New Proposals for Transformable architecture, engineering and design: In honour of Emilio Perez-Piñero.
Felix Escrig and Jose Sanchez (eds.) Starbooks, 2013. pp157-162.

Natural geodesic lab: looking for "galan de noche" fragance inside orchard's landscape (Murcia).

J. Carrasco[1], A. Abellán[2]

[1]Professor in architecture–Alicante University, *jose.carrasco@ua.es*
[2] Professor in architecture –Alicante University, *antonioabellanalarcon@gmail.com*

Summary: During the second weekend in May 2012, a group of students from Alicante University (Degree in Architecture), built a geodesic dome for the on-site laboratory to achieve the precise humidity and temperature values needed for the fragance of "galan de noche", a backyard bush that can be enjoyed during the warm summer nights.
This performance was part of a set of designs to improve and recover natural and cultural site conditions, developed during a cycle of 24 hours for a couple of guests (near the river side walk in Murcia's orchard) working together with multidisciplinary group HuertaBizarra.
As the natural day can be divided into little time periods, some of the assignments would be referred to the awakening or the twilight, relax or sport, "siesta" or playtime, breakfast or tea time.
Cartographies, models and tests were previously needed. Each category will be exemplified in this paper. In this context, some helpful academic backgrounds would be Philippe Rahm's depictions (i.e. "Digestible gulf stream"); Buckminster Fuller's workshops (in Black Mountain College); Olafur Eliasson's performances ("the Mediated Motion"; and Frei Otto's models about the unaffordable (Stuttgart Spinnerzentrum).
The main performance would need a geodesic dome with a typical orchard cottage. "Arduino" hardware would be used to control the environmental data, in which some volunteers' body heat and the breathing steam would be monitorized and expelled towards the cottage.
Following with the scheduled time-table, in a place in which muddy ground had previously been improved with interlaced hurdle, a little shed would be placed as a tribute to Frei Otto's pedestrian bridges, a nice cover to have breakfast near some fishmen.
Half a year would be time enough to map, synchronize, test and perform a collection of little architectural services in a real context for real persons, as an attempt to demonstrate architecture as an environmental device, more a tool to interact than a product, and convinced that this exploration opens the scope for future scenarios.

Keywords: *performative architecture, sensitive prototypes, transformability, architectural education, cyclic design.*

FRAMEWORK

This experience wants to prove that targets of architectural education can be amplified working a complete Semester focusing the workshop in a natural environment (in this case the Murcia's orchard) through those conditions which are difficult to tackle, portray and handle, discussing about possible uses in relation with relaxing and cultural values and using minimum impact devices [1]. This workshop designed some real actions with the help of brief training exercises each one with the awareness of a professional assignment.

All the experiments would be referred to part of a day of our couple of guests in Murcia's orchard: working groups would select the awakening, the twilight, meals or digestion, relaxation or distraction, sport or games… creating imaginative scenarios like those referred to a refreshing breakfast inside the river Segura bank, or a romantic dinner lighted with purple light floating on the river, or a relaxing bath using red cabbage extract… a series of little experiments to fulfil a complete 24 hours cycle. (Fig. 01).

Philippe Rahm helped us to understand a discipline closer to become a new ecology: "*to understand architecture in a broader sense which could include the physiologic and atmospheric, the sensitive and meorologic, the gastronomic and climatic*…"[2]. Broading the fields of architectural knowledge, more interested in commitments to achieve an artificial comfort in public and domestic spaces and less interested in the physical construction of the space. His particular "bricks", some of which students will try to use, are atmospheric (e.g. temperature); physiological (e.g. food); social (e.g. dress); physical (e.g. actions); or neurologic (e.g. mental stimulus).

Fig. 01 Geodesic dome and orchard cottage, artificial devices to simulate "galan de noche" fragance. (photo: J.Esquiva, Huerta Bizarra).

A) CARTOGRAPHIES

Some experimental cartographies, traced with imaginative resources (handmade and raster hybrids) were used to fix the scope of each intervention (Fig. 2 and 3).

First, cartographies are compound of uncertainty. Guy Debord's phsycogeography would name them natural drifts ("dérives"), a kind of unplanned journey in which the authentic experience is obtained by subtle environmental interactions [3]. Recently, Chema Alvargonzález had emphasized the value of unexpected discoveries, energy of future realities and interpretations. [4] "…*with everything written down inside blogs, images, devices that speak about a drift travel, time travel*…" Careful notations are needed in order to label surprising and hidden situations.

