Editorial

Material Oriented Ontology

Lucas Muñoz

This year has set itself as the beginning of a new rhythm. Already it's repetition of twenty twenty, unique every century, made us cheer for a very special year, full of changes. And indeed it is, though not all the cheerful we would have chosen. This editorial note is being written from the "new normality", a term coined to designate the fragile period that came after the global pandemic we were confronted with last spring. A new normality that needs to be more "new" than "normal". The normality we were coming from led us to be shaked down by the wave produced by the very natural tides we were playing with. If we do not position ourselves in a new and different way, it will be the drag of that same tide that will pull us to more troubled waters.

The call for texts that detonated the compilation of thoughts and reflections that are here presented, was an invitation to define the coordinates and the consciousness behind this positioning - confronted with the previous normality and, now that they have been written, confronted with the new one. A call that was titled Material Oriented Ontology, sympathising from its very foundation with the thought of philosopher Tymothy Morton and the ecological positioning of his school (Object Oriented Ontology). A call to create an open and multiple vision oriented to the materials, one that will suppose a study of the agencies and uses we (the people from now and the future, together to the planet from now and the future) do of them. It was intended with this call to understand, within the social and natural systems we create from, the co-responsibilities between the people that work with matter for a market use and the people that are the receivers of those works. This is a call for texts from an architecture magazine to create editorial work that will include us all.

As such, it has received a plural answer that, far from the surface, dives into some of the different depths we can find in the constructions we act within. What is being presented on following pages is a combination of texts that compiles thoughts about systemic thinking, architectural history, lexicon tricks used by the market and its green washings, the beautiful but insane architectural "sausages" and, in general, a compendium of multiple ideas that says that there is a necessity for a change; that the beauty we are working from must return to it; that we could do muchif we were to be more conscious of which and where are the solid values to build upon, either materially or in some other way.

As a consequence of all the conversations that were shared during the gestation of this RA magazine issue, we have developed as well a document that has been called Manifesto for the Built Environment as an Agent for Sustainable Change (MaBEASC). This Manifesto is a compilation of possible ideas and directions to take within the built processes. It does not pretend to be a doctrine or a code, more likely a set of ordered and clear notes. As such, it is open to be extended, improved or implemented partially, since its intention is that of inspire, and ideally walk with, the change.

This document, developed together with Cristina Freire, Joan Vellvé Rafecas and Tomás Miranda, comes together to a poster that illustrates and resumes it in a more intuitive way. If it is the case that this poster will end up on your wall, or if it will happen to be present during the projection of your projects, dear reader, then it may serve as a guide or inspiration for those to participate of this "new" within the "normal". And perhaps be conscious and careful of the footprint they traced when the projects tread as, inviting to these lines the words of WB Yeats, the fragile tissue we walk on are the dreams and fortune of others.

> "I would spread the cloths under your feet: But I, being poor, have only my dreams; I have spread my dreams under your feet; Tread softly because you tread on my dreams."
>
> W B Yeats

01

Matter and mutability

Ignacio Borrego Gómez-Pallete

If we shift the discourse to the ontological level, as the approach to matter suggests in this edition, we must refer to transcendental properties of matter. If, in addition, in this intellectual distancing we introduce the contemporary consciousness of a circular economy, then we will have to consider the mutability and reuse of matter, which as we will see does not depend so much on its physical properties but on the way in which it is manipulated. This hypothesis will be tried to be proved through a more interdisciplinary approach to ultimately reach the field of architecture, and finally propose that the essence of the constructions is in its form, and not in the matter itself, which is substitutable, corruptible.
The importance lies in the systems and relationships between the different elements that set up a construction. Identity is not in matter, but in the information it contains.

The law of conservation of mass or matter, also called the Lomonosov-Lavoisier Law states that matter is not created nor destroyed, it is only transformed. In an ordinary chemical reaction, mass remains constant, that is to say, mass consumed by reagents is equal to the mass obtained from the products.

Matter is often a subject of study in science, and in the field of biology it finds an area where form and material configuration is essential. This is produced by means of growth, which is a natural process and is different from construction, which implies artifice and artisanal intent. Nevertheless, biology has, on occasion, forgotten this essential distinction, and assumed living bodies to be objects created with intent. Thus, the wings of birds are described as extremities meant for flight, when a more precise explanation is that they are not so much meant to perform this activity as that thanks to them, a bird is able to fly. Nature is formed casually, and it is the random lives of its individuals that support the solutions that are best suited to the surroundings. Natural matter evolves.

The scientist Jorge Wagensberg describes with clarity Nature's ability to replace its components, the atoms, to temporarily resist degradation produced by time.

> "We left the city after breakfast. We stopped for lunch mid-way (the overheated Fiat Hispania celebrated by puffing like a whale) and we arrived in enough time to shop and prepare dinner. This was more than thirty years ago. The other day it took me exactly twenty two minutes to reach the residential estate that had engulfed that small village, the setting of those endless summers of my childhood...
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> ... After four thousand metres my heart skipped a beat: there was the same semi-stagnant water of the stream, the same red earth of its banks, the same reeds, the same water plants, the same dragonflies, the same fig tree with the hole in its trunk - the secret place where my brother and I would stash all our secrets!, the same whiff of mud, the same sounds...

> ... The place possessed an extraordinary power of evocation, but look out, because here begins our reflection.
>
> It's clear enough that those molecules of water weren't the same, nor were those of the plants, the dragonflies, nor those that stimulated my olfactory senses, or the textures I felt on the tips of my fingers. Not even the molecules of our fingers! Those were other atoms and molecules thirty years ago. Since then, matter has been replaced a thousand times. What is permanent then? Not the particles, but the relations between them, their order..., that is to say, information. The essence of things is more in their form than in their matter. Edwin Schrödinger recounts something similar in some place of his memories. A living being, any one of us, has a material basis but, unlike other inanimate structures (such as a house, for example), our "bricks" are not permanent. The quality of a living being is maintained precisely through exchange. Atoms once well positioned within the body now float freely through the universe... and the other way around. The reader of these lines will scarce conserve any of the atoms of their childhood, but will be loath to admit that they are not the same person when they refer to themselves as the same unique individual. Identity is well able to withstand the change in matter, but very poorly when it comes to a change in information..."[1].

> After this revelatory reflection by Jorge Wagensberg we can make an evident leap to Bruno Latour. The French philosopher compares the material renovation of the Pont Neuf to a living being, construction and genetics, artifice and Nature.
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> "It's hardly surprising that its name hasn't changed, for after more than four centuries the Pont-Neuf (the "New Bridge") is still under construction! It was redone in 1891 already, right down to the foundations of its piles, under the close surveillance of the Ponts et Chaussées engineers. Today it's again being restored. Signs inform us of its ailments, its remedies and the name of its physicians. To replace every stone worn by time there's a new stone, carved in an open-air workshop on the Quai des Orfèvres by a sculptor, an expert in the trade. Physiologists claim that the body lasts several decades owing to movement in which each cell is replaced by a flow of fresh proteins to occupy the exact place and function of the aged cells whose debris scatters in the wind. For a biologist the living body therefore differs from a stone bridge only in the pace of its renewal. Speeded up, both resemble a jet of water that maintains its shape through the swift movement of countless tiny drops, each adding its minute contribution to the slightly trembling form..."[2].

Architecture has traditionally clung to spatial and temporal stability nevertheless, it is the conditions of lightness and ephemerality that provide a more contemporary definition of our new context. Ever since Buckminster Fuller disturbed us by asking about the weight of our buildings, we have dreamed of new ways to face the need to build.

The questions that directly affect the design of a building have multiplied and accelerated in such a way that we are now aware that the impositions and readings during the development stage of a project are not the same that will affect the constructed reality during its useful lifetime.

It is therefore, a modern need for buildings to be able to adapt to changes; from replacing elements that rejuvenate its status, flexibility in modifying its configuration, to possessing a systematic ability to disappear and give way to new structures.

Natural selection is a concept that has made its way to the field of construction and it is in our hands to promote regeneration by sustainable means.

The systems of building construction are as important at the time of implementation as during maintenance and demolishing.

Socio-economic circumstances have stimulated the appearance of exciting new responses to adapt creative and constructive processes to an accessible reality, such as the usually direct relationship between the size of the elements of a work (from bricks that may be handled to complete façade elements that are executed in a workshop, and subsequently transported and installed on-site).

Architectural creation is engulfed in an implacable market where financial parameters are absolutely decisive. This would not be a cause for worry if these conditions were not guided by a series of short or medium-term profitability goals.

One of the consequences of globalisation is the awareness of the limits of the habitable space and its natural resources. The Earth is exploited on a large scale and in addition to agriculture and industry; construction is an important consumer of these limited resources.

It is therefore necessary to introduce sustainability parameters when interpreting the entire construction process[3]. For this we could simplify natural resources in a practical sense by accepting that the lower the energy and material consumption, the better the process.

Undertaking a project involves its installation within an area, the addition and removal of materials and maintenance during its use. The reversibility of each of these three stages is a relevant factor in its assessment.

Substrate. Modifying the topography and vegetation involves an exchange of matter (possibly not utilising it) and alters pre-existing natural properties.

Installation. Construction implies a use of matter that may later be recycled or remain unused for ever. In some cases, the removal of matter is produced during the execution itself, not only in excavation, but also in the possible debris generated by the process itself.

Maintenance. The durability of the construction and its use requires a supply of matter throughout its useful life.

Alongside this consumption we must take into account processes of conservation, even material compensation such as the recycling and reuse of used materials. This would mean, in the best case scenario, a negligible impact from a material point of view.

By calculating the material consumption, we may obtain a sustainability balance in kilos. In order to apply these values in comparative terms, it may be more useful to link them to the volume of the activity and describe these values in kg/m^3.

From a distant point of view, taking into account the entire useful life of the buildings, the capacity to adapt and regenerate of the architecture, subjected to the most acute limitations of territory and material and energy resources, challenges conventional building procedures and encourages the formulation of respectful designs that leave the smallest ecological footprint.

The new economic and above all, environmental context forces us to consider and take advantage of the recyclable and reusable capacity of materials in constructions that pose the least possible disturbance to our surroundings.

Art gives us examples where matter is used with the desire to limit its impact and, above all, with the goal of expressing its mutability, its impermanent, instantaneous condition of a dynamic process. This is the case of Andy Goldsworthy's installation in Madrid[4].

Throughout his career, Goldsworthy has used plant elements such as wood, leaves, petals, animal elements such as sheep's wool; or inorganic elements such as clay, mud, snow and ice. Even stones whose solidity as oval structures was questioned by the action of being submerged in rivers and tides. His works appear in solitary and country environments as well as in museums, and are generally of an ephemeral nature.

The project consisted of various large domes made from piled trunks of wild pine from the woods near Buitrago de Lozoya, located 80 kilometres to the north of Madrid, administered by the Council for the Environment and Territorial Planning of the Region of Madrid.

The artist visited the woods several times to select the trunks that would form part of the exhibit "Inside the entrails of the tree". Some had been recently cut and were strewn around on the ground, others were piled and ready to be transported and later converted into paper or boards. Goldsworthy clarifies that none of

these trees were expressly cut for the purposes of the exhibition, and once over, the trunks continued on to their original destination and were transformed into commercial products.

All constructions have a limited lifespan that may vary between days in temporary constructions, and centuries, but there comes a moment when the original materials must be removed.

Another event with a similar commitment to reducing the environmental impact of the materials used was held in 2000 in Hamburg, at the Swiss pavilion at the International Expo, which was designed by Peter Zumthor. The temporary nature of these pavilions is a common characteristic of most set-ups at this type of event. However, on certain occasions, they constitute a relevant factor in the decisions regarding their execution.

The Swiss architect's proposal focused on this condition of matter "in transit" by using only standard-cut wood in the construction, which was arranged according to the drying stacks where wood is treated before being used. The presence of vertical metallic tensioners reveals that the large square wood profile walls have not even been screwed together. They have only been compressed vertically in order to ensure their stability for the lifetime of the pavilion.

The geometry and dimensions of the building elements are directly determined by the industrial production of wood and are not altered at any moment, so as not to change their original conditions and constitute only a pause in their commercialisation.

After the Expo, all the wood was unstacked and reused. 100% of the materials used in the pavilion were directly sold to be used in construction, without being handled for recovery, thus improving the concept of recycling with that of reutilising.

This attitude is a clear reflection of the trend sought by recycling processes. Optimised recycling consists of not letting the material deteriorate at each manufacturing stage so it may be indefinitely recycled maintaining its properties from its birth or start to its obsolescence, when it may be reborn, thus giving rise to the concept "from the cradle to the cradle"[5]. William McDonough and the chemist Michael Braungart propose a change of focus. Reducing the impact on the environment would slow it down, but whether faster or slower, we would still be moving towards the same end. Faced with this panorama they suggest that the problems be tackled from their roots, that is to say, instead of reducing energy consumption, we should focus on taking into account from the design or conceptual stage of any product, that the strategy or policy encompasses all the phases of the products involved (extraction, processing, use, reuse, recycling...) making energy expenditure unnecessary and resulting in is a positive balance with regard to supply and expenditure, by taking advantage of solar energy and eliminating waste generation. Being "less bad" is not the same as being good.

The essence of buildings is in their form and not in the material itself, which is replaceable, corruptible and dispensable. The importance lies in the systems, in the set of decisions, solutions and relations between the different elements that make up a construction. Identity lies not in the matter, but in the information it holds[6].

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He graduated in Madrid in 2000 receiving the Best Student Prize of that year at ETSAM-UPM, and the 1st National Prize for the best academic record in Spain, 2000. His doctoral thesis "Informed Matter", directed by Federico Soriano, obtained cum laude in the doctoral defence in 2012, and the X Arquia Tesis First Prize in 2015. He founded the architectural office dosmasuno arquitectos with Néstor Montenegro and Lina Toro in 2003 and founded Ignacio Borrego Arquitectos in 2014. He has received 37 national and international prizes in architectural competitions and architectural awards, such as COAM Prize, AIT Award or A+ Prize. From 2006 till 2013 he was co-editor in chief of the indexed architectural review of the National Architects Association of Spain: Arquitectos (Consejo Superior de Colegios de Arquitectos de España-CSCAE). This scientific Review is indexed, and in that period he edited 15 issues, with over 750.000 copies delivered ton all registered architects in Spain. In 2009 he founded CoLaboratorio at the Technical University of Architecture of Madrid with Almudena Ribot, Javier García-Germán and Diego García-Setién. It is a research space for design strategies and new fabricating methods implemented in the contemporary industry, developing different initiatives such as the implementation of the FabLab UPM. This activity has a continuity at the CoLab Berlin, a laboratory of collaborative design, as part of an international net in Madrid and Berlin. As CoLab Berlin Director he is also in charge of the Digital Studio at the Institute of Architecture of the Technical University of Berlin.
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Notes

01. Jorge Wagensberg "Sobre el Alma de las Medusas" Text included *in Ideas para la Imaginación Impura. 53 reflexiones en su propia sustancia*. 2002.

