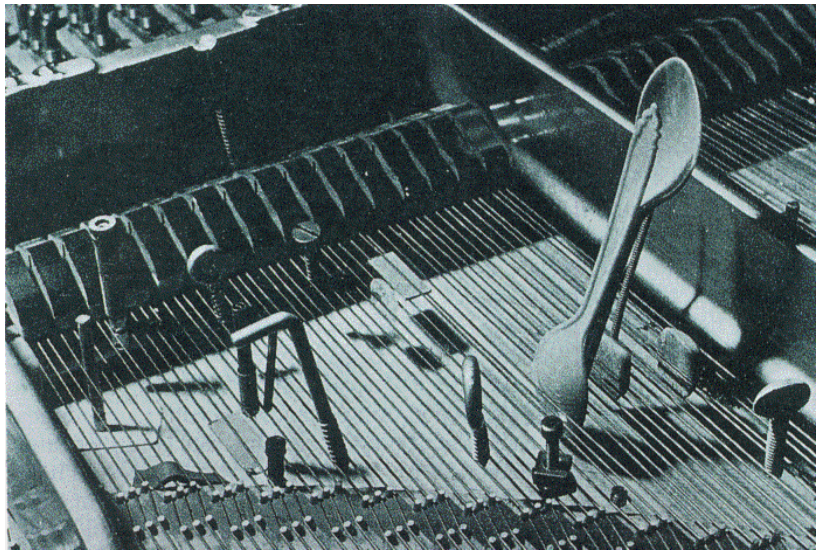
Another valuable example of subverting architectural notational systems is the work of Bernard Tschumi. In *The Manhattan Transcripts*, Tschumi approaches notation as a way to deconstruct architectural elements. The representations of the project are made by employing operations such as repetition, distortion and superimposition. He pointed out that the aim of the project was to transfer to another medium: "things normally removed from conventional architectural representations, namely the complex relationship between spaces and their use, between the set and the script, between "type" and "program," between objects and events" (Tscumi, 1987). Through this process the Transcripts are creating spatial creativity. By employing different modes of notation he alludes to realms "normally excluded from most architectural theory" such as choreography, sports, photography, which he consider to contribute and question the limits in architecture (Ibid.). Therefore the drawings and images he has created are used as representational means and as well as a set of architectural instructions.

The comparison with a script makes me consider that architectural conventional forms of representation should contain a second layer of meaning, being employed as

"To propose a new attentiveness to notation in architectural representation is not to propose another paradigm shift – a simple substitution of one way of working for another – but rather a proposal to enlarge the catalogue of techniques available to the architect working in the city.
Stan Allen



22. John Cage, *Fontana Mix*, 1958

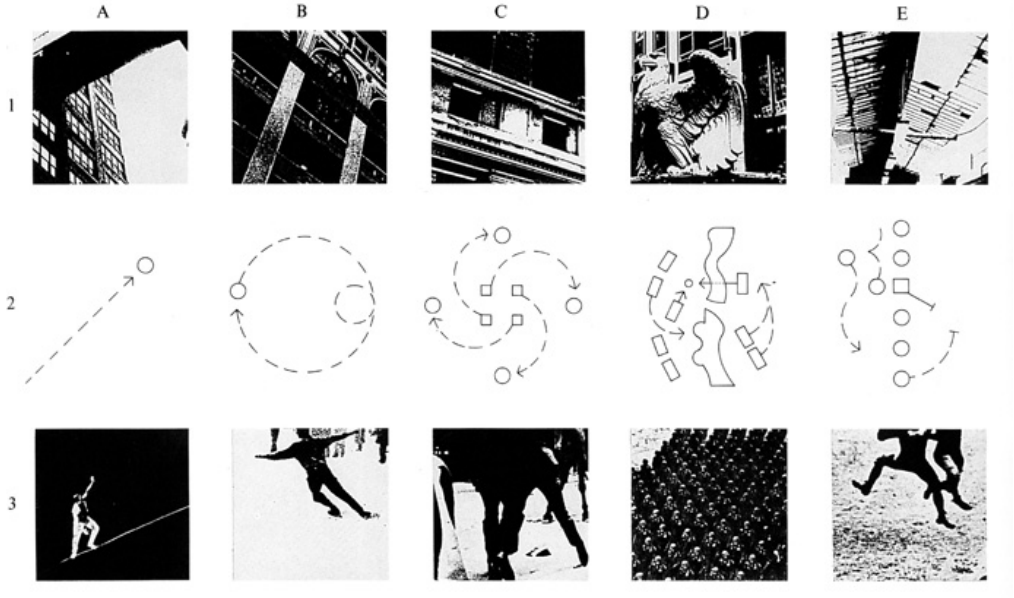


23. *Prepiano*, 1940

instructions to determine the spatiality of an architectural form.

The comparison made by Yago Conde, between his Olympic Village design and a garment's pattern further supports the scope of my thesis to create a methodological approach to create interior architecture by appropriating the constructive process and the performative aspect of pattern making.

"Although no mode of notation, whether mathematical or logical, can transcribe the full complexity of the architectural phenomenon, the progress of architectural notation is linked to the renewal of both architecture and its accompanying concepts of culture.
Bernard Tschumi



24. Bernard Tschumi, *The Manhattan Transcripts -The Block,* 1979

The interior as a map

The power of architectural drawing to act as a mediator between the imagination and the physical manifestation of the mental imagine establishes its instrumental role as a translator. Interested in the representation of interior space and willing to change the conventional methods of designing it I find it necessary to discuss its various manifestations within the frame of mapping.

The information necessary to understand the spatial qualities of an interior are manipulated and grasped by means of notations and conventions, thus imposing an objective reading of interior space which guides the transformative process from "two-dimensional drawing to a three-dimensional construction" (Weinthal, 2011). It is this process and the inherited characteristics of a space that makes interior surfaces i.e. walls, floor and ceiling perform as a map. Ro Spankie argues also that the drawing is a mediator between mind, eye, imagination and hand, attributing the act of drawing the characteristics of a map (Brooker, Weinthal, 2013).

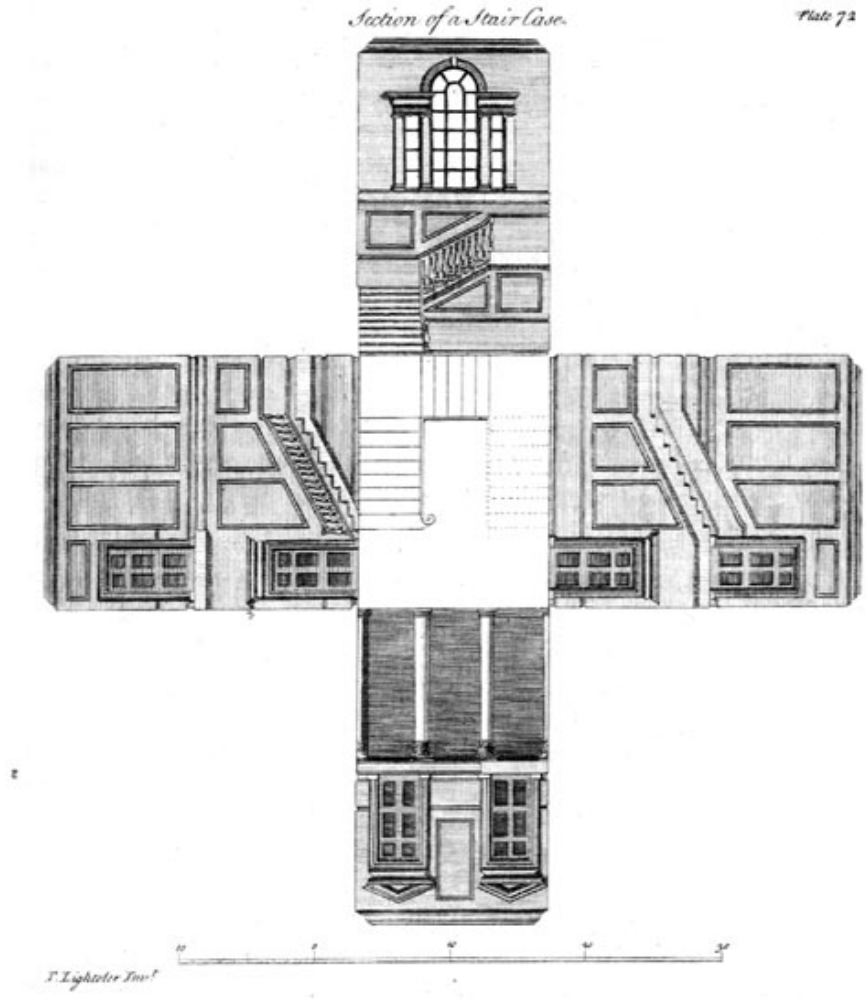
Mapping is the process of creating a map and it concerns the field of geography and mathematics. A map is a conventional representation, usually made on a flat surface, upon which is transferred information about a certain space including shape, size and relationships. Although mainly employed to depict geographical features, mapping is as well used as a tool to analyze the relationship between built space and site, within the disciplines of architecture and landscape.

Lois Weinthal, architect and editor of several books on the interior as a theoretical discipline argues that interior realm requires alternative forms of mapping due to the multiple layers varying in scale and material (Ibid).

Interiors can be documented using a variety of standard methodologies such as orthographic projection, full-scale

drawing, surveying but using mapping to inquire critically the interior exposes concerns related to materiality, structure and theory which says Lois Weinthal gives "new perspective on how the interior is viewed and constructed" (Ibid.). The following examples offer an overview on methods of mapping on various scales and using different techniques.

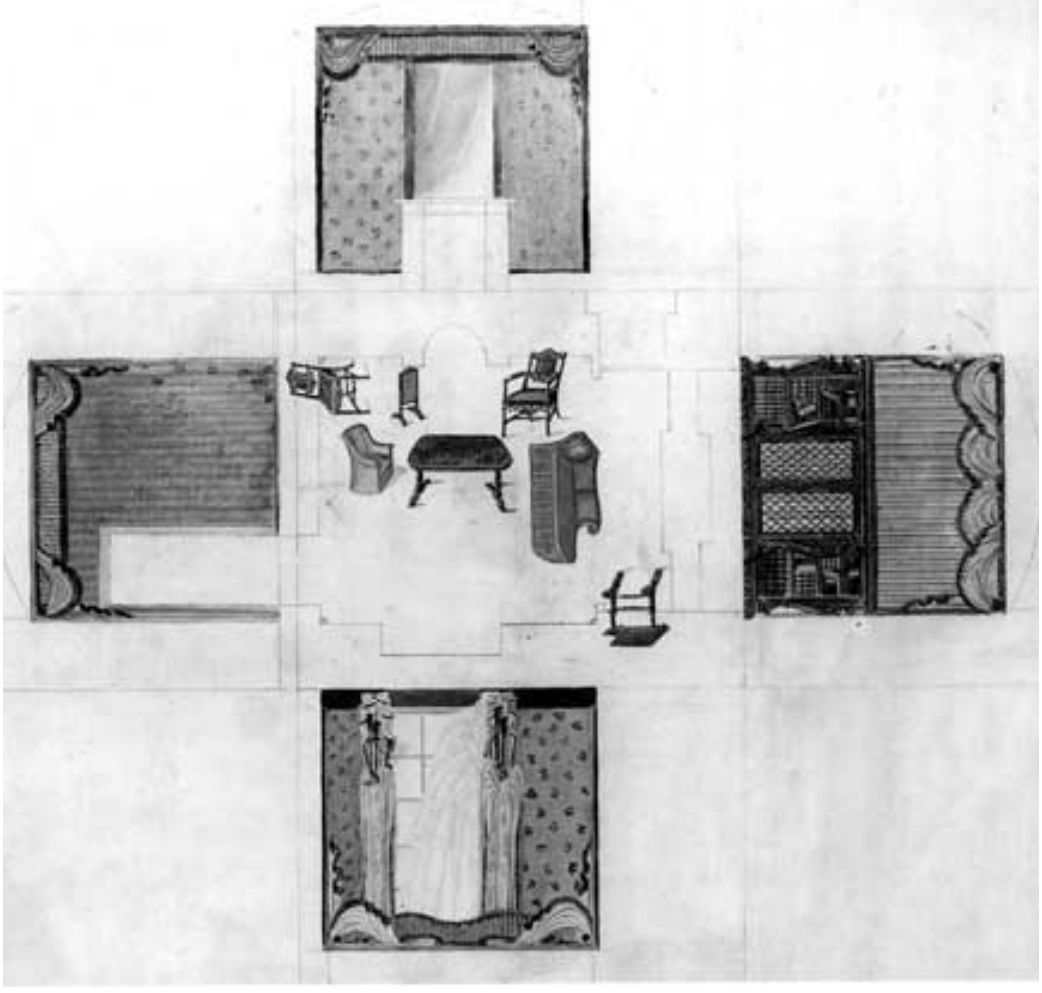
When the representation of interiors was bound to classical conventions and historical styles, one could identify and comprehend the period of style depicted within an image, says Anthony Vidler (2000). The classical conventions he indicates are the orthographic projections of walls and floor plan. In the essay "The Developed Surface"



25. Thomas Lightoler, *Section of a stair hall*, 1757

Robin Evans suggests that although this architectural drawing technique was considered fundamental for the depiction of interiors it was "far from being of permanent value" and therefore it would undergo alterations. Evans dwells a moment on the idea that architectural drawing defines the information it communicates. Distinctly than the neutrality which defines the map, a drawing is not an impartial medium: it "distributes information in a particular mode" (1995).

Evans identified in the orthographic projections of the eighteen century interiors two shifts which changed and challenged the perception of them. The common representation of rooms was done by presenting the whole



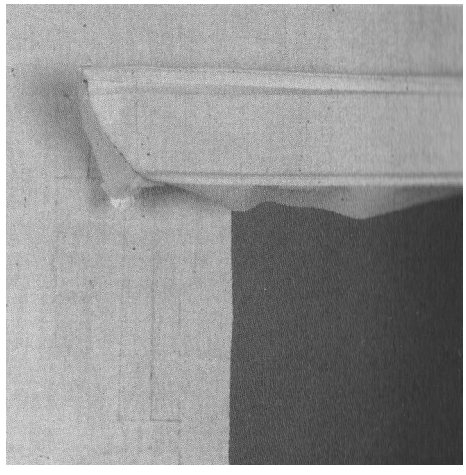
26. Gillows and Co., *Furnishings for a small drawing room,* 1822

floor plan and by sectioning a building and showing one of their walls. The first change broke down the organization of rooms and showed singular spaces employing the technique of developing a surface to unfold the walls and floor within a single plane. At the beginning of nineteen century a second dislocation took place: furniture was removed from the surface of the wall and placed to the center of the floor plan. This new technique has fused together three type of drawing: orthographic projection, perspective and the developed surface (Ibid.).

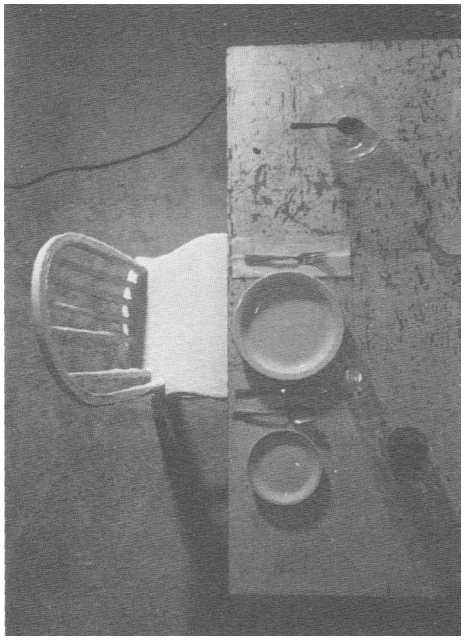
Another example of mapping is the project of Lois Weinthal, *Corner and Darts* which removed drawing conventions from construction of clothes to the construction of a room. Her project has greatly influenced my choice to pursuit the theme of clothing construction in my graduation thesis. She characterizes clothing patterns as means of documentation for the body. Similarly, the wallpaper covering the walls of a room can be thought of as pattern of the surfaces of the walls. The analogy generates an inquiry on how can elements of one discipline be translated to the other (Weinthal, 2011).

The investigation focused on integrating the dart from clothing construction in the surfaces of the wall. Using muslin,-an inexpensive fabric to create the first drafts of garments Weinthal covers the walls, manipulating it to find out where could darts come into being. The changes of surfaces from one direction to the other allow for the production of volumes, darts in full-scale (Ibid).

Architect Dan Hoffman believes that inquiries which are made by employing different techniques to manipulate materials inspire the architectural processes (Weinthal, 2011). Jeanine Centouri's *Flattened Room* is a very good example of this kind of approach. Objects and furniture are wrapped in latex, which has the property of retaining details of the surfaces it is applied to. The resulting skin is unfolded once the material has dried, in order to reveal strange patterns. The familiar, volumetric shapes have now become flattened and unrecognisable two-dimensional diagrams. Lois Weinthal describes her project as being an approach to mapping in relation to orthographic projection.

