P4 reflection & design research summary
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September 2017
Methods & Analysis Graduation Studio

In this booklet, I will approach my project in relation to my research in three parts.

1) Purpose: what is the aim of my project and why, what is the greater academic or socio-political context of my ambition?

2) Form; which means did I extrapolate from architectural analysis to strive for my aim?

3) Technology; what technology is fundamental to the project?

1. PURPOSE: ECO-POLITICAL CONTEXT

1.1 The nature/culture divide. We find ourselves in a time where the (western world) is increasingly forced to re-evaluate its conceptual distinctions between 'nature' and 'culture'. Climate change, natural disasters as well as socio-political conflicts that occurred in the past century exemplify that this idea, as both the 'causal' forces at play as well its consequences are neither distinctively 'human' or 'natural' anymore. This led theorists to coin the term 'anthropocene' for the era that is defined by human impact. The problems of climate change, land ownership, food security, technological advancement and refugee crisis are closely intertwined.

The Colombian war, is exemplary of the contingency of the forces that are sometimes called 'natural' and 'cultural'. Large scale agricultural renewal, driven by (socio-)political as well as technological forces, uprooted Colombian farmers from their land, largely contributing to the start of the civil war.

Yet our socio-political dependency on agriculture is perhaps most closely illustrated by the fact that cities were originally made possible by controlled production and storage of food. In the granary building, where grain is stored for public purposes, food and food security have a presence in the urban context. The agora, the marketplace in Athens was an point where food and politics converged as politics often converge around common means of life.

1.2 we don't have enough food, not secure and not sustainable enough. Food safety as well as sustainability in food production bring forward the challenge for urban planners and architects to collaborate with scientists, real estate experts and farmers to find suitable form for food production inside cities. What should it look like, where should it be in the city, how efficient could it be, would it combine with other (public) building programs?

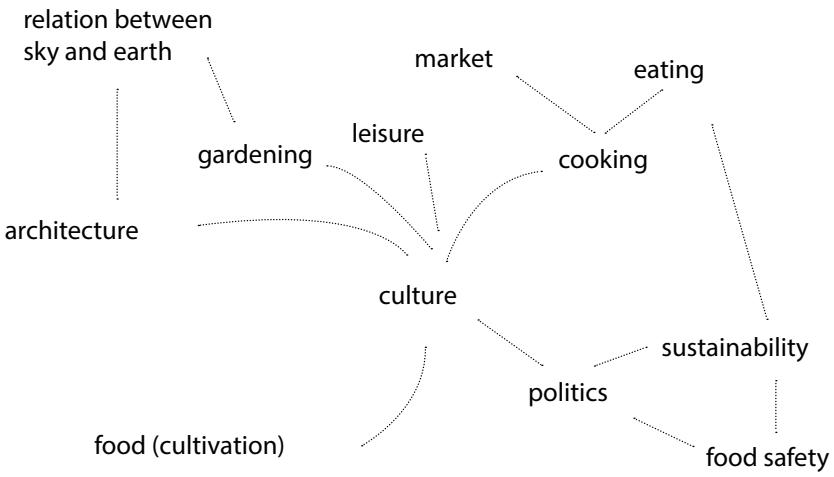
An increasing amount of inventors and entrepreneurs take on the challenge, yet their industrial farms are often located on the edge or of the city where they are solely exploited commercially - inaccessible and invisible for the public. I claim that, due to its central position in relation to culture, food production could be activated as a *common resource* for big cities, and Bogota in specific. Food cultivation and safety could become re-instuted in the city as a public, and perhaps semi-institutional building, reminiscent of mythical granary building and Athenian agora. Interpreting the architectural, ecological and social environment as (potential) "commons" and "common resources" is central to the studio of Methods and Analysis. This goes both for the purpose as for the research methods employed in the studio: it is encouraged to open the pool resource of existing forms and typologies that is available to us to base our design upon. I strove to let both the purpose and method of my project be guided by the "heuristics of the commons".

1.3 To activate food as a common resource is to expose it in the web of relations it is embedded in as well as to reinforce and accomodate these relations. Food cultivation could then, for an example be re-embedded from the seclusion of the commercial realm back into the urban public realm, where debate is possible on food safety, sustainability and equality of distribution. It

Top: The civil war

Middle: Sky Greens Vertical Farm, by Jack Nguyen. Singapore.

Bottom: possible diagram of web of relations food cultivation is embedded in


relation between
sky and earth
market
eating
leisure
gardening
cooking
architecture
culture
sustainability
politics
food (cultivation)
food safety

could be visibly be re-embedded in its relation to cooking, eating and markets. This presence, or re-appearance of these things in eachothers vicinity and in the public realm, is not only of social, political and ecological significance. It will also enable these often separate realms to interact, cross-influence. A place where cultivation & culture meet.

1.4 relationship between purpose and form in this project is twofold:

1) a smooth interaction between programmatic components allowing for unecxpected encounters, while still retaining borders essential for the functioning of vulnerable programmatic elements.
2) exposing a quality or characteristic of argriculture that is at the same time a relevant architectural thematic.

In my view, architecture is about the way we structure the relationship we have to our environment. This includes the human, but also non-human environment. Sun, rain and wind revolve around our buildings in a way that is sometimes pleasant and sometimes unpleasant, depending on how the building shapes its relation to these elements. What essence of agriculture would in this case be relevant for architectural form, the interactive programmatic space of my project in specific?

Perhaps it could be peculiar relation between vertical and horizontal, up and down, sky and earth. Horizontally, the land stretches out in infinite extension. Vertically, space is very articulated. Crops grow because of nutrients underneath them, towards the sun and rain above them. This specific relationship in agriculture that takes place between sky and earth has been recognised interculturally and throughout time, and has been associated with love and eroticism. This is illustrated by Chinese thinker Confucius in 5th century BCE and Muslim philosopher and poet Rūmī in 13th century this (see right page).

This character of smooth horizontal space in combination with striated vertical space has become a guiding architectural theme and ambition in my project. As I found this specific spatial relationship elaborated in the work of some modernist architects, I have built forth upon the heritage they left. This heritage is the formal spine of my project. As this thematic is present in early Chinese thought on boundaries and architecture, I have studied their understanding of boundaries as well, and written a paper about it which you can find in the appendix.

Summary) Make an urban farm

A) cultivation
1. uncover agriculture in its web of relations
2. embody the relationship between sky and earth that is implied in agriculture
3. create a (technologically) efficient environment for growing crops in an urban context

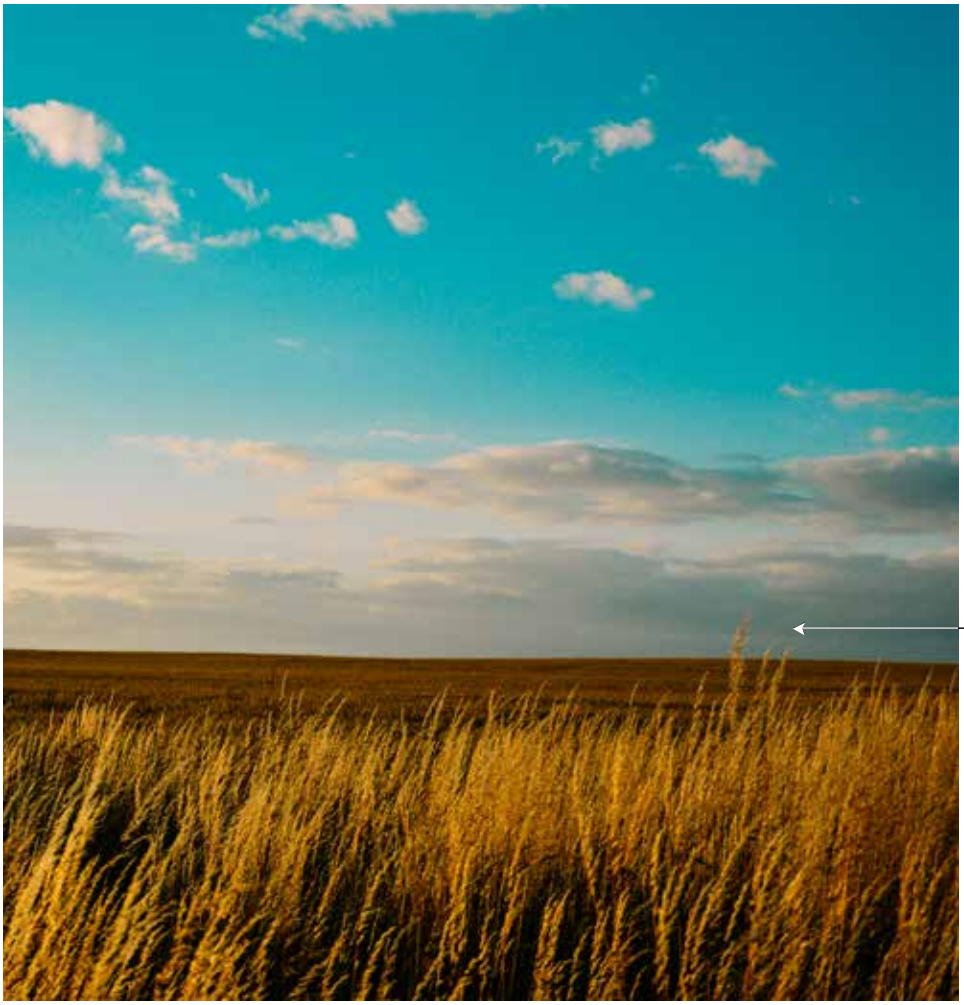
B) culture
1. create a platform that allows for smooth interaction between programmatic components.
2. retain the boundaries essential for functioning of (vulnerable) programmatic components

"When Heaven and Earth stimulate and join, while yin and yang attain one another, then they illumine, protectively cover, and nourish all things. Only then do plants flourish, buds emerge (…) The energy of Earth rises up and that of Heaven descends. Yin and yang rub together. Heaven and Earth agitate each other. Drumming it with thunder and lightning, arousing it with wind and rain, setting it in motion with the four seasons, warming it with the sun and moon, all forms of fertilisation arise."