02. Bruno Latour "Paris: Invisible City". 2006. http://www.ensmp.fr/~latour/virtual/index.html

03. Joan Sabaté. "Nulla estetica sine etica" in *Aquitectos 182-Bajo Consumo [II]*. Revista del Consejo Superior de Colegios de Arquitectos de España, Madrid 2007.

04. Andy Goldsworthy. *Inside the entrails of the tree*. Palacio de Cristal, Parque del Retiro, Museo Nacional Centro de Arte Reina Sofía. Madrid, from 2 October 2007 to 21 January 2008.

05. William McDonough and Michael Braungart, *Cradle to Cradle. Remaking the way we make things*. North Point Press, 2002.

06. Ignacio Borrego Gómez-Pallete, *Materia informada. Conformación, Deformación y Codificación, los procedimientos de almacenamiento en la materia*. Fundación Arquia, 2019.

02

Calidad versus economía, o cómo dar forma a la basura y que resulte atractiva

Wilfried Wang

La constante erosión de la base material del diseño arquitectónico y la construcción tiene principalmente causas económicas. Como consecuencia, se han erosionado los fundamentos morales, intelectuales y sustantivos de la arquitectura. Esta desaparición discurre en paralelo a los avances en otras áreas de la cultura humana. El efecto acumulativo de esta erosión es la "construcción" de delgadas capas de ficción que consolidan estados de falsa conciencia. A lo largo de los siglos, la arquitectura ha sido aceptada y se ha permitido convertirse en la servidora de las ficciones colectivas. Con el cambio climático, la siguiente capa de ficción que se superpondrá a este barniz cultural es la de la "naturaleza".

Llega un momento en la carrera de la mayoría de los arquitectos idealistas en el que experimentan una verdad desalentadora: los edificios de los que se habían enamorado como imágenes en realidad resultan ser bastante menos significativos, duraderos y bien construidos de lo que les habían hecho creer sus profesores o de lo que ellos mismos habían pensado. La Torre Einstein de Mendelsohn, la Villa Savoye de Le Corbusier, el Museo Guggenheim de Gehry, el Kunsthaus de Cook y Fournier o la Ciudade da Cultura de Eisenman carecen de la integridad conceptual y material que los ingenuos jóvenes arquitectos proyectan sobre ellos.

Sin embargo, estos ejemplos de la arquitectura moderna no son los únicos casos en los que existe una disparidad decepcionante entre la constitución y la representación de un edificio; entre la ambición intelectual y la ardua labor de dotar de coherencia a los aspectos conceptuales y sustantivos del diseño arquitectónico. De hecho, la mayoría de los edificios actuales carecen de cualquier tipo de ambición en lo que respecta a la relación entre el concepto de diseño y la ejecución física. Hoy en día, la mayoría de los edificios son traducciones cuantitativas de las necesidades económicas de los clientes, que de algún modo acaban dando lugar a un bricolaje de materiales baratos ensamblados por trabajadores semicualificados y que duran poco más que el período de garantía. De hecho, desde hace algún tiempo, la práctica totalidad de los edificios son vertederos habitados construidos con materiales semitóxicos dispuestos ingeniosamente, que esperan su *coup de grâce* antes de que sus componentes se amontonen permanentemente sobre el resto de desechos de la civilización moderna, en el vertedero, cuyo nocivo contenido se deja coagular de forma negligente en el único ejemplo funcional del por lo demás mítico efecto de goteo neoliberal.

Gracias al dominio de la lógica capitalista, especialmente en la arquitectura pero no solo en este campo, se ha permitido que los criterios económicos prevalezcan sobre los cualitativos. Las comodidades (en el sentido sostenible), la firmeza y el deleite han quedado atrás. El eclipse de la materialidad como criterio cualitativo en la arquitectura, o en la medida en que todavía sea posible hablar de materiales en relación con la industria de la construcción, ha sido prácticamente total. La profesión ha presidido este eclipse de sistemas de valores durante los últimos siglos con indiferencia.

La eliminación de la lógica de los detalles guarda relación con la desaparición de los materiales como base física de la arquitectura. La unión de los elementos ya no está relacionada con la naturaleza de lo que se está uniendo. La noción griega del ensamblaje experto de objetos, τέχνη, se ha visto sustituida por una acumulación de capas, cada una de las cuales satisface ciertas necesidades de rendimiento. La sintaxis griega que tejió una narrativa tectónica desde los materiales y elementos constructivos hasta un concepto plenamente desarrollado, completo con su lógica compositiva, ha sido irrelevante durante siglos. Hoy en día todo es posible; cualquier material de construcción puede combinarse con cualquier otro elemento para crear cualquier forma.

De hecho, el objetivo principal de la arquitectura en la actualidad es dar forma a la chatarra y que se vea bien como *imagen*. La creciente especialización de las formas de conocimiento, la continua división del trabajo, la acelerada digitalización de los procesos de producción y la consiguiente explosión de la gama de productos, junto con la separación espacial y temporal de los métodos de ensamblaje, simplemente han reforzado, en última instancia, la antigua práctica de la fabricación de salchichas.

Las salchichas –o la versión latina *salsica* de *salsicus*, sazonado con sal– eran el resultado de rellenar tripas de animales con los restos picados después del desmembramiento completo de animales como cerdos, vacas u ovejas. La salchicha como producto final fue el brillante invento de los carniceros mesopotámicos en algún momento entre el 3100 y el 800 a.C[1]. Desde entonces, todas las sociedades han disfrutado del consumo eficiente incluso de algunas de las partes menos salubres de los animales; partes con las que la mayoría de la gente no tendría normalmente contacto directo ni desearía ver antes de su procesamiento. *Parts Unknown*[2] [Partes desconocidas] o, para algunos, ojos que no ven, corazón que no siente. Esta dichosa ignorancia constituye la base de la confianza que los consumidores depositan en la salchicha como tipo de producto, puesto que pocos saben realmente lo que contiene.

Por lo tanto, ¿qué contienen los productos modernos? ¿Podemos confiar en la descripción del contenido que aparece en el paquete? El análisis de la variedad de "productos" de las tiendas de comestibles o supermercados servirá como analogía de la variedad de productos disponibles en la industria de la construcción. En los supermercados se pueden distinguir tres categorías de productos: en primer lugar, los alimentos "no procesados"[3] como la fruta, las verduras y los huevos; en segundo lugar, los alimentos semiprocesados, como el pescado y la carne crudos; y en tercer lugar, el resto de artículos procesados, desde los productos lácteos hasta los alimentos enlatados y congelados. El rango de precios, en particular en esta última categoría, es amplio; desde unos pocos céntimos por una chocolatina hasta las tres cifras por bebidas alcohólicas de lujo. El precio debería considerarse una señal de advertencia: *caveat emptor*. El comprador debe tener en cuenta que es muy probable que un producto barato contenga una serie de compuestos sintéticos como antioxidantes, colorantes, emulsionantes, enzimas, edulcorantes de alta intensidad y almidones modificados (como el jarabe de maíz con alto nivel de fructosa), sabores artificiales idénticos a los naturales, espesantes, estabilizantes y conservantes. De este modo, en una

chocolatina[4] encontramos una versión dulce de la salchicha, y de forma recurrente, los sabores artificiales idénticos a los naturales siguen del mismo modo la composición de agentes químicos en la salchicha que simulan la estructura molecular de los aromas naturales pero que se derivan en gran medida de los productos de la industria química. Una chocolatina barata debe su existencia a los dones combinatorios de las industrias agrofarmacéutica, química y de refinado de petróleo.

Se ha demostrado que la relación simbiótica entre estas industrias es un factor de gran importancia en las epidemias sanitarias de la civilización contemporánea, como el cáncer, la obesidad, la diabetes y las enfermedades coronarias[5]. La letra pequeña que aparece en la parte posterior del paquete de una chocolatina le ofrece algo de información al comprador, pero no la versión completa. Los informes de los medios de comunicación señalan los efectos de la comida rápida[6], pero las estadísticas sanitarias realizadas en todo el mundo demuestran que estas advertencias generalizadas no se toman en serio, especialmente por parte de los más afectados. En la actualidad, una parte importante de la dieta habitual de la gente pobre consiste en productos poco saludables que se venden bajo la apariencia de una alquimia similar a la salchicha con la necesidad inherente de un tratamiento "sanitario" posterior.

La lógica de la alquimia similar a la salchicha ha impregnado todos los campos de las actividades humanas; sin embargo, el principio de rellenar pieles representativas con material de menor calidad puede haber sido desarrollado por los albañiles fenicios ya en el siglo X a.C[7]. Se construían dos capas de paredes de sillares finamente revestidas y se rellenaban con escombros y barro; un sistema que los antiguos griegos denominaron posteriormente εμπλεκτον (*emplecton*)[8]. El sistema de muros de los fenicios es uno de los primeros ejemplos de la división del trabajo en la representación arquitectónica: la capa externa más costosa se redujo a un grosor mínimo, suficiente para soportar su propio peso antes de que la cavidad se llenara de escombro barato. Mientras esta capa exterior siguiera la lógica de construcción de la mampostería, continuaba existiendo un vínculo entre el material elegido y la sintaxis constructiva-compositiva: se veía cómo se construía un muro, o al menos su revestimiento exterior.

Así, mientras que los materiales compuestos de revestimiento contemporáneos siguen el mismo principio fenicio de la división del trabajo en la representación arquitectónica, hoy en día ya no existe ninguna relación entre lo que se ve, lo que se encuentra más allá de la superficie y cómo se mantiene en su posición. Muchos arquitectos lo consideran una ventaja, ya que esta división del trabajo en la representación arquitectónica los libera de las estrictas disciplinas constructivas, por lo que ya no existen limitaciones en el uso de cualquier material de superficie y en cualquier forma.

Los materiales de revestimiento contemporáneos forman parte de una lógica constructiva que contribuye inevitablemente al avance de los objetivos capitalistas: los materiales y sistemas de revestimiento son cada vez más delgados y ligeros para facilitar y acelerar el montaje en la obra. Este conflicto se prolongará mientras los objetivos y los sistemas de valores capitalistas sigan siendo preeminentes y la calidad quede relegada por la economía a un papel ornamental.

Aun siendo ligero, el material aislante y de refuerzo entre las capas visibles debe cumplir ciertos criterios de rendimiento, por ejemplo, la rigidez, la capacidad térmica o la resistencia al fuego[9]. En general, las sustancias de relleno en los sistemas de revestimiento proceden de la industria química; un ejemplo es el poliuretano, una sustancia que se procesa principalmente a partir del petróleo crudo. Al igual que ocurre en la industria agrofarmacéutica, sin la participación de las industrias químicas, el material de relleno seguiría procediendo de fuentes más directas y naturales. De hecho, sin las industrias química y de refinado de petróleo, muchos recursos naturales no podrían sustituirse a precios tan bajos con efectos sensoriales tan convincentes.

En la enseñanza de la arquitectura modernista (en contraposición a la arquitectura moderna[10]), la creencia de que la aparición de nuevos materiales y procesos o sistemas de construcción conduciría a nuevas formas de expresión persiste hasta la actualidad. Esta creencia es en sí misma una forma de ilusión superficial, si bien carece de fundamento en cuanto a los nuevos materiales y procesos de construcción. En su ensayo sobre "construcción" de 1928, Hannes Meyer cita treinta "nuevos materiales de construcción para la nueva forma de construir casas". Tan solo cinco de estos treinta materiales fueron efectivamente desarrollados a principios del siglo XX[11]; los otros tienen un origen anterior. Curiosamente, cuatro de los cinco nuevos materiales son amorfos y por lo tanto no están sujetos a ninguna lógica de composición. Meyer no explica cómo el uso de materiales amorfos llevaría a la "construcción pura" como "la base y característica del nuevo mundo de las formas"[12]. La arquitectura modernista no ha logrado sustentar un lenguaje a partir de materiales de construcción contemporáneos y tampoco hay perspectivas de que otros "nuevos" materiales o tecnologías como las nanopartículas o similares puedan sentar las bases de un nuevo estilo arquitectónico.

Si analizamos la historia de la construcción de edificios, ha habido principios y períodos de composición que han dado lugar a formas y espacios basados en el uso y el ensamblaje de materiales sometidos a un procesamiento mínimo: el iglú inuit; la cabaña caribeña; las casas hechas de piedras, troncos o adobe; las iglesias o incluso catedrales construidas con piedra o ladrillo. La limitada disponibilidad de recursos, incluida la energía, y la relativa abundancia de mano de obra hicieron que se desarrollasen técnicas de procesamiento en la preparación de materias primas para edificios. El trabajo con materiales sencillos como la piedra y la madera requería conocimientos y experiencia: los materiales reales exigen respeto, y eran los artesanos los que realizaban ese tratamiento respetuoso de la materia.

Con el principio del emplecton llevado a su extremo contemporáneo, es decir, con la separación de la capa representativa de una sustancia interna, donde ninguna de las dos tiene especificidad material, los oficios tradicionales se han visto sustituidos por una gestión empresarial que concede prioridad a las transacciones contractuales fluidas y no conflictivas. A día de hoy, la arquitectura, como cualquier otra forma de expresión cultural, satisface principalmente la imaginación, las fantasías y los caprichos de los clientes, cuyas múltiples fuentes para la apariencia externa de sus objetos de encargo proceden de siglos anteriores, hoy en día conveniente y rápidamente fotografiados como "sugerencias de servicio" y posteriormente convertidos por ordenadores en documentos contractuales compatibles con BIM. Así es como las villas en los suburbios, los edificios de oficinas en los distritos centrales de negocios, los clubes de golf y los centros vacacionales, los campus universitarios y aeropuertos completos pasan a formar parte de la expresión de una realidad supuesta, pero insustancial e insustancial. Rasca la superficie del material de revestimiento que cubre cualquiera de estos edificios, corta la piel de la salchicha, y extrae aquellas sustancias que preferirías no conocer –*Parts Unknown*– pero que apoyan la realidad ficticia autoreflexiva elegida por los clientes. En el hemisferio norte, esta realidad autoficticia permite de forma condescendiente la intrusión de versiones humanas de sustancias que sostienen la piel, ilegales explotados cuyo servicio mal pagado permite que esta realidad exista.

La invención de los fenicios de la pared de doble piel llena de escombros tuvo lugar antes de la definición de los siete pecados capitales del mundo antiguo. Las fuerzas psicológicas que hasta el día de hoy causan la separación de la apariencia del ser, que provocan la desmaterialización de la construcción, pueden analizarse en base a cuatro de los siete pecados capitales: el orgullo y la vanagloria como los instigadores en connivencia con la avaricia y la pereza. El orgullo y la vanagloria obligan a los clientes a querer que

sus edificios parezcan algo más de lo que el presupuesto permite; la codicia y la pereza provocan que los clientes y los arquitectos elijan tanto elementos de menor calidad como atajos en la transformación y el montaje adecuados de estos elementos. El resultado es un *ersatz* adornado.