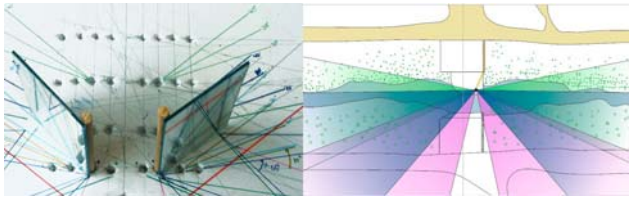

Fig. 02 Landscape cartography. Refracted vision with mirror glasses in the bank of the river, for one of the meal activities. (design: A. Sánchez y I. Arangüen, students).

Fig. 03 Sky cartography: nearer pantone colour for each hour during the day (close and opposite to sun, hour is labelled near the timeline) in order to choose precise moment for red cabbage actions. (design: Azorín y Soriano, students).

Second, cartographies include patterns, a kind of interlayer to transit between metaphor and concrete, between imagination and knowledge. "…*Before counting, maps had to be made to remember locations of poison or predators*…" and later on "…*something awakens a secret x-factor that plays with balance, varying tensions and pulls the mind one way. Colours, sounds, the steps of a dance suddenly create harmonies that lift our spirits*…" as Cecil Balmond is suggesting us, we have to scan the environment to select particular layers: "…*with our own private radar, we pattern an aesthetic sense, for refinement, delicate balance, trial and error …a compulsive will to invent and abstract*…"[5]

Third, cartographies are made of abstractions. It means that we have to pay attention to abstract, select and label, as Jorge Luis Borges concludes when he explains the attempt to portray the reality with one-to-one scale: "…*The map of a single province occupied the whole city, the map of the Empire, the whole province. Later on, these excessive maps didn't satisfy the people and the cartographers depicted a map for the empire with its same size*…" this is a suitable story that speaks about the scientific incapacity to approach the completeness of phenomena... [6].

An equivalent effort is required when ficticious character Zubiria is instructed by Mr. Bauvan, memorizing objects and phenomena inside the Spherical Room in Bazoches Castle: "… *del techo caían decenas de hilos blancos, invisibles al fundirse con las paredes del fondo… y a diferentes alturas, objetos de lo más diverso… La finalidad es que despierte… para que cuando ataque un baluarte o asalten el que usted está defendiendo, necesite solo de unos segundos para hacerse un cuadro nuevo de la situación*…" [7].

Finally, we had to establish the borderline for each cartography. In scientific language, it's the ecosystemic logic in which the experiment for that cartography would be completed and unterstood. Francis Alÿs calls it "the city inside the city" (talking about the old town inside Mexico DF): "…*a microcosmos, with its economy and folklore… my research dominion, because it was a scale I could afford and, mainly, I could walk… it took me several years to to leave that perimeter*." Alÿs exposes the absurdity of urban disorders, trying to denounce their arbitrariness [8].

Jorge Wagensberg would label these categories "attempts to reduce the degrees of uncertainty", as ways to approach a complex reality [9].

B) TESTS: MODELS & WORKBENCHES

During the previous weeks before the 24 hours experience in the orchard, teams would prepare the workbenchs to bring forward part of the needed sensorial experience.

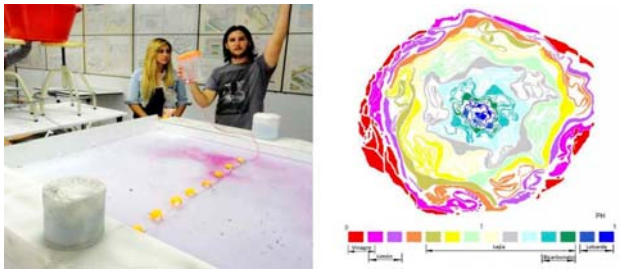

Fig. 04 River model with boiled red cabbage. (design: Angel Montenegro, Esther García and other students)

Fig. 05 Workbench to compare white and natural noises. (design: Jose Sedes, Cristina Juan and other students).

In this context, two concepts were applied. First, the idea of "model" was understood beyond its static and Cartesian understanding, closing the distance between essay and reality, following Olafur Eliasson's approach

about versions and reality [10]. Second, the idea of "hapticity", as a condition of reality that can be included in essays, like that bird that uses its movement to build its surrounding nest or the tribal man that uses his muscles to shape his cottage. In both cases, the haptic (smell, touch, hearing…) reveals subtle ways to understand and use nature [11].