— Confucius, Book of Rites (Li ji zhu shu), ch. 37, "Yue ji," p. 21a; ch. 38, "Yue ji," pp. 16b–17a. (transl. M. E. Lewis)

Earth fosters what Heaven lets fall. When Earth lacks heat, Heaven sends it; when she has lost her freshness and moisture, Heaven restores it. Heaven goes on his rounds, like a husband foraging for the wife's sake; And Earth is busy with housewiferies: she attends to births and suckling that which she bears. (…) Unless these twain taste pleasure from one another, why are they creeping together like sweethearts? Without the Earth, how should flower and tree blossom? What then, would Heaven's water and heat produce?

— Rūmī (in: R. A. Nicholson, Rūmī, George Allen and Unwin Ltd., London, 1950, pp.122-3.)



To answer this formal question I have considered several formal schemes ranging from being inspired by OMA to classicism. Eventually I ended up with a scheme that could satisfy both. It would be a scheme that emphasises a smooth space horizontally and an articulated borders/edges vertically. As this is a that could builds upon both the heritage of modernist architecture and Japanese/Chinese architecture, a formal analysis followed of Mies von der Rohes court houses (1934) as well as Bunshafts Lever House (1952) and some of SANAA's work. Through analysis of these projects, I distilled several tools that could help me achieve the architectural qualities I was looking for. They guided, from large-scale to small scale, the typological form, spatial definition, and boundary definition of the building.

1. Typology
Platform-tower *Gordon Bunshaft of Skidmore, Owings & Merill*
Heavy roof (?)

2. Spatial definition and configuration
Glass patios *Ludwig Mies von der Rohe & SANAA*
Centrifulgality (?)

3. Boundary definition and/or blurring
Neo-enthasis: Blurring horizontal boundaries by breaking 'euclidean' geometry. *SANAA*

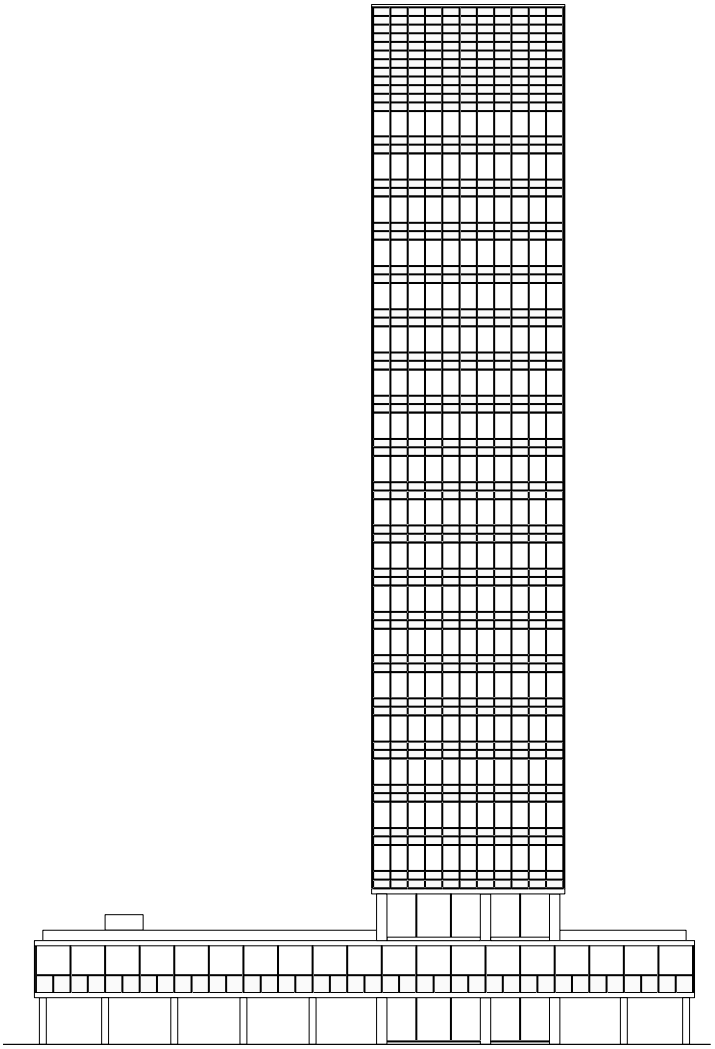
2.1 Typology: platform tower

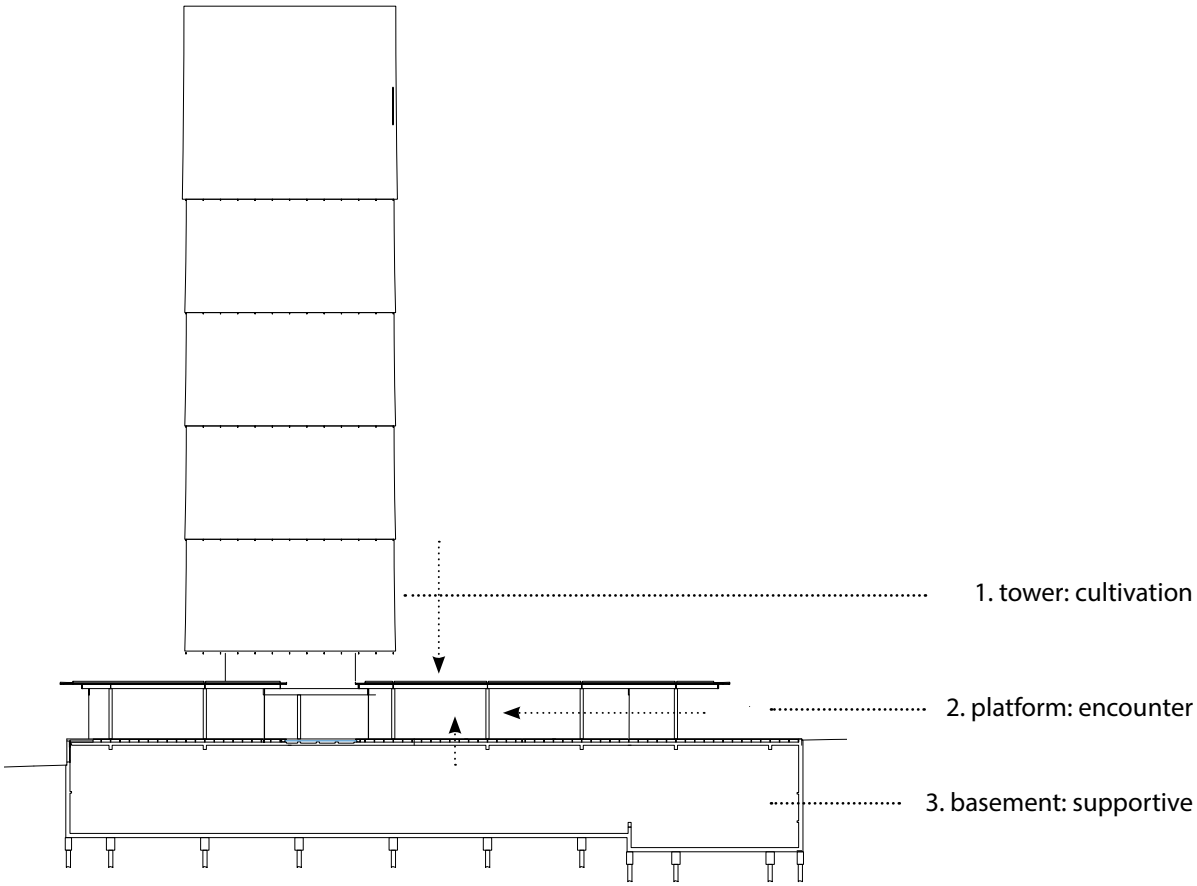
As in the city center of Bogota space is very expensive, any industrial urban farm would have to be a high-rise building to be viable. In the context of the building, high rise is often shaped according to the platform-tower typology. Thus this typology was chosen to guide the overall form of the building, with the Lever House by Gordon Bunshaft as reference project. Gordon Bunshaft shows in this building how to make two contrasting volumes a coherent whole through the use of proportion and facade rhythm.

Gordon Bunshaft of Skidmore, Owings & Merrill (SOM)
Lever House
1952
Reconstructed elevation (top)

The platform-tower typology offers the possibility of secluded programmatic activities in the tower that interact with the urban context through the platform. The basement underneath provides supportive functions for both the public platform and tower.

Diagrammatic section of building (bottom)




1. tower: cultivation
2. platform: encounter
3. basement: supportive

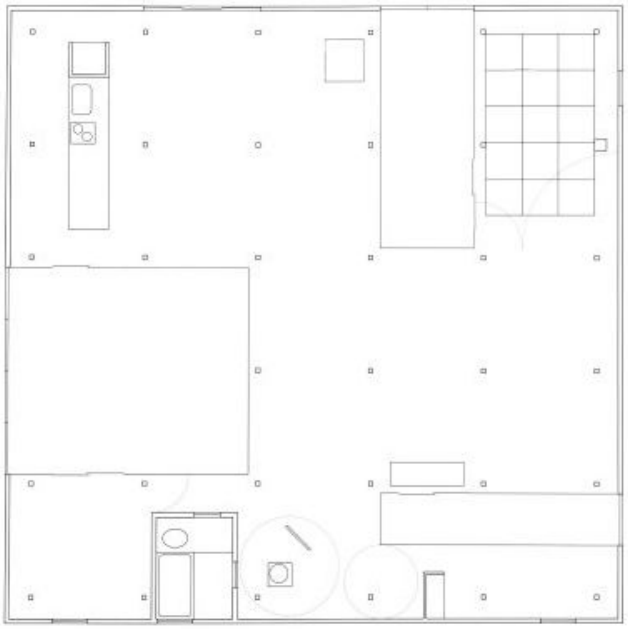
2.2 **spatial definition** smooth space defined by *glass patios*

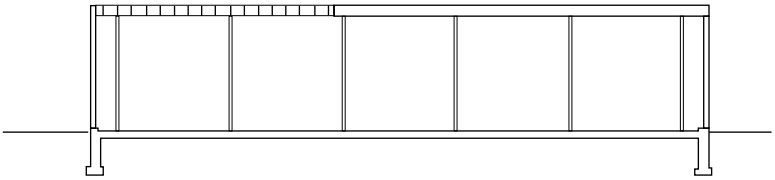
Both Nishizawa and Mies von der Rohe spatially define the interior of these projects with glass patios. Both work with three clearly hierarchical patios. In von der Rohe's case, the biggest patio is the most public, located at the entrance, and the smallest the most private. (see next page for my response).