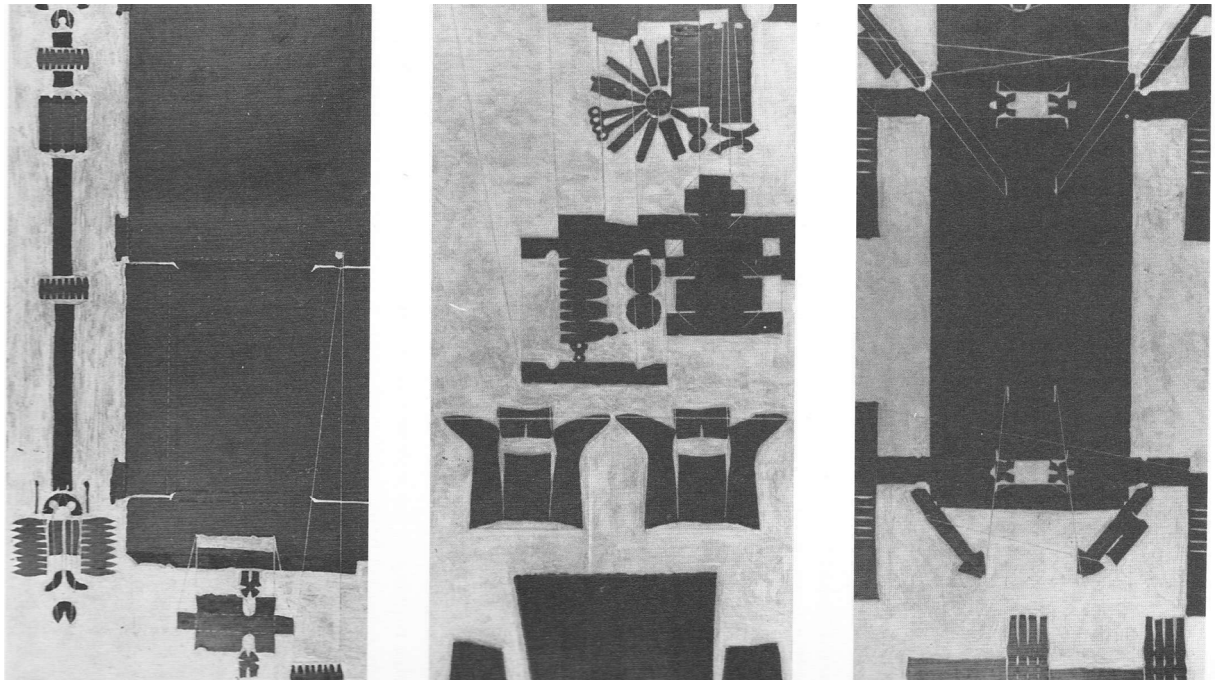


27. Lois Weinthal, *Corner and Darts,* 1993



The proposals made clear the need for a change within the realm of interior and underlined the idea that representations are not necessarily fixed and bound to a convention. It suggests that architects can break the standards by altering the existing ones or they can even introduce new techniques which subsequently can develop new methodologies.

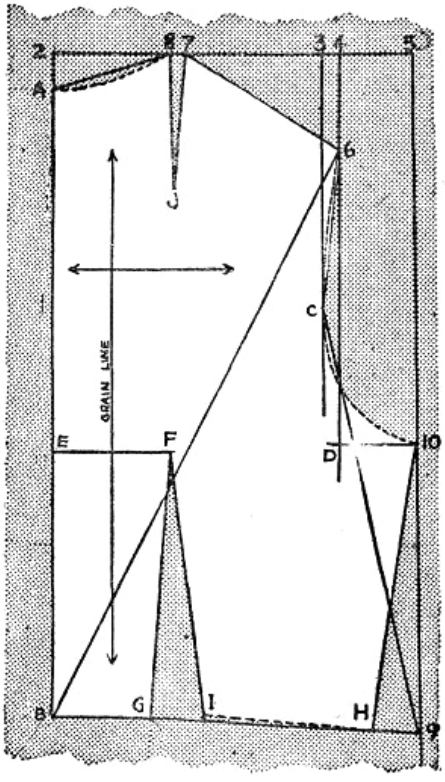
28. Jeanine Centuori, *Flattened room*, 1991



29. Jeanine Centuori, *Flattened room*, 1991

Part 2 Representation of the body

For the development of this thesis it is important to stress out the role that geometry played in the construction of a garment across time. Previously I have delineating the relevance and emphasis of geometry within the representation of space seen across history. Due to my belief that methods of representation are of great influence on the final design, be it a clothing item or an interior space I will further examine the pattern from multiple points of view. Firstly, as a representation of the body by relating it to its geometrical development, pointing out its evolution. Secondly, as a methodological approach indicating the operations involved, focusing on its performative condition. Thirdly, seen as a map in the sense that it represents the developed surface of the human body. Lastly, the analysis will understand the pattern from the point of view of standardization of measurements.



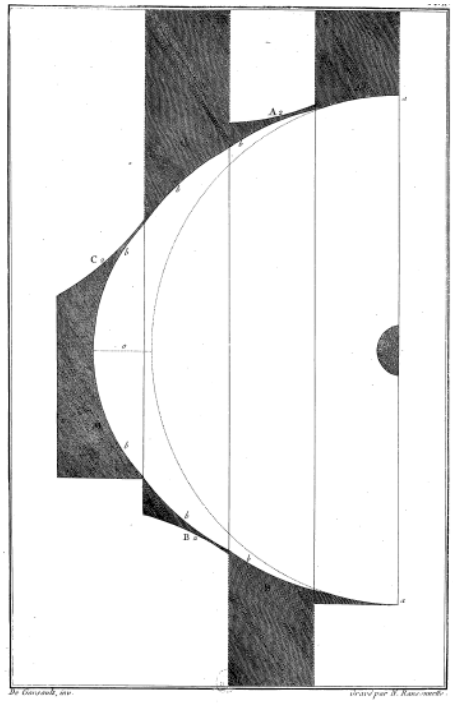
30. Harriet Pepin, *Modern Pattern Design,* 1942

The cut

31. Atelier Misericordia, *Cutting a pattern*, 2013

The emergence of independent towns in the late period of the middle Ages marks the inception of the tailoring industry. It is now when tailors come together in guilds. At the time the construction of clothes was based on a circular shape. It is believed to be linked to its religious symbolism which in Christianity meant that it had no beginning or end, was the symbol of the eternity of God and the immortality of the soul. The tailors began their constructive development with the geometrical shape of the circle. Cutting into the circle acquired the meaning of setting free of the body and dividing the whole into parts. Due to this separation, the construction of clothing could be made more logically emphasizing specific body features and therefore it revealed a "tendency toward subjectivisation and individualization" (Kraft, 1998).

According to Kraft, the development of cutting methods was influenced by cutting open the human body. This action lead to the dismantling of the garment into parts and it is best represented by the detachment of the sleeve from the garment. The result shaped clothing to perfectly fit the body and improved their duplication by allowing the creation of different styles (1998). Wendy Gamber, social and cultural researcher writes that cutting a dress in the sense of "fashioning a shape" is not only a difficult process but it is as well what "distinguished dressmakers from seamstresses typically stitching together garments that had been cut from the cloth by male tailors" (1995, p. 458).



32. M. de Garsault, *pattern for a garment*, 1767

Cut is synonym to style in the fashion industry, in the sense that the method of cutting a material gives different patterns which subsequently determine the form of a garment. Although synonyms of cut, to divide, to delete, to detach, to shorten, to pass through, to dissolve, they create contrasting images in one's mind. In architectural representation a cut is equal to a section and it also defines a technical process through which something is divided,

"A simple cut or series of cuts acts as a powerful drawing device able to redefine spatial situations and structural components.
Gordon Matta-Clark

detached. Comparative to pattern making the action of cutting employed here disects the building in parts, removing one wall in order to understand its internal development and fills in the other cut surfaces in order to render their thickness.

As if he was working on a one to one scale, artist Gordon Matta-Clark makes use of the action of cutting in architecture with his 1975 *Conical Intersect* by creating voids within the surfaces of a parisian building. He drew attention onto the power of the decoupage to shape the space around it, thus, the relationship between the negative shape and the enclosing space was defined by its edge (Evans, 1995). Of interest to me is the emplyment of cutting method applied on concrete walls almost as if they are made of paper. Defining pattern making as cutting I would argue that Matta-Clark has created another garment for the interior space by subtracting parts of its surfaces. The interior is reassembled by adjoinng surfaces not seen before: floors and walls of other space and even surfaces defined by exterior forms such as buildings, streets and ground.

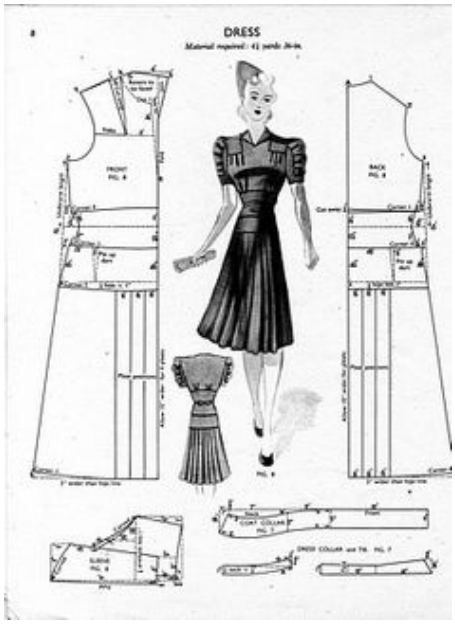
33. Gordon Matta-Clark, *Conical Intersect*, 1975

Methodologies: drafting and draping

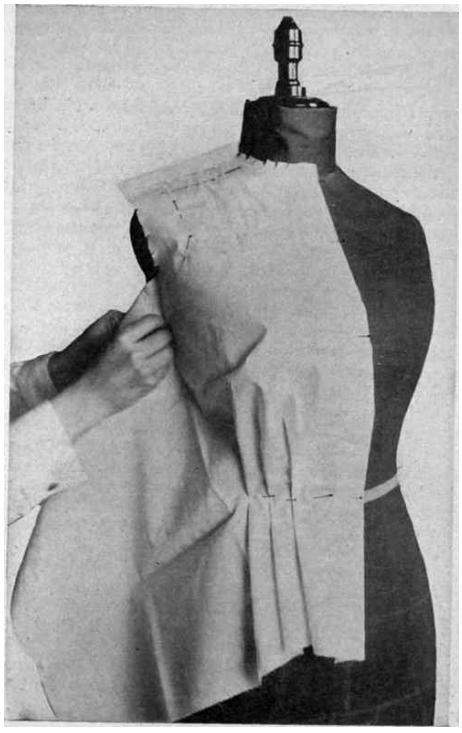
Creating a pattern can be defined as the process of measuring and cutting some given material in order to put it back together. The most important tools used for this process are the tape meter and the scissors. A first turning point in the evolution of clothing pattern making is made by the action of cutting with scissors. Through this action, the transition from draping fabric to constructing clothes challenged the representation of the body and thus gave new understandings to the corporeal (Kraft, 1998).

Depending on the technique, the process of creating a garment has two approaches. One method works with measurements and calculus to define the shape of a pattern and is called pattern drafting or flat-patterning the other method, draping, uses the process of fixing fabric to a form in order create shapes which are then measured and translated into a pattern. The flat-pattern method entails drafting a block pattern using rulers, curves and straight-edges. The block pattern is drafted on paper or thicker cardboard and it is a simple, fitted garment made to the wearer's measurements. To verify the fitting of the block pattern, mock up garments called toiles (UK) or muslins (US) are created.

The second patterning technique involves fixing a muslin fabric on to a torso shaped form. The pattern maker draws markings directly on the fabric, which later on will be transferred on paper. The draping technique contrasts the drafting method not only by employing different tools – fabric opposed to paper - but also by approaching the construction of patterns from two opposing points: technical precision against free shaping. By looking at the draping technique one can understand how the process of positioning and pinning fabric on a form develops structure .



34. *Drafted pattern dress.*

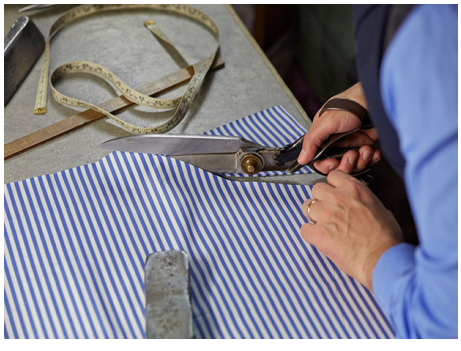


35. *Draping a simple waist*

Drafting patterns. Performance act and performative script

36. Budd Shirt makers, *tailor's tools*

37. Budd Shirt makers, *Cutting a pattern*



38. Budd Shirt makers, *Cutting a pattern*

Thinking of clothing construction as being a performance act opens up two distinct directions worth analysing. Both approaches create an association between the trio constituted of performer - i.e. the tailor-, mannequin and tools – i.e. paper, scissors, meter, and pencil. Thinking at the tailor as playing the main role, the performing act is established through displaying the operations of measuring, cutting, drafting in the process of creating patterns. The movements of arms and the back and forth actions between the volumetric shape and paper create a theatrical performance.

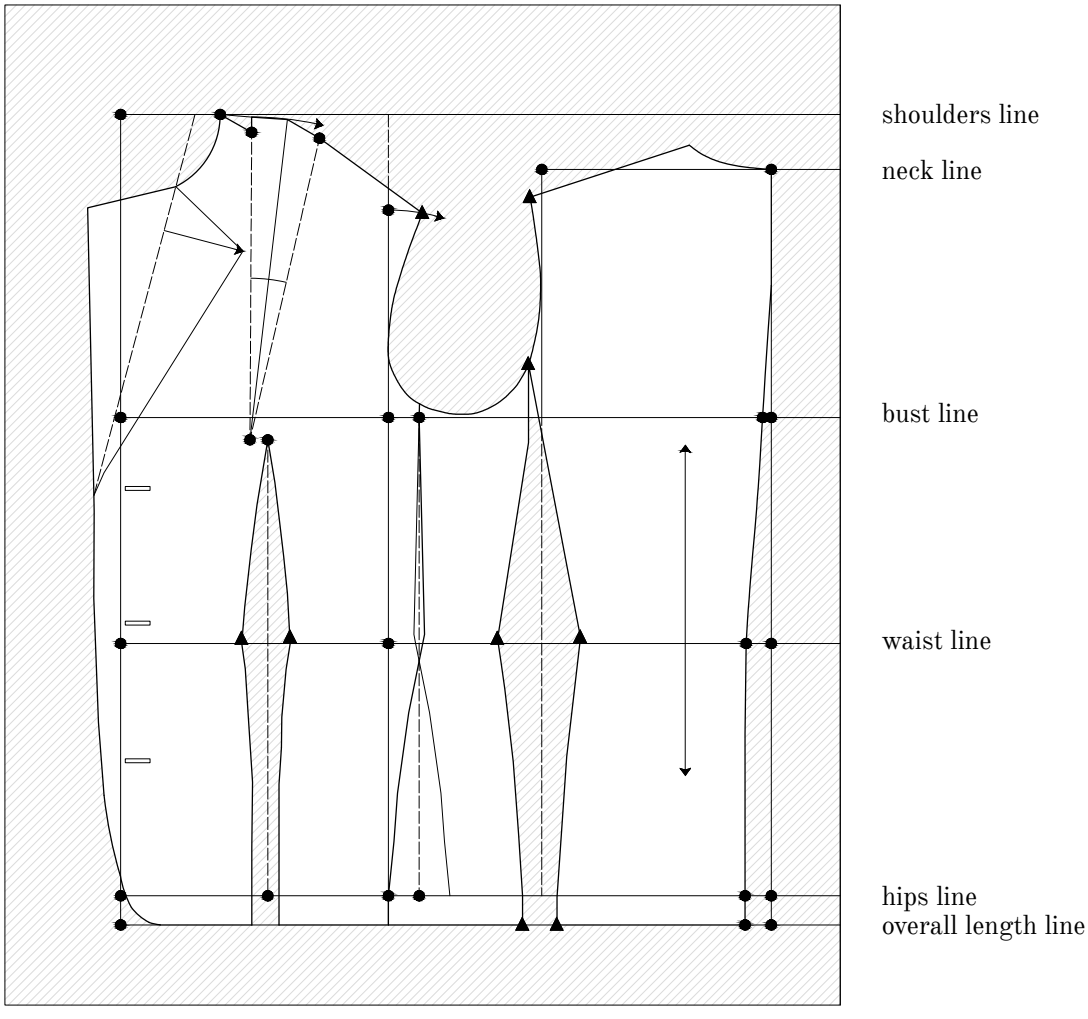
Differently, connecting the cutting diagram with the notion of performance creates a completely different meaning. The pattern unfolds as a script, giving instructions on how the tailor needs to proceed, in a sense determining the subsequent actions of cutting and assembling the fabric of which the garment will be made of.

Of main interest for my research is the second interpretation given to the pattern. Being thought of as a directive instructing the tailor, the pattern employs an internal terminology that mediates the performance. Moreover, these conventional elements create a narration for the evolution of the cutting methods. In order to be able to interpret a pattern and later use it to create a garment one needs to know how to read its narrative. Thus , it is not only a matter of decoding the symbols and marks, but as well understanding the sequence of actions that guide the construction process.

In relation to geometry, patterning is a process of understanding and abstracting three-dimensional shapes in order to be translated into two-dimensional diagrams , which will subsequently be shaped back into a volumetric form according to a spatial plan.

The symbols of a pattern include notches, circular holes,

arrows, double lines, dots, triangles and/or rectangles. The notches indicate seam allowances, centre lines and the lines indicating the waistline, hip, breast, shoulder tip, etc., zipper placement, matched points and fold points for folded hems and facings. Circular holes indicate a dart apex, pocket placement or the placement of other details, buttonholes and corners without seam allowance. An arrow might indicate the alignment of the pattern with the fabric (the arrow is always parallel to the straight grain of fabric) but as well cutting and stitching direction. Double lines mark the length of a pattern for different fits. To match the adjoining pattern pieces pots, triangles or square symbols are used.