Some exercises in the workshop would consist on the selection, modelling and essay of an environmental haptic condition. For example, before building the geodesic dome, a dark and rectangular room was brought to the university with a decodification sounds, temperature and humidity for "galan de noche" fragrance: "W*e remember the fresh summer nights in our rural courtyards with that specific flower fragance, and we wanted to rebuilt just the conditions in which that smell was produced*…", explained Cecilia Sirvent, the lider student (Fig. 6).

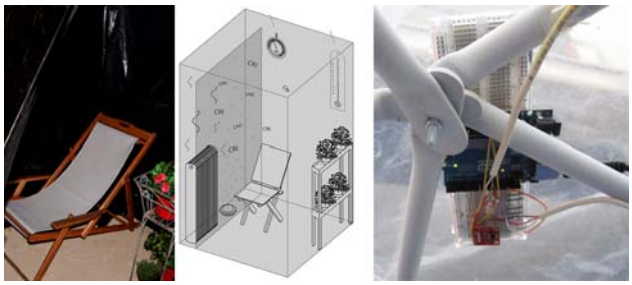

Fig. 06 "Galán de noche" first model; Temperature & humidity sensor. (design: C. Sirvent, E.González, studs.)

Fig. 07 Model to essay the ability to walk on river mud. (design: J. Anton, J. Camacho and A. Contreras).

These workbenches were scaled models in which teams could equalize natural experiences (digestive, visual, tactile, emotional, inserted in a particular portion of the day cycle), using analogic devices to essay linear or nonlinear phenomena, with low-tech technologies. Equalize meant something extraordinary for us: it was the ability to compare and synchronize the design with a portion of a natural, daily and seasonal cycle.

For that reason, we needed to work with Fitz Roy's parametric attitude, meteorologist who demonstrated that atmospheric phenomena were predictable with scientific data related to air pressure, humidity and temperature, opening science to new frontiers [12].

Some innovative simulators included in the workbenches were: a tripod with a chromatic chart to select proper sky colour to be used in the red cabbage experiment (Fig. 3); a bedplate to study the influence of the dyeing red cabbage on river flow (Fig. 4); the tool to synchronize white and natural noises (studying their intensity and frequency) in order to write down a lullaby (Fig. 5); the geodesic dome for "galan de noche" fragrance (Fig. 6 and 8); the sinking essay over a mud bedplate (Fig. 7)… all of them designed to move forward and adjust part of the final experience.

Students worked in the same direction as Frei Otto did in his lab "Spinner zentrum": figuring up a way to essay minimum surfaces (soap), recovering classical load path methods (hanging models), using transparent containers with enclosed atmospheres, including photographic procedures to observe changes, etc. Nowadays as fifty years ago, thinking up step by step, experimental workshops can be combined with master lessons in order to explore that we call a new architectonic ecology [13].

C) PERFORMANCES: GEODESIC DOME, ORCHARD COTTAGE & RIVER MUD

Before arriving to the final day, some training about the performative abilities were needed. For that, we paid attention to Olafur Eliasson' procedures. In "The Mediated Motion", he had established a sequence of spaces using natural materials like water, fog, soil, wood, stone, fungus and duckweeds to create sensorial atmospheres in order to receive smell, taste and other psychological stimulus apart from the visual hegemonic one, all of them connected by a path, a surface, a stair and a hanging bridge [14]. Subtle modifications were implemented, like those referred to the throbbing perception when walking across the bridge or the dizziness, watchful sense when walking across the sloped surface, all of them to approach to a mediated experience.

Fig. 08 Geodesic dome. Assembling and testing. (design: Cecilia Sirvent, Estefania González).

The main resource to adjust and scale each of the devices was going to be the human body. Not only because body scales and fixes an affordable construction (like the case

of the birds), but rather because we consider that space can be understood while movement is produced: that's a clear argument tested in "Your Mobile Expectations" by Olafur Eliasson [15], "Paradox of Praxis 1" by Francis Alys [16] and "Upward Mobility"by Alex Villar [17].

With "Upward Mobility", Villar's main tool to look into urban space is himself being recorded while walking and jumping across the obstacles, cabins, fences, cornices that he finds in street, as an attempt to depict a contemporary cartography of urban space.

Fig. 09 Orchard cottage. (design: Huerta Bizarra)

For the installation of "galan de noche" fragrance [18], the roundness of geodesic dome was suitable to produce less environmental interferences: constant surface conditions are needed when body heat and breathing had to be driven towards the cottage.