Mientras que en los antiguos templos griegos un material más duradero y más caro simulaba una forma más barata de construcción –mármol para la madera–, desde entonces, con algunas excepciones, se han utilizado materiales más baratos con una vida útil más corta para sustituir a materiales de aspecto más valioso. Con la era del petróleo crudo impregnando todas las áreas de la civilización, hemos llegado al poliestireno con una pizca de pintura química como el material más común para simular y sustituir al resto de materiales. Debidamente sellado y pintado de forma decorativa, se integra a la perfección en el interior y exterior de los edificios sin que nadie se dé cuenta de que en realidad no es un perfil de madera dura o una columna de mampostería. Al igual que ocurre en el mundo de la cosmética, la cirugía plástica, la moda y el diseño de automóviles, la industria de la construcción actual cuenta con sus cremas y polvos, su propio tipo de bótox y lipoinyección, sus corsés y hombreras, sus herramientas de *styling* y "carrocería aerodinámica". El principio de la salchicha, del revestimiento y del relleno, del emplecton, este acto fundamental de pretensión no se ha limitado a los materiales de construcción o a los detalles de ensamblaje; se extiende a todos los espacios y formas, a simulacros construidos completos. De esta forma, en conjunto, la cultura contemporánea es un gigantesco revestimiento que esconde una basura indescriptible. Este extenso "castillo de naipes barnizados" solo logra resistir el desmoronamiento gracias a la fantasía individual y colectiva. Cada uno de nosotros persigue una combinación de deseos refinados y ficciones autohipnotizantes.

La civilización ha luchado por la autonomía en todos los aspectos de su existencia. La construcción de una realidad barnizada independiente de los materiales reales y sus demandas ha formado parte de este proceso de autonomía. Es un proceso irreversible. A medida que el cambio climático despliega su impacto en este proceso de autonomía, empezaremos a ver otra capa ornamental aplicada a este revestimiento general: imágenes estilizadas de vacas deambulando libremente por los pastizales vertiendo su leche directamente en los *tetrabriks* de bebidas forrados de aluminio o polietileno. Sí, queremos que nos cuenten historias en las que todos podamos creer. Esta capa ornamental no se limitará a los envases de los productos o a las imágenes de las estrategias publicitarias, sino que también se extenderá más allá del *greenwashing* de los edificios. Será otro intento de satisfacer nuestros ansiosos deseos con nuestras ficciones autohipnotizantes. "La naturaleza", al menos lo que aún consideramos que significa, servirá como la gran referencia. Será la versión más amplia de lo que la industria agrofarmacéutica ha estado añadiendo a los productos alimenticios que muchos de nosotros hemos estado disfrutando tanto: imágenes sintéticas idénticas a la naturaleza para representar los aromas sintéticos idénticos a la naturaleza.

No será posible recuperar una zona cero de cultura material, puesto que cada aspecto de nuestras vidas se ha visto invadido, impregnado y pervertido por la práctica de la fabricación de salchichas. El emplecton fenicio, el principio de la división de la cultura en una piel decorativa y un relleno servil, no puede desprogramarse de la mentalidad de la gente. La "arquitectura", o lo que queda de ella, seguirá siendo el arte de cómo dar forma a la basura y que resulte atractiva. La "calidad" seguirá estando a las órdenes de la economía.

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Notas

01. https://en.wikipedia.org/wiki/Sausage.

02. En aras de la comprensión intercultural, Anthony Bourdain fue pionero en la desmitificación de las aprensiones y prejuicios principalmente anglosajones-occidentales hacia las culturas alimenticias "desconocidas" del resto del mundo.

03. En sentido estricto, habría que incluir como procesos la pulverización de pesticidas, el encerado de cítricos o la radiación de verduras. No obstante, por el bien de este ensayo, tomemos la integridad formal de un objeto como el criterio para esta simple clasificación.

04. Entre los orígenes de los dulces de pequeño tamaño se encuentran los llamados "pralinés", inventados según Josef Loderbauer por el cocinero de César de Choiseul, primer duque de Choiseul, conde de Hostel, conde de Plessi-Praslin, vizconde de Saint-Jean (1598-1675), *Das Konditorbuch in Lernfeldern,* Verlag Handwerk und Technik, Hamburgo 2009. Entre las primeras chocolatinas inglesas se encuentran las ideadas por Joseph Fry y su hijo en torno a 1847, y la chocolatina de John Cadbury, de 1849; frutos de la colonización y la industrialización. Una de las chocolatinas más populares, la de la marca Mars, contiene un 59,9 % de azúcar.

05. https://www.commondreams.org/views/2017/07/24/how-food-and-drug-companies-ensure-we-get-sick-and-they-make-money y otros muchos informes.

06. Schlosser, Eric, *Fast Food Nation: The Dark Side of the All-American Meal*, Houghton Mifflin, Nueva York 2001.

07. Sharon, Ilan, "Phoenician and Greek Ashlar Construction Techniques at Tel Dor, Israel", *Bulletin of the American Schools of Oriental Research*, n. 267, 1987, 21–42. Sharon afirma que la construcción de sillares y muros rellenados con escombros se llevaba a cabo ya en el siglo X a.C.

08. Los antiguos romanos llamaban a estos tipos de construcción de muros *opus caementicium* y *opus incertum.*

09. Aunque requerían una calidad de rendimiento especial para edificios altos, los elementos del revestimiento de la Torre Grenfell de Londres carecían de ella, lo que tuvo trágicas consecuencias. Hoy en día, no sólo en Gran Bretaña, todavía existen muchos rascacielos que están revestidos con sistemas peligrosos.

10. La arquitectura moderna se extiende más allá de los paradigmas ortodoxos desde la Bauhaus hasta el estilo internacional.

11. Caucho sintético, espuma (celular) u hormigón celular (el mismo principio de producción, pero señalado dos veces por Meyer), resina sintética, madera sintética y viscosa.

12. "Edificio" Hannes Meyer, trad. inglés en *Hannes Meyer: Buildings, projects and writings",* Claude Schnaidt, Verlag Arthur Niggli, Teufen, 1965, 95-97.

Imágenes

01. Exterior de la fundación Louis Vuitton, París 2006-2014, arquitectura de Frank O: Gehry, fotografía del autor, 2019.

02. Interior de la fundación Louis Vuitton, fotografía del autor, 2019.

03. "m&m, Kit Kat, Twix, Hershey's, Snickers, mr. Goodbar, Butterfinger, Payday, Milky Way, Oreo, Mamba, Airheads ...", fotografía del autor, 2019.

03

El animal que llevamos dentro

Erez Nevi Pana

La humanidad ha progresado mucho. Nuestra evolución evidencia un enorme poder y grandes avances. Entre el amplio espectro de logros humanos podemos citar los símbolos, las pinturas, el lenguaje, la escritura, la impresión, internet, la arquitectura y el diseño. Todos ellos son manifestaciones transformadoras de los avances intelectuales humanos, amplificados por diferentes herramientas de comunicación que han unificado a los individuos bajo la etiqueta de cultura compartida. El diccionario de Cambridge define la cultura como "el modo de vida, especialmente las costumbres y creencias generales, de un grupo particular de personas en un momento determinado", pero ¿realmente refleja la cultura actual mis valores y creencias más profundos?

El diseño, que tiene un impacto cultural inmenso, empezó a desarrollarse hace 3,3 millones de años, cuando los fabricantes de herramientas comenzaron a dar forma a las piedras para cortar y romper. Los primeros diseñadores demostraron una imaginación y una habilidad técnica fascinantes. En un periodo de dos millones de años, se alteró la forma de las piedras para llevar a cabo diferentes funciones. El diseño empezó a crecer y a desarrollarse como un lenguaje en una dimensión evolutiva, que sufre cambios en base a las necesidades de la humanidad. La pintura, seguida de la escritura, se utilizó como un medio para preservar la información (Avital 2010), como una unidad ampliada para el almacenamiento de datos, y desempeñó un papel significativo en la evolución humana con una amplia continuidad y un desarrollo gradual hacia la inteligencia artificial actual.

Los primeros fabricantes de herramientas demostraron una imaginación y unas habilidades técnica fascinantes, como demuestran los hallazgos de Lomekwi 3, un yacimiento en la zona occidental del lago Turkana (Kenia), que muestran el registro de la fabricación de herramientas a lo largo de unos 700.000 años (Hovers, 2015). La evolución de la fabricación de herramientas ha llevado a la evolución del pensamiento visual. El hombre ha llegado a manifestar grandes logros en la tecnología y la funcionalidad, pero también en la estética de los objetos diseñados. Caracterizados por los ornamentos o el minimalismo; por una exquisita artesanía o por la producción en masa mecanizada; deseables y de aspecto impecable, o aburridos y ásperos: los objetos se modificaban a menudo y el concepto de belleza seguía cambiando. El deseo de cambio surgió del hambre artística de fabricar y lograr lo que está fuera de nuestro alcance. Esta necesidad y curiosidad por lo nuevo forma parte de la inteligencia humana. Al igual que en otros reinos, los diseñadores se

mantuvieron en una búsqueda constante para encontrar alternativas a una realidad determinada, utilizando las tecnologías y desarrollando una cultura material para cumplir las características funcionales, y la belleza que alimenta el gusto del espectador.

La suposición de que los humanos eran la única especie que llevaba a cabo un uso extensivo de la tecnología basada en la piedra fue refutada hace mucho tiempo, puesto que se han desenterrado herramientas rudimentarias de piedra hechas por chimpancés en las selvas de Costa de Marfil, lo que demuestra que los chimpancés han estado usando herramientas de piedra durante al menos 4300 años y por lo que se concluye que los primates entraron en la Edad de Piedra. El uso de herramientas no significa que los primates sean únicos entre otros animales; los cuervos improvisan y enseñan a sus crías técnicas para fabricar herramientas con las que atrapar su comida. Sabemos que los elefantes, los insectos, los delfines, los pulpos y otros animales organizan su vida utilizando objetos como herramientas para facilitar su día a día. Los animales tienen cerebro y lo usan como nosotros, para experimentar el mundo, para pensar y sentir, para resolver problemas y asegurar su supervivencia (Morell, 2013). Su rango emocional también es más amplio de lo que se creía en un principio. Como nosotros, los animales tienen una vida mental, una personalidad, estados de ánimo; ríen y juegan, experimentan desde emociones simples como la tristeza y la felicidad hasta otras más complejas como los celos, la pena y la empatía; son conscientes de sus acciones e intenciones.

La existencia de la conciencia en las especies animales ha sido analizada por etólogos, investigadores de humanidades y profesionales de la psicología comparada. Las diferentes especies cuentan con niveles dispares de conciencia e inteligencia, un estado de conciencia de su entorno. Exhiben angustia y sensibilidad, conciencia y autoestima. Las vacas tienen acentos y dialectos regionales, los peces utilizan herramientas, las ovejas no olvidan una cara y pueden reconocerse entre sí y a los humanos por su rostro (Kendrick, et al., 2001). Los cerdos pueden reconocerse a sí mismos en un espejo, e interpretan la imagen reflejada utilizándola para encontrar alimentos ocultos (Broom *et al.*, 2009). Juegan a los videojuegos mejor que los chimpancés y son seres alegres, sociales y afectivos. Además de los pollos, cabras, búfalos de agua, patos, terneros, ciervos, caballos, perros, gatos, conejos y pavos, entre otros; todos ellos son animales conscientes que matamos para comer.

La incorporación de carne a la dieta humana ha tenido un impacto muy significativo en la relación hombre-animal. Huesos hallados en Etiopía evidenciaron que los primeros seres humanos que utilizaron herramientas y comieron carne fueron los *australopithecus afarensis*, y en 2010 se encontraron pruebas del consumo de tejidos animales mediante herramientas de piedra hace 3,39 millones de años en Dikika (Etiopía) (Hovers, 2015). El progreso de la humanidad está sujeto a la presencia de vida silvestre, y el consumo de carne dio lugar a la reducción del tiempo de forrajeo, que era fundamental para gestionar y mantener los niveles de energía. Como resultado, se disponía de tiempo para las relaciones sociales y la recopilación de información, así como para razonar y comprender. La matanza de animales y el consumo de carne se convirtieron en parte de la existencia humana y se desarrollaron diferentes tradiciones y prácticas relacionadas con este hecho: los animales trabajaban para las personas, se utilizaban para vestir y su sangre, huesos y piel se usaban en objetos diseñados.

Con el paso del tiempo, la noción de materialidad ha evolucionado desde la función pura hasta incluir la belleza y el tacto en la materia física. Hoy en día existe una variedad inconcebible de materiales y la tecnología desempeña un papel fundamental en la abundancia de materiales y productos que inundan el mercado: madera contrachapada, brocha de pintura, papel de lija, guantes de seguridad, corcho, latón, yeso, papel, cola de madera, esmalte, MDF, pigmento negro, molde de aluminio, película fotográfica, papel de inyección de tinta, hormigón celular, cartón, papel pintado, rodillos de pintura, pintura con brillo, lápices de colores, tiza, cera de madera, lienzo, caucho, ciertos plásticos, seda, asfalto, encuadernación, etc. Todos ellos son productos y materiales comunes que pueden utilizarse en el proceso de diseño para dar forma al producto final. Todos y cada uno de los productos pueden contener ingredientes animales o pueden fabricarse a partir de componentes presentes en la naturaleza. Hoy en día, la gama de materiales que contienen ingredientes animales abarca mucho más que los productos animales comúnmente conocidos, como el cuero, el ante o la lana. Los ingredientes animales como el aglutinante de gelatina, la cola de hueso, el colágeno y el ácido esteárico, entre otros, se mezclan en materiales y productos que no reconocemos y que se relacionan con las prácticas estándar de la industria en las que los animales se convierten en carne y cuero. Diferentes industrias trabajan en armonía de tal manera que dos fabricantes distintos coexisten de manera mutuamente beneficiosa para maximizar los beneficios de una vaca, un cerdo o un pollo y similares. Las partes principales se utilizan para la alimentación, y el resto (sangre, huesos, grasa, piel y pelo) se recogen y se comercializan a través de diversas industrias.

El libro *PIG 05049* muestra un animal, compuesto por 185 productos diferentes, las partes del cerdo número 05049 (Meindertsma, 2008), que "se encuentran en los lugares más diversos" como parte de los productos que encontramos a diario. La maximización de los beneficios tiene un impacto claro en el ciclo de vida y muerte del animal, en el que la rentabilidad y el fortalecimiento de la economía pasan por la explotación de un cerdo: se utiliza cada parte del animal. La viabilidad de los productos expuestos en el libro se basa en la lógica numérica por la que todos los productos mencionados se fabrican en cantidades mucho mayores. Como describió Verweij: "Se ha olvidado durante mucho tiempo que la escala de un cerdo es la escala a la que comerciamos. Esto se debe a que, a escala de un cerdo, no tiene sentido separar unos cuantos miligramos de pigmento negro, gelatina o colágeno. Solo tiene sentido si manejas decenas o cientos de cerdos cada día".

Los animales domesticados que se crían, se reproducen y luego se convierten en carne para esta industria multimillonaria también se utilizan en innumerables industrias más pequeñas que están interrelacionadas. Si apoyas a una de estas industrias, las apoyas a todas.