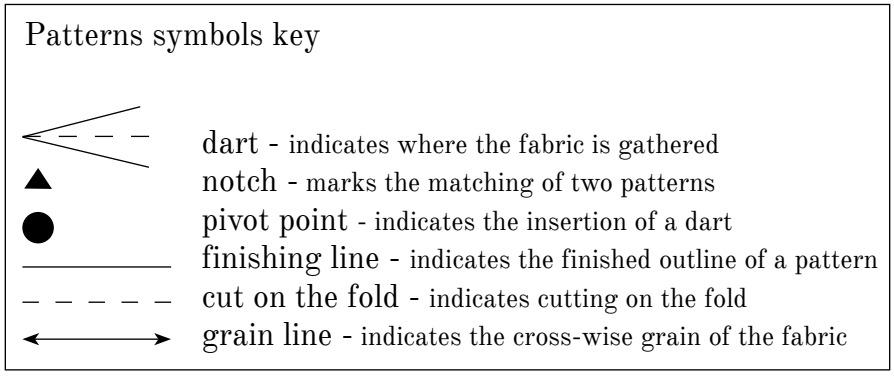
39. *Diagram of a coat's pattern*, drawn by author, 2015

The pattern in itself is a programmable surface containing a clear description of the future functions of its elements. In this sense a paradigmatic position is created by Gottfried Semper who considers the line between decoration and structure as being blurred and the surface becomes identifiable with programme and function (Benjamin 2006).

Andrew Benjamin further expands on Semper's conception: "it allows the elements of architecture—wall, floor, column, corner, etc.—to be an effect of an operative or generative conception of the surface" (Ibid).

Although referring to urban surfaces, in his article *Programming the urban surface*, theoretician and architect Alex Wall , describes surface as a dynamic structure which accommodates a variety of activities developing in time. Moreover, he stretches the belief that surface is as an enabler factor, an instrument of design, completely opposing representation, in the organization of objects and spaces (Wall, 1999).

In accordance to the concept exposed by Wall I argue that the shapes within the pattern of a garment acquire meaning to unfold different functions: some will become containers of accessible space such as pockets or hidden space such as collars and cuffs while others are cut out leaving holes in the pattern to shape button holes or decorative elements.



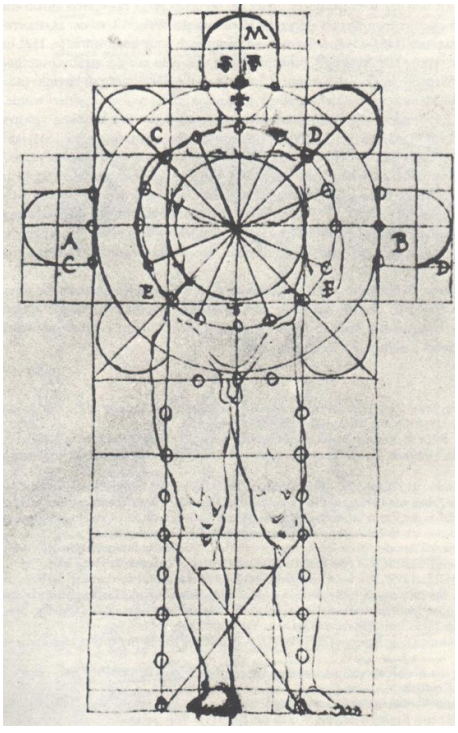
40. *Patterns symbols key*, drawn by author, 2015

The instrumentality of the diagram is represented not only through reading the symbols which guide the actions of the tailor but as well through the relationships established between the fragments of a pattern. They are determined by the position of indentations in the edge or surface of the pattern. Therefore, the cutting diagram is seen as the basis, the technical plan of clothing and it is the starting point for constructing a garment.

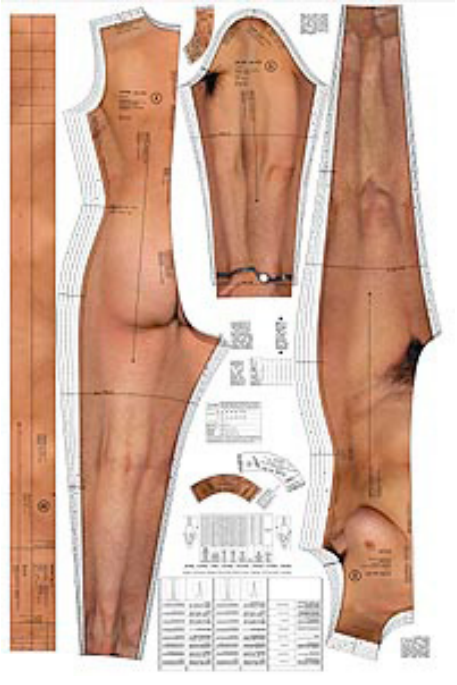
The pattern as a map of the body

Analysing the pattern from various points of view gave me insights on its connection to other disciplines. In essence the pattern is a surface, which unfolds like a map due to a precise system. Drawing an analogy to geography or mathematics, the pattern has clearly established coordinates for each point, line and mark. The lines within the pattern define the function of each resulting shape. In order to construct a pattern for a body, one has to first measure it and establish relationships between its limbs according to the aforementioned coordinates.

As already understood by tailors the volumes composing the body are deconstructed in multipled surfaces which than can be measured according to a proportional convention, being referenced and represented in relation to each other. Thus, this proportional relationship maintains the size of each body part and therefore the overall scale of the human body. Reference elements such as the highest or lowest point, the largest or narrowest section, and the longest or shortest limb rationalise the body and conduct its representation to be understood as similar to a map.



41. Francesco di Giorgio, *Figura Dei, 1475*



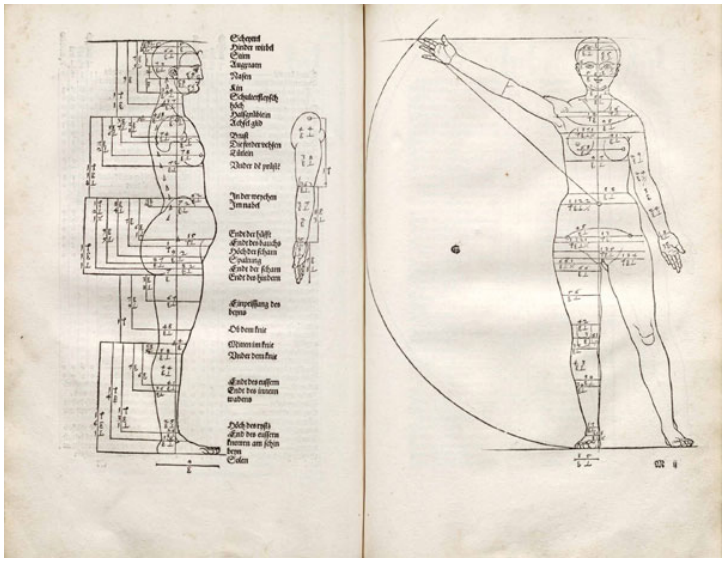
42. Alba d'Urbano, *Il Sarto Immortale*, 1997

One of the map's characteristics is to retain a proportional relationship between its elements. In this sense, the mapping of the body starts with the understanding of the human's figure proportions. As stated before, the proportions of the human body concerned the Renaissance artists and architects who began to study the classical texts of Greek and Roman philosophers. The well-known diagram of Leonardo da Vinci's Vitruvian Man is based on the comparison made by first century Roman architect Vitruvius, between the proportions and measurements of the human body in correspondence with temples. A contemporary of Leonardo da Vinci, theorist Francesco di Giorgio, has as well illustrated a human figure based on a proportional system. His diagram *Figura Dei* overlays a human body over the floor plan of a Latin Basilica resembling a cross, which showed the idea that the human shape reflects a divine and cosmic order (Mayernik, 2003).

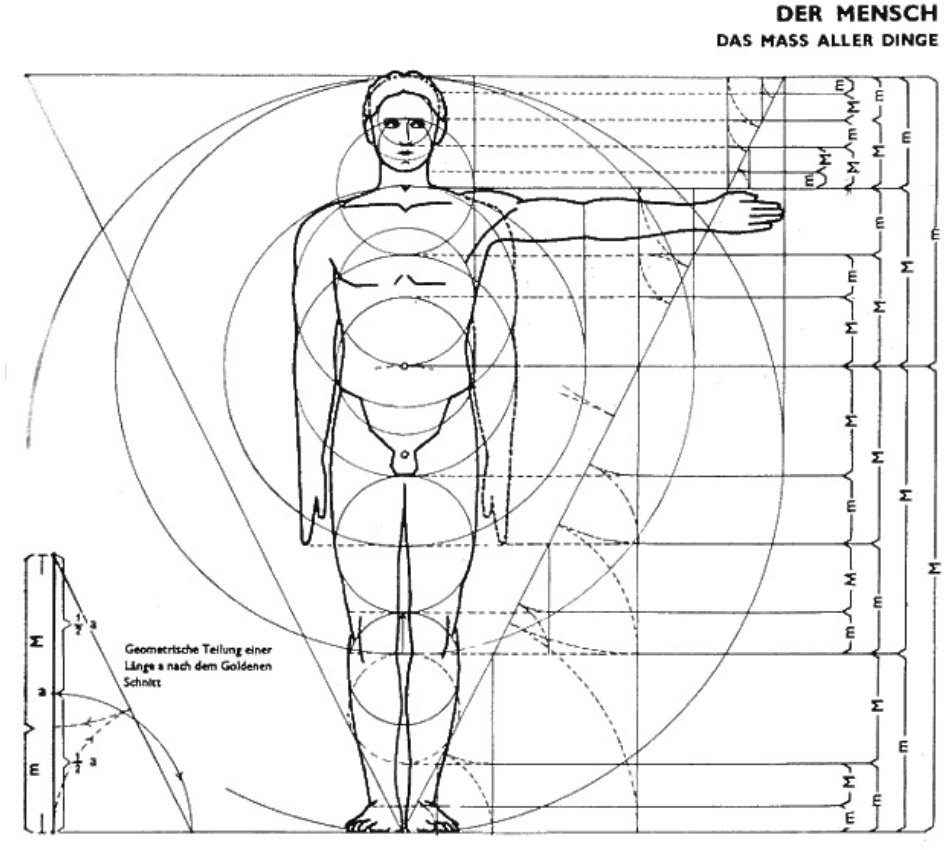
The comparison between body and buildings act as precedents for the kind of associations this thesis alludes to. If body and buildings proportions were preocupations of the Renaissance man, a few centuries later, the advent of modernism put forth an interest for standardisation of human's figure proportions in relation to its surrounding space.

This standardisation was another kind of mapping the body and the interior. It reduced the construction of architectural space to a small number of possibilities.As well it made it fit for a selection of average body typologies.

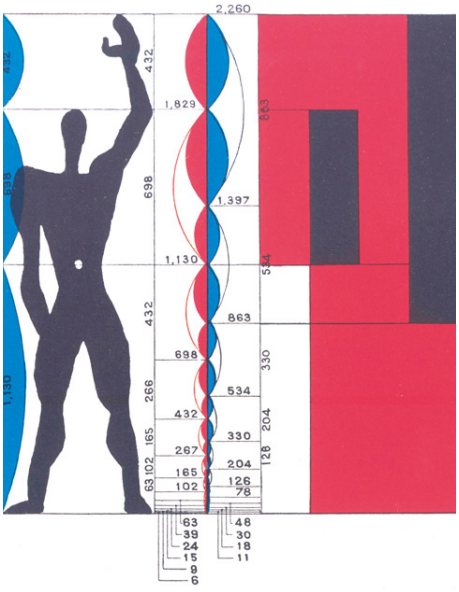
In 1936 Ernst Neufert, former student of the Bauhaus School, put together a catalogue of relationships between the dimensions of the human body to its surroundings named Architect's Data. This rationalization of the body establishes it as a representation of a norm (Lambert, 2012). My focus is its relationship with the interior which in this case becomes a sort of tailored space to fit a number of idealized bodies. Another type of a normatized body is Le Modulor created by Le Corbusier ten years later, in 1946. The ambition that was to have a universal system of proportion guiding all the aspects of the architectural design. Meant to shape man's environment the system



43. Albrect Dürer, *Human's proportions*, 1528



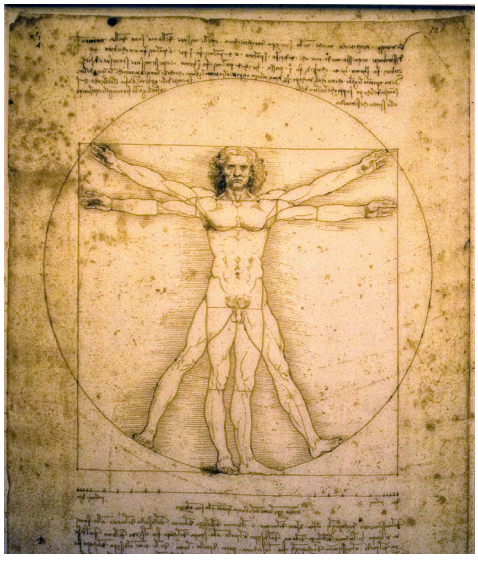
44. Ernst Neufert, *Bauentwurfslehre,* 1936



45. Le Corbusier, *Le modulor,* 1945

used reference points according to dimensions of a certain type of body and thus could only create a singular view on the space. The mapping of the body was based on the golden section and the proportions could be scaled up and down according to Fibonacci's progression. I believe this idealized body could never exist and thus the interiors created according to it are idealized spaces which would not fit the regular body figure.

In conclusion my analysis moves from the depiction of the body in order to gain knowledge on representing it to the analysis of the body in order to devise a copy of its surface that would perfectly fit (clothing) and moving to the body's dimensions in relation to its environment (always in relation to anatomy and proportion). I am trying to establish a connection between the constructive process of patterns and the study of representation through anatomical analysis and the interior space around it based on bodily dimensions. Thus, I would like to advance further the idea that there is a missed opportunity for creating a constructive approach to interiors based on methodological principles of pattern making.



46. Leonardo da Vinci, *Vitruvian man*

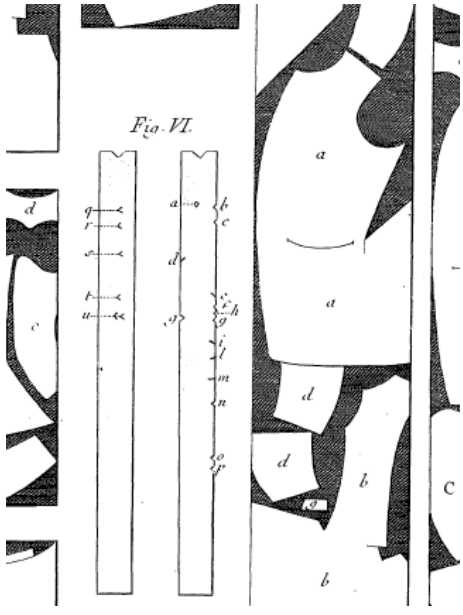
Standardisation of patterns

There has been a devotion for standardization of clothing since the 16th century and this subject will trouble not only tailors of the future but as well mathematicians and geometricians whose contributions to the subject I will mention further. The pattern construction methods have moved from draping fabric which meant wrapping cloth around the body, to drafting patterns according to the curves and proportions of the body.

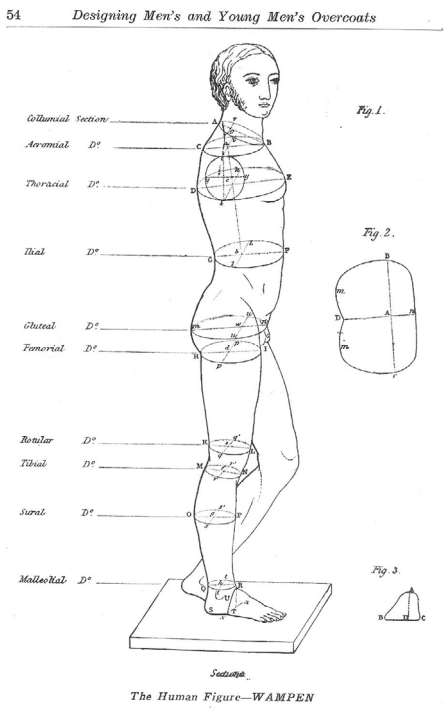
One could argue that the book *Libro de geometria practica y traca* written by Juan de Alcega in 1580 might be the first attempt of making available patterns to the general public which could start drafting clothes in the intimacy of their homes. In relation to Juan de Alcega's book, art historian and curator of the Metropolitan Museum of Art in New York in the '40s, A. Hyatt Mayor, questions the reason behind it being published: ''Did he want to standardize the dress of Spanish officialdom the world over?''

In *L'Art du Tailleur* from 1767 M. de Garsault illustrates the strip of paper he used for taking measure. His system involved cutting notches in the strip to measure the breadth of the back and the length of the arm to the elbow. Half a century later, the advancements in pattern making became even more apparent when, F. A. Barde designed the pliable measuring tool that we know today as tape meter. The tape meter systematized and ordered cutting patterns while their process reflected geometrical and mathematical constructions.

