Digestive devices for architectural pedagogies: pervasive landscape experiences using red cabbage dye near Segura River (Murcia).

Jose Carrasco\textsuperscript{1,a}, Antonio Abellán\textsuperscript{2,b}

\textsuperscript{1} Prof. Ph.D. Architect, University of Alicante, Spain
\textsuperscript{2} Prof. Architect, University of Alicante, Spain

\textsuperscript{a} jose.carrasco@ua.es, \textsuperscript{b} antonioabellanalarcon@gmail.com

Keywords: emergent teaching practice, architectural education, landscape experience.

Abstract. Architects have traditionally worked our proposals for both city and landscape inspired by the “genius loci”, starting with an abstract idea, form or material. Projects were mainly based on the recognition of the physical, static and mainly visual nature of reality. Nevertheless, it seems to us that architecture education needs to orientate towards other kind of raw materials, being aware of environmental or climatic indicators, like those exposed by artist Christelle Gramaglia or architect Philippe Rahm, in order to assume new kind of responsibilities when facing ecological concerns. It also seems that life activities (i.e. walking, becoming sick, falling in love) are tiny throbbing pieces of reality that can be understood as if they were hooked from one end to the following start point.

Trying to put in relation both families of concerns, we essayed experimental methods for architectural education during the second Semester of 2012, producing devices to perform precise interventions for an experience that would become real: a day-gift for a couple of tourists near the river side walk in Murcia’s orchard, working in collaboration with Spanish collective HuertaBizarra.

As the natural day can be divided into little time periods, some of the assignments for the students would be referred to the awakening or the twilight, relax or sport, “siesta” or playtime, breakfast or tea time. Cartographies, models and tests were developed. This paper refers to some of these assignments, related to the recognition of changing chromatic properties of red cabbage in contact with other alkaline or acidic materials, capitalizing an amazing collection of experiences, at the same time sensitive with environment.

Fig. 1. Hertzberger (image form “Lesson…”p176, 2005); Halperin,“Boiling milk Solfataras” (2000).


We need to explore another kind of genius besides “loci”, for example, to be watchful with pollution in streams, rivers and other waterways hardly perceptible and often unnoticed, as Christelle Gramaglia suggests us in her work “River Sentinels” [1]. She exposes that, unfortunately, only advanced equipments and careful scientifics can evaluate the effects of effluents on aquatic environments unless drastic indicators appears, like changes in color or large quantities of dead
Architects have progressively been encouraged to expand their environmental knowledge in order to increase sensitive and performative interventions. From the most passive and contemplative relation that Hertzberger exposes in his essay “Lessons for Students of Architecture” in which he describes how “people use their surroundings in every situation as best they can, and quite often the things around them, unintentionally, offer unexpected opportunities” [2]; going through Toyo Ito’s intelligent attitude, as Iñaki Ábalos focuses, by introducing subtle transformations to observe and obtain keys to understand complex phenomena, like when placing a little straw inside a river which means that you are able to understand the sense of its stream, flow and swirls [3]; or emphasizing nature’s inherent and paradoxical values as Halperin does, to explore daily time versus geological time (fig. 1): “…I have been thinking about it- the fast moving lava versus slow time inside a cave—and now I can understand geothermal water through boiling milk with the help of a 100-degrees-Celsius sulphur spring in the crater of an active volcano”… a sample of mankind product in the middle of the genetological nature [4].

During the previous weeks before the experience in the orchard’s landscape, teams prepared the creative workbenches to bring forward part of the needed sensorial experience (hand-made and digital resources). 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 nonlinear phenomena with low-tech technologies. Equalize means something extraordinary for us: the ability to compare real time with model time, real phenomena with simulated process… and synchronizing both parts. Also, equalize means a symbiosis between physical experience and environmental properties, as Olafur Eliasson suggests us (in the case of climbing a hill or crossing a river, you end up identifying pairs of conclusions, i.e. distance/time, deepness/effort), recognizing that direct action and performance are operative tools to work in it: “…One Friday at half past one there I was on the bridge with Emile and a bag full of red powder and people starting to stare at us. I hesitated for a moment, then emptied the bag out over the parapet … I could literally feel people in cars slowing down, the cars went all quiet. And there was this cloud, floating over the river like a layer of gas … There was a crowded bus ten metres away and everybody was staring at the water… then I carefully put the bag in a trashcan, as if colouring the centre of Stockholm was the kind of thing I did every day …Next day the front page of the papers: “The river turned green”. [5]

Some innovative simulators included in the complete experience were: a tripod with a chromatic chart to select proper sky color to be used in the red cabbage experiment (fig. 5 bottom); a bedplate to study the influence of the dyeing red cabbage on river flow (fig. 2); the tool to synchronize white and
natural noises (studying their intensity and frequency) in order to write down a lullaby; or the geodesic dome searching “galan de noche” fragrance [6].

2. Vegetable indicator and its chemical reaction

The red cabbage (Brassica oleracea var. capitata f. rubra) is a type of cabbage with a characteristic purple color also known as purple cabbage, red or blue kraut, due to its natural pigment anthocyanins (flavins). It’s a natural indicator about the pH value of the soil or liquid in contact with it and, because of that, cabbage leaves performs in a greenish-yellow color when soil is basic or alkaline (pH > 7), purple when neutral (pH ~ 7) and reddish when acid (pH < 7). The resulting liquid changes again if it’s mixed with others [7].

Preliminary experiments tried to essay this red cabbage ability to perform and adapt in different liquid mixtures. Simulating a workbench market in which you could buy different dyed products, the group of students offered the rest of the class a natural drink (red cabbage + vinager or lemon or bicarbonate) and artisan pens with red cabbage dye to type your name in a new T-shirt. Apart from these friendly trials, red cabbage was chosen to design complete systems to report about the concentration of CO2 in the air or in water.