The model to build the dome was a truncated icosahedron and it was not going to be occupied. Buckminster Fuller developed similar shapes in Black Mountain College (Asheville, Carolina del Norte, 1948-1949), using workshops to foster radical pedagogies about a new, luxuriant and optimistic architecture: "*…in a time of collective defiance against the authority of institutional, bureaucratic and capitalist structures… dome-construction workshops, for example, responded to global problems such as resource management by wielding architecture as a universal technological apparatus*…"[19]

Our dome was the envelope to fix the air conditions while the cottage was the version of the orchard house. Stored water would produce heat radiation under the floor and bended woods would shape the cabin to protect our guests from night breeze (Fig. 8). To complete the experiment, a digital "arduino" timer reported the humidity and temperature modified by the body heat and breathing steam, using special clothes for it.

Another experiment would take place early in the morning. A surface in the river bank had to be modified with interlaced hurdle, in a place where a little shed would be tied to cover our guests while fishermen would serve their breakfast from the other edge of the river (Fig. 10). The way to tight the hurdle was learnt from Frei Otto's designs for bridges with bundles of crossed bars (Metchtenbergbrucke and others), in which minimum support conditions and tie connections were needed. A frame door was connected to a node in which the rope with pulley was fixed, producing regular distributions of hurdles. The system was balanced like those harps with tensed threads inside a wood frame, in which the internal tensions are not transmitted to the surroundings [20].

Fig. 10 Modifying the mud surface inside the river. (design: Jorge Antón, Jorge Camacho, A. Contreras)

The suitable distance to talk with fishermen while having breakfast forced the design team to adapt a part of the surface of the river bank. Sinking stilts were used, and double direction hurdles were dropped, behaving as the rackets on the snow, increasing the surface to reduce the contact tension.

CONCLUSION

The collection of experiments would produce some lessons: first, those little architectural devices could be placed in a natural environment assembled and dismounted with no ecologic footprint and adapted for a particular cyclic phenomena (a day, a week, a season).

Second, the desire to produce a mediated experience in real context would be possible only to a certain degree, because even in the case of a reduce number of people (our couple of guests), many unexpected reactions would happen.

Third, cartographies and tests would end up producing another graphic category: a kind of "anatomic" drawings [21], like the one in fig.12 with the dome, the orchard cabbage, the temperature (greys density) and humidity (circles density) that portrays the precise moment to release the modified air towards the cottage. We name it "the drawing of the completeness".

Fig. 11. Breakfast experience at first hour in the morning. (photo by Carlos Jurado, Huerta Bizarra).

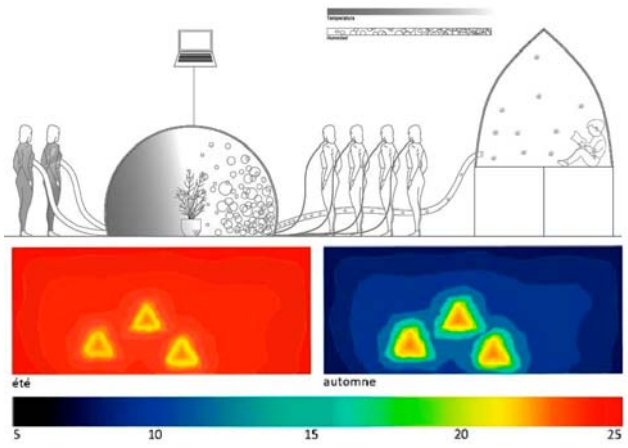

Fig. 12. Air modified drawing. Interaction between dome and cottage. (design: Cecilia Sirvent, Estefania González).

Finally, using advanced software (the "arduino" timer on top of the dome), the possibilities to check and version the installation increased. They will be able to essay its technical nature, its feedback capacity, its parametric configuration and its accessible understanding (Fig. 13).

"24 Hours of Orchard Relax (24hrH)" is an academic essay to test the natural and seasonable opportunities to transform the orchard, approaching it from a renovated and fresh point of view [22].

Fig. 13. Red-cabbage Spa. Last scheduled activity. (design: Angel Montenegro and Esther García, students).

References

[1] "Direct action" is our preferent tool to foster the "Common Good" way of life, and was first tested by Antonio Abellán and Izaskun Chinchilla for the "Taller para la Innovación Social y el Desarrollo de Productos y Servicios Arquitectónicos Sostenibles" organized by "Observatorio del Diseño y la Arquitectura de la Región de Murcia". (Sánchez Morales J.A., Torres Nadal J.M. et al., Región de Murcia, 2009).