Three main benefits emerge from this advancement. The first one is concerned with the introduction of a unified reference system, guiding the construction of garments. The second one advanced the efficiency of abstraction by making mathematically visible certain proportions. The two-dimensional representation of the three-dimensional body, detached in individual pieces, represents the third



47. M. de Garsault, *strip of paper for taking measurements*, 1767

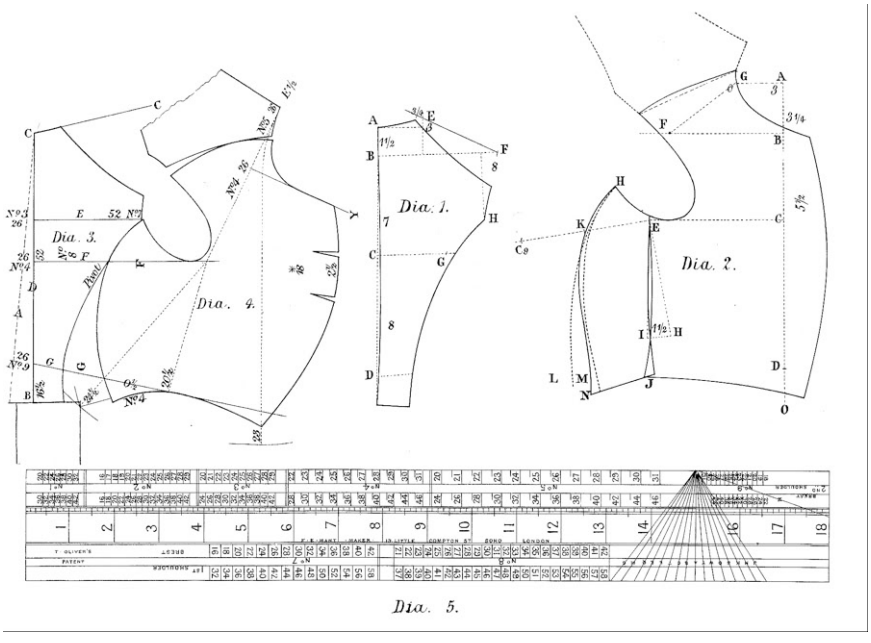


46. Henry Wampern, *The human figure, 1860*

geometrical advantage emerged from the creation of the tape measure (Kraft, 1998).

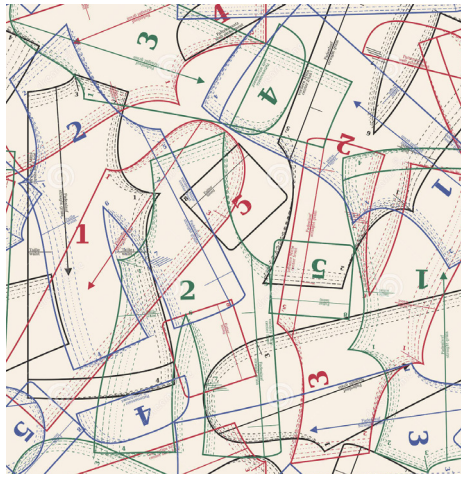
The diversity of methods for creating patterns was as large as the number of tailors was but Kerstin Kraft identified two overlapping methods that developed within the same period of time. One defined by the earlier identified proportions of the body was defined as the proportional method and the second one, based on measurement of the body was defined as corporismetrie (garment measuring) method (1998).

The disagreement over the methodologies of constructing the ideal patterns was dealt with by the publishing in 1860 of *Anatomy preparatory for anthropometry* a book on anatomy and geometry by mathematician Dr. Henry Wampen. The book guided tailors by explaining anatomical and geometrical notions about the body to achieve the ideal male form. To do so Wampen took detailed measurements of Grecian statues of athletes, being greatly influenced by the Neo-Classical aesthetics emphasizing the beauty and proportion of human anthropometric forms and proportions (Waugh, 2013).



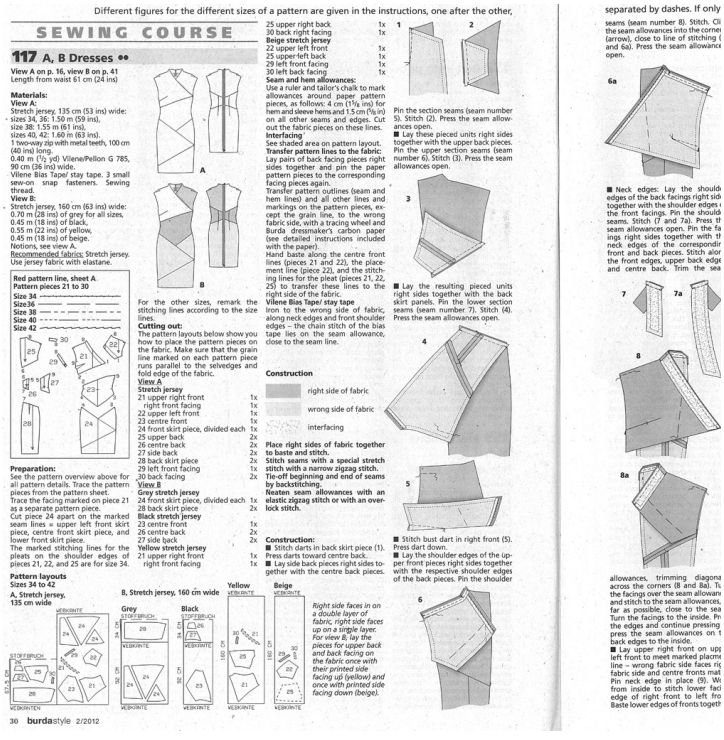
48. Henry Wampern, *measurements and diagram of a pattern, 1860*

The last quarter of the nineteen century show a preoccupation for the systematization of patterns. Books and magazines such as Scientific Dress Cutting published "systems" for drafting patterns in an attempt to "replace trade secrets with scientific principles" and make it accessible to the general public (Gamber, 1995, p. 466). The drafting systems were based on a proportional method which proposed measuring the bust of the wearer and acquire from it all the other measurements by means of calculation.



49. *Burda patterns*

The standardization of patterns reached the contemporary understanding with the publishing, in 1867, of the first tissue patterns by Ebenezer Butterick, former tailor, and followed the principle of proportional method (Ibid.). Although graded patterns offered the possibility of creating garments in one's own home, there were also consequences. Wendy Gamber states that the patterns not only substituted a dressmaker's skill but as well judgement due to the supplying of the "finished template, a paper version of the actual garment" (1995, p. 479).



50. *Instruction set Burda patterns*

Towards a design methodology

The premises of this thesis situate the pattern within the context of interior realm with the purpose of using the characteristics derived from its formal reading and as well its construction methodologies to shape interior spaces. In pursuing to develop a methodology for this project I experimented with the different techniques and actions a tailor does when constructing a pattern.

The aim was to investigate the sequence of actions that guide the construction process and to translate them into operations applied to the fabrication of interior spaces. These experiments can be classified according to the three main activities needed to draft a pattern: the first one based on the action of folding the second one focused on cutting unnecessary material the third one looked at assembling back what was folded and cut. References are used along my own experiments to guide my studies. Documenting and analyzing each outcome I can draw up conclusions to help me formulate the methodological process I was aiming at.

Wrapping – creases as folds

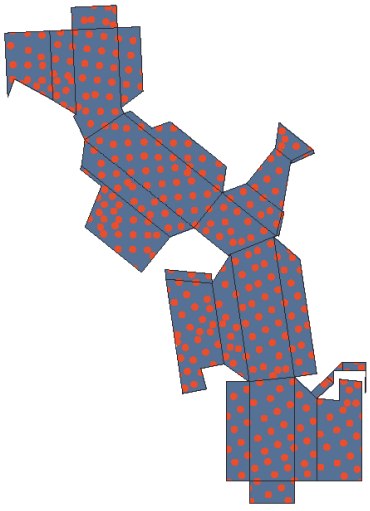
To develop my research through making I have chosen to analyze and research the concept of the fold. Inspired by the process of draping, one of the methods of creating a pattern, my first experiment played with the action of wrapping. This method of working strongly emphasizes the notion of the fold in pattern making. To better understand the meaning of the fold I will further analyze it through a concrete, material point of view relating it to pattern making and clothing as well, I will make connections to the philosophical way of understanding this concept.

According to the definition given by the Oxford Dictionary, the concept of fold has many meanings. Interesting for my research are only some of them which encompass the literal meaning of bending an object (in this case the paper) over on itself so that one part of it covers another. (Figure 3).

In the drafting construction process of a pattern a technician would take measurements of someone's body and with simple mathematical operations he would translate the measurements on paper. Distinctly, creating a pattern by draping fabric, the pattern maker folds and pleats the textile in order to find the appropriate shape of his intended design.

A very interesting example which served as inspiration for the development of the next trials is the work resulted from a seminar teached by architect and professor, Andrew Zago at Southern California Institute of Architecture. Although his investigation mainly focused on reconciling mass with a geometric construct through the use of different techniques such as folding, wrapping, projective drawing and contortion (Castri, 2013) I will refer to it in relation to the action of wrapping. One experiment covered a contorted set of five boxes with a dotted patterned surface. This trial revealed that by removing the excess of dotted pattern from the area where the boxes intersected eachother, the resulting surface treatment appears to have a different pattern logic than at the beginning of the wrapping.

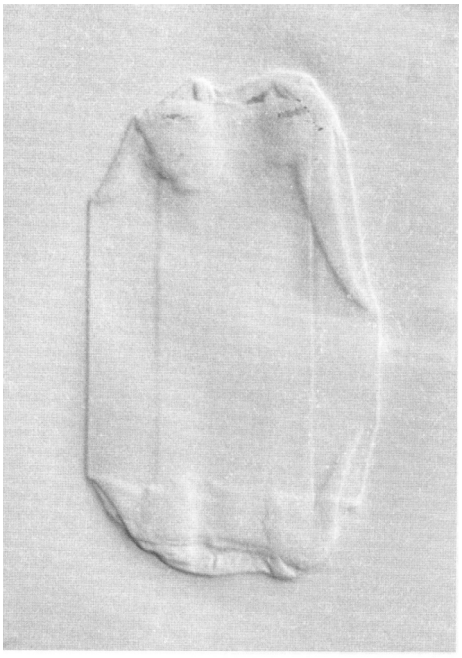
50. *Contorted boxes*, 2013



51. *Pattern of contorted boxes*, 2013

What interest me in their study is the use of the folding and wrapping as processes independent of pattern making. The study alters one of the methods of constructing a garment and uses as a wrapping technique derived from draping. Influenced by their approach I want to bring together the wrapping technique with the pattern making to demonstrate my beliefs that a process of construction can transcend the borders of its original discipline.

Artist Monica Wyatt thinks about the wall in terms of it being a boundary, merely a surface and asks phenomenological and psychological questions concerning its thickness, its sides, and its interior. She answers this question through a series of experiments giving metaphorical interpretation for the poche and interior space (Weinthal, 2011). *Pressed-Brick wrappings* is an attempt to occupy the wall. (Image 20) Using paper Wyatt wraps a brick to reveal its interior which is never acknowledged to exist. Acting like a skin, the paper emulates the spatial characteristics of the brick. It preserves its thickness, depth and width as well as its borders. Flattened, the wrapped paper still holds the above mentioned characteristics (Hoffman, 1994).



52. Monica Wyatt, *Pressed-Brick wrappings, 1992-1993*

Inspired by these works, I began my experiments with wrapping paper around two volumes: one rectangular and one cylindrical box. My first experiment focused on the action of wrapping as a derivative process from draping and I have manipulated craft paper on the rectangular volume. The second experiment, performed on the cylindrical volume, took further the process of draping by identifying the overlapping, extra areas of paper which could be removed in order to recreate the shape of the box.

Stepping further than Wyatt, I question the construction of these volumes by mapping the unfolded wrapped surfaces. The topology of the paper gives specific information. Negative and positive creases unfold to define different surfaces. Reading the creased paper as a map I understood that the multiplicity of the creases define areas where pressure was applied most in order to flatten the paper. Distinctively, the regions less creased are those where the paper was pulled and tighten

around the walls of the box. The multiplicity of wrinkles on smaller areas, informs the viewer on the amount of paper that needed to be folded to get the paper to take the shape of the box. Comparative to clothing patterns where lines define the purpose of each shape they delimit, creases border and define areas which acquire a function. Therefore the wrinkles outline the unfolded shape of the box with its walls and bottom part. If one took away the excess of paper, following the wrinkles outline, the remaining surface describes the new pattern for the box. This first trial demonstrates that using a filter, such as pattern making, to approach a constructive process can generate viable and alternative solutions to substitute the traditional ones.

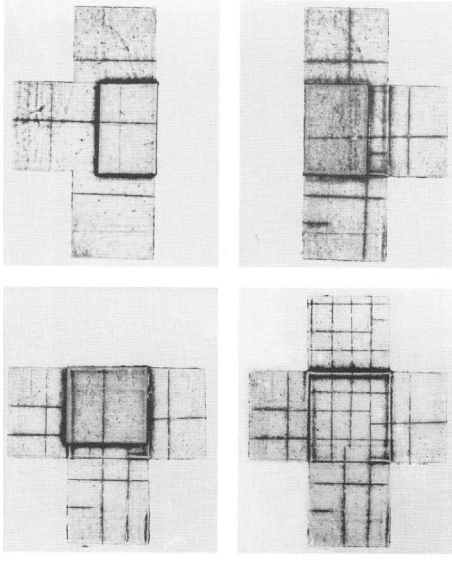
The fold – conceptual and material notion

French philosopher Gilles Deleuze gives a conceptual definition to the notion of the fold, reflecting his thoughts regarding this permanent dichotomy. In his conception the outside is nothing more than the unfolding of the inside.

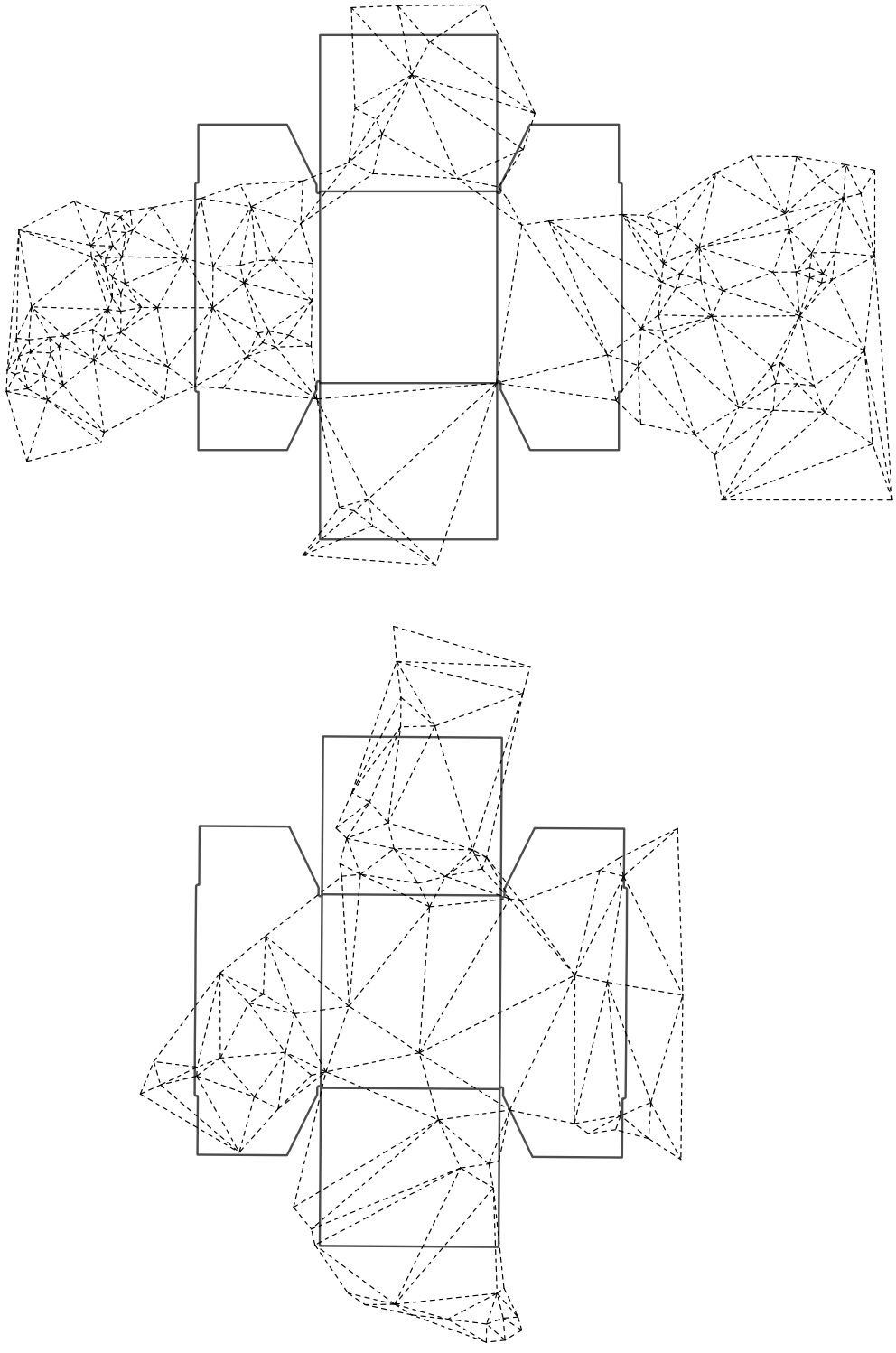
How do we define the inside and the creation of interior spaces? Monica Wyatt employs the fold as a technical tool to allude to the existence of inside hidden spaces (Hoffman, 1994).

This conceptual thinking is strongly linked to the philosophical notion of the fold established by Deleuze, both understanding the relationship between inside and outside as a continuous movement. The fold is bringing together the inside and the outside. Bending a cruciform paper surface against it, the folding hides the outside, changing it to inside. Unfolding it, the surface exposes the inside surface, originally outside surface. Through this experimentation Wyatt shows how the original condition of the inside space, dependent on the outside, is changed.