Ryue Nishizawa
(from SANAA)
Weekend house
1997-1998
Simplified plan and section.
Not to scale. (right)

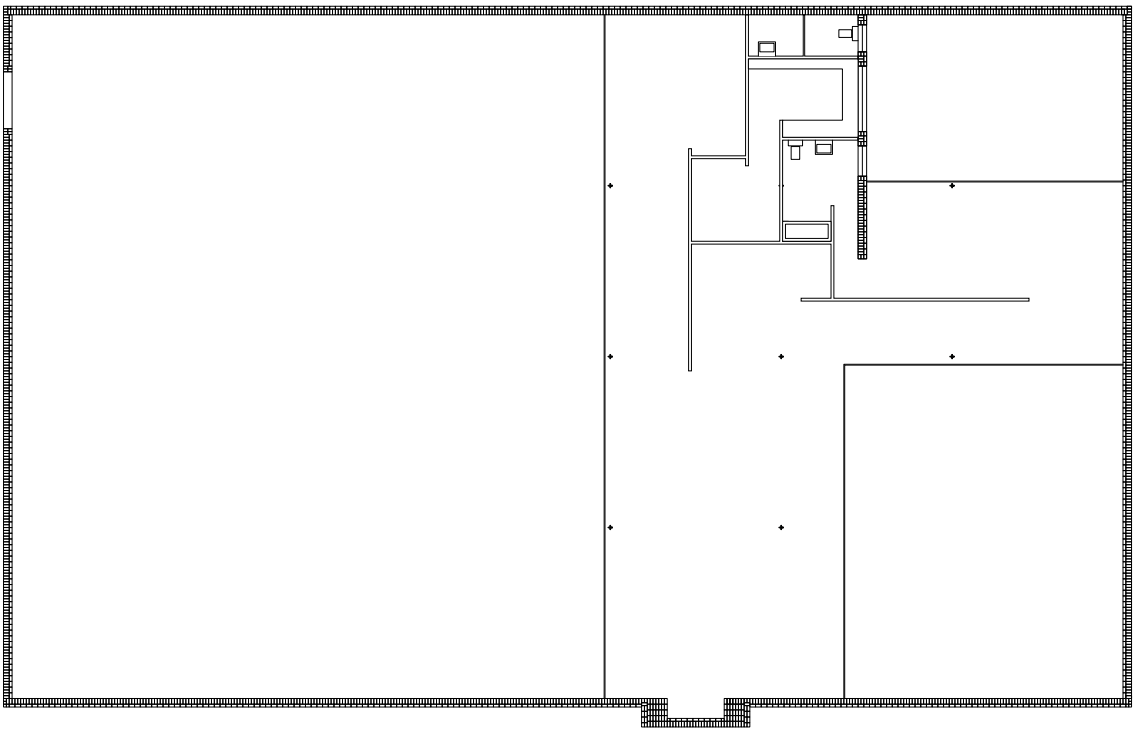
Ludwig Mies von der Rohe
House with three courts
1934
Simplified plan (without tiles) and
elevation. Not to scale. (below)

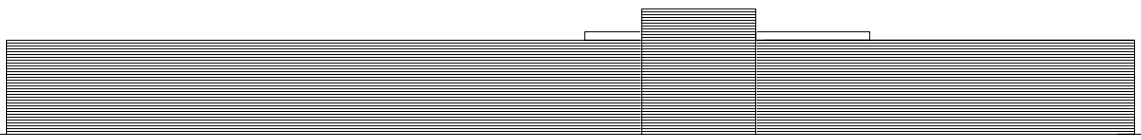
large to small spaces,
large to small patios.
circular hierarchy.





open to secluded,
public to private





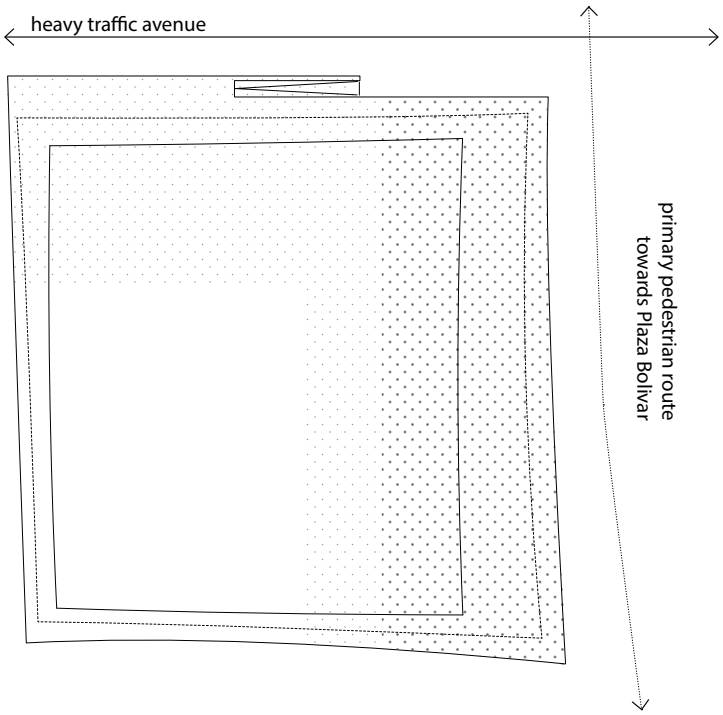
In the urban farm, patio configuration of Mies' and Nishizawa's patio houses is reversed. The smallest patio's divide the largest, most 'public' spaces and the largest patios give shape to a more secluded area of the ground floor, where the spaces arounds the patios are smaller.

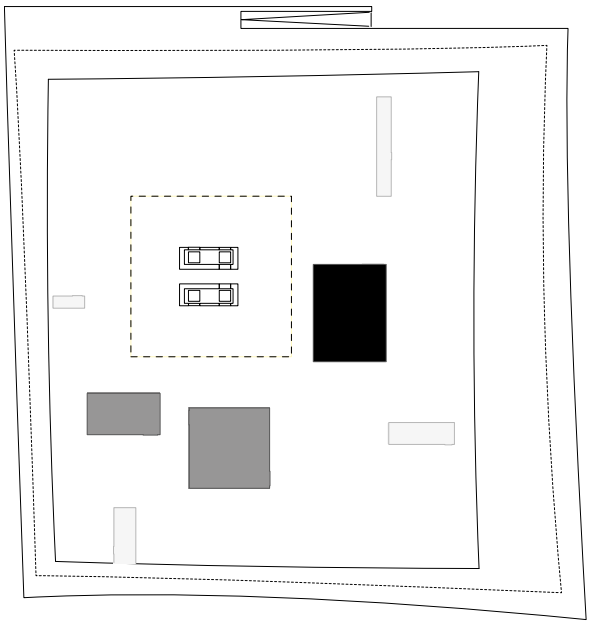
The patio's are divided into three types: 1) a large traffic patio in the center that connects basement and ground floor 2) large patio's to reside in; 3) small 'boxes' of nature that are not accessible. The ground floor is divided into zones of traffic intensity, and the patios respond to these zones both by their 'type', and through their density. In the parts with the highest density of patios the in-between spaces are smaller, and more secluded.

Top right: zoning on ground floor, from heavy traffic to light traffic / open to secluded.

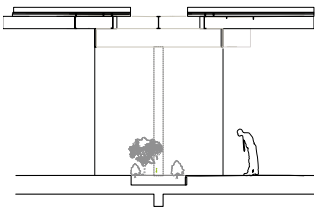
Middle right: configuration of patio types

Bottom left: simple sections of patio types

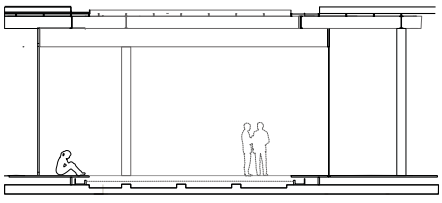




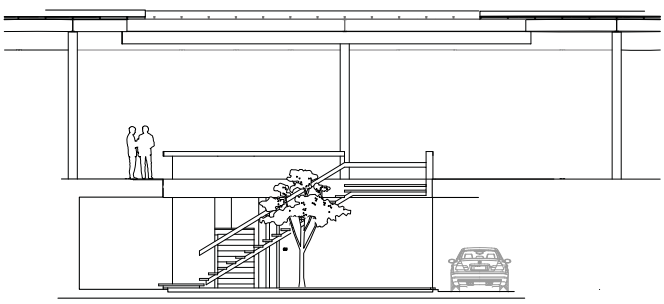
2. small "glass boxes of nature (4x)