[2] For his installation "Digestible Gulf Stream" (2008), Philippe Rahm placed two surfaces with different temperature (12 and 28ºC) at the precise location in which cyclic and convective air flows could be produced.

[3] The idea of psycogeography can be followed through: Mesa, M. "Victimas de un Mapa. Arquitectura y resistencia en el tiempo de la cultura flexible" PHD, cap 07.3 p147 "…*los mapas situacionistas ya demuestran un interés por la interpretación de la ciudad como contrafigura del espacio normalizado y del tiempo pautado*…"

[4] Alvargonzález, C. "Mehr Licht", Santa Monica Art Center, 2011, p23, ISBN 978-84-393-8775-6.

[5] Balmond, C. "Element", 2007. ISBN 978-3791337784. p6.

[6] Borges, J.L. "Del rigor en la ciencia" http://elmundoenverso.blogspot.com.es/2007/12/del-rigor-en-la-ciencia-jorge-lus.html.

[7] Sánchez Piñol, A., “Victus”, p39, 2012. ISBN 978-84-96735-72-9).

[8] www.francisalys.com/ and Sánchez, A. “Entrevista con Francis Alÿs. Transitar la paradoja”,Exit #57, feb 2011 p6-13.

[9] Wagensberg, J. “La rebelión de las formas”, 2004, p19. ISBN 84-8310-975-1.

[10] Eliasson, O.“Models are real”, 306090 Books, v.11, p18-25, 2007. ISBN 1-56898-734-7.

[11] Juhani Pallasmaa develops his theory about haptic architecture through “The eyes of the skin” (1995) “The thinking hand” (2012) ISBN 978-8425224324; and Wheland, S. “Common ground. An interview with Juhani Pallasmaa”, Journal of Architectural Education vol 63, oct 2009 p75-79.

[12] Fitz Roy predicted storms during Beagle journeys once that was selected by Francis Beaufort (geographer who created gradients for sea winds) for Galapagos Expedition with Charles Darwin. (Weinstock, M. “The architecture of emergence. Evolution of form in nature and civilization”. 2010. pag 44. ISBN 978-0-470-06632-4).

[13] New structural surfaces from analogical essays were possible in a period of time in which surfaces were mathematically unapproachable.You can follow Frei Otto’s history about laboratories (Stuttgart University) and methods in Bubner, E. “Intitute for Development of Lightweight Construction and atelier Warmbronn”, included in “Frei Otto Complete Works” p81. ISBN 978-3764372330.

[14] The stimuli are provoked by little devices, tributes to ancestral and natural memory like those ”shiitake” fungus, which grow in the basement of a tree; or those little, floating, elongated duckweeds with free reproduced under the water. “The Mediated Motion”, Bregenz museum, 2001. Studio Olafur Eliasson, “Encyclopedia”, 2008. Chapter “Journey”, p225, ISBN 978-3-8365-3233-4.

[15] Eliasson, O. “Your Mobile Expectations”, 2008. ISBN 978-3-03778-117-3.

[16] Alÿs, F. “Paradox of Praxis 1”, DF, 2000. Included in Sánchez, A. “Entrevista con Francis Alÿs…” op.cit.

[17] Villar, A. “Upward Mobility”, 2002. Included in “Experimental Geography”, Nato Thompson, 2009, p21. ISBN 978-84-0091636586.

[18] “Night-blooming cestrum”, “Hasna Hena”, “lady of the night”, “night-blooming jessamine” are names for the same plant, a species of Cestrum, family Solanaceae, native to the West Indies and South asia. Common in homes and yards, which blooms in clusters offering a rich fragrance on summer nights. It can grow even in winter if you control the temperature (between 15 and 25 ° C), its humidity and light conditions.

[19] Colomina, B. “Radical Pedagogies in Architectural Education”, The Architectural Review, sept 2012.

[20] The principle of the harp, as a model case for captive forces, is explained by Möller, E. in “The Ligthweight Principle”, inside “Frei Otto Complete Works”, ISBN 978-3764372316, p33-37.

[21] Anatomize, in its greek root, means cut and turn to make visible the portions, like a scanner.

[22] An recent paper with a map and a complete description of the activities, was published in Archipills (2013 vol.3 march, “Cycles”). Abellán. A. Carrasco, J. “Vital Courses that Assemble Reality”. http://www.archipills.com/avellanvol3i.html

(Photographic credits: Jose Carrasco, except when another author is indicated).