Exploring on this though, by using the process of wrapping, my next try out deals with the idea of the volume being generated by two surfaces: one from the inside and one from the outside. Differently than Wyatt, I use a hollow volume in order to read the inside and



53. Monica Wyatt, *Cruciform folding, 1992-1993*



54. *Patterns for a box*, drawn by author, 2015

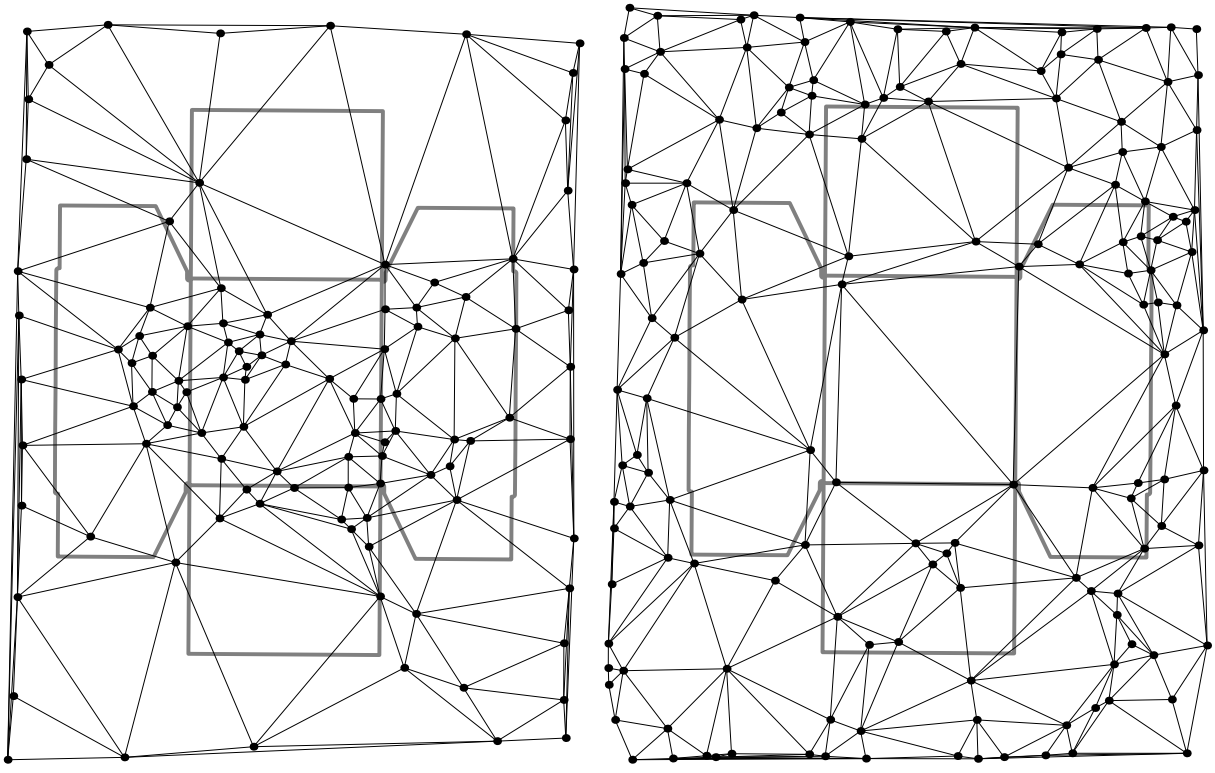
the outside individually. The inside and outside pattern are visibly different, the multiplicity of wrinkles define opposite areas. The inside pattern is taken over by smaller creases while the outside is outlined and surrounded by these. Superimposing the two gives a more accurate reading of the overall pattern.

Addressing the construction of a pattern, the next study focused on the notion of the fold as an equivalent to the dart. In the field of pattern making, the notion of the dart has a concrete, material meaning. It represents a structural element which tailors the garment to the wearer's shape. Through this experimentation I intended to find out how I could create a pattern for a volume (i.e. cylindrical box) by starting the process different than the usual. Employing the action of wrapping, I have covered a cylindrical box in craft paper and as previously I unfolded it to identify the main creases. Examining them from the point of view of the tailor, one could clearly read the creases as darts. In a clothing pattern, the dart gives volume to a surface by taking in the fabric that overlaps. A triangle shaped surface, the dart, is closed by stitching its sides on a symmetry line. Therefore where inevitable overlaps occur, the excess paper is cut away in the process of joining its edges.

The same reasoning was employed to create the pattern of the box: the extra paper surface was removed to be able to close the paper pattern and shape a similar paper box with the original one. In technical terms this product is called toile, performing as an architectural draft model.

This body of research was focusing on the effects the manipulation of the paper was generating. One interesting aspect is the formation of creases that can be interpreted as darts, subsequently shaping the paper pattern. Another aspect that I found interesting is that the usage of a patterned paper describes very well the transformation that occurs when wrapping paper unevenly against a shape. I have used a square gridded paper to wrap again a box

> "The outside is not a fixed limit but a moving matter animated by peristaltic movements, folds and foldings that together make up an inside: they are not something other than the outside, but precisely the inside of the outside (Deleuze, Foucault p.96-97).



55. *Unfolded wrappings of a box*, drawn by author, 2015

The fold as a material notion in pattern making: the dart

Translating the three dimensional curvature of a human body onto paper is made by using darts. They are folds sewn into fabric to provide structure and shape. Starting from a flat surface, the technical process of constructing a pattern for a garment incorporates the fold as a geometrical shape and it is usually placed along a sewing line.

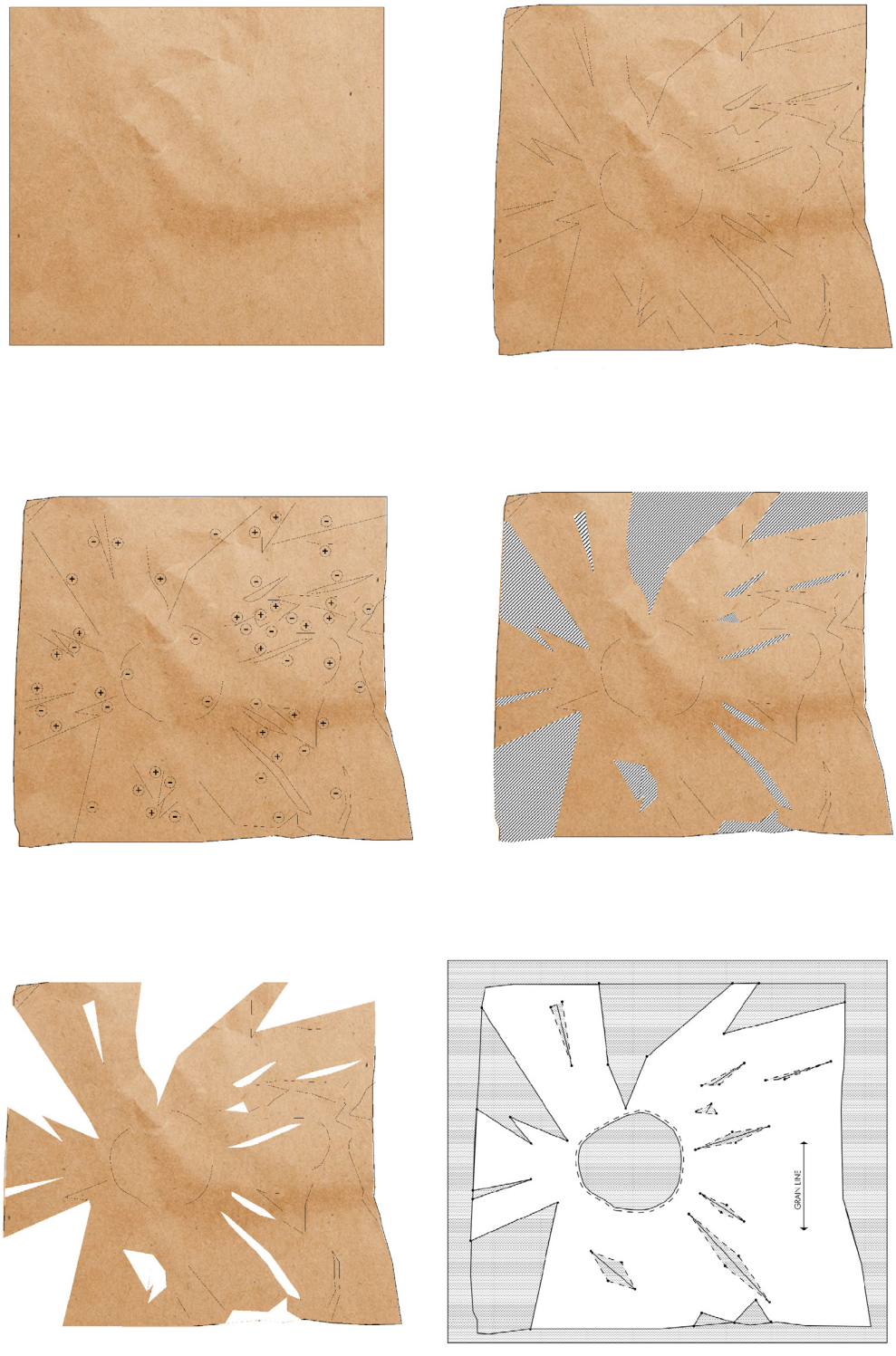
Moving forward from experimenting with wrapping objects and concentrating my attention on drafting a pattern, I took into consideration constructing a pattern for an architectural element. I have started with a corner of a space on one to one scale and I manipulated the paper around it. I chose it because I was intrigued by how it was generated. Using a column from the structural grid of the building as a point to attach walls to it, the architects enclosed a small interior space. The intersection of the column and a wall creates a corner bigger than 90 degrees.

As in my previous experiment I first push the paper in the corner as much as I can, to be able to retrieve the same shape of the "body" on which I press against. The ulterior actions are a series of back and forth movements through which I alter and fit the "garment" back on the corner as good as possible. This is the aim of a tailor: to be able to create clothes that fit perfectly its customer. I work with the toile like a tailor made suit. Secondly, I take the draped paper and mark the prominent lines and then I unfold it and identify the area where the paper overlaps. As before, the overlapped areas become the dart giving three-dimensional shape to the pattern. The third step is to fit the toile on the corner and if alterations are needed I repeat the last two steps again.

Throughout this exercise I have understood that working on a fragment of an interior in 1 to 1 scale is difficult. The many trials I did have resulted in errors due to the poor manipulation of a big surface of paper. Despite the effort, I have concluded that I need to work with a smaller scale because contrary of the pattern made for a human body, the pattern made for architecture can be scaled up and down without worrying of losing details.

56. *Inside wrapping*

57. *Outside wrapping*



58. *Creating a pattern by wrapping*

Therefore, my next experiment focused on working on a physical model. This time I have chosen to recreate a 90 degree corner composed of three surfaces intersecting each other. The reason behind is supported by the fact that working with a standard dimension and shape is best. Later this standard pattern can be altered to be fitted for a different “body”.

This next trial incorporates the methodological findings from the previous experiments. The dart, defined as an overlapping area of paper became the focus of the process. The properties of the dart are intrinsically linked to the construction process of patterns and the most important ones are related to its geometry. The boundaries of a dart converge to a central point and the dart is defined by the amount of fabric taken in or removed. Another property of darts is concerning the adjustability of their direction. Because the dart can extend to any edge of the pattern without affecting the fit, it can be rotated in any direction, making sure that the pivotal point is retained.

Relying on theoretical background and on the outcome of my material research, I have pursued to expose how the characteristics of a pattern making can be employed in the creation of a space.

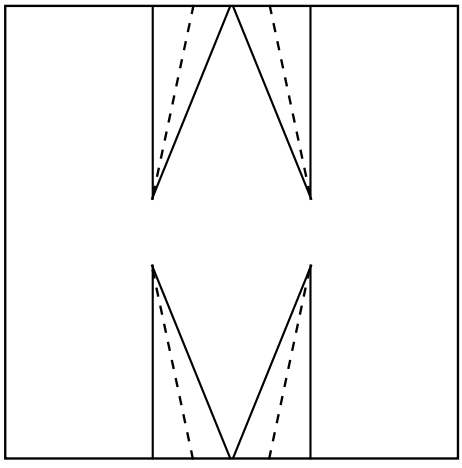
The work of a tailor is inherently linked to a form, a body. In my search to find an appropriate correspondent I found best to use the generic corner formed by three planes sitting perpendicular on each other. The orthographic projection, unfolds the three surfaces of the corner in one single plane. My interest is to fold back again these planes using the process of pattern making.

The first step is to define the intersection point of the planes as the pivot point from where the darts are going to be inserted. The second step outlined the intake of each dart and established them as being equal to eachother. This is the basic pattern, the "block" of the corner, based on which alternations can be made, giving the corner construction an infinity of possibilities. The investigation focused further on the placement of the dart at first only starting from the intersection point of the surfaces, later from any point on the boundary of the surfaces and as

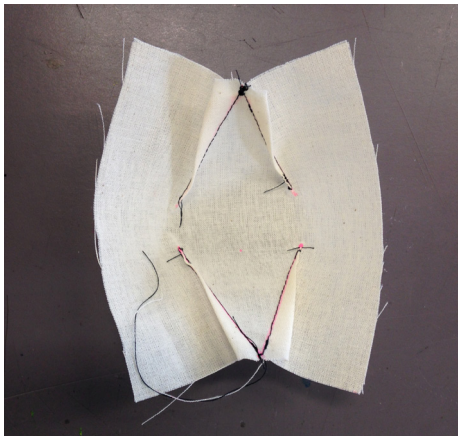
59. *Wrapped cylindrical box*

60.. *Toile of a cylindrical box*

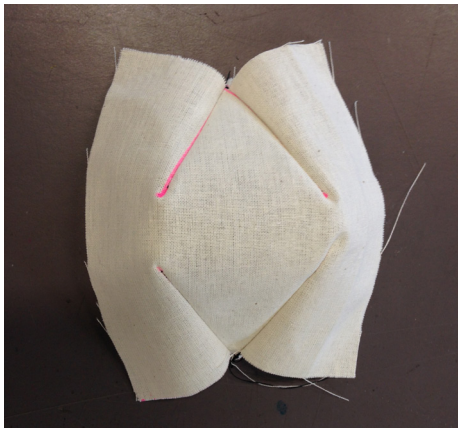
61. *Pattern of a cylindricalbox*



62. *Diagram of fabric including darts*



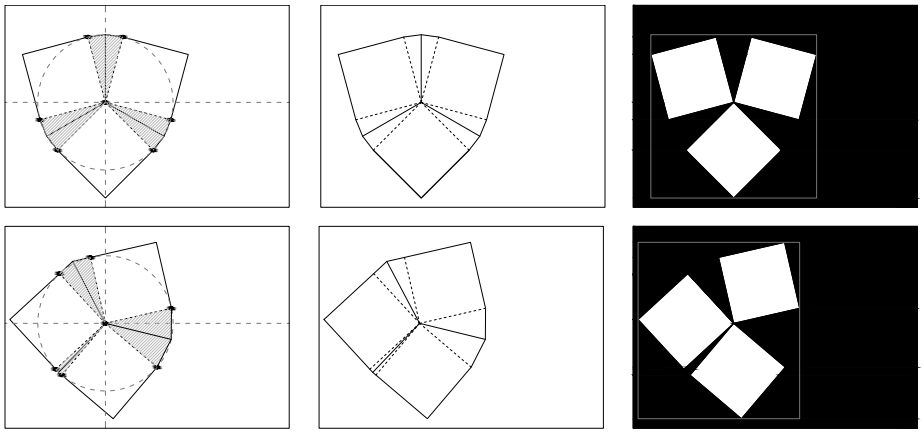
63. *Fabric including darts, back side*



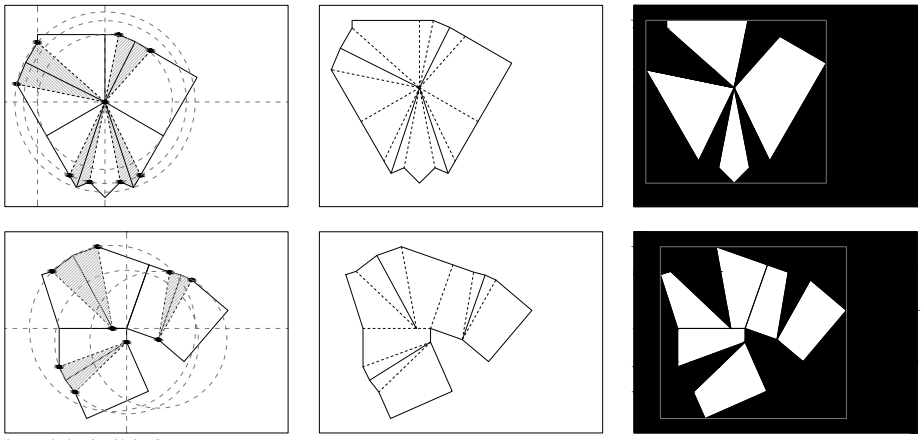
64. *Fabric including darts, front side*

well using a combination of the two.
The aim of this experimentation was to underline pattern making's ability to perform as an esential factor of reassembling a space.