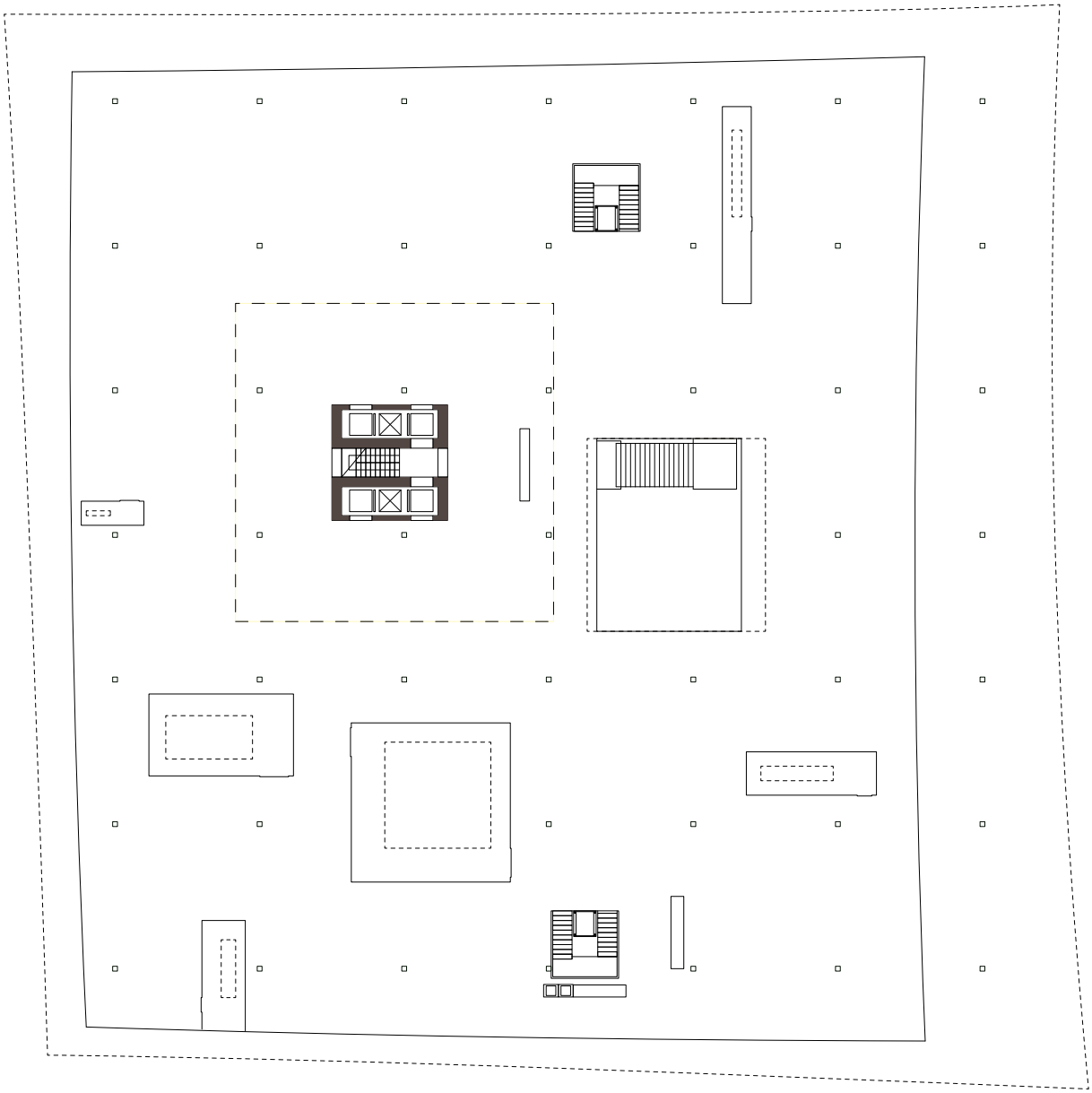
3. patio's to reside in (2x)

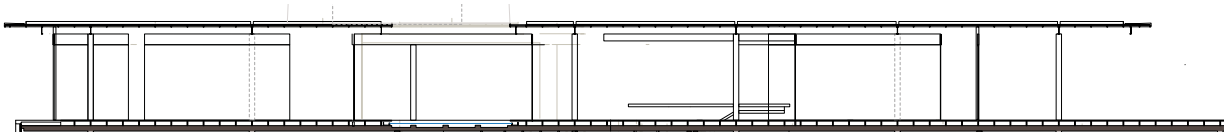


1. double-height traffic patio (1x)



Simplified plan and section of ground floor, illustrating relationship roof, columns, facade. (Tower and basement left out). Not to scale. (right)





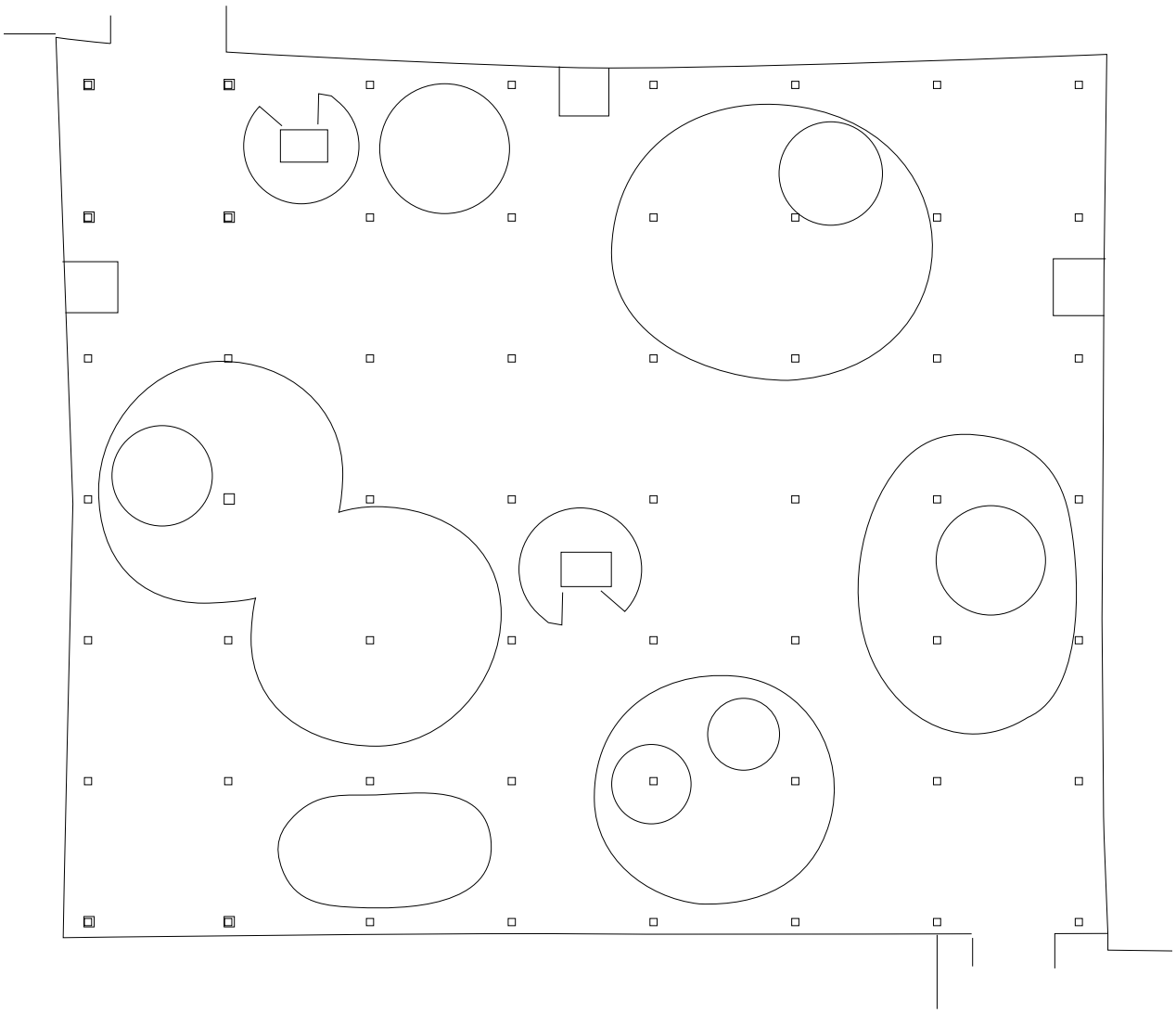
2.2 **boundary definition**: blurred boundaries and shivering edges through *neo-enthasis* and *non-parallel indentation*

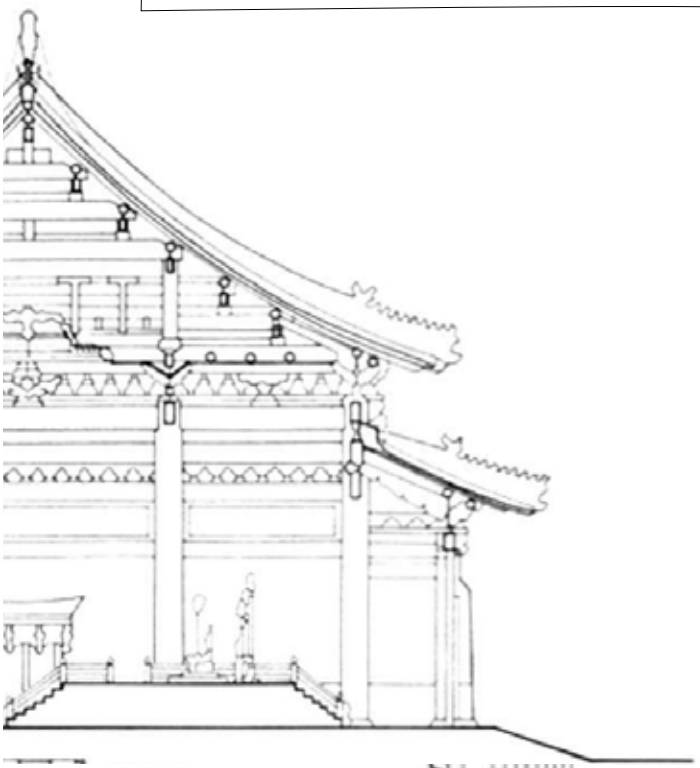
SANAA breaks the 'euclidean' glass box by using a new form of *enthasis*. Where the Ancient Greeks used enthasis to optically stabilize the geometry of their buildings, SANAA reverses this into a destabilizing effect. There seems to exist some kind of surface tension that brings the outer edges of the building to life. I would argue that, through this destabilizing effect, the boundary that the transparent facade of Louvre-Lens forms, becomes a bit more blurred.