La mayoría de nosotros no creemos que sea correcto tratar de forma cruel a los animales, así que ¿por qué seguimos comprando productos animales y sosteniendo estas industrias? Hemos establecido una serie de mecanismos de justificación social y psicológica que permiten que las personas compasivas y humanas contribuyan y formen parte de prácticas inhumanas sin entender ni reconocer lo que hacemos. En su libro *Por qué amamos a los perros, nos comemos a los cerdos y nos vestimos con las vacas: una introducción al carnismo* (2011), la psicóloga social estadounidense Melanie Joy acuñó el término "carnismo" y lo describió del siguiente modo:

"El sistema de creencias y la psicología del consumo de carne... el carnismo es una de las muchas atrocidades, una de las muchas ideologías violentas que lamentablemente forman parte del legado humano (...) aunque la experiencia de cada conjunto de víctimas siempre será algo único, las ideologías en sí son similares. La mentalidad que permite este tipo de violencia es la misma. Es la mentalidad de dominación y sometimiento, de privilegio y opresión, de convertir a alguien en algo, de reducir la vida a una unidad de producción".

Joy argumenta que la defensa principal del carnismo es la negación, que se expresa por la cualidad de ser imposible de ver: el factor de invisibilidad. Según Carol J. Adams, escritora estadounidense, feminista y defensora de los derechos de los animales, "Si el problema es invisible, entonces existirá invisibilidad ética". Una de las formas de evitar que algo sea visible es no ponerle nombre; "si no lo nombramos, no podemos pensar en ello. No podemos hablar de ello, ni refutarlo, ni cuestionarlo". Otro aspecto de la invisibilidad del carnismo es mantener a las víctimas ocultas, fuera de la vista, fuera de

la conciencia pública El primer paso para cambiar, como indica Joy, es ser consciente de la existencia del sistema y salir de él, porque sin conciencia nunca habrá una elección libre real.

Para ayudar a concienciar, los diseñadores deberían analizar la realidad más allá de la que se ve; con su belleza y su fealdad, con nuestros triunfos y fracasos. Cientos de millones de animales de granja se sacrifican cada día en todo el mundo, y los números siguen aumentando. La expresión de una postura ética hacia estos animales empezó a ampliarse y a vincularse con productos no incluidos en la dieta. Un estilo de vida ético que se corresponde con el consumo en su conjunto ha surgido y se ha desarrollado en base a una concepción básica y lógica: si no es ético comer un animal, no es ético llevarlo puesto o sentarse en él. No obstante, necesitamos seguir avanzando e impulsar el debate hacia nuevos ideales que se correspondan con una sociedad verdaderamente civilizada y humana, que rechace los "somníferos morales" para poder abrazar el diseño limpio. Deberíamos despertar voluntariamente y avanzar hacia un futuro ético en el que nuestra cultura sea consciente y las industrias que la sustenten estén ligadas a nuestros valores más profundos. Como diseñador y como ser humano, quiero trabajar y vivir en una sociedad civilizada genuina, que se libere de la ignorancia y el especismo; es un gran desafío contener al animal que llevamos dentro, pero es un desafío noble. Debemos mantenernos centrados y recordar que nuestra realidad va en consonancia con nuestras elecciones; la moral de los diseñadores contemporáneos es fundamental, pero eres tú quien debe establecerla y expresarla.

En el "clima" actual, el papel del diseñador no puede limitarse ni adherirse solo a la etapa de resolución de problemas. Debemos estar en sintonía con la naturaleza y predecir los desafíos futuros para ir unos pasos por delante de ellos. Debemos trabajar desde un enfoque crítico, visionario y holístico. Tenemos la capacidad de orientar a la humanidad hacia un aura de grandeza y una conciencia progresiva. Para ello, debemos reconocer que todo y todos estamos interconectados; debemos pensar con una mentalidad unificadora que abarque todas las formas animadas e inanimadas. Desde un punto de vista holístico, los diseñadores deberían añadir a su libro de principios la reutilización de materiales, la reducción del consumo, el comercio justo, el cultivo orgánico y las políticas de residuos que sanarán la tierra, el océano, el aire y el sistema social en el que se apoya nuestro mundo. Así como nuestra ética médica se estableció después de la Segunda Guerra Mundial, existe la necesidad de crear una construcción filosófica ligada a los principios morales en el campo del diseño. Nuestros conceptos deben sumergirse en mayores profundidades y aspirar a reformular la mentalidad de las próximas generaciones, a reformar el mundo material y revelar la armonía en la que debería existir el diseño. El diseño debe luchar contra la ignorancia y la brutalidad, y aspirar a una mayor conciencia y armonía. Ya no es una cuestión de evolución, sino de supervivencia. (...)

Erez Nevi Pana
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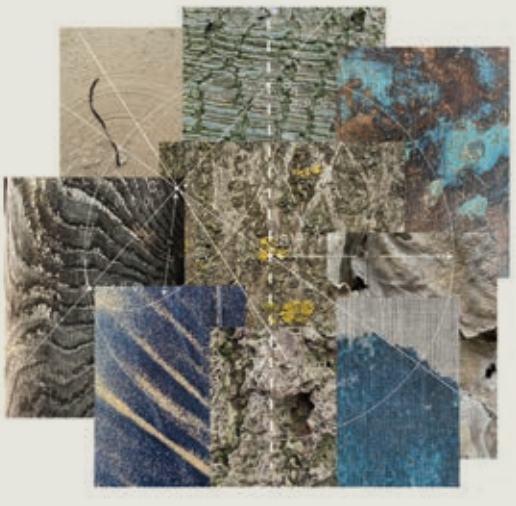
04

Decisiones conscientes sobre materiales. Un enfoque sistémico para re-enmarcar nuestra relación con los materiales y acelerar un futuro de impacto positivo

Cristina Freire

Estamos inmersos en una crisis de sostenibilidad alimentada por nuestro modelo industrial de "extraer, fabricar, consumir y desechar"[1] y nuestra cultura de "usar y tirar"[2]. Necesitamos un cambio urgente y sísmico de un crecimiento lineal a una prosperidad sostenible. El impacto positivo puede constituir el núcleo de nuevas ideas, proyectos y modelos de negocio, integrando todos los aspectos de la sostenibilidad y creando un valor tangible y duradero. Podemos re-enfocar nuestra conversación creativa con los materiales con un propósito de impacto positivo. Aplicando el pensamiento sistémico, los profesionales de los materiales pueden imaginar una 'nueva normalidad'. Una relación re-enmarcada con los materiales, un nuevo *modus operandi* y nuevas oportunidades aprovechando el potencial de la circularidad y la tecnología pueden actuar como palancas de cambio. Más allá de las oportunidades inmediatas que las decisiones conscientes sobre materiales pueden generar en productos y edificios, podemos acelerar radicalmente un futuro de impacto positivo.



HACIENDO FRENTE A UN DESAFÍO INELUDIBLE

El 50 aniversario del Día de la Tierra[3] nos ha visto inmersos en una crisis de sostenibilidad a una escala nunca vista: emergencia climática, escasez de agua, 'sopa de plástico', contaminación del aire, crisis migratoria... Esta crisis no se creó ni ocurrió de la noche a la mañana. Es una consecuencia de decisiones. Decisiones a gran escala, a pequeña escala y a todas las escalas intermedias. Decisiones políticas, corporativas y de los consumidores. Decisiones de organizaciones consolidadas en el mercado y decisiones de los recién llegados. Un complejo supra-sistema de decisiones interconectadas e interdependientes que da forma a nuestro mundo y que ejerce una mayor inercia a medida que avanza.

Nuestro modelo industrial de "extraer, fabricar, consumir y desechar"[4] y nuestra cultura de "usar y tirar"[5] vinculan inextricablemente el crecimiento con la insostenibilidad. La ciencia es inequívoca e irrefutable: nuestro sistema económico dependiente de un crecimiento continuo conduce a eventos climáticos más extremos, menor acceso al agua, más contaminación y mayor desigualdad tanto en las economías maduras como en las emergentes. Nuestro estilo de vida más allá de los límites planetarios ya ha traspasado una serie de "puntos de inflexión" en los sistemas naturales, y las emisiones de gases de efecto invernadero tendrían que reducirse drásticamente para evitar los peores impactos[6]. El mundo va camino de consumir como si hubiera tres planetas Tierras en 2050[7].

Estamos presenciando las consecuencias de las decisiones fundamentalmente erróneas de una era de dominio humano y de arrogancia sobre el planeta y sobre todo lo que vive o existe en él. Una trampa de crecimiento que descompone los sistemas homeostáticos y rompe las conexiones simbióticas en todos los ámbitos imaginables.

Otro mundo es posible bajo decisiones diferentes. Necesitamos un cambio urgente y sísmico del crecimiento lineal a la prosperidad sostenible, de la cantidad al valor.

PULSANDO EL BOTÓN DE REINICIO

Los profesionales de los materiales (diseñadores, arquitectos, artistas, ingenieros...) pueden colaborar con los innovadores urbanos y digitales y con otras voces comprometidas a activar el cambio e imaginar juntos una "nueva normalidad". Un reinicio que fomente el bienestar y la regeneración en lugar del crecimiento y el consumo a toda costa. Juntos podemos liderar el camino habilitando nuevas opciones conscientes... y eligiéndolas. Creando prototipos y construyendo con una apuesta por esas nuevas opciones e inspirando a otros a hacer lo mismo.

Hasta el 80% de los impactos ambientales de los productos se determinan en la fase de diseño[8]. Las actividades de gestión de materiales son responsables de dos tercios de las emisiones globales de carbono[9]. Nuestras elecciones de materiales tienen consecuencias, positivas o negativas, en el uso de energía, en el uso de agua y en la salud y el bienestar de los usuarios de productos y edificios. A corto plazo hay una oportunidad muy clara y relevante para tomar decisiones conscientes con respecto a los materiales.

Pensando en grande, apostar por tomar decisiones más conscientes sobre los materiales puede provocar conversaciones creativas más profundas. Puede dar lugar a una mezcla alquímica de exploración, imaginación, serendipias y conexión para llegar a preguntas únicas e ideas diferentes sobre cómo pensar, construir e inspirar de maneras completamente nuevas y que aceleren el cambio.

IMPACTO POSITIVO "POR DEFECTO"

El concepto de ecodiseño o diseño para el medio ambiente ya existía en la década de 1990 como estrategia para reducir los impactos ambientales asociados con los productos y los procesos de producción. Los diseñadores estaban adoptando un nuevo *ethos* que perseguía una re-calibración entre la actividad humana y el impacto negativo en los sistemas naturales. El Protocolo de Kioto, un documento que establece objetivos vinculantes para la reducción de las emisiones de gases de efecto invernadero introducido en 1997 y ratificado en 2005, identificó varios desafíos en los que el diseño podría tener una contribución clave[10]:

> "(...) calidad de vida, el uso eficiente de los recursos naturales, la protección de los bienes comunes mundiales, la gestión de los asentamientos humanos, el uso de productos químicos y la gestión de los residuos humanos e industriales y el fomento del crecimiento económico sostenible a escala mundial".

Esto puede interpretarse como un llamamiento a abrazar las raíces del diseño, que comenzó como un sistema de resolu-

ción de problemas, y a minimizar los impactos negativos tanto en el planeta como en la sociedad. Un enfoque de "hacer menos daño".

En la actualidad el concepto de "neutralidad" del impacto es protagonista del debate tanto en el ámbito corporativo como político. Un número cada vez mayor de organizaciones, ciudades y regiones están anunciando sus compromisos de ser neutrales en carbono en 2050, tal como se consagró en el Acuerdo de París[11], que sucedió al Protocolo de Kioto en 2015.

Para un número cada vez mayor de profesionales, organizaciones y consumidores, sin embargo, el listón está más alto: la idea de generar un impacto positivo en las personas, el planeta y la economía está ganando fuerza cada día.

Existe un potencial aún inexplorado de impacto positivo que debe estar en el núcleo de nuevas ideas, proyectos y modelos de negocio. Un potencial de integrar todos los aspectos de la sostenibilidad y centrarse en crear, mantener y distribuir valor para lograr una prosperidad sostenible.

Lo mismo ocurre con las reflexiones sobre materiales y las elecciones de materiales. Podemos mirar al proceso de toma de decisiones con respecto a los materiales a través de una lente ampliada y poner el foco en acelerar el impacto positivo.

EL PENSAMIENTO SISTÉMICO APLICADO A LAS DECISIONES SOBRE MATERIALES

El pensamiento sistémico se ha utilizado ampliamente para abordar problemas complejos o para replantear marcos conceptuales[12]. Mirar a través de una lente sistémica significa tener una visión holística, explorar el contexto, discutir los límites, observar dinámicas y profundizar acerca de las conexiones e interconexiones.

Aplicado a las decisiones con respecto a los materiales, un enfoque sistémico puede ayudarnos a identificar oportunidades para abordar simultáneamente diferentes ángulos y para replicar el impacto positivo a través de todo el sistema.

Con el fin de explorar cómo crear el caldo de cultivo ideal para un enfoque sistémico en nuestra conversación creativa con los materiales, podemos centrarnos en las siguientes palancas de cambio:

1. Re-enmarcar nuestra relación con los materiales. 2. Adoptar un enfoque verdaderamente colaborativo. 3. Inspirarnos en el pensamiento circular. 4. Diseñar para el impacto positivo. 5. Aprovechar la tecnología digital.

Re-enmarcar nuestra relación con los materiales

Un enfoque de impacto positivo en las reflexiones sobre materiales y las elecciones de materiales trasciende el ámbito de la ciencia y puede ser una llamada de atención para repensar nuestro papel como seres humanos dentro de los sistemas naturales [13, 14]. Nuestro enfoque de "reclamar y explotar" los materiales no es coherente. Tenemos la oportunidad de reprogramar la ecuación con un papel ajustado para los seres humanos, reconociendo que hemos sido demasiado exclusivistas, prescriptivos y limitantes a la hora de determinar qué valor, qué significado y qué oportunidades presentan o representan los materiales. De hecho, ver los materiales a través de ojos sesgados nos ha empujado a crear sin descanso materiales nuevos para satisfacer nuestras necesidades, nuestros objetivos y nuestros requisitos.

Podemos entablar una relación con los materiales en el marco de un acuerdo diferente.

Si dejamos a un lado las connotaciones existentes asociadas con los materiales y vamos más allá de los valores estéticos, sociales, ambientales y tradicionales del diseño podemos ampliar y profundizar las conversaciones creativas con los materiales y permitir un intercambio recíproco, así como un sistema verdaderamente dinámico.

Podemos reconocer la complejidad y la incertidumbre. Podemos aceptar la coexistencia del cambio -un material existente muta-, la revelación -se revela una potencialidad dentro de un material existente- y la emergencia -algo nuevo se desarrolla-[15].

Podemos aprovechar la sabiduría inherente en imitar la naturaleza[16], así como encontrar inspiración en las conexiones simbióticas y en los procesos de apoyo mutuo que ocurren en los sistemas naturales[17].