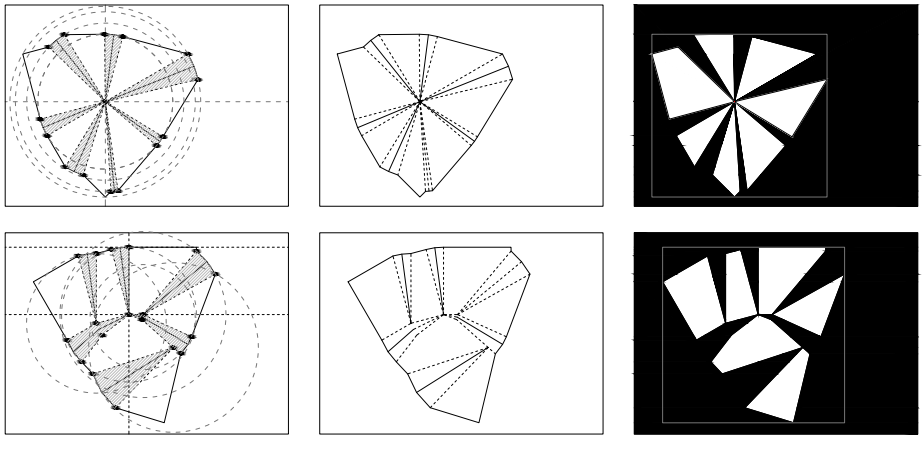
An important aspect to be investigated is the assemblage of a pattern. With an interest in creating interior patterns I placed my attention on the flexibility of unfolding orthographic projections of a space. For this purpose I drafted a ficticious room to emphasize its potential in being assembled differently. Therefore, it creates a range of patterns and underlines the power of using pattern making as a tool of representation. The same interior is depicted differently every time although when putting it back together it will always recreate the same space.



darts inserted along the edges of the surfaces

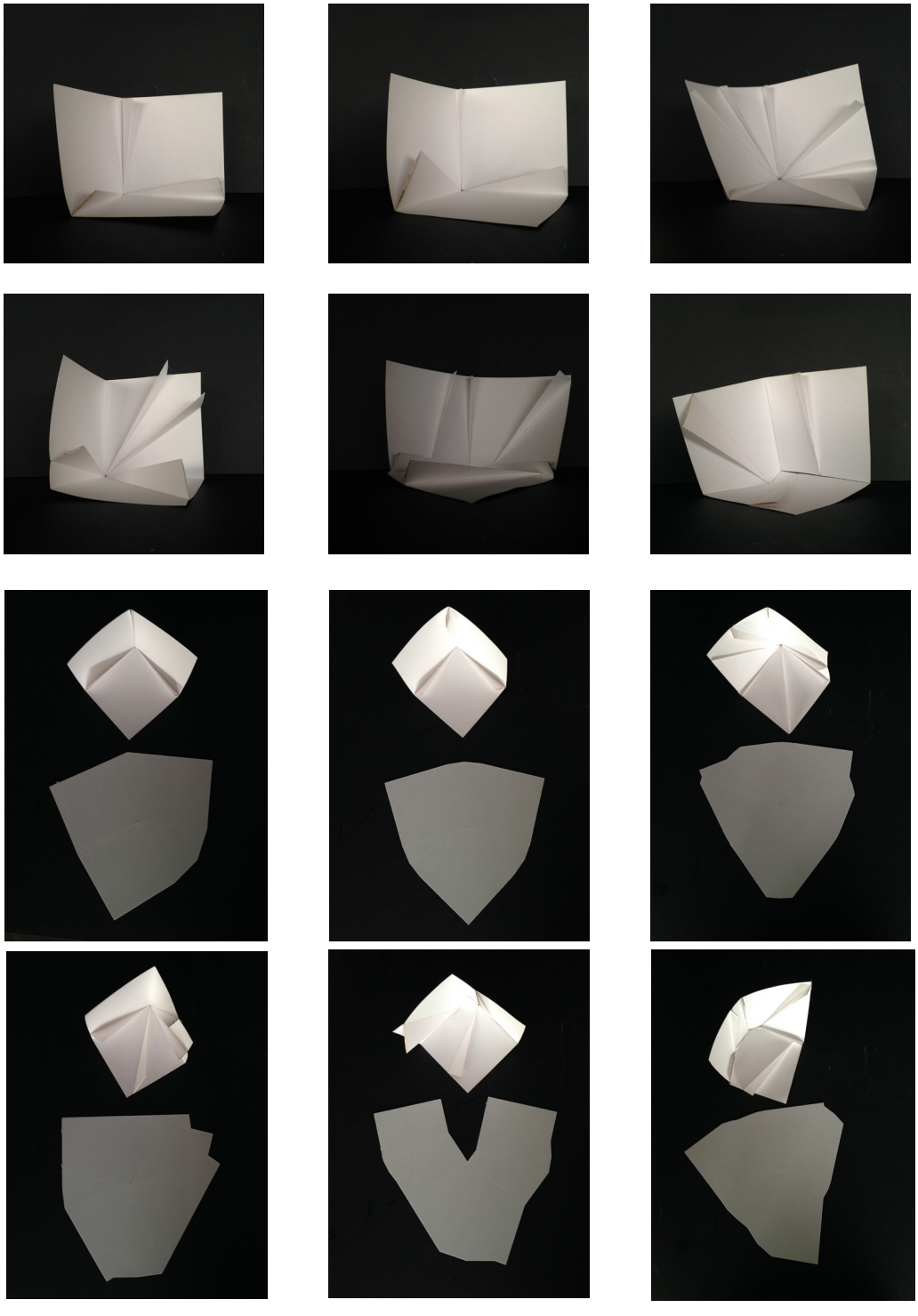


darts inserted into the surfaces of the planes

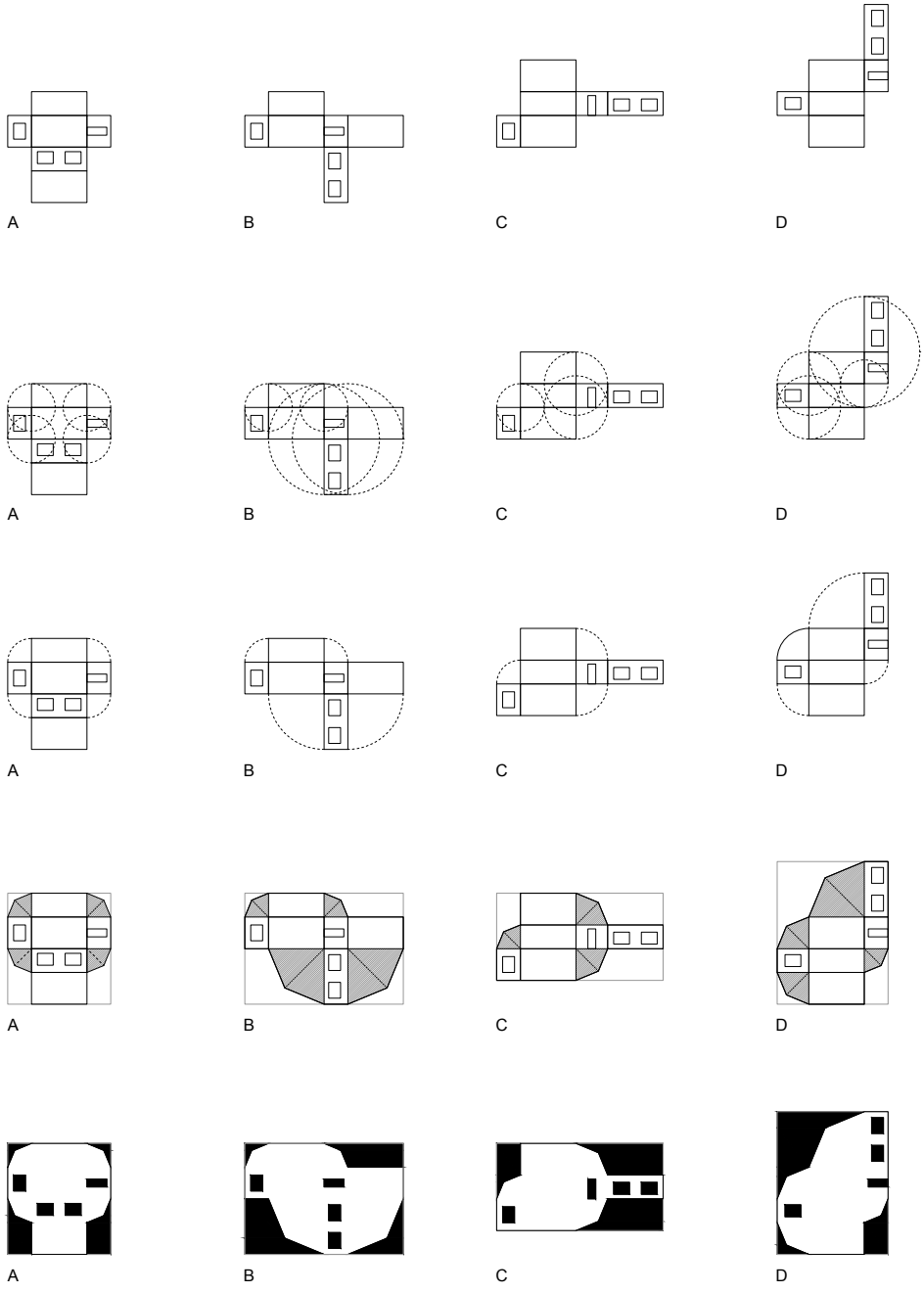


darts inserted along the edges and into the surfaces of the planes

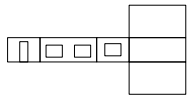
65. *Construction diagrams and patterns of a corner*



66. *Patterns and toiles of a corner*



67. Different assemblages of orthographic projections



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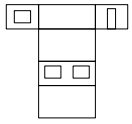

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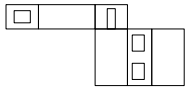

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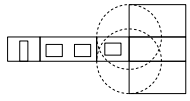

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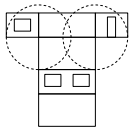

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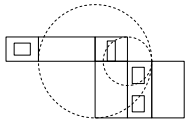

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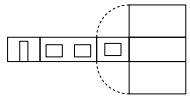

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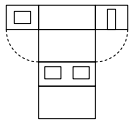

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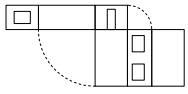

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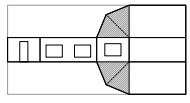

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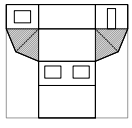

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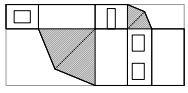

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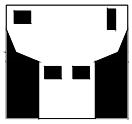

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Final design

The final design incorporates the findings from my previous studies and the knowledge gained through the artistic research pursued by analysing design references and theoretical concepts.
Hypothetical constructs investigates depiction of space through the use of orthographic projection and builds up new forms of representation by adopting elements and transformations from the discipline of pattern making. It re-reads interior space through examining the placement of its constitutive elements according to standard measurements. The interior is reconstructed based on diagrams drafted by introducing pattern making elements. The position of darts into different reference points re-establishes the proportions and dimensions of the space.

Delineating the methodology for the creation of interiors

The investigation of historical methods of geometrical representation accompanying the realms of architecture and pattern making establishes the groundwork for a method in questioning the representational conventions of architecture.

Developing a system of working, a methodology of representing and creating interior space by borrowing techniques from the field of pattern making this thesis undermines and subverts the established architectural conventions and explores the hypothetical interior constructions by using a non-conventional process.

Concept

In the pursuit of finding a context for applying the methodology extracted from the theoretical and material research I have made, the standardisation of measurements spurred my interest. Clothing and interiors have accomplished to create not only a universal language, but as well a uniform method of representation. Thus, questioning the conventional techniques of representation also re-reads and interprets the standard measurements of interiors. German architect Ernst Neufert wrote *Architect's Data Book* in the pursuit of adapting the human body's measurements to a rationalised environment.

The body exists only as the representation of a norm, says architect Leopold Lambert (2012). His further thoughts on this theme expand the concept of standardisation and define it as a limited number of possibilities regarding the dimensional combination between the human body and its environment. This thesis questions this idea and proposes a subversion of the rationalisation of the interior by means of representation borrowed from the realm of pattern making.

As identified in the theoretical chapter of this thesis the human body seen as a map integrates reference points to incorporate the dart which subsequently shapes volume due to its functions: rotate around a pivot point and gather fabric. Although fitting the same shape the dart creates different cuts/styles.

The patterns that I created are orthographic projections of an interior space, flattened to a sheet. The function of these interiors is meant to give context to the creation of the patterns, therefore influencing the aesthetics of the cut diagram. As well the pattern acts as a diagrammatic script intended to regulate its performative status.

The methodology devised as a result of the analysis and experimentation made throughout the development of this project incorporates four guiding conditions:
- the incorporation of the dart as an element formulating variability and increasing the number of patterns one can create for an interior.

- the usage of orthographic projection as a representation reminiscent of the interior architecture methodology.

- the dissection of the interior's cutting diagram based on its intended function and not on the obvious separation of its vertical and horizontal surfaces.

- the simmetry - the methodological step of separating a surface in two halves to improve the efficiency of the process.

Design

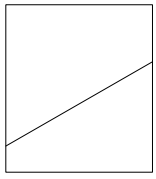
The design proposes an analysis on the interior as one would analyse a body to look for those ements based on which the tailor constructs a block pattern. This then is transformed multiple time to create a varietion of patterns.

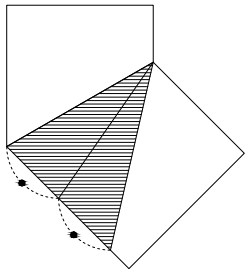
Drafted on paper and translated to a cheap cotton fabric the phisical models are essentially toiles, drafts to work on in the creation of a final design.

Methodological elements

As presented throughout the development of my research a methodology consists of: a series of actions to be performed, a medium onto which the performance is made which in this case detaches into different elements; and tools of representation in the sense of a language used as a set of convention.

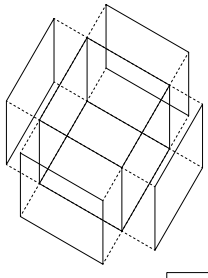
Actions

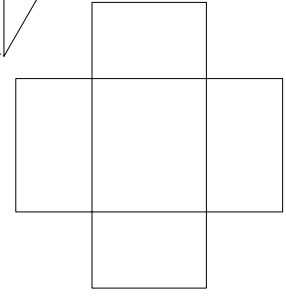




Dart

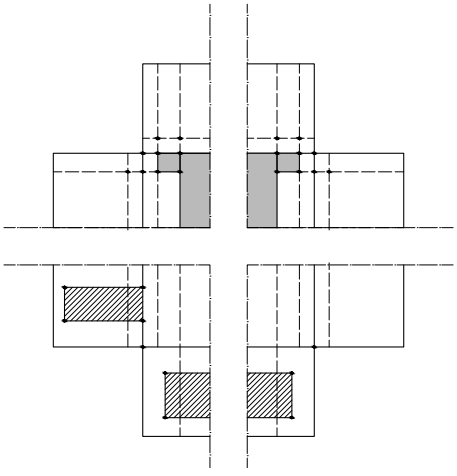
The incorporation of the dart as an element formulating variability and increasing the number of patterns one can create for an interior .





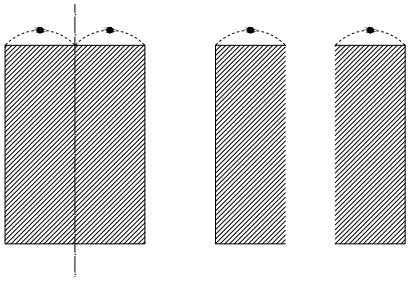
Orthographic projection

The usage of orthographic projection as a representation medium reminiscent of the interior architecture methodology.



Dissection

Within pattern making, the tailor cuts along the neck line and arm holes to separate the pattern in different parts. The dissection of the interior's cutting diagram based on its intended function and not on the obvious separation of its vertical and horizontal surfaces.



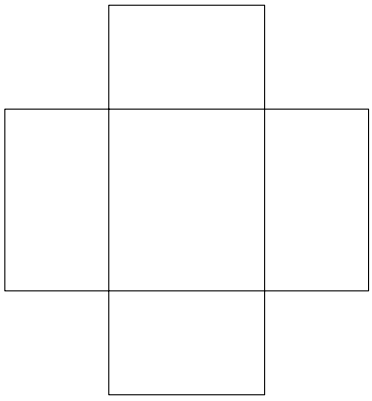
Simmetry

The methodological step of separating a surface in two halves to improve the efficiency of the process.

Elements

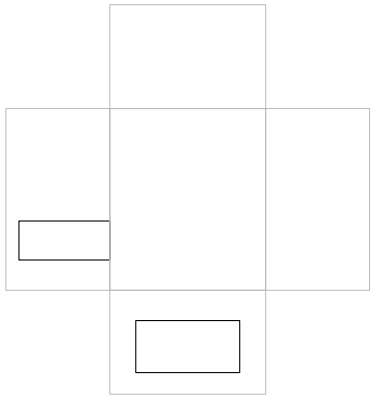
Developed surface

This representation tool, reminescent of the interior discipline conventions, is grafted in my methodology as an important element, being the starting point of the pattern. The surfaces of the interior are developed using ortographic projection in order to incorporate walls and floor within a single plane.