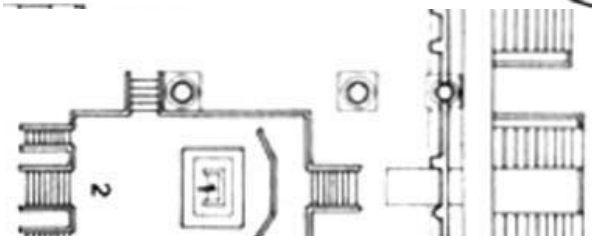
In the Louvre Lens, roof edge, roof construction, and facade are all focussed into the thinnest of lines. In the Hall of Supreme Harmony in Beijing, something very different happens. Every layer mentioned is pulled apart, separated, forming a suspended boundary - it is unclear when one is inside or when outside. In the vertical sense, these layers are separated as well, but not penetrable. As such, their indentation forms a articulation of a more striated space in the vertical sense. The tracks of these separated edges are parallel.

Top: SANAA
Louvre Lens
2012
Schematic plan of the "Hall"
(Author's drawing)

Bottom: Hall of Supreme Harmony, Forbidden City, Beijing.



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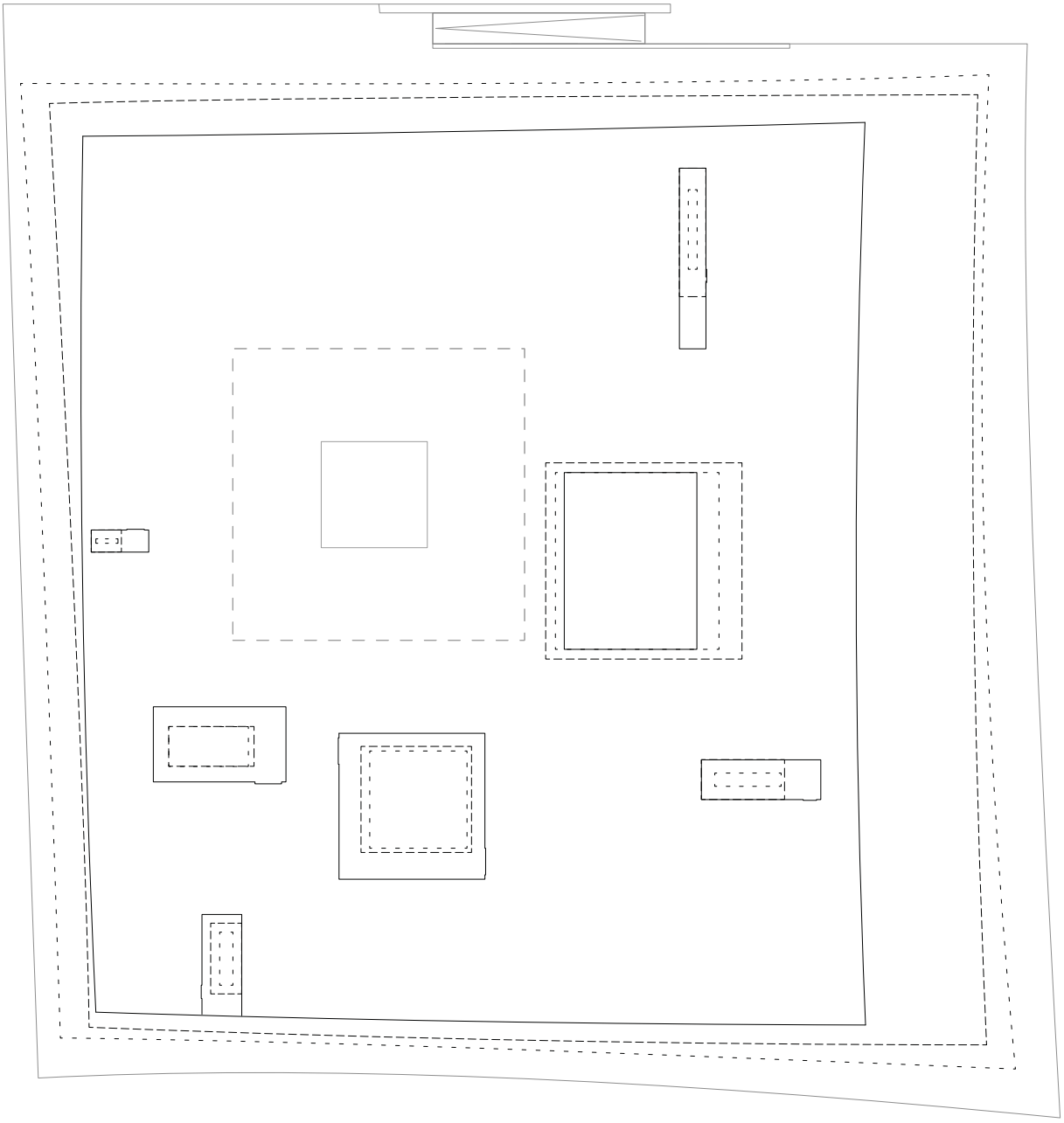
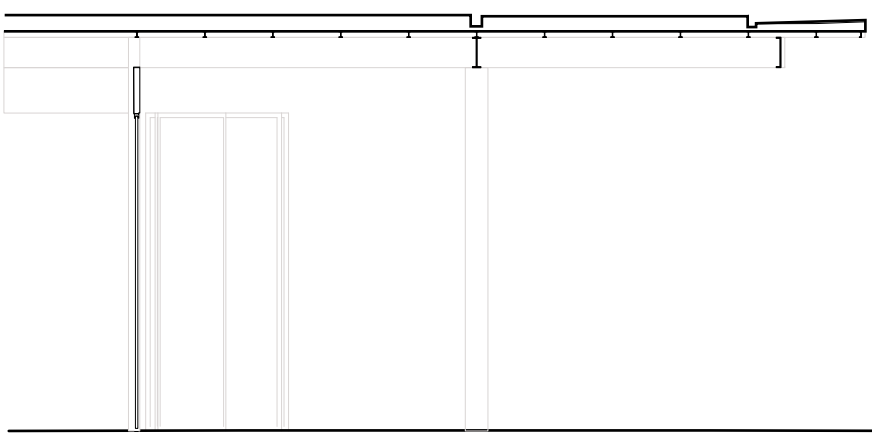
On the ground floor of the Urban Farm, the two contrasting tools found in Louvre Lens and Hall of Supreme Harmony are used together: The outer edges of the building are pulled apart in several layers that are subject to enthasis as well. To make the separated edges even more independent of one another, they are non-parallel.

Top: drawing showing the indentation and non-parallel seperation of several layers: plateau, roof edge, constructive edge, facade.

Bottom: section of east antrance of urban farm.





I did not find a growing system ready to (sustainably) use in a tower. Out of many growing systems based on water (hydroponic) or air-diffused liquid (aeroponics), I chose a couple of systems as examples because of their sustainability (smart use of sunlight) and ease of use in a tower. These examples all work with a kind of system that rotates sunlight and nutrients in such a way that all plants get equal of both of them.

In my own growing system, I combine the dripping system of the DIY 'tower garden' (see patent), with the principle of horizontal rotation for sunlight found in Granpa dome. Leafy greens grow in baskets that sit in large cylinders. These cylinders contain perforated partitions that allow the water to slowly drip through the cylinder. The solution feeds the plants and eventually drips out of the bottom. In order to efficiently supply and drain the dripping water throughout the tower, I use the tower floors as drainages that double as reservoirs. In this way, as much water as possible is re-used. These reservoirs are then monitored. In case nessecary, the composition of the nutrient solution could be changed by adding from the main reservoir. (see next page).

Top left: Jack Nguyen's patent for his "sky greens" vertical hydroponic farm

Top right: Patent for the "tower garden" DIY aeroponics

Bottom: Granpa Dome hydroponic farm in Japan, by inventor Takaaki Abe.

(12) **United States Patent**
Agius

(10) **Patent No.: US 7,168,206 B2**
(45) **Date of Patent: Jan. 30, 2007**

(54) **HYDROPONIC APPARATUS**

(75) Inventor: **Joseph Agius**, Cudgen (AU)

(73) Assignee: **A & B Hydroponics International Pty Ltd.**, Cudgen (AU)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/466,767**

(22) PCT Filed: **Jan. 31, 2002**

(86) PCT No.: **PCT/AU02/00097**

§ 371 (c)(1),
(2), (4) Date: **Aug. 1, 2003**

(87) PCT Pub. No.: **WO02/063945**

PCT Pub. Date: **Aug. 22, 2002**

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(30) **Foreign Application Priority Data**

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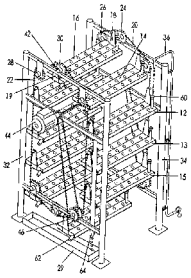
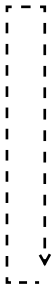
(57) **ABSTRACT**

A hydroponic system with modules having a hollow interior, a bottom wall with drain holes, and an open top end. A module conduit in each module carried by the bottom wall for channeling fluid through the hollow interior. The bottom wall of each module adapted to engage a top end of an adjacent module for stacking the modules in an end-to-end arrangement to form a planting column. A conduit receiving slot formed in the bottom wall of each module to engage a top portion of a conduit from an adjacent lower module when the modules are stacked end-to-end to provide a continuous fluid passageway through the planting column. A platform vertically carrying the planting column atop a fluid reservoir. A supply line connecting the reservoir to the fluid passageway. A fluid distributor atop the column in fluid communication with the fluid passageway for distributing fluid into the planting column.