Podemos ser lo suficientemente curiosos, y lo suficientemente testarudos, como para mirar bajo la superficie, para llegar a conocer más sobre cada material y para entender mejor las interconexiones con otros materiales: lo obvio y lo no tan obvio, las historias ocultas detrás de cada material, los hilos aparentemente dispares que se entretejen.

Podemos ir más allá de las especificaciones técnicas, más allá de los logotipos y más allá de las etiquetas. Podemos crear y mantener un espacio para nosotros y para los materiales. Podemos mantener los ojos abiertos para dar cabida a ideas poco comunes, conexiones inusuales y oportunidades para crear nuevos espacios para la expresión material.

Tal vez no elegimos un sistema material para el impacto positivo, sino que dejamos que surja[18].

Adoptar un enfoque verdaderamente colaborativo

Pensar sistémicamente no servirá de nada a menos que actuemos sistémicamente.

Podemos aprovechar la fuerza colectiva y aglutinar información, ideas y pensamiento crítico de muchos campos diferentes y muchas voces diferentes en nuestras conversaciones creativas con los materiales. Con una perspectiva de sumar en lugar de limitar o elegir. No hay una "única respuesta correcta"[19].

Artistas, especialistas e innovadores en los campos de la sostenibilidad, las tecnologías digitales o el futuro urbano ya están colaborando en algunas conversaciones creativas con los materiales.

Al involucrar a estos profesionales, así como al considerar cómo y dónde buscar más allá, el concepto de "neo-generalistas" puede ser particularmente inspirador[20]:

> "Cuando el contexto cambia, ellos también. Son fluidos y flexibles. Sus preferencias generalistas, combinadas con lo que han experimentado a través de actividades especializadas, contribuyen al desarrollo de meta-habilidades: capacidades de cruce de fronteras que son esenciales a medida que respondemos a grandes problemas o aprovechamos oportunidades imprevistas.
> En términos de red, donde un especialista puede ser considerado como alguien que vive en un nodo y un generalista como alguien que ocupa un espacio liminal en los puentes entre nodos, el neo-generalista es alguien fluido que se mueve constantemente entre puente y nodo. Son adaptables, receptivos, catalíticos".

Los neo-generalistas pueden ayudar a crear círculos virtuosos de exploración y aprendizaje a lo largo de la conversación creativa.

Tenemos la oportunidad de fomentar un nuevo *modus operandi* para tomar decisiones conscientes sobre los materiales más allá de la negociación entre partes o la compensación de las consecuencias negativas para unos u otros. Podemos aspirar a co-crear soluciones que integren todas las voces involucradas y a tomar decisiones honestas y transparentes durante todo el proceso[21].

Crear esta dinámica de trabajo fundamentalmente colaborativa al comienzo de nuestra conversación creativa es de vital importancia. Integrar todas las decisiones sobre los materiales en la fase de diseño puede evitar una cascada de impactos negativos más adelante en el proceso, así como detectar o crear oportunidades para activar el cambio.

Al promover un propósito compartido de impulsar el impacto positivo y al permanecer abiertos al conocimiento, la experiencia y la mirada única del otro, estaremos alineados con los términos de nuestra nueva relación con los materiales.

Podemos entablar una relación en el marco de un acuerdo diferente. Podemos ampliar el significado de la honestidad material y la expresión material[22] en el contexto de nuestra conversación creativa.

Inspirarnos en el pensamiento circular

El concepto de economía circular[23], también conocido como circularidad, ha adquirido gran notoriedad en los últimos años, con los Objetivos de Desarrollo Sostenible de las Naciones Unidas[24], la Fundación Ellen MacArthur[25] y el libro de Kate Raworth Doughnut Economics[26] impulsando un interés global en el tema. Una economía circular aspira a ser un "sistema de ciclo cerrado" que construye y mantiene valor y que es capaz de "desvincular el crecimiento económico y el desarrollo del consumo de recursos finitos[27]". En una economía circular, los residuos se convierten en materia prima para el siguiente ciclo material y los consumidores se convierten en usuarios, ya que los recursos "se utilizan pero no se agotan"[28].

Este concepto se basa en la filosofía de diseño "de la cuna a la cuna", que a su vez se inspira en los sistemas vivos[29] reconociendo la diversidad como fuerza motriz de los sistemas resilientes, mirando a los residuos como alimentos y migrando hacia los recursos renovables[30].

Uno de los pilares de los modelos circulares es el énfasis en diseños más eficaces que eligen y gestionan los materiales conscientemente a lo largo de su ciclo de vida.

Las decisiones conscientes sobre materiales son esenciales para acelerar la circularidad. Diseñar productos o edificios que se puedan utilizar durante un período de tiempo prolongado y que puedan ser fácilmente desmontados, adaptados, re-manufacturados o re-acondicionados fomenta la circularidad, y varias estrategias de diseño circular aspiran a estos objetivos[31].

A su vez, la circularidad ofrece una oportunidad única para nuestras conversaciones creativas con los materiales. Una oportunidad para explorar nuevos caminos de creatividad, innovación y colaboración. Una oportunidad para pensar en sistemas y en ciclos de materiales.

Un número cada vez mayor de proyectos e iniciativas integran los principios de circularidad en el diseño de productos, edificios y ciudades, aunque este campo todavía se puede considerar incipiente en comparación con su potencial.

Los modelos circulares se basan en principios, estrategias, directrices y herramientas que nos ayudan a identificar y evaluar las decisiones sobre materiales[32]. Pero no existe un enfoque único ni un solo camino hacia la circularidad. Hay diferentes puntos de partida, diferentes opciones y diferentes viajes.

El pensamiento circular abre un mundo de posibilidades.

Diseñando para el impacto positivo

A modo de punto de partida para la conversación creativa, es fácil sentir intuitivamente cuál es el "camino consciente" a recorrer: evitar las materias primas escasas y las sustancias nocivas, priorizar materiales localmente disponibles y que ya hayan sido utilizados previamente, utilizar únicamente lo necesario sin desperdiciar materias primas o minimizar las mezclas de materiales, por ejemplo.

Al abordar la sostenibilidad, sigue siendo común ver enfoques verticales centrados en aspectos específicos de los materiales (huella de carbono, contenido reciclado o cadena de suministro responsable[33], por ejemplo). No obstante, un número cada vez mayor de proyectos e iniciativas están integrando aspectos adicionales y aspirando a un resultado "circular" o "saludable" para materiales, productos o edificios. Y están aprovechando algunas de las metodologías, bases de datos y herramientas de evaluación de impacto específicas que están disponibles en el mercado[34]. Estas herramientas pueden ayudar a analizar, comparar y debatir opciones materiales con un lenguaje común, aportando así un gran valor a la conversación creativa. También pueden ayudar a identificar productos químicos relevantes por su potencial riesgo[35, 36]. Sin embargo, es importante mantener un enfoque más amplio que busca abordar tantas capas del impacto positivo como sea posible. No hay ningún recurso único e integral para el impacto positivo.

Al considerar los materiales creados por el hombre, una mayor comprensión de por qué se crearon y de las dinámicas geopolíticas, económicas y ambientales detrás de su ciclo de vida puede aportar información útil sobre sus oportunidades e impactos, además de añadir contexto[37]. Se están explorando cada vez más ideas sobre cómo prolongar su uso o reutilizarlos en productos y edificios, pero están aún lejos de ser la norma[38]. Los productos químicos nocivos o potencialmente nocivos pueden estar presentes o pueden liberarse involuntariamente mediante el desgaste o el lavado de materiales, como en las fibras sintéticas y los textiles. Los micro(nano)plásticos son un recordatorio de que carecemos de una comprensión holística sobre los impactos de al menos algunos materiales hechos por el hombre en los sistemas naturales[39].

Es importante tener en cuenta que una elección de impacto positivo en un proyecto puede tener un mayor impacto ambiental, social o financiero en otro debido a circunstancias específicas del proyecto, de la ubicación o del momento temporal. Cómo ser inclusivo también varía en cada contexto. Se requieren enfoques específicos y particularizados para cada conversación creativa.

Salirse de la ruta típica puede ser muy relevante en un contexto de impacto positivo. Los materiales estándar "listos para usar" rara vez son la única opción disponible. Explorar ideas experimentales, encontrar inspiración en la artesanía local o tradicional, reemplazar soluciones industriales por propuestas innovadoras hechas por empresarios locales o empresas familiares o combinar materiales olvidados con innovación tecnológica son grandes oportunidades para añadir nuevas capas a nuestras conversaciones creativas con los materiales.

Aprovechar la tecnología digital

Dada la compleja dinámica y la multitud de ángulos y voces que abarca un enfoque sistémico, explorar cómo las tecnologías y herramientas digitales pueden ayudarnos a crear nuevos espacios de oportunidad adquiere una especial relevancia. La tecnología Blockchain y sus implicaciones para el concepto de gemelos digitales, por ejemplo, está dando solución a uno de los grandes retos de las decisiones conscientes sobre materiales: cómo realizar un seguimiento fiable y seguro y cómo compartir información relevante sobre los materiales a medida que éstos fluyen a lo largo de su ciclo de vida, desde su fabricación hasta su uso y reutilización. Este seguimiento requiere una gran cantidad de información, que no siempre está siempre fácilmente disponible o que puede estar protegida por derechos de propiedad intelectual.

Los pasaportes digitales de materiales, el gemelo digital más ampliamente utilizado, ya están apoyando decisiones conscientes sobre materiales. Como parte de la Estrategia de Datos de la Unión Europea anunciada en febrero de 2020[40], se establecerá un espacio de datos común para aplicaciones circulares inteligentes y se desarrollarán pasaportes digitales para el entorno construido que proporcionen información sobre origen, durabilidad, composición y reutilización, reparación y reciclaje. Podemos explorar posibilidades para ampliar este enfoque circular e integrar capas adicionales de impacto positivo. Un enfoque holístico podría permitirnos aprovechar el potencial de la minería urbana[41] para revitalizar los ciclos de materiales y las cadenas de valor locales, así como impulsar un modelo de prosperidad sostenible.

Definitivamente veremos mayores niveles de automatización en los sistemas de recopilación de datos a través de la teledetección, el escaneo láser o las nubes de puntos. Así como nuevas iniciativas que aprovechan la realidad virtual, la realidad aumentada y el aprendizaje automático. Más allá de las posibilidades de recopilación de datos, una mayor automatización permitirá dar vida a nuevas ideas sobre cómo visualizar decisiones conscientes sobre materiales o sobre cómo compartir aspectos de nuestra conversación creativa con los usuarios o con el público en general. Esto permitirá habilitar nuevas formas de conectarnos, crear conciencia e inspirar a otros.

Otro impulso a las decisiones conscientes sobre materiales vendrá de las plataformas o mercados digitales de intercambio. Las plataformas colaborativas facilitan y pueden hacer más accesibles las opciones de compartir, donar, intercambiar o comercializar materiales y productos nuevos o usados. Podemos explorar

las posibilidades de nuevos materiales o de nuevas opciones para materiales ya utilizados aprovechando el potencial de las plataformas existentes[42] o uniendo fuerzas para crear nuevas plataformas o mercados digitales de intercambio de materiales que impulsen el impacto positivo.

ACELERANDO EL CAMBIO

La actual crisis de sostenibilidad evidencia la delicada interconexión entre los seres humanos y los sistemas naturales, así como la urgencia de pulsar el botón de reinicio.

Se presenta una oportunidad crucial para re-imaginar nuestras conversaciones creativas con los materiales con un propósito de impacto positivo.

Al establecer nuevos términos para nuestra relación con los materiales y para nuestro proceso creativo colaborativo, podemos explorar nuevos significados para la honestidad material y la expresión material.

El alcance va más allá de las opciones obvias y de las voces obvias.

Siendo ambiciosos y aspirando a "llegar más lejos" podemos integrar poco a poco nuevas capas de impacto positivo y convertirnos en agentes de cambio tanto a nivel local como global.

Aprovechando el pensamiento circular y las nuevas tecnologías digitales podemos crear nuevos espacios de oportunidad.

Pensar y actuar sistémicamente puede ayudarnos a tomar decisiones conscientes sobre materiales que permitan crear y mantener valor. Más allá de las oportunidades inmediatas que nos brindan las elecciones conscientes de materiales, podemos acelerar radicalmente un futuro de impacto positivo.

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11. El Acuerdo de París pide que se tomen medidas urgentes para mantener un aumento de la temperatura global durante este siglo muy por debajo de los 2 grados centígrados por encima de los niveles preindustriales y que prosigan los esfuerzos para limitar el aumento de la temperatura aún más hasta los 1,5 grados centígrados.

12. WILLIAMS, A., "Systems thinking: A review of sustainability management research", en *Journal of Cleaner Production*, 2017, 148, pp. 866-881.

13. HARAWAY, D.J., *Staying with the Trouble. Making Kin in the Chthulucene*, Duke University Press, Durham y Londres, 2016, pp. 36-57.

14. MARGULIS, L., SAGAN, D., *What is Life?,* University of California Press, Berkeley, 1995, pp. 17-18.

15. VAN GEERT, P., "Unfolding potential as dynamic emergence. A view from the theory of complex, non-linear, dynamic systems", en *The Journal of Cognitive Education and Psychology* 2014, 13, 3, pp. 324-356.

16. SZAKY, T., *Outsmart Waste: The Modern Idea of Garbage and How to Think Our Way Out of It,* Berrett-Koehler Publishers, San Francisco, 2014, p. 20.

17. ŠIJAKOVIĆ, M., "Symbiotic architecture: Redefinition of recycling design principles", en *Frontiers of Architectural Research*, 2018, 7, 1, pp. 67-69.

18. Jurgen Hoogendoor (empleado del municipio de Amsterdam) presentó en 2016 el lema del consorcio de innovadores urbanos formado por DELVA Landscape Architects/Urbanism, Metabolic y Studioninedots al diseñar un distrito circular en Buiksloterham, Amsterdam con la frase "no se diseña una ciudad circular resiliente; se permite que surja". Extraído de: DELVA LANDSCAPE ARCHITECTS, *Circular Cities: designing post-industrial Amsterdam. The case for Buiksloterham*, DELVA Landscape Architects, Amsterdam, 2016, p. 7.

19. Según la tesis del filósofo jurídico Dworkin de 1985, siempre hay una respuesta correcta como cuestión de derecho que el juez debe descubrir en situaciones en las que los derechos legales de las personas se ven comprometidos.

20. MIKKELSEN, K., MARTIN, R., *The Neo-Generalist. Where you go is who you are*, LID Publishing Ltd., Londres, 2016, p. 34.

21. Un ejemplo de proyecto reciente en el que he colaborado y que ha adoptado este enfoque es MO de Movimiento, en Madrid. Las conversaciones con el fundador del proyecto Felipe Turell y el diseñador del proyecto Lucas Muñoz a lo largo de nuestra colaboración han sido particularmente inspiradoras.

22. NESBITT, K., *Theorizing a new agenda for architecture: an anthology of architectural theory 1965-1995*, Princeton Architectural Press, Nueva York, 1996.