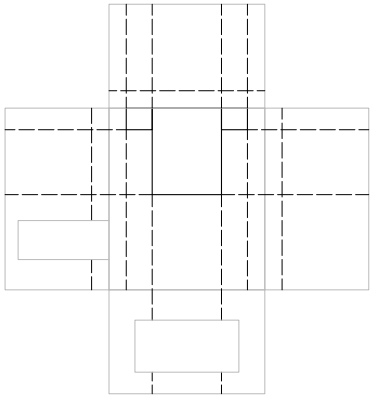
Cut outs

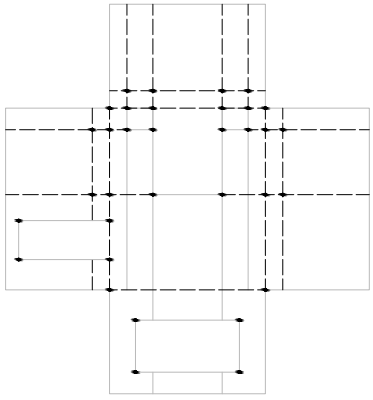
The openings of the windows and doors are defining elements of an interior. Thus, I have chosen to represent and use them as important elements of the interior patterns I am creating.



Reference lines

The body's "geography" clearly emphasizes lines which are used as guides to insert different constructive elements in a pattern. In the interior realm these reference lines are created by the intersection of the walls surfaces and by the edges of pieces of furniture. In this case, the edges are projected onto each surface to create guiding lines.





Pivot points

Placed along a reference line, a pivot point represents the location where a dart is inserted in a pattern in order to shape a volume, adding or subtracting fabric. In this case, the intersection of two perpendicular lines marks a rotation point where a dart is to be integrated.

Conventions

dart - indicates where the fabric is gathered

notch - marks the matching of two patterns

pivot point - indicates the insertion of a dart

guide line - guides the process of drawing other lines

sector line - indicates the half division of a line

finishing line - indicates the finished outline of a pattern

cut on the fold - indicates cutting on the fold

top stiching line - indicates the position of the stiching

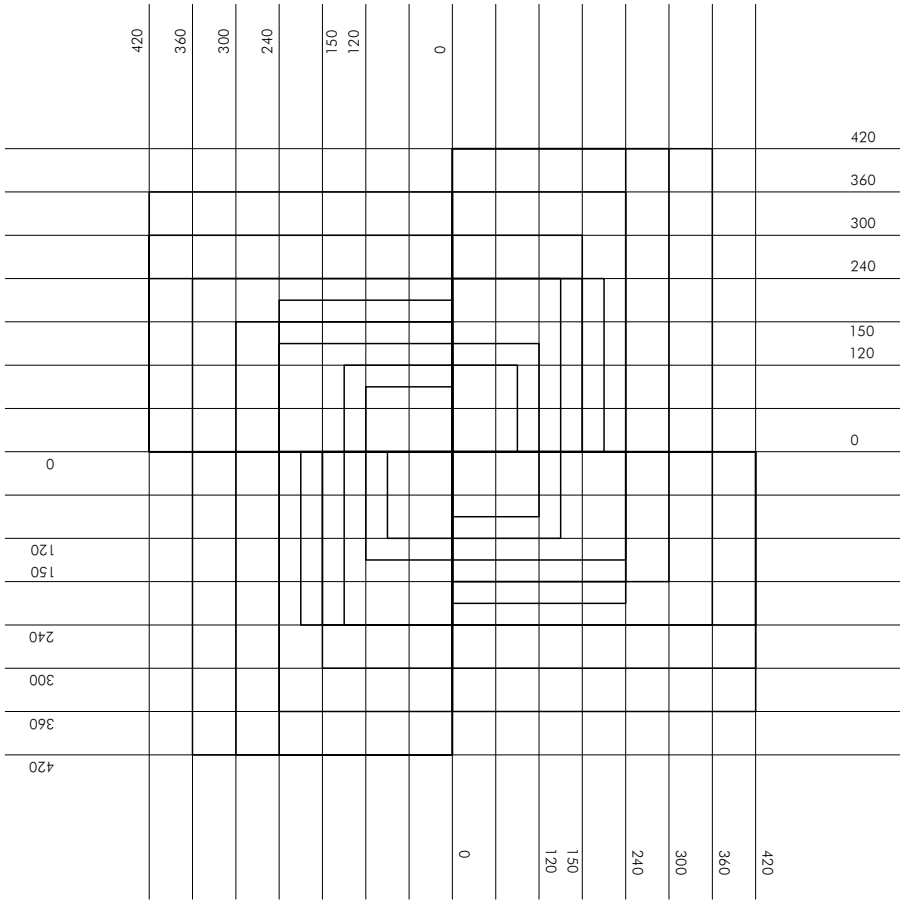
simmetry line - indicates where the pattern is divided in two equal parts

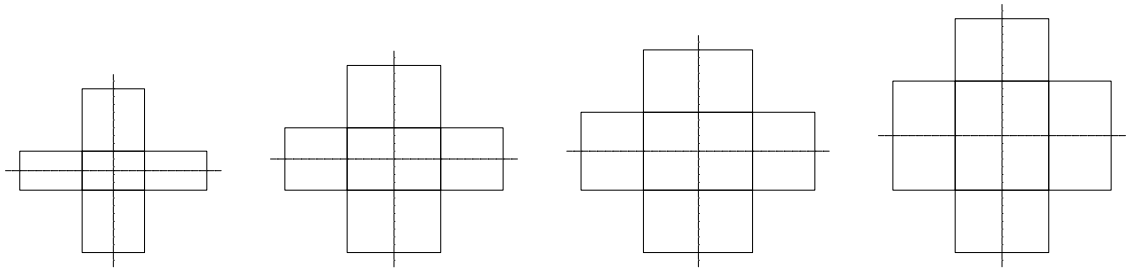
grain line - indicates the cross-wise grain of the fabric

Domestic interiors

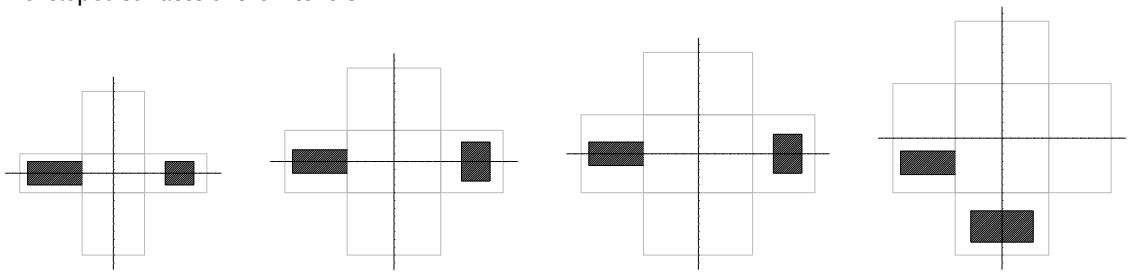
Using Neufert's manual to chose standard dimensions of domestic interiors I made a selection of my own to allow some diversity among the spaces having the same program. I then chose to apply the methodology on four domestic interior spaces: the bedroom, the kitchen, the dinning room and the bathroom.

Comparing the interior with clothing patterns for the human body I have identified certain elements which perform as equivalent to one another. They are incorporated in the interior patterns I created and I have used them to guide and define the working methodology throughout the design of *Hypothetical construction*s.

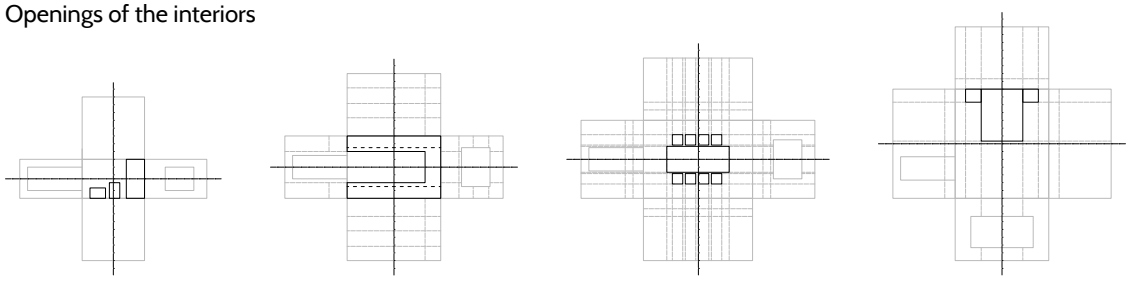




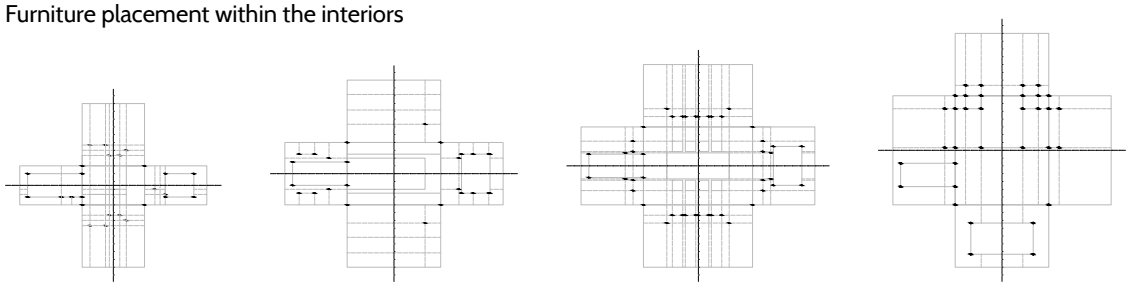
Developed surfaces of the interiors



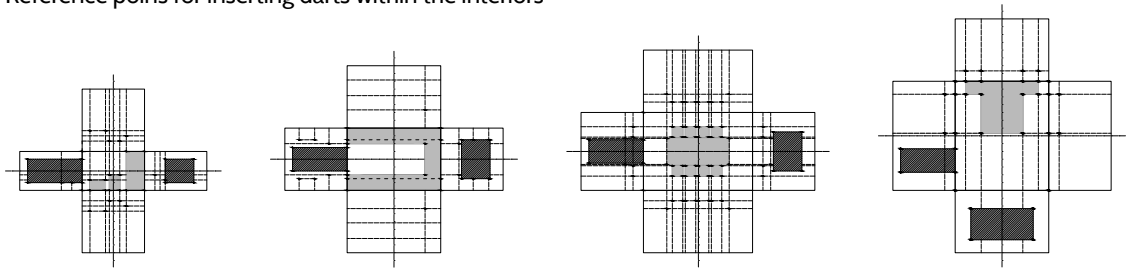
Openings of the interiors



Furniture placement within the interiors

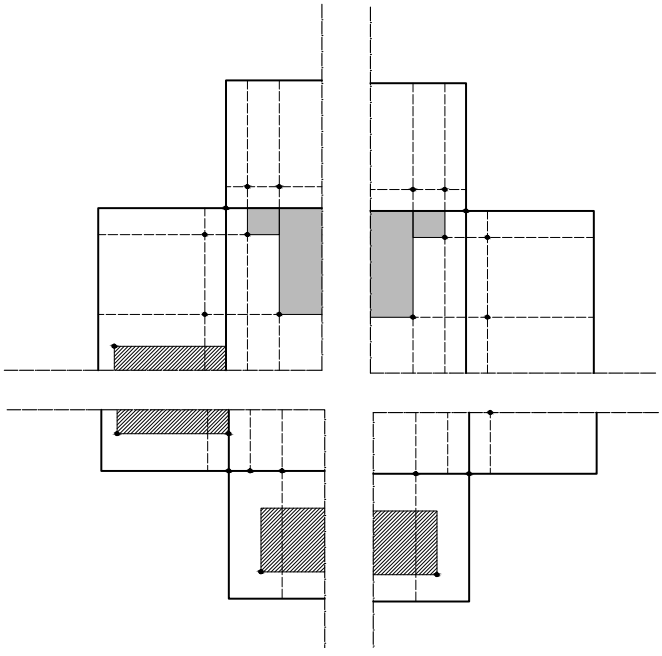


Reference poins for inserting darts within the interiors

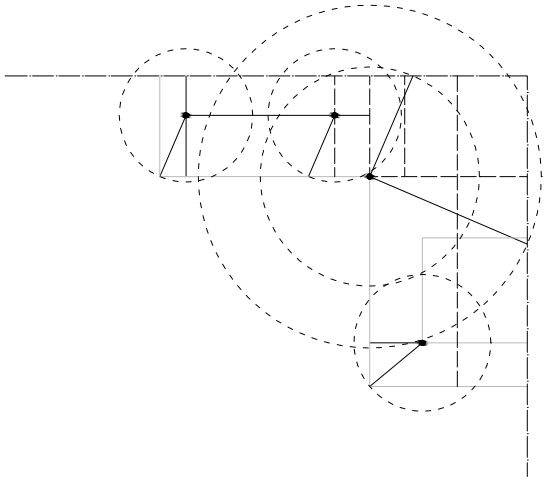


66. *Interior elements guiding the methodology*

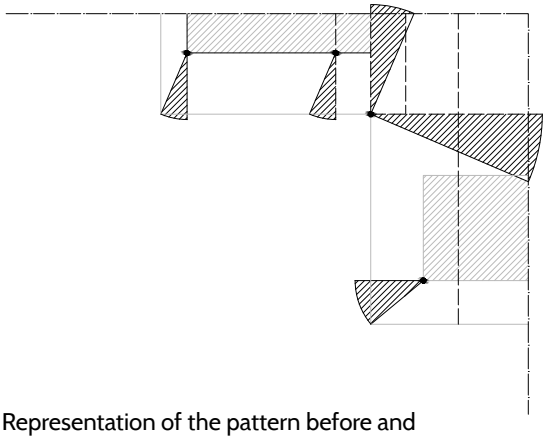
The bedroom



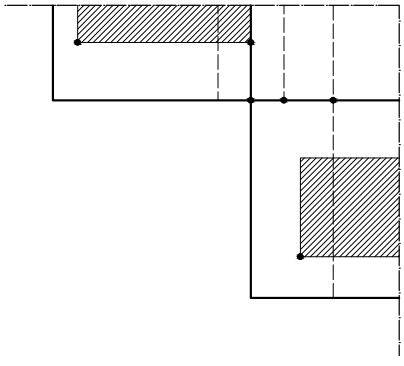
Dissected bedroom interior



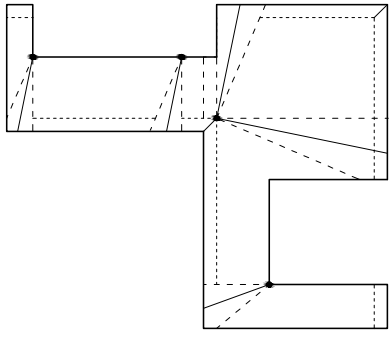
Guiding drawings for the placement of darts



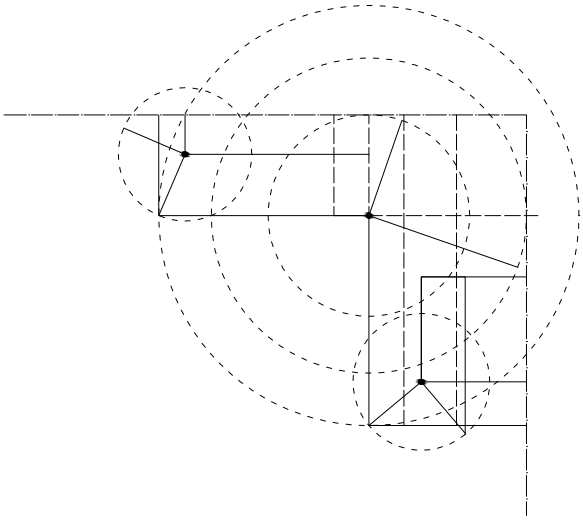
Representation of the pattern before and after inserting the darts