28 Claims, 8 Drawing Sheets





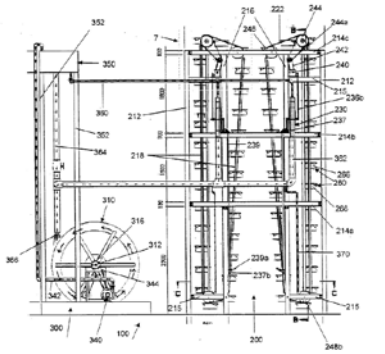


Figure 2

(12) **United States Patent**
Bryan, III

(10) **Patent No.: US 7,055,282 B2**
(45) **Date of Patent: Jun. 6, 2006**

(54) **HYDROPONIC PLANT CULTIVATING APPARATUS**

(75) Inventor: **Morris Bryan, III**, Anderson, SC (US)

(73) Assignee: **MB3, L.L.C.**, Anderson, SC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 162 days.

(21) Appl. No.: **10/915,967**

(22) Filed: **Aug. 11, 2004**

(65) **Prior Publication Data**

US 2006/0032128 A1 Feb. 16, 2006

(51) **Int. Cl.**
A01G 31/00 (2006.01)

(52) **U.S. Cl.** ..... **47/62 R**

(58) **Field of Classification Search** ..... 47/82, 47/59 R

See application file for complete search history.

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Primary Examiner Francis T. Palo
(74) *Attorney, Agent, or Firm* McNair Law Firm, P.A.

(57) **ABSTRACT**

A hydroponic system with modules having a hollow interior, a bottom wall with drain holes, and an open top end. A module conduit in each module carried by the bottom wall for channeling fluid through the hollow interior. The bottom wall of each module adapted to engage a top end of an adjacent module for stacking the modules in an end-to-end arrangement to form a planting column. A conduit receiving slot formed in the bottom wall of each module to engage a top portion of a conduit from an adjacent lower module when the modules are stacked end-to-end to provide a continuous fluid passageway through the planting column. A platform vertically carrying the planting column atop a fluid reservoir. A supply line connecting the reservoir to the fluid passageway. A fluid distributor atop the column in fluid communication with the fluid passageway for distributing fluid into the planting column.

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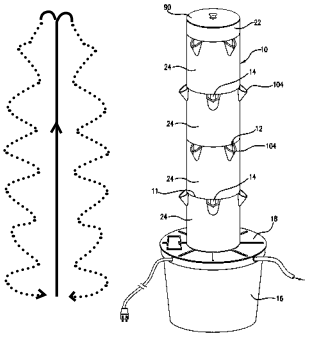
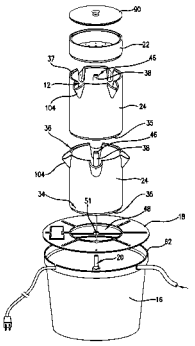
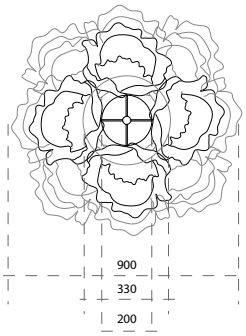
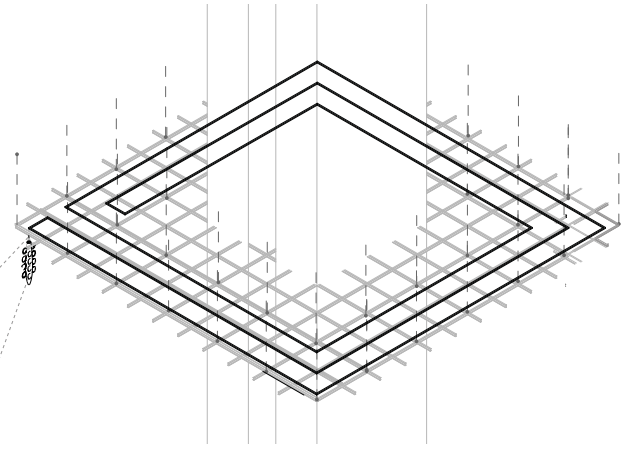




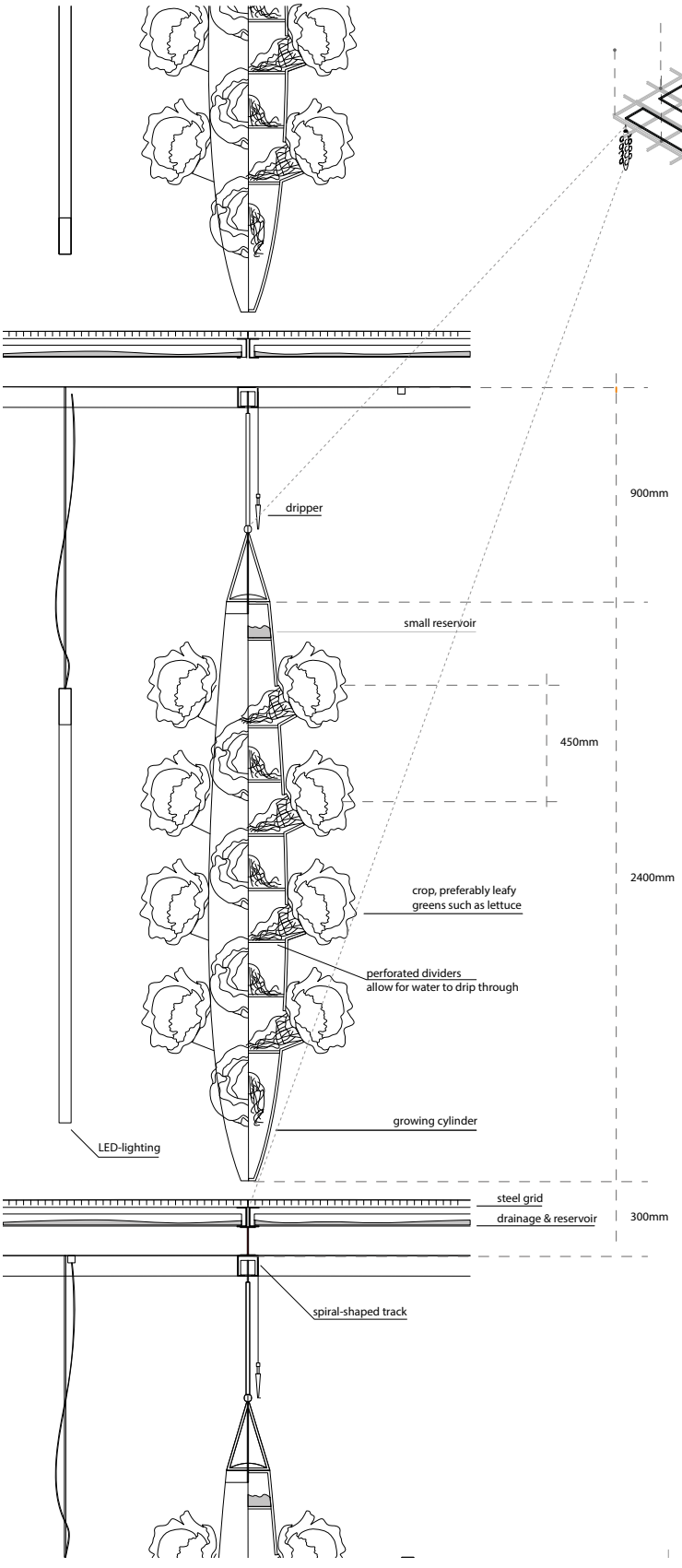
Growing system in Urban
Farm Bogota.



produce
1 month/lettuce
16 lettuce/cylinder
168 cylinders/floor
14 productive floors
37632 lettuce/ tower
45184 lettuce/yr
392 m2/tower
1152lettuce/yr.m2
1237 lettuce/day



spiral track shown in relation to structural system of tower



D: APPENDIX

Boundary Construction in Early China

In this essay, I intend to examine Early Chinese cosmology and boundary construction in the work of sinologists John Hay, Robin Yates and Mark Edward Lewis, focussing on the fourth to second century BCE[1]. I aim to demonstrate the means by which the early Chinese constructed and maintained spatio-temporal boundaries in order to achieve order in the cosmos in the form of civilised unity. I will argue that the Early Chinese extrapolated and 'cut' out from a perceived cosmic continuum an intricate system of corresponding space-time intervals. They resolved contrasting intervals by encompassing them in larger wholes and grouping them hierarchically in concentric part-whole relationships ranging from the scale of the body to the scale of cosmos. Eventually, the embodied individual was to be ritually aligned and corrected to this system in order to achieve cosmic order and unity.

Fourth century BCE 'Chinese' lived in a world that was far from ordered. Divided by wars, increasing social mobility and intellectual polemics, all their hope for peace and order hinged on those who could achieve unity. Chinese thought of this time established core principles of cosmology, ritual and governance that were adopted by later thinkers and set the foundation for the imperial dynasties that followed[2]. The body became a central issue in this time of transition. It was described as the natural and necessary center for organising space, as the source for virtue and ritual order, as ultimate center for self-cultivation and as measure of value. The ritually disciplined individual became an able-bodied point of radiant influence on its surroundings[3].

Body, place, space and boundary (conditions) are critically re-examined in contemporary architectural discourse[4]. Since their introduction in 20th century Western philosophy, Japanese concepts of space, such as space-time interval 'Ma' (間) and Nishida's now-place 'Basho' (場所), have been studied by architectural theorists[5]. An understanding of the early Chinese body and the way it structured and inhabited space

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[1] Lewis, 2006; Yates, 1994; Hay, 1994. These sinologists rely mostly on Early Chinese written discourse in their work.