23. KORJONEN, J., A.A.V.V., *"Circular Economy: the concept and its limitations"*, en Ecological Economics, 2018, 143, pp. 37-43.

24. La totalidad de Estados Miembros de las Naciones Unidas adoptaron en 2015 diecisiete Objetivos de Desarrollo Sostenible (ODS) como parte de la Agenda 2030 para el Desarrollo Sostenible. Los ODS son un llamamiento urgente a la acción para que todas las naciones impulsen la paz y la prosperidad de las personas y el planeta.

25. La Fundación Ellen MacArthur se puso en marcha en 2010 para acelerar la transición a una economía circular.

26. RAWORTH, K., *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*, Penguin Random House, Londres, 2017.

27. WEBSTER, K., *The circular economy. A wealth of flows*, Ellen MacArthur Foundation Publishing, Cowes, 2015, p. 16.

28. Ibid. 27. p. 19.

29. MCDONOUGH, W., BRAUNGART, M., *Cradle to Cradle: Remaking the Way We Make Things*, North Point Press, Nueva York, 2002.

30. Ibid. 27. p. 15.

31. BAKKER, C., A.A.V.V., *Products that last: product design for circular business models*, TU Delft Library, Delft, 2014, pp. 82-107.

32. Algunos ejemplos de guías y recursos sobre diseño circular son las iniciativas colaborativas de la Fundación Ellen MacArthur Fundación con IDEO (productos), con ARUP (edificios) y con partes interesadas clave en la cadena de valor textil (moda).

33. Esto es especialmente relevante para los minerales de conflicto, el cobalto, el algodón o la madera, por ejemplo. Debido a los altos impactos sociales y ambientales de su cadena de valor, las políticas públicas y las empresas están sumando esfuerzos para lograr un suministro responsable y trabajando en estándares.

34. Puede consultarse un resumen de las metodologías, herramientas, etiquetados y sistemas de certificaciones para productos y edificios en: HEINRICH, M., LANG, W., *Materials Passports: Best Practice Innovative Solutions for a Transition to a Circular Economy in the Built Environment*, Technische Universität München, Múnich, 2019, pp. 30-43.

35. Puede consultarse un resumen de sustancias químicas de interés en: HEINRICH, M., LANG, W., *Materials Passports: Best Practice Innovative Solutions for a Transition to a Circular Economy in the Built Environment*, Technische Universität München, Múnich, 2019, p. 13.

36. En algunos casos es fácil encontrar opciones "sostenibles" (por ejemplo, productos con una etiqueta ecológica) para comprar o testear en un nuevo proyecto, como por ejemplo pinturas o barnices sin Compuestos Orgánicos Volátiles (COV), resinas sin bisfenol A (BPA) ni formaldehído o pigmentos sin dióxido de titanio. Cuando las opciones son limitadas, las herramientas de evaluación de impacto (véase 34) y la información técnica disponible sobre cada producto pueden servir de apoyo a una evaluación que valore los riesgos y busque minimizar los impactos.

37. A modo de ejemplo, el museo interactivo de FashionforGood en Amsterdam es una iniciativa de sensibilización acerca de las cadenas de valor de materiales hechos por el hombre y sus impactos y oportunidades (específicamente centrándose en fibras sintéticas). El poliéster, por ejemplo, es una fibra sintética derivada del petróleo que tiene un proceso de producción de alto impacto y que contribuye a la contaminación por microplásticos. La mayoría del poliéster utilizado actualmente en los productos es virgen debido a las limitaciones para su reciclaje. La mayoría de los hilos y fibras de poliéster reciclados en el mercado provienen de polietileno tereftalato (PET), específicamente de botellas de plástico.

38. Un ejemplo es Circl, un pabellón de ABN AMRO en Amsterdam que ha sido diseñado de acuerdo con los principios de la economía circular e inclusiva. El concepto espacial se centra en la adaptabilidad y muestra algunas aplicaciones de materiales innovadores y productos reciclados o reciclados.

39. HU, D., A.A.V.V., "Microplastics and nanoplastics: would they affect global biodiversity change?", en *Environmental Science Pollution Research,* 2019, 26, pp. 19997–20002.

40. COMISIÓN EUROPEA, *Una estrategia europea de datos*, Oficina de Publicaciones Oficiales de las Comunidades Europeas, Bruselas, 2020.

41. El término minería urbana se utiliza en este contexto para referirse al proceso de recuperación de materiales de productos, edificios y/o residuos para que puedan ser utilizados, reutilizados y reciclados. Como ejemplo, en Europa el proyecto ProSUM ha desarrollado una plataforma regional de "minas urbanas". Y en Amsterdam, el consorcio formado por la Universidad de Leiden, TU Delft, Waag Society y Metabolic ha establecido un mapa "geológico" que muestra las concentraciones de metales valiosos en edificios para informar y planes futuros para extraer materiales de segunda mano.

42. A modo de ejemplo, Excess Materials Exchange es un mercado digital lanzado en los Países Bajos en 2017 para encontrar opciones de reutilización de alto valor para materiales usados.

Imágenes

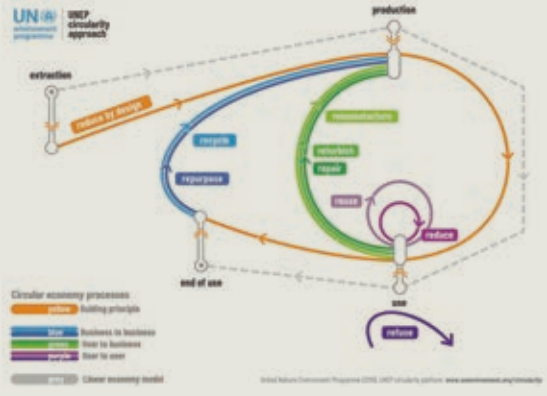
New Lenses, New Cartographies. Lucas Muñoz&Cristina Freire, 2020.

05

The circular nature of materials: emulating nature

Manuel Quirós

The transition from a linear economy to a circular one brings with it a series of practical challenges for the entire process chain: from the extraction of raw materials, processing, product or services design, manufacturing, usage and end of usage. We may ask ourselves: What are the strategies to comprehend and apply this new paradigm towards a circular economy? This article deals with some aspects within a framework of ideas in this complex circular system to help and guide designers and entrepreneurs to make progress with regard to materials in this paradigm change. It also describes some of Nature's strategies from a systemic perspective and their potential use.



The current economic and productive model that affects the entire global system, irrespective of the activity or sector, continues to be mostly linear. The process begins with the extraction (destruction) of pristine natural resources that are converted into raw materials which subsequently must be transformed in order to become products or services that shall be packaged, distributed, sold and used, to finally end up in a landfill after the end of their cycle of use. This model was globally accepted for decades and is currently being questioned due to many of its aspects that have a chronic and colossal environmental and social impact; to the realistic acknowledgement of the finite nature of the resources which must then be replaced by others, thus re-questioning the entire process itself. Government, scientific, business and financial organisations have spent more than a decade warning us of a growing pressure on global resources and the climate, owing to human activity (IPCC, 2014; WBCSD, 2014; *European Commission*, 2018). The circular economy seeks to lead to global sustainability and is a promising means to reduce the pressure exerted by humanity. This model constitutes a breakthrough (*European Commission*, 2014), whether by means of design or an economy that does away with the concept of waste, incorporating cascades where both biological and industrial materials are reincorporated without losing their value and utility. This model was launched in the 80's by Börlin and Stahel (Börlin, 1987), further developed by McDonough and Braungart (2002), and finally globalised by the Ellen McArthur Foundation (2000), **(fig. 02)** and the UN **(fig. 03).** It achieves a greater degree and depth of sustainability and regeneration, which is very interesting and hopeful. Additionally, the model reconnects us to nature, of which we are a part, emulating natural operations that have functioned in a

sustainable and regenerative fashion for 3.8 billion years, for example, in water and carbon cycles, or in the flow of materials where the concept of waste does not exist and is replaced by that of resources (Quirós, 2016, 2019). The link between nature and design is vital and it must be consciously applied to improve innovation and lead towards sustainability and regeneration (Bar-Cohen, 2006). This process may be achieved by considering the functioning principles of living systems, comprehending survival strategies in nature, evolution and growth, as well as by a more in-depth and holistic understanding of the survival techniques and processes used in eco-systems on a daily basis. The circular model that it refers to is presented as a logical opportunity for valuable strategies that promote aspects such as recycling, systematic re-use, preventing the loss of valuable materials, ecological design as good design, and industrial symbiosis. Additionally it can generate new employment opportunities, sustained economic growth and development, demonstrating new associated business models that may direct Europe, currently the leader and promoter, towards a radical waste reduction that will concurrently decrease elevated levels of CO_2 and NH_4 emissions, and the consequences for the climate as well as other environmental impacts. This "new" model is a definitive optimisation of the system that goes beyond materials to include a careful management of its flow, whether within the technical cycle where they are maintained as much as possible, reused, refined and finally recycled, or within the biological cycle which promotes a cascade of non-toxic materials that can undoubtedly serve as fertiliser for natural soil productivity as the concept of natural capital. This afore-mentioned biological cycle refers to the use of organic materials in industrial processes which have the innate ability to return to the natural regenerative cycle. On the other hand, the technical cycle requires the capacity for disassembly and repair in the conceptualisation and design of products that may possess a high level of quality and durability that may be recovered within the flow of materials.

In the diagram displayed in Figure 02, the smallest circles constitute those that retain the greatest value and must be understood in 3 dimensions as if it were a top-down view of a cone. The expanding success of the model, involves the progress in and understanding of sectors such as industrial design, textile design or architecture, inverse logistics and undoubtedly, the emergence of new associated business models. It is estimated that it may have an impact on cost savings to the tune of more than 600-700 billion euros in Europe, regardless of the type of consumer goods and services (*The Ellen MacArthur Foundation*, 2012-2013), and also mitigate the risks linked to price uncertainty given the potential volatility in materials supply due to climate change (Goddin et al., 2014; Report of the European Commission (2014). Since 2000, sectors such as electronics, automobiles, home appliances or textiles, to name just a few, have been aware of the increase in the number of users and the volatility associated with supply security (*The Mckinsey Commodity price index* 1999-2001).

On the other hand, circular design for the technological cycle is also operational in services products, where technical materials or nutrients may be constantly and safely recycled into new materials and products. To establish the continued flow of resources in the so-called *wastes or rejects*, they must be recycled into materials that possess properties similar to those of the original material. This requires a primary or tertiary recycling of materials (McDonough, 2013), understood to be a mechanical re-processing into another product with equivalent properties. McDonough and Braungart stress that the quality of the material must be maintained, and distinguish between supra-recycling and infra-recycling where the latter does not permit a cyclical flow of resources but only delays the linear flow from production until the aforementioned waste. Therefore, infra-recycling means that a material is re-processed as a product of lesser value or of potentially lesser value. Supra-recycling, on the other hand, refers to retaining or improving the properties of the material, the latter being a relatively new and little-explored concept, although there are a few interesting cases in the textile sector, such as Elvis and Kresse or Freitag, to name a few. In line with this distinction, the processes that may be deemed quaternary recycling or external recycling do not fit within a circular approach to product design, according to certain authors (Kumar et al., 2011).

The circular model not only emulates natural strategies but also build a model based on waste disposal and pollution associated with the negative impacts of business "as usual" or *b.a.u*. To this classification we must add the resulting impact of greenhouse gas emissions as well as those that affect life on earth, in water and in air.

A second concept of this circular model is based on the favourable maintenance of the quality of products and their materials in order to preserve their value within the system (Steinmann, Z.J.N. et al. 2019). Finally, the circular model focuses on the regeneration of the natural systems that we depend upon, on which the welfare of the planet's inhabitants and the basis for a global economy rests. This was already stated by Ivon Chuinard, the creator and owner of the multinational textile company, Patagonia: "you can't do business on a dead planet" (Chuinard, 2016).

3 potential strategies that we should not underestimate rest on the aforementioned basis initiated by Stahel, McDonough and Braungart:

Slowing resource loops by designing long-lasting goods whose shelf life may be extended (for example, by repairing or remaking/refabricating), where the period of use of the products is extended and/or intensified, which would be progress in the deceleration of required resource loops.

Promoting *closed resource loops* that feed back, thus avoiding massive extractions of pristine materials.

Increased *resource efficiency*, understood as a backup to the previous point on reduced material usage in the initial stages of the product life cycle, the current basis of the production machinery.

Inaction and the resulting slowdown of this aspect towards circularity have a series of associated risks that businesses are already accounting for in their strategies and balances, as they affect the implicit value chain. Thus, for example, the historical prices of materials and/or future price projections are normally used to identify the risk of price variations and thus, their perspective and volatility (*The McKinsey Global Institute*; Duclos *et al.,* 2010). On the other hand, the risks to the continued supply of a specific material for a given product subject to the availability of this material for purchase by the product manufacturer, are well documented (IlbStudio, 2012, various references). But in reality, there is a complex interaction between various elements such as the availability of a material, the competing markets that use this material, supply and demand in each of these markets, the regulatory limits of legal extraction, the political stability of the supplying countries and the capacity of their buyers to absorb cost increases due to these factors. These are enormously complex multilevel projects. Thus, the supply chain risks may be associated to a series of external factors such as supply monopoly, the existence of legal imperatives, weak governments, deficient environmental standards or sources of certain materials such as conflict minerals (European Union, 2014; Yale University, 2018).

Another significant risk that must increasingly be taken into account is the scarcity of future and accessible supply in the earth's crust (EU 2010, Annex V). There is a debate on the concepts of "absolute scarcity" and "economic scarcity" that implies that the cost of extracting the materials increases as the available resources are consumed and the typical output reduces as a consequence of climate change and severe and unexpected environmental phenomena (hurricanes, floods, fires, pandemics,...) Finally, we must mention the growing risk associated with the toxicity of the material, increasingly subject to current legislation and prone to future restrictions which may lead to interruptions in the prolonged use of certain materials, thus limiting their potential use as well as their future economic value. Within the European Union (hereinafter, EU) the current REACH regulation REACH, 2006, from its initials for Registration, Evaluation,

Authorisation and Restriction of Chemicals) also promotes alternative methods to assess the risks of substances that are potentially dangerous and harmful. To this we must add the RoHS Directive (RoHS, EU 2011), also of the EU which prohibits the marketing of new electrical and electronic goods that contain more than the agreed upon limits of lead, cadmium, mercury, hexavalent chromium, polybromides, flame retardants that contain biphenyls (PBB) and polybrominated diphenyl ether (PBDE). Another reference framework is the *Substitute It Now* programme (SIN List, 2014) of the International Chemical Secretariat, based on the criteria established by the EU regulation of chemical products that have identified very high concentrations of certain substances. Finally, the *Cradle to Cradle Certified* ™ list of prohibited chemical products (C2C, 2013) refers to substances that contain more than 1000 ppm owing to their tendency to accumulate in the biosphere, and lead to irreversible negative effects to the health of living beings, including human beings.