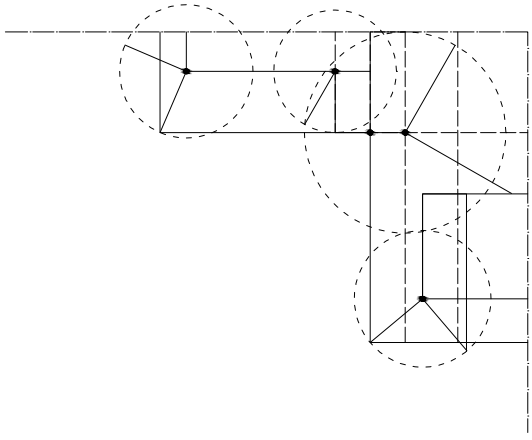


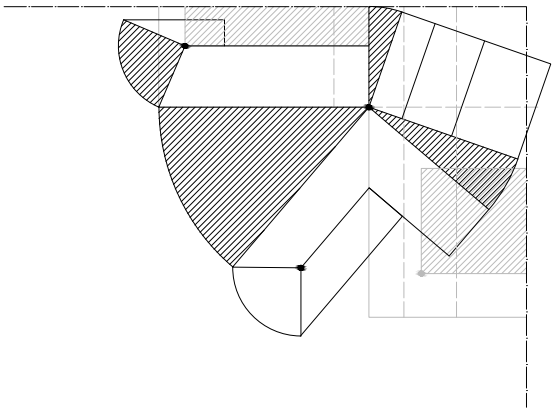
1/4 Representation of bedroom interior

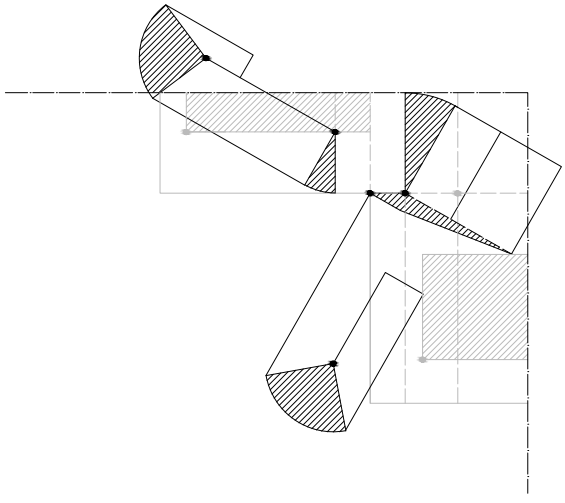


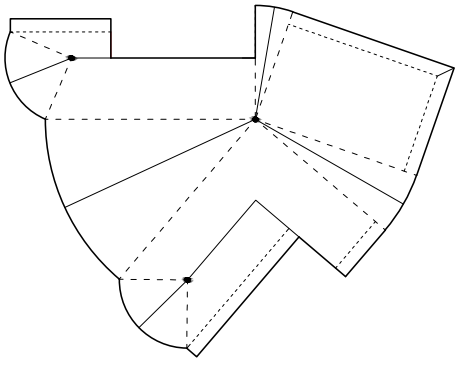
Interior final patterns

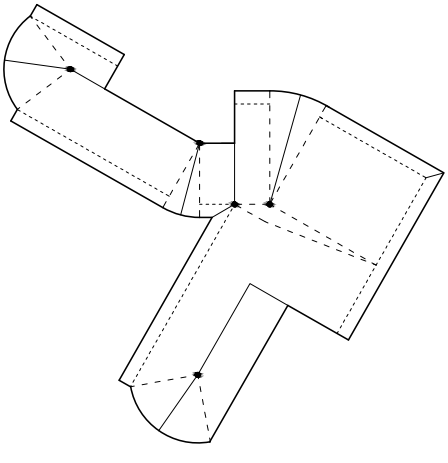


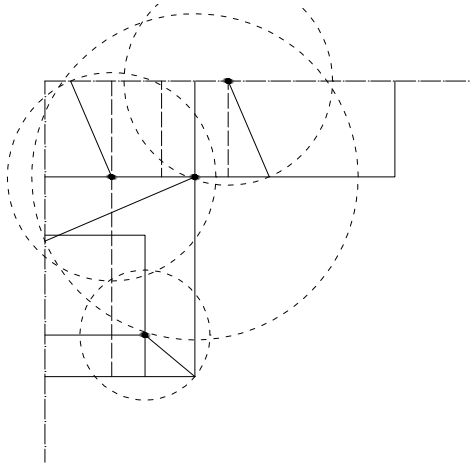




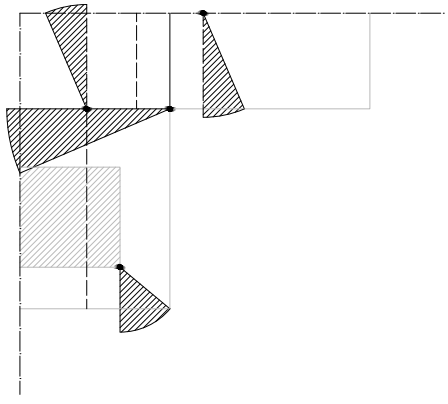




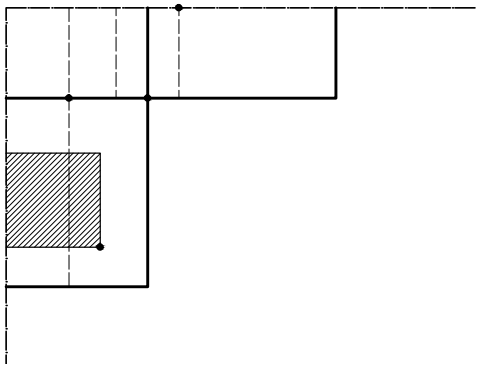




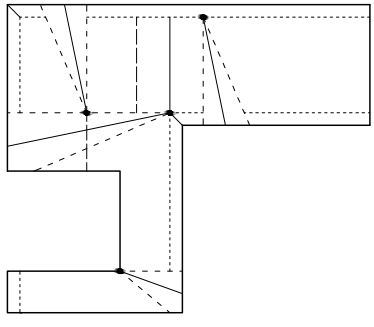
Guiding drawings for the placement of darts



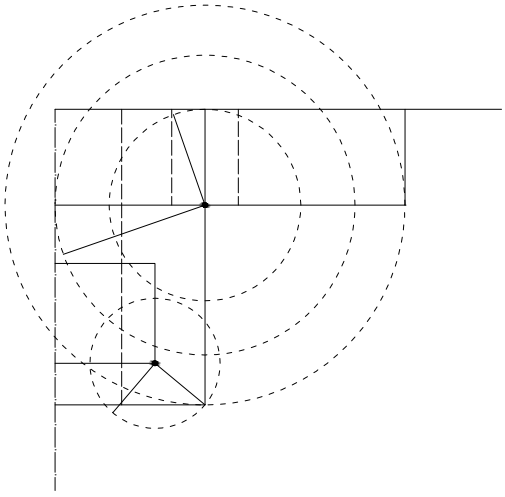
Representation of the pattern before and after inserting the darts

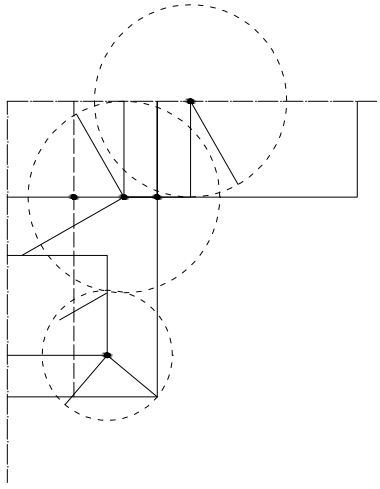


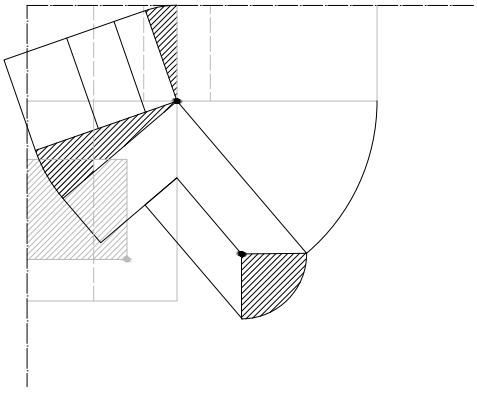
1/4 Representation of bedroom interior

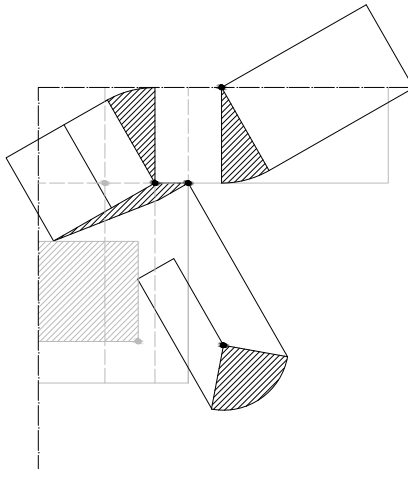


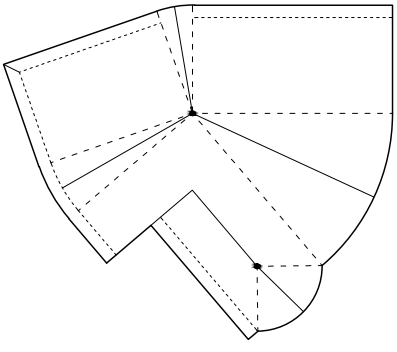
Interior final patterns

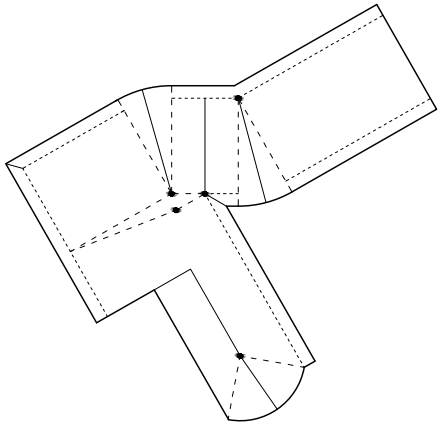


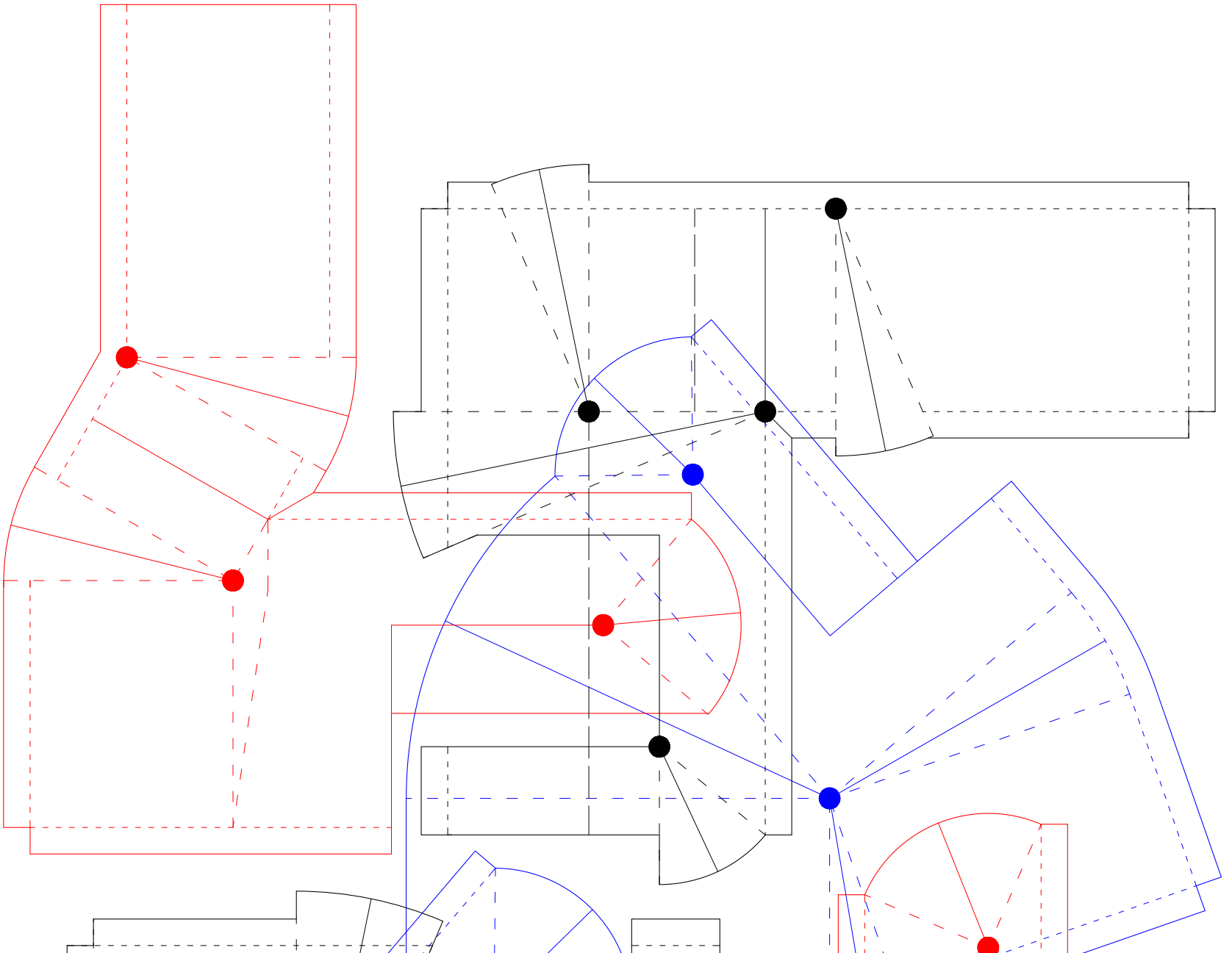


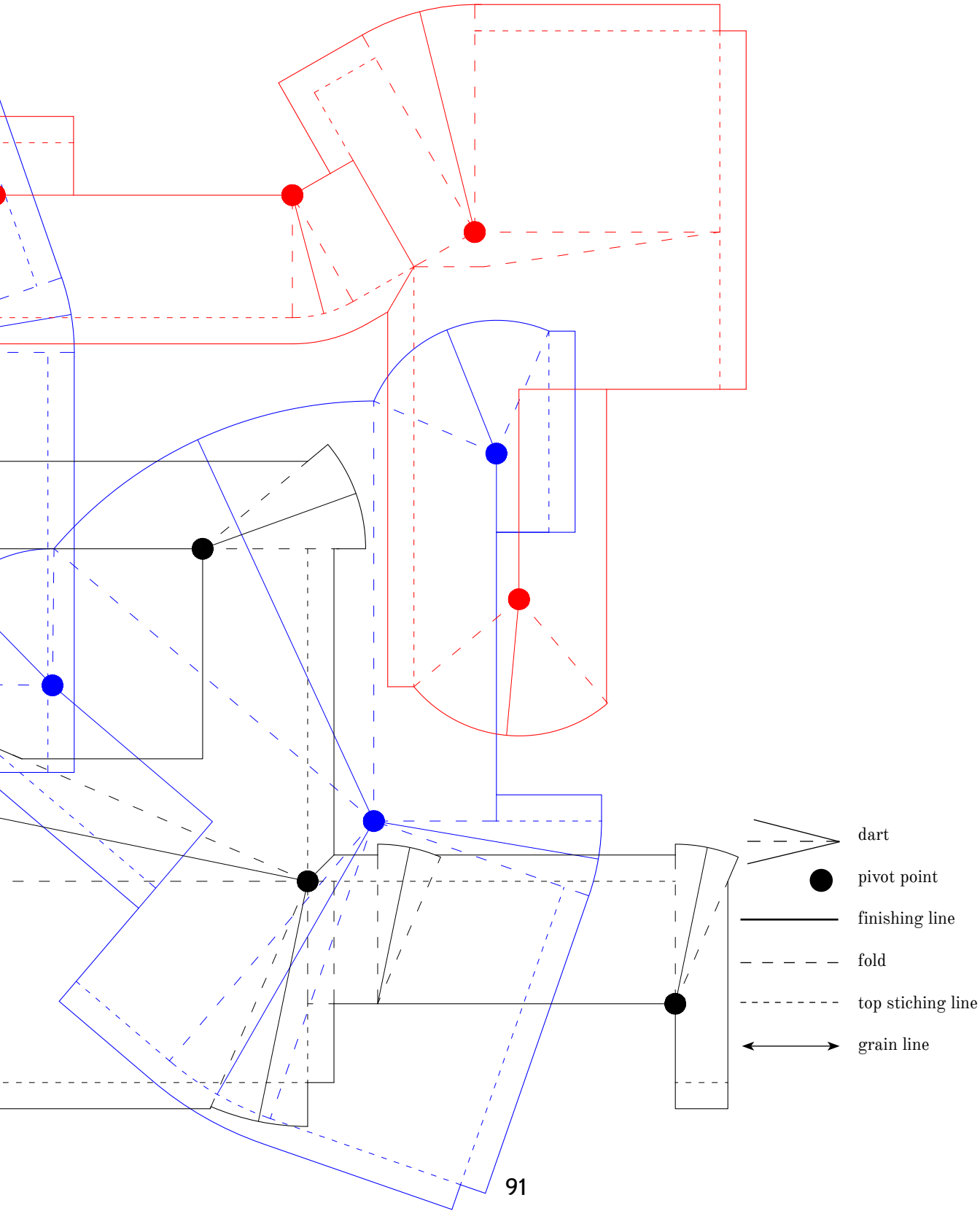











dart
pivot point
finishing line
fold
top stiching line
grain line

Conclusions final design

The relationship between actions, elements and representational conventions support and strengthen each other to create a coherent methodology.

By mixing two processes of representation, the project develops a methodology which allows the drawing to become an autonomous artefact.

Pattern making works with two-dimensional shapes in order to recompose the three-dimensionality of the human figure, while architectural representation uses plane geometry to represent space. Thus, the aim of the project is to employ geometrical constructions and to combines the different goals of each discipline to shape space.

The separation of interior surfaces is not made any more based on vertical and horizontal planes and as such represented individually. They are merged together based on the front and side projections of the interior's constitutive elements (furniture, openings) and therefore the interior is dissected according to the reference lines defined by these projections.

The gap in between the drawing and the building that Robin Evans was writing about is filled up with the employment of pattern making. Delineating this methodological approach to architecture creates a constructive process which functions at the same time as a representation tool.

Conclusions

Conclusions

Hypothetical constructions is anticipating a different process to generate interiors based on mixing methodologies and subverting standardized dimensions.

Borrowing the drafting technique of pattern making it is a proposal for "enlarging the catalogue of techniques" an architect posses, as Stan Aleen has suggested. It also questions the usage of conventional techniques and encourages the search for new representational mediums by merging existing ones with either visually simillar ones or methodologically complementary processes.

This thesis aims to create a sensibility towards the creation of interiors. It changes the perception on interior spaces by employing a different methodology which focuses on other aspects of the constructive process than the standardized methods.

My project raises questions regarding representational conventions and normative dimensions, looking at it through the lens of the pattern maker. Hereof I decided to use as a context ficticious interior spaces created by following the measurements given by Neufert's Architect's Data book.

Translating interior surfaces into patterns I have played with the tools of two disciplines to graft another methodology. It has been materialized in a series of paper patterns which subsequently construct textile fabric physical models.

The patterns are used as hypothetical instruction sets to build interiors and by introducing the dart as a tool to manipulate shape, they alter the appearance of the interiors.

Hypothetical constructions embody a catalogue of patterns aiming to create a relationship between method and representation within interior spaces.

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