Professional laboratories have many technical tools to measure environment: among others, the pH index, the humidity and temperature. For the first one, sensors evaluate the concentration of hydrogen ions (H+) to determine the acidity or alkalinity of the dissolution. Performed in Centre d’Art Santa Mònica (Barcelona), an experience conducted by Homs and Fonollà about how to use the red cabbage dye is described here: “…we boil the red cabbage to obtain the dye. To prove its chameleonic property, you choose three food with diverse acidity value: lemon juice with a 2,5 pH, water with 7 pH and albumen with 8,9. If you add and mix a little drop inside each vessel, some chromatic changes are produced. The lemon juice turns into a pink-reddish liquid. Water turns into violet and the albumen changes to green. Why? Different hydrogen ions concentration produces changes in its molecular structure …” [8].

3. Collection of red cabbage activities

Purple hour, or how to obtain the approximated moment in the river surface in which its levels of acidity or alkalinity in the water are magnified. For that purpose, a geodesic floating sphere with a plastic lentil (in which a red cabbage dye acts as a interface) filters the natural light on top of the river, to be able to compare the resultant color with the tabulated others, as a simple report about the degree of CO2 pollution. (fig. 2).
Tea time. It’s the moment to have a tea produced in a particular hookah while eating an Arabian sweet bread. While seating around it you can experience how human CO2 changes the natural color of red cabbage extract by blowing through the conduit (fig. 4).

Architect Philippe Rahm helps us to explain some correlations. He has developed successful projects based on the idea that clothing, light or diet are effective tools to achieve a thermal comfort from a natural way. Based on his experience, there are five ways for cooling down a space: modifying the air conditioning (atmospheric solution), drinking (physiological solution); taking off clothes (social solution); resting (physical solution); stimulating a sense of coolness (neurological solution) [9].

Fishing game. A little device working as a buoy next to the hook segregating red cabbage dye by the time it sinks and floats. With the help of this movement, a little portion of the river surface will be inked and its colour will be compared with those selected from a pantone chart: “…the fisherman prepares the buoy by adding the red cabbage dye inside the small capsule near the bait. The reed is hurled silent and carefully. While the buoy starts sinking (fish bites), a small amount of red cabbage dye is released indicating the place. It’s time to recover the prey and recognize the pollution of water…” (from students report). As in the previous experience, the goal is to sensibilize about water pollution by comparing chromatic patterns (fig. 5).

Relaxing Spa. “Enjoy your bath with two basins which are set dug in the ground and filled with red cabbage dye chromatically differentiated: one to obtain a cold sensation by choosing the bluish dye
basin (red cabbage extract mixed with lemon juice), and at the same time having a refreshing drink (rooibos); other to obtain a warm sensation, by choosing the intense reddish dye (mixed with vinegar) while having a hot and pepper food.” Although the atmospheric temperature is homogeneous, the students produce different sensitive reactions (fig. 6).

Like Philippe Rahm in his “Digestible Gulf Stream” (2008), they had prepared some digestives, the first one based on mint (which has molecules of crystalline menthol, tricking their guest’s brain with a temperature of 15 degrees); and the second one based on chilli (which has molecules of capsaicin to activate a neuro-receptor TRPV1 simulating a temperature of 44 degrees).

4. Conclusions and future work

This collection of experiences proves that targets of architectural education can be amplified by focusing the interest in a natural environment (in this case Murcia’s orchard), designing with respect and no ecological footprint, in contexts which are difficult to tackle and portray. 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 spa using red cabbage extract… a sequence to complete a 24 hours cycle. This workshop also proves that it’s possible to work with uncommon parameters from odd, collateral realities (the chromatic property of boiled red cabbage) in order to denounce and protect the natural environment.

Like Henry Matisse, who understood the reddish filtered light coming from the courtyard crossing the garden when portraying his studio (fig. 7) [10]. Like Jorge Luis Borges, who recognized that apple’s flavor depends on the act of biting it as the value of a book depends on the act of reading. Like Philippe Rahm, who identify sensations that can be perceived inside the body (diet) and outside it (atmosphere), breaking down the barriers between neurology and physiology. Red cabbage diagrammatic drawings and Philippe Rahm’s isosurfaces produce the same fascination as that pictographic design system named Isotype created by Otto Heurath in the 50’s: all of them investigating the role of communication in the making of modern and contemporary man: “…when icons of objectivity were crafted with the aim of visualizing the invisible economic factors that underline the functioning of society…” [11].
As a way to incorporate the opinions received from students and colleagues, future academic experiences will be opened to other disciplines, i.e., with the incorporation of scientific methods from sociology in order to identify collective opportunities and public conflicts; from natural sciences to open the scope of new approaches; or from ethnography to be more precise when describing the human communities.

5. Acknowledgements

This is a sample of emergent pedagogies that are been produced by the Research Group "Teaching Architectural Projects" leaded by Chair Prof. Jose Maria Torres Nadal in University of Alicante. Collective “HuertaBizarra” has shared the authorship of the making-offs, and has organized the accommodation and provision of food during orchard’s experience [12]; all red cabbage devices were designed by Angel Montenegro, Rafael Miralles and Esther Garcia, students in University of Alicante [13]; photographs were made by Jose Carrasco.

References

[6] The device to reproduce “galan de noche” fragrance (a bush that can be enjoyed during the warm summer nights) and others, can be read in Carrasco, J., Abellán, A. “Natural geodesic Lab: looking for galan de noche’s fragrance inside orchard’s landscape (Murcia)”, in “New Proposals for transformable architecture, engineering and design”, ed. Starbooks, Sevilla, p157-162, 2013.