I would like to include a brief reference to an aspect that is little known to industry and design professionals: biomimicry. It is a disruptive discipline of strategic design and management for companies regardless of their sector, where the functions of living beings are emulated at different scales (organism-species-ecosystem) and levels (micro-macro-meso) to identify and expand the field of solutions to multiple challenges that we face in this century. Owing to space limitations, I shall only mention what is known to professionals and followers of biomimicry as Life's Principles (hereafter, LP: Figure 04; Baumeister *et al*., 2012) that other European schools have denominated Nature-Inspired Design Processes (Tempelman *et al*., 2015). LPs represent a pattern found in multiple living species that provide us with innovative, inspiring and creative strategies for survival, creating a model that is different from the current one. Adapting ourselves to these laws is an obligatory and non-negotiable challenge, not only for us but also for the ways in which we can contribute to the health of the planet on which we depend (Quirós, 2013). In this way, we see the inter-connections, the links between the species and their habitats. Nature thus shows us the limits that we should not have crossed, as for the first time in history, we have become climate "makers", capable of changing it at a global and systemic scale (Rockstrom et al., 2009)., At the centre of the diagram **(fig. 04)** we read, *"life creates conditions that lead to life"* which represents a fundamental message, a mantra that may be applied to any action developed by our discipline. We shall thus be able to ask ourselves: Does my business/design/proposal *create conditions favourable for life?* LPs can inspire us to find answers within the natural model. Through 6 principles sub-divided into a series of sub-principles that strategically guide us to understand and act with the goal of creating sustainable and regenerative solutions, just as life on Earth has been doing for many millions of years. On the outer layer we read a series of laws that operate inexorably on the terrestrial system and which cannot be ignored. Only if we consider Nature's lessons within a systemic context can we ensure that our designs shall be appropriate for the goal that we seek with sustainable development. This is a key step in biomimicry and what distinguishes it from a more general category of bio-inspired design. The application of these principles require time but once we begin to understand these patterns, we must begin to apply them at the start of any design process, at the stage of establishing the scope, and continue to take them into account and use them throughout the remaining stages of conceptualisation and development. The goal is to translate these natural lessons into design specifications, parameters for quality control, materials selection and other manufacturing or processing options. Although it frequently involves a certain degree of complexity and the full application of the 6 LPs presents certain ongoing limitations, however reproducing all of these patterns is an excellent goal to aspire to, in order to change the way we operate currently. It is interesting to comprehend the multi-disciplinary character of the application of this discipline to those that must be present at the decision-making table of biologists along with designers, engineers, economists, etc.

Ecovative. Biological cycle. The incessant increase in the demand for materials and products is going to create a bottleneck as the middle class develops greater economic access (Kharas and Hamel, 2018). Most of this material is made from finite resources that are used only once and then discarded. A clear example of this type of material/product is that which is used extensively in packaging using polystyrene for protecting shipments and for delivering breakable and not so breakable items. Polystyrene is made of petroleum and is usually used only once. It is voluminous and takes hundreds of years to break down by the action of light, water and wind, meanwhile creating enormous short-term, medium-term and long-term problems. Technically, it can be recycled, but the high economic and environmental costs make its recycling unfeasible. Parallel to this reality and applying the environmental emergency towards circularity, we have access to a large number of agricultural sub-products that are discarded or under-utilised, and that may serve as a potential source of applicability from the circularity described in this article. Bayer and McIntyre (ecovativedesign.com) , the founders of *Ecovative Design*, were inspired when they observed the mushrooms that grew on wooden splinters and how mycelium worked. Mycelium is the plant part of the mushrooms, formed by hundreds of interlinking microfibres produced by spores, which makes it an incredibly strong material when dried, being similar to a natural glue and self-assembly in its functioning. This allowed the team to formulate a new method to produce materials that can replace different products such as petroleum-based expanded plastics, particleboards with formaldehyde, which are known to cause cancer. Since 2007, *Ecovative*, a New York based firm has been seeding agricultural waste with mycelium, placing this material in different moulds according to the product desired **(fig. 05)**. By combining mycelium with agricultural waste, objects such as bricks, protective material for transporting delicate objects, furniture, decorative objects and even fireproof material for multiple uses can be crafted. As the plant material - fungi is completely organic, at the end of its cycle of use, the material can easily be retransformed or discarded, when it returns to the carbon cycle. Fungal mycelium, fed by nutrients from this agricultural waste, extends its network through the available organic material, holding it firmly and after several days of growth, a thermal shock stops it from growing further, thus producing the desired forms without any adverse effect for the users' health (Karana et al., 2018; Ikea; Ecovative).

Thus, materials that are toxic and hard to recycle such as expanded polystyrene (EPS), expanded polypropylene (EPP) or expanded polyethylene (EPE) which are widely used today can already be replaced. It is worth mentioning that mycelium grows in 5/7 days without the need for light or water, making the agricultural sub-product pass through a simple process of dehydration and thermal treatment to stop growth and ensure the absence of spores and allergens.

Within this category of processes we may already include a large variety of natural resources that have not been used until now in the manufacturing industry, such as living micro-organisms, in the aforementioned case. This would include other fungi and bacteria, agricultural waste, algae and compounds derived from plants, animals and micro-organisms, to name just a few. Companies such as Dell, Steelcase, H&M and Ikea are already expanding their scope with the guarantee provided by the *Cradle to Cradle* certification. Meanwhile Ecovative is already moving into the insulation sector with regard to construction, textiles (Mycoflex™), packaging and food-based products.

What began as a laboratory of ideas is today a business reality of great potential and development. Its expansion is guaranteed and the creativity to link business and nature awaits us.

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Images
01. UNEP circularity approach model (2019). Translated by the author.

02. Model of the circular economy according to the Ellen McArthur Foundation.

03. UNEP circularity approach model (2019). Translated by the author.

04. Life's Principles or Nature's survival strategies. Biomimicry Institute ©.

05. Diagram comparing the manufacturing process of a conventional material and a circular one. Modified from Ecovative®.

06

Consuming Signifiers

Joel Blanco

Products speak; they speak of their history, their producers, their ingredients and materials, and undoubtedly, they speak of their owners. In this text, I set out to explore the link between responsible consumption, its labelling, and the creation of consumer identity; and how the industry takes advantage of this phenomenon when positioning products.

Often, certain slogans or labels can be problematic: "Vegan"; "Cruelty Free"; "Green Planet", "Green Product"; "Biological"; "Sustainable"; "Conscious Consumption"; "Recyclable"; "Organic"; "Ethical"; "Palm Oil Free". There's a good chance that any of these labels may awaken in you a certain sense of guilt as a consumer. Guilt for not fulfilling their demands, for not adjusting to their definition of what it means to "consume responsibly", guilt for not fitting within their framework. Often, companies and providers appeal to the moral compass of consumers when advertising their products through slogans, prefixes and brands, endowing their products or services with these seals of confidence. Seals that guarantee the ethical nature of the product and give the client the most responsible or more ethical alternative when buying a cream, dinner, or in general, when investing their money. A logic that says consumption is not incompatible with making the world a better place.

Looking back at recent history, one of the most infamous cases in Spain was that of the "Bio" prefix. From 1993 onwards, the law dictated that the only products in the Spanish market that could include this denomination in their names were those that had been sourced organically - free from chemicals in their manufacturing process[1]. This prefix did not only designate the class of product, it also made the implicit statement that products without this prefix were of lower quality. As may be expected, this did not go down well with large food corporations; they wanted a share of this trade but could not label their products as such. Additionally, as we have said,

the rise of biological food products gave their products an image of lesser value. Under pressure from these beleaguered companies, in 2000, the Ministry of Agriculture changed the laws involving the use of the "Bio" prefix, creating the "Eco" prefix to exclusively refer to organic products. From that moment onwards, anyone could use the original label for their products, which were still assumed by consumers to be biological, regardless of whether their origins were eco-friendly or not. This paved the way for the market exploitation and commercialisation of "biological" products, leaving those small pioneering producers with the costs of sowing the seeds of this trend while its benefits were harvested by the giants of the food sector. For example, the dairy company Pascual soon launched a drink called *Biofrutas,* whose ingredients were neither organic nor biological and the only thing "bio" about it was its name. Once government regulations changed, there were an increasing number of products in supermarkets with names that appealed to health-conscious and environmentally-aware consumers who were interested in naturally sourced products. Some examples that we can all remember are *Biocentury, Bio Activia and others.*

Years later, in 2007, the Committee for Organic Agriculture of Aragon (CAAE in Spanish) would condemn the decree that, for eight years, allowed companies to swindle consumers with the "Bio" prefix. The European Commission reacted by drafting a regulation that overrode the national regulation (Regulation 834/2007) and its implementation in 2009 put paid to these labels. The products that contained the prefix "Bio" and whose ingredients did not fulfil the legal requirements were forced to look for new terms with which to attract customers. This regulation was the reason behind brands such as *BioFrutas* becoming *BiFrutas* (not before attempting to seek middle ground with *Pascual Funciona,* a name that sought to imply certain benefits for one's health) or *Biocentury* becoming *Bicentury*, or Danone's *Bio* changing its name to Activia.

Although this conflict around the term "Bio" would appear to be a thing of the past, the phenomenon is still prevalent today. A more recent example is that of *LUSH*, a "store for cruelty free, vegetarian and vegan cosmetics, with a spa in Madrid" (retrieved from their Spanish website), that grounds most of its communications on its "cruelty free" positioning. Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November (2009) on cosmetic products has a section dedicated to animal testing. In this section, the regulation explicitly prohibits: "the placing on the market of cosmetic products where the final formulation has been the subject of animal testing"; the placing on the market of cosmetic products containing ingredients or combinations of ingredients which have been the subject of animal testing"; "the performance of animal testing of finished cosmetic products"; and "the performance of animal testing of ingredients or combinations of ingredients". This regulation was introduced in 2009 and entered into force in 2013. Basically, any communication that refers to a product as "cruelty free" from this date onwards is redundant. Nevertheless, the company declares on its Spanish website:

> "Lush do not test on animals, do not use materials that contain animal derivatives that are unsuitable for vegetarians and only buy raw materials from companies that are not involved in the use of, or commission the use of, animals for testing and have no plans to do so in the future. We believe that animal testing is not acceptable".
>
> [...]But voluntary company codes of conduct, "cruelty free" labelling and logos are necessary when there are no laws to protect animals. If there were strong laws, then all companies would be forced to be cruelty free, instead of only the fairer companies that do so by choice"[2].

Neither Europe, nor the US nor Latin America permit the marketing of products that have been tested on animals. In any of these locations, the *#crueltyfree* tag is a spurious moralistic marketing strategy. By the commercial use of these terms, companies such as LUSH can lead consumers to believe that their products are less cruel than their competitors who nonetheless, are subject to and follow the exact same laws. All they are saying is that they do exactly what other brands in the European market do, they just display their concern more. To top it all, and although they are remedying it, many LUSH ingredients still contain, for example, traces of palm oil, whose exploitation is to blame for destroying the habitat of orangutan communities[3]. Testing creams on animals is cruel, but burning down their jungles apparently isn't.

The force of these claims that appeal to "the moral virtues" of a product lies not in their manufacturing process but in the connotations that they give to the product. Thus, when choosing, the brand's slogan and the presence of these prefixes reinforce the consumer's personal values and in some way, help them to perform an active role. An example of this: buying a coat from Ecoalf - a company that recycles ocean plastic and includes it in its textiles, in spite of the fact that multiple washes of these clothes release microplastics back into the ocean - implies saving the ocean. This not only gives meaning to the product but also gives a symbolic weight to the act of buying it. Interestingly, not only are many of these labels and prefixes present on the products on our shopping list but they also appear on the social media profiles of the consumers themselves. It's not strange to read how someone defines themselves as "Vegan, antifascist, LGBT friendly" on a Tinder profile or display "Save the Planet" on an Instagram bio. As we've seen, this is similar to LUSH when they assure us that they are #crueltyfree; to Ecoalf and saving the oceans; or to Biofrutas and their contribution to health.

There are many more examples of "virtue signalling" (Thomas Bartholomew) on social networks, not only by individuals but also by companies and the advertisers themselves. For example, the case of Gillette's relatively recent campaign "The Best Men Can Be", sought to promote positive behaviour in men in order to move away from bullying, sexism, toxic masculinity, etc. The campaign was received so negatively that one might suspect them of seeking out scandal in order to attract a larger audience. What's more striking here is the significant discrepancy between what Gillette said was good and what Gillette did: after the controversial ad, the internet was flooded with images of "grid girls" who exhibit the brand logo on the seat of their trousers at motor races. In this case, Gillette considered it sufficient to point out what was good and tell others how to behave, while the actions of the brand itself were to the contrary. As individuals, people have an inherent need to belong and be part of something bigger, to feel committed to the society we live in and to aspire to improve. These choices act as signifiers for our ego. A 2016 Morgan Stanley report calculated that more than 70% of consumers below 35 years of age declared choosing their products and brands based on ethical reasons. This indicates that younger generations consider themselves as being more aware of the consequences of human action on society, the economy and the planet. Nevertheless, if these generations are so conscious about responsible buying, why do they continue to fall for the industry's advertising gimmicks? We'll try to explain this through the ideas surrounding the concept of attention economics.

The argument made by Simon in 1971 to describe reality as it was then, appears to foresee the consumption of information today through the internet and social networks.

> *"...in an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes. What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it".* (Simon 1971, pp. 40-41).

This copious flow of information can overwhelm the individual and leave them unable to process it in all its abundance. It is this sensation that we feel in the supermarket, of amazement as

we stand before the shelves for minutes, walking around, unable to decide which can of tuna to choose.

The individual may feel lost amongst this freedom and their subjectivity is overwhelmed before the choices available to them. It creates the perfect scenario for uncritical adherence to opinion, that is to say, the subject no longer actively generates an opinion - as this would require the ability to process all the information - but consults a source that they consider reliable and accepts it without critical examination. Thus, opinions, similar to the products we consume, are not created but sourced from the variety displayed on shelves. We may imagine a consumer's internal monologue to be something like this: "if this product is telling me that it is more moral than the other, then surely it is so and I should opt for it". The same phenomenon is evident when we speak of *Fake News*, as in the same way that we select a product in a market, a fake news that fits one's ideology or bolsters one's political stand may be shared, and echoed, without checking its veracity.

In his article for The Spectator in 2015, the British journalist James Bartholomew coined the term "virtue signalling", to which we have referred before[4]. In it he describes virtue signalling as a public act, with very little associated cost, whose goal is to inform the rest of one's socially acceptable stance on a topic. According to this, we essentially become passive subjects and, instead of acting on our values and opinions, we sign up to what we believe is a good cause. Knowledge becomes virtue and in the Socratic method, when one understands what it is to be good or virtuous, they will automatically "be" so, even without acting upon it. According to this thought, which is not lacking in ideals, there is no difference between knowledge and virtue. Just as the clothes make the man, appearing to be and seeming are conflated with being, in a time when image is everything.