[2] Lewis, 2006. pp. 307.

[3] Lewis, 2006. pp. 73-76.

[4] see: Casey, E.S. (1997). The Fate of Place. A Philosophical History. Berkeley: University of California Press; Iragaray, L (1993). Place, Interval: A reading of Aristotle, Physics IV. in *An Ethics of Sexual Difference*. Ithaca: Cornell University Press; Pallasmaa, J. (1996). *The eyes of the skin.* Hoboken, New Jersey: Wiley; Schoonderbeek, M. (2010). *Border Conditions*. Amsterdam: Architectura & Natura.

[5] For (Japanese) discourse on *ma* 間 and *kire* 別 see: Suzuki, D. (1973). *Zen and Japanese Culture.* Princeton, Weatherhill, New York & Tokio: Bollingen Series; Ohashi, R. (1994). *Kire. Das 'Schöne' in Japan. Philosophisch-ästhetische Reflexionen zu Geschichte und Moderne.* Cologne*:* Dumont; Isozaki, A. (2006). *Japan-ness in Architecture.* Cambridge: MIT Press; Oosterling, H. (2016). *Waar geen wil is, is een weg.* Amsterdam: Boom uitgevers.

could be valuable to this project, as it is a fundamental predecessor[6] of Japanese thought and shares in its absence of traditional western conceptions such as Euclidian geometry or Platonic view on objects[7].

Primordial chaos and substance-thinking

The (historical) construction of space had already been a subject of discourse for the early Chinese. These narratives began from "the image of a primal state of undifferentiated chaos (乱 *luàn*) out of which all objects and ultimately human society emerged". One of the most influential stories describes a formless watery chaos out of which objects emerge through a process of sequential division. This process is laid out in mathematical terms, in which the original unity is first divided into two parts, then three or four, eventually resulting in the formation of all things. Although these divisions were not man-made, the texts insist that the sage could understand the principles underlying the creation of divisions and emergence of ordered space and use this understanding to regulate the world. 'Knowing divisions/categories' was significant to the Early Chinese, because even though it had vanished, primordial chaos remained a threat, lingering as some kind of 'cosmic background radiation'. Due to its entropic forces, boundaries were temporary and dynamic. For the sage this historical background and its lingering forces provided principles out of which the world could be ordered. At the same time it provided a constant threat of universal dissolution back into a state of non-distinction, if its underlying principles were to be abandoned.[8]

Corresponding to the nature of the (primordial) process of division and its non-absolute boundaries, *phenomena* for the Early Chinese remained fundamentally connected through *substance*. Body and surrounding objects were understood as fragments of this substance, as compounds of distinct substances and as parts of a larger whole. As compounds of diverse substances, "all spatial units were temporary and unstable conflations of disparate elements that tended to dissociate. As parts of larger wholes, they were dependent fragments that achieved stability and meaning only through incorporation into an encompassing structure"[9]. This 'substance-thinking' is central to early Chinese language and, according to Chad Hansen, its ontology. He has defined this ontology as "mereological[10]". The contents of mereological ontology are substances,

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[6] It is noteworthy that, both in character as in meaning, concepts used in Japanese spatial philosophy (see note 5), 'ma' and 'kire' retain a strong relation to Early Chinese concepts of space and boundaries. (1) **ma** 間 *(Chinese: jiān).* In both languages refers to a dynamic space-time interval. "between two things / space (between) / moment". *From door* 門 *and moon* 日, orig. the moon peaking though (a crack in) the door. (2) **kire** 切 (Chinese *qiē*) In both languages refers to a cut in a (perceived) space-time continuum. In Japan refers to the moment of the "cut" or "hit" in Kendo as well. Closely related through its 'knife' component to 別 (Chinese: bié) *separation, cut, difference* and 分 (Chinese: fēn) *social division, cut*; both words that are used in early Chinese texts to indicate division. See note 15.

[7] Hay, 1994.

[8] Lewis, 2006. pp. 1-2

[9] Lewis, 2006. pp. 13

[10] Mereology is the study of parts and whole. From μέρος (part) and λόγος (study, discussion).

meaning that nouns are stuffs delineated by measures, as in 'a bowl of rice'. 'Rice' here refers to rice-stuff, undefined in space or time[11]. Hansen writes:

> The mind is not regarded as an internal picturing mechanism which represents the individual objects in the world, but as a faculty that discriminates the boundaries of the substances or stuffs referred to by names. This 'cutting-up things' view contrasts strongly with the traditional platonic philosophical picture of objects which are understood as individuals, or particulars which instantiate or 'have' properties (universals)…[T]he Platonic view of the mind is one in which the mind knows (has or contains) these 'meanings' or intelligible abstract objects. Chinese philosophy has no theory either of abstract or of mental entities.[12]

The cosmos is made up of interpenetrating, flowing 'stuffs' that can be 'cut', and organised under part-whole relationships. In such a view, boundaries have to be carefully maintained if they are not to fade. Thus making and sustaining boundaries was a ritual practice.

Ritualised space and body

Early discourse on ritual repeatedly asserted that it "maintained order through imposing divisions"[13]. This included divisions between men and women, subject and ruler, junior and senior, men and beasts (or barbarians). *Xunzi ji jie,*" reads: "ritual was created to divide people in order to maintain order" and "rituals devoted to ancestors are the origins of 'categories.'" (*lèi* 類)[14]. *Li ji* reads: "without separation (*bié* 別) humans are beasts"[15]. The governance of the state was given a similar role, as it was urged to maintain appropriate divisions in order to preserve society[16].

Ritual boundary making was closely connected to the body. Rituals required a considerable amount of bodily control and revolved around correcting, aligning, and positioning the body properly. Mark Evans argues that several early Chinese texts such as the *Lun Yu* contained "paronomastic glosses" or "wordplay", that indicated close phonetic and graphic links between the term 'ritual' and words referring to the body and its manipulation, such as 'to take position'[17]. In *Li Ji, 'bodiless ritual'* is compared to

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[11] Hay, 1994. p 19-20. From here on I will use the term "substance-thinking".

[12] Hansen, C., quoted in Hay, 1994, p. 20. Originally from *Language and Logic in Ancient China (*Ann Arbor, 1983), pp. 31-39

[13] Lewis, 2006. pp. 2

[14] *Xunzi ji jie,* ch.11, "Li Lun", pp. 231-232. Quoted in Lewis, 2006.

[15] *Li ji,* ch. 26, "Jiao te sheng," pp. 18b, 19a. Quoted in Lewis, 2006.

[16]: Etymologically speaking, the words used in *Xunzi Ji Jie* for 'categories' and 'separation', seem to support Hansen's thesis as they emphasise 'cutting up' and 'distinguishing between 'stuffs' rather than geometrically delineated boundaries. **lèi** 類 (categories) from 犬 (dog) and 米 (rice) and 頁 (head), meaning to observe/distinguish between crops and between animals. **bié** 別 (separation) from 骨 (bone) and 刂 (knife), meaning to cut/separate meat from the bones. From Proto-Sino Tibetan *brat ("cut apart, cut open). **fen** 分 (cut/social division). From knife 刀 and separation 八. Meaning to divide.

[17] Phonetic and graphic link pointed out in Lewis, 2006. pp. 14. **lǐ** 禮 (ritual) (*lier, 3rd tone) from 礻(示) altar and 豊 ceremonial vessel; **tǐ** 體 (body) (*t'lier, 3rd tone) from 骨 bones and 豊 ceremonial vessel; **lì** 立 (to stand) (*gliep, 4th tone).

'soundless music'[18], indicating the defining role that body had in ritual. Furthermore, the body became central to ritual in a spatial sense. For the Chinese the world was organised through concentric part-whole relationships, in which on every level the establishment of a center was the essential first step, ranging from the body, household, capital, state (China as 'middle kingdom') to the cosmos. As the smallest spatial unit, the body became the point where ritual efforts converged. In this context, ritual claim to social order developed into a concern for training, disciplining and protecting the body/self[19]. The correct positioning or disciplining of the body became the first step of the ordering of the cosmos[20].

Intellectual inquiry into the body/self first took shape in a number of foundational texts. In Yangist writings such as the *Mencius,* the body was defined as a central self set against external objects. In this definition, the body/self and one's nature/life were described as valuable, in contrast to external objects. These "things" or external impressions posed a threat, as they tended to tie down the body and ultimately could seduce it to sacrifice its vital energies for these things. *Lü shi chun qiu* reads: "Man's nature is to live out his lifespan, but things disturb him, so that he is unable to live out this span. Things are the means to nourish life; one does not use one's life to nourish things"[21]. The body/self was to be a still center within a constant flux of ever-changing objects, only allowing in tastes, sights and things that benefit its nature/life. In stillness, the vital energies (氣 qì) of the body/self would be nourished, generating a 'spirit-like power' (神 shén) that could command feelings and actions of others without any visible manifestation, bring order to its surroundings and eventually radiate its influence towards all edges of the world. In the "*Nèi Yè*" (內業 "inward training"), these ideas on the body and its cultivation were further elaborated, starting from the physical body, working through the sensory organs and culminating in the perfection of the mind and spirit. The body/self was regulated by its own center: the heart/mind:

> That which regulates them [sense organs] is the heart/mind.
> That which pacifies them is the heart/mind.
> The heart serves to store a heart;
> At the center of the heart, there is yet another heart.
> This heart of the heart,
> Is an awareness that precedes all words.[22]

This practice of *centering* the heart/mind is in turn possible only through the body. Correcting or aligning the body is the essential first step leading to a fixed and clear mind:

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[18] Lewis, 2006.

[19] Lewis, 2006. Lewis often uses the pairs body/self, mind/heart and life/nature since there did not always seem to exist a strict distinction between the paired words, e.g.: **shēn** 身(body, life, self); **xīn** 心 (heart/mind); **quán xìng** 全性 (entire + nature/life).

[20] Lewis, 2006. pp.14

[21] *Lü shi chun qiu jiao shi*, ch. 1, "Ben sheng ," pp. 20–21. Quoted in Lewis, 2006. pp.16

[22] *Guanzi jiao zheng*, ch. 16, "Nei ye," p. 270. Quoted in Lewis, 2006. pp.23

> If your body [形 xíng, *form*] is not correct [正 zhèng, *aligned*],
> The inner power will not come,
> If at the center you are not tranquil,
> Your mind will not be well ordered.
> Correct your body and gather in the power,
> Then it [the power] will pour in of its own accord.[23]

Thus the centering mind/heart was established as a fixed point from which the order of space proceeds, and self-cultivation was directly linked to world-cultivation.

Ideas on the body were further developed between the fourth and second centuries BCE, in which it was characterised in several ways. One of them was that the body was a temporary compound of (sometimes rival) substances. As they could flow in and out, the skin as interface between body and world became an extended zone. The embodied self was also described as the result of conjoining of energies from heaven and earth. These energies directly subject the body to temporal phenomena such as the seasons. In most texts, this conjoining of energies was what gave life. One had to nourish and channel these energies according to ritual principles, so that they could dwell in the body. Furthermore, the body served as an image through which larger spatial units could be homologically and isomorphically understood, culminating in theories on the body-as-state, and the body-as-cosmos. In these theories, the emperor operated as the mind/heart of the state and his officials as the sensory organs (*guān* 官). As the ultimate center, the imperial ruler had the responsibility to bring and maintain order and unity to the cosmos through ritual. Since the emperor was to be unmoved, his officials performed the rituals.

Through ritual the early Chinese sought to relate through separation, align through division actions of men and the constant moving of the cosmos. Ritual and categories/divisions were patterned on principles extrapolated from heaven and earth:

> Ritual is the guiding principle of Heaven, the true meaning of Earth,and the conduct [行 xíng] of people. Since it is the guiding principle of Heaven and Earth, the people will pattern themselves on it. Patterning themselves on Heaven's brightness and following the nature of earth, they produce the "six energies" (…) and use the Five Phases. The energies form the five flavours, emerge as the five colours and find patterns as the five sounds.[24]

The reality [实 shí] of man's actions had to conform the name [名 míng] of ritual categories/divisions. Thus categorisation in language and ritual were intimately bound up. Robin Yates has elaborated on the entanglement of language of ritual as well as numerology and cosmology.

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[23] *Guanzi jiao zheng*, ch. 16, "Nei ye," p. 270. Quoted in Lewis, 2006. pp.23; 形 is used in contemporary Japan as *kata*'to indicate aesthetic form in the broadest sense of the word, including behavioural form. See Oosterling, 2016. **xíng** 形 (form, body, expression). From *hair/beard* 彡 and (phonetic) *to open* 开.

[24] *Zuo zhuan zhu*, Zhao 25, pp. 1458–1459. Quoted in Lewis, 2006. pp. 30.

According to Yates, the Chinese language gave order to the world by developing sets or schemes of enumeration. This started with binary sets like heaven-earth, man-wife, one-many, superior-inferior and order-disorder. These formed triads (heaven-earth-man), quadruplets (the Four Directions, the Four Seasons), quintuplets (Five Phases, Five Colours), and so on. Eventually (in Han dynasty) all things were ordered by thinking in correlative categories. Units within categories respond and relate to each other, and only exist by virtue of one another: Yin only exists in comparison to Yang, the West owes its direction to the North, East and South. As relational groups, they often formed homologies or templates of each other as well of the entire system, leading to a complex network of correlating units in different categories. A cardinal direction could be related to a season, an orb (organ-function group in the body), certain substances or energies, an so on. Thus, there was no strict distinction between spatial and temporal units: space was divided in intervals that had particular characteristics coordinated with temporal intervals[25].

Besides within correlative linguistic categories, spatial orientation and measurement of time entangled along strings of astrological and (diagrammatic-) numerological thought. The determination of the four cardinal directions (square) in space was dependent on celestial (circular) movements in time and celestial movements became visible as they traversed the cardinal directions. Correspondingly, space and earth were conceived as square and time and heaven as round. In *Archaeoastronomy in China,* Feng Shi suggests that the white spiral in early versions of the 'Tai Chi Diagram' (fig. 1) embodies the circular movement of the 'east star mansions' around the 'Big Dipper' as still astrological reference in the sky[26]. In early Han cosmographs, the Big Dipper is often located in a circular disc, surrounded by the 28 lunar lodgings and flanked by the cardinal directions. Evidence suggests that in Shang dynasty the world was divided in four directional quadrants laid out from a central square (fig. 3). By the time of Warring States, earthly and astral phenomena were both captured in the same nine square grid diagrams (*Nine Palaces Map* 九宮圖), as part of numerological-astrological mode of thought (fig. 2).[27]

Numerological-cosmological thought in Early China eventually lead to complex (spatial) calendar systems that prescribed daily ritual timing and positioning of the emperor and his bureaucracy. These systems developed to the point of discouraging travelling, marrying and sacrifice on specific months or days. It also resulted in (ideal) architectural constructions such as the nine square urban grids, the Bright Hall [*ming tang* 明堂] and ideal temple constructions. So the emperor, and eventually his people, could fully align to the principles and rhythms of the natural cycles[28].

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[25] Yates, 1994.

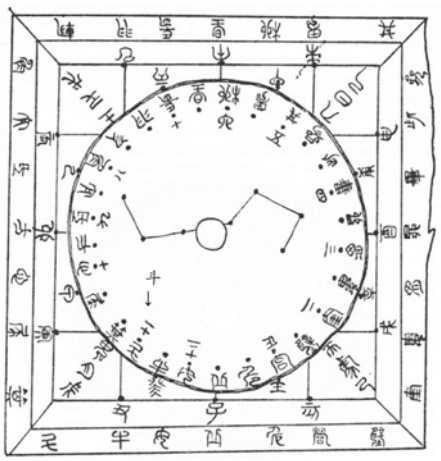
[26] Shi, 2001

[27] Lewis, 2006. pp. 247-248

[28] Yates, 1994.

图 8－4　古典文文献所载"太极图"

1－3.A型　4－9.B型　10.C型



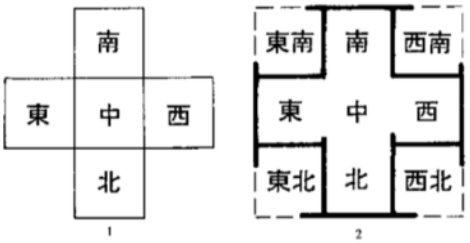


图 8－15

1．五位图　2．九宫图

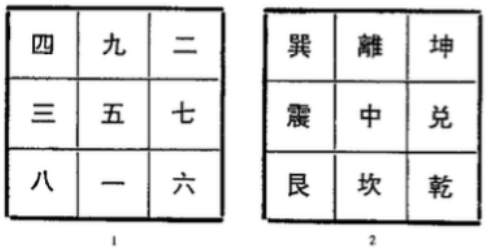


图 8－17　九宫图

fig 1. (top left): Several early types of the 'Tai Chi Diagram' [太極圖 *Tàijí tú*]

fig 2. (top right): Early Han cosmograph with the Dipper at the center of the rotating "Heaven Plate"; from the tomb of the Marquis of Ru Yin, ca. 168 BCE

fig.3 *(bottom left): 'five positions'* [五位] *and 'Nine Palaces Map* [九宮圖]*'.*

fig.4 *(bottom right): 'Nine Palaces Map* [九宮圖], on the left filled with numbers as part of astral numerology, on the right referring to the eight directions and center.

Conclusion

During the time of Warring States and Qin dynasty in Early China, intellectuals found themselves transitioning from a period of relative disorder and magic-shamanistic beliefs to a period that brought relative order to China, the promise of cosmic unity, and the discovery of the embodied individual as the essential center from which spatio-temporal order could be achieved.

Their construction of spatial, temporal and linguistic-ontological boundaries, divisions and categories can be characterised as the 'cutting' in a continuum, resulting in (dynamic) space-time intervals that corresponded to each other concentrically in a part-to-whole hierarchy and transversally through graphic or numerological homologies. Thus these intervals appear, rather than an 'in between' secondary to surrounding objects or geometries, as fragment of a connecting substance or emptiness that is defined by the way it qualitatively depends on other fragments or larger wholes. In this understanding, 'mouth' and 'stomach' could appear as space-time intervals that emerge as they qualitatively (or functionally) interrelate through the way they digest food, channel substances, their vulnerability to exterior circumstances, and so on. As all divisions tend to fade, 'cuts' need to be ritually repeated, leading to a rhythmic disciplinary structure that stretches out in language, space and time and that contracts itself into the still point of the empty mind or in the moment of the 'cut'.

The principles underlying this process of differentiation and unification were believed to be extrapolated from both the primordial process of differentiation that created everything, and from lingering forces of chaos that threatened to sink the world back into a state of non-distinction. By extrapolating from those principles and aligning to them, the Early Chinese related and separated, divided and harmonised the actions of the embodied individual with the eternal moving of the cosmos. The unmoved, centered mind of the emperor, the ritual capital and the Chinese state became fixed points in terms of which order of space was laid out in all directions, eventually leading to a united cosmos. The agency of his ritualised body as well as the order of emerging linguistic-ontological categories, calendrical charts, ideal architectural constructions, grid systems and numerological diagrams, promised to the Chinese intellectual the cosmos in the palm of his hand.

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Images

fig. 1, 3, 4:
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fig. 2:
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