ECO-SIGNIFIERS, EGO AND SCHIZOPHRENIA

To understand why virtue signalling or why consuming certain labels is so attractive, it is useful to take a detour into Lacanian thought on ego-formation. In contrast to earlier scholars who understand the concept of "ego" from a Cartesian perspective "I think, therefore I am", Lacan proposed the idea that ego is formed by experience. For the French psychoanalyst, an individual remains unconscious of their own identity until they attain *the mirror stage* of their development, that is to say, the moment when they begin to identify themselves in their reflection in a mirror[5]. Until this moment, all their experiences, sentiments and sensations lack continuity, floating in nothing without being associated with a narrative. After this stage of their lives, individuals arrive at the socialisation stage and then begin to recognise themselves in their experiences. These (re)cognitions, now understood as "signifiers" may be of an object, a genre, a style of music, a nation, a religion, etc. Their relation to a subculture, the colour of their skin or any other signifier, may help to create the narrative of a person about their person. Or to put it in other words, when we speak of ourselves, we cannot do so without referring to other elements that contextualise us: "My name is Alf. I am a 12-year old boy. I watch Dragon Ball Z in the mornings. I want to save the ocean. I hate plastic. I went to high school in Arteixo, my favourite food is spaghetti and my dream is to be a Youtuber".

According to Lacan, schizophrenia is a mental condition that does not allow an individual to link signifiers with the signified, the inability to correctly group signifiers in order to form their own narrative and create their identity. If Alf, the hypothetical child from the previous paragraph, is unable to identify himself with the experiences he describes, we may diagnose Alf with schizophrenia. Continuing this line of thought, the literary critic and theorist Frederic Jameson retook the definition of schizophrenia to describe post-modern culture as one that, owing to its overabundance of signifiers, makes it impossible for the individual to compile and construct a coherent narrative[6]. He speaks of a society constantly in its mirror stage, where individual and collective identities blend into each other, again and again, to progressively form a weaker one each time.

Jonah Peretti, the creator of Buzzfeed, adds that today, signifiers are a given in *Mass Media*, highlighting in his essay "Capitalism and schizophrenia*":*

> "In Lacanian terms, consumer capitalism needs subjects who continually reenact the infantile drama of mirror stage identifications. These subjects must oscillate quickly between schizophrenic consciousness and idealized ego formations. I assert that the increasingly rapid rate at which images are distributed and consumed in late capitalism necessitates a corresponding increase in the rate that individuals assume and shed identities. Because advertisements link identity with the need to purchase products, the acceleration of visual culture promotes the hyper-consumption associated with late capitalism. Put differently, capitalism needs schizophrenia, but it also needs egos. The contradiction is resolved through the acceleration of the temporal rhythm of late capitalist visual culture. This type of acceleration encourages weak egos that are easily formed, and fade away just as easily. An essentially schizo person can have a quick ego formation, and buy a new wardrobe to compliment his or her new identity".

Peretti not only points out that people exist in a constant state of mirror stage, but he also mentions how these constantly new ego formations involve a continuous demand for signifiers. We speak of behaviours, of morals, of trees, movies or any other commodification of identity. From a similar point of view, Ian Woodward explains in his book *Understanding Material Culture* that "... according to the semiotic approach, material culture is said to be a 'signifier' that communicates things to others, accomplishing some kind of social 'work'". The philosopher Paul Verbeek explores this further: "Not only has philosophy not recognised the meaning of things and their material nature, it is also the failure of contemporary post-modern industrial design, whose products are primarily meant to serve as signs instead of material things, as symbols or icons of their owners' lifestyles. Post-modern consumers buy objects less for their material nature than for their capacity to express the type of person intended to own them"[7]. When we acquire a certain class of objects, we do so because in some way we see ourselves reflected in them. This is evident if we think of clothing; but we also identify with bands or styles of music, behaviour, collectives, characters from our favourite TV series or any other thing –or product– that appeal to us.

We may affirm that the more narrative-heavy these products, the greater the ease and relevance with which they are adopted as signifiers. In Western culture, semiotics plays an important role in this type of behaviour as language is the expression of our thought system. We objectify what is abstract and the objectual is liable to be possessed, possessions in turn communicating the identity of their owner. Or to put it other words, the narratives that accompany the object of consumption do not solely speak of the purchased good but also of the buyer's personality, if I buy vegan products, I'm a vegan; I buy eco-friendly products, therefore I am eco-friendly; I buy cruelty free, therefore I am cruelty free. Thus it is that the signifiers are enshrined in the objects and these objects also include the mission we seek to fulfil; helping us to distinguish ourselves from the herd, but at the same time, making us part of a collective that shares the same mission or ideals. We live as consumers in the complete commodification of morality, a secular version of the sale of Indulgences where buying is responsible and if I buy good, I am good. *Emere ergo sum. I buy, therefore, I am.*

ART AND DESIGN IN LATE CAPITALISM

We tend to think that art can function as a sort of rebellion against established systems, but the reality is that they usually work in close symbiosis. From the moment in which the photo camera liberated art from its representative function, the latter has progressively changed into an introspective search for what constitutes art itself. Currently, art and design are not an exception

and are not immune to the market circuits that we have discovered throughout this text. One of the characteristics of art today is that it generally depends on a narrative that accompanies the work, often prioritising its symbolic value: what the work stands for instead of its aesthetic value. The art of political connotations, for example, is extremely dependent on this dynamic. Many institutions take recourse to this type of art to echo their ethical orientation, encouraging and commissioning works by creators that can contribute to the formation of their identity, and are urged to follow this path by governmental frameworks that provide them with financial support. You'll hear many cultural centres, collectives and institutions proclaiming themselves as feminists, anti-colonialists, ecologists (among other -ists), you'll see them and their boasts will be accompanied by the renewed themes of the artists they sponsor. This has its pros and cons: on one hand it boosts the constant creation of new works and on the other hand, the criteria for judging a work are not so much about the work itself but about its media potential. The lines between artist, designer and content creator are more blurred than ever, thanks to digital media. Sharing is a way to tell the world what is your stand, to represent the type of person you are and your tastes and orientations. This decentralisation of the criteria for evaluation restores, in some way, power to popular opinion, but also limits the horizons of creativity to what is socially acceptable , what is good and desired, castrating art of any type of critical potential and frequently leaving it as a tool to spread awareness or disseminate viewpoints. "I like this work of art" is conflated with "I agree with its message" or "It's very me".

COMMERCIAL SUSTAINABILITY

A fix for all of this may be a sufficiently strong regulation that leads all products to be ethical in a holistic manner, that do not pollute, do not consume resources, do not exploit workers, that do not do direct or indirect damage to the planet, and ultimately, are sustainable here and at their source. Right now, the onus of responsible buying is on the consumer. Perhaps this might change if labels cease to be part of the products and become a legal criteria for their marketing. This would eliminate the companies' need to proclaim aloud their goodwill as a marketing tool and make them focus once again on the qualities of the product itself - however, I seriously doubt that this is the best solution.

Derrida said that we live in a time out of joint, we do not have access to a self-presence of life rather we experience the world in relation to consumer goods, manufactured by humans but not controlled by them beyond this moment. We may multiply this by the fact that additionally, we now inhabit multiple temporary spaces at the same time. We are losing ourselves and in multiple dimensions, by associating ourselves with these goods and with their sellers' messages. We no longer build the world on the basis of our history but in relation to goods and indirectly to their corresponding resources. Our obsession for sustainability is a symptom of our inability to understand the world within any system that is not capitalist. Thus, our concept of progress in inherently linked to our capacity for, and propensity to, create new consumer goods. To speak of sustainability within a commercial framework means that we refuse to let go of our consumer goods, or make radical changes to our lifestyle. The apparent climate situation tells us that our system does not permit a "sustainable" sustainability. Perhaps the system will change, or perhaps we will change, or perhaps one will lead to the other, who knows, but I agree with Grafton Tanner in this regard when he says: "For now, we live in the mall, but it's closing soon"[8].

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Images

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02. Screenshot of Gillette's ad.

03. Posted byu/aroh100876 in /r/JordanPeterson/ subreddit in 2019. Displaying antagonist reaction towards Gillette's campaing.

04. Meme posted by GoneForeverAaronHernandez in January 16 2019•via Android.

05. Laila Laurel and her awarded "anti-manspreading chairs" (actually a really bad design with a "strong" message) - Extracted from *Daily Mail*.

06. Ore Streams is an investigation by Studio Formafantasma into the recycling of electronic waste commissioned by NGV Australia and Triennale Milano.

07

Imagining recycling, recycling designing, designing the image: Reutilisation as a design strategy

María Villanueva Fernández
Héctor García-Diego Villarías

Throughout history, recycling has become a solution for product development on several occasions. Beyond the ecological conscience that has been constituted especially from the 60s until the present time, this practice has served to solve different problems: technical, conceptual or even social. During the 20th century some seating furniture was made in which the recycling of materials and parts of objects has given rise to real design milestones and has helped, without being its main purpose, to create a sustainable image. This article attempts to tell the story of these pieces and their ecological context, to show the operation of reuse as a project strategy and as part of a holistic process that seeks to respond to technical, functional and conceptual issues, beyond the merely ecological.

THE IMAGE OF RECYCLING

Since the creation of the concept of ecology in 1866 by the German philosopher and naturalist Ernst Haeckel, a process of transformation of the way we look at nature has been gradually but constantly developing. From 1960 onwards, this process became more intense, leading the most advanced countries to rethink their relationship with the environment at different levels and proliferating an attitude of awareness of the protection and respect for the planet and its limited resources. This was a consequence and, at times, the cause of the materialization of various actions of a social, political and business nature that seek collective solutions to address environmental problems.

In particular, it has resulted, over the past few years, in close collaboration between civil society, academia and agencies[1] and UN funds and programs. This movement has led to environmental[2] awareness campaigns, to summits, meetings and conferences on land and climate[3], to changes in environmental law -initiating strategies to improve legislation[4]- and to the responsible modification of inadequate business practice, all for the sake of sustainable development[5]. However, some companies and agents in this chain, taking advantage of this phenomenon that could be misunderstood as a fashion, turn these ecological attributes into a simple "hollow" image in which production does not follow minimum sustainability standards. Through the so-called *greenwashing*[6], users are induced to perceive values of a product that they do not really have, or at least, not completely.

Although the design field has also been affected by these 'greenwashes', a great awareness has been created throughout the production chain (from the creator to the user, including the producer) which has often resulted in responsible and fair design, paying special attention to its material nature, complexity, processes and life cycles. All this has led to the creation of an ecological image, this time veracious, but which sometimes limits the designer's project strategies to the field of ecology, relieving other important issues such as form, function or symbolism to a secondary place.

The efforts made since the 1960s until the boom in recent years have led to the promotion of environmental education, the creation of activities and training systems in design schools, as well as the development of research into new bio-materials[7] and their circularity. Being biodegradable, compostable, renewable, recyclable are some of the inherent characteristics of the responsible product today; however, there is another aspect that far from being novel, emerges as a fundamental resource and project strategy, also providing a clear image of awareness: reutilisation. This strategy is far from innovative; indeed, it can be said to be as old as mankind.

Throughout history there have been episodes where the reuse of materials or object elements has become the key and solution for a product. Beyond awareness, this practice has served to resolve issues of different significance, solving technical and conceptual problems or even claiming social reasons, designing from the material and its implications. In particular, in the 20th century we find some examples in which the recycling of materials and parts of objects, understood in a broad sense, has given rise to real design milestones that have marked its history and have helped, without being its main purpose, to create an ecological image. Taking the chair as a plot typology, below are different examples that show the operation of reuse as a tool and design strategy that seeks to respond to other issues, beyond the merely ecological **(fig. 01)**.

DESIGN RECYCLING

Recycling is a process inherent in Nature from the beginning. Through biochemical, physical or geological processes in which matter and energy are used in a cyclical way, a balance of ecosystems is reached. Human beings, in their capacity to adapt to the environment, have used this resource: first, by taking advantage of and using the materials, just as they found them in nature; later, by converting them into raw materials, processing them and, finally, recycling them. One of the ways of recycling is reutilisation, if understood as defined by Blanco in his book *Notes on Industrial Design: "the re-cycling of a part, material or product to make a new one or to recover the used material"*[8].

Reusing came before recycling[9]. Since prehistoric times, transforming certain materials such as metal, fabrics and minerals was a complicated and expensive task. The practice of reutilisation was then extended, coexisting with that of recycling, although not as we know it today. After the industrial revolution, in which the processing of materials was simplified, to reuse ceased to be a common operation, resurfacing in times of warlike conflict when, due to scarcity, there was a special need to make use of either the material or the components of objects.

It was precisely during the inter-war period that the first modern cantilever chair[10] was created back in the mid-1920s. That piece, in addition to being the cause of a legal dispute already known for its original authorship[11], was based on an ingenious exercise of reutisilation carried out by its creator Mart Stam. From 1925 onwards, the young architect began experimenting with small diameter gas tubes which he joined with elbows that allowed him to create right angles and great functional possibilities. These experiments led to the first *cantilever* chairs (*Freischwinger)*, which were later built from steel tubes.

The chair proposed an innovative morphology of great formal purity that adapted to the concept of modern architecture and the spirit of a new era. This piece was exhibited at the 1927 Stuttgart exhibition[12], where it was very well received, especially because of the oscillating effect achieved by the flexible curved steel structure that gave a sensation of suspension in space[13]. Although the chair was considered to be *"structurally rigid and visually overpowering"[14], it* opened the way to a new concept of furniture from the formal creation of the object, but from the constructive perspective too **(fig. 02).**

As Giulio Carlo Argan explains, "*it is no longer a question of moving from matter to form. Since the starting point is already a form (the metal tube), the process is a formal construction: from unity to complexity through successive projections*"[15]. In this case, the material and its form determine both the design and the construction process, since the starting point is a specific morphology that, at the beginning, comes from the gas pipe. This new construction principle creates the image of modern furniture, constituting, together with other similar chairs of the time, a milestone in the history of design.

After the Second World War, design's horizon underwent a transformation motivated precisely by the consequences of the war. On one hand, there had been great advances in industry and materials, due to the innovation developed for combat. This situation led to a drunkenness of creativity and material experimentation that would characterise the 1960s and 1970s. On the other hand, however, just after the war ended, there was a concern about material resources that led to rationing plans in different sectors.

In addition to the latter and as a consequence of the former, from the 1960s onwards there was a new interest in recycling and reutilisation, promoted by the initial ecological currents. However, at the end of the 1950s, the Castiglioni brothers made some original proposals which, according to Zabalbeascoa, *"were both an open door to the recycling of objects and the decontextualisation of elements of industrial manufacture*[16]. "In fact, as Dardi and Pasca point out in their book *Design History Handbook,* this way of understanding product development based on the association of different elements from different fields and recognising the potential of existing anonymous objects has turned them into "unquestionable points of reference"[17].

The recognisable Castiglioni style has generally been linked to Marcel Duchamp's *ready-made.* Although the artist's work was limited to the field of art[18], the Castiglioni's products had a practical purpose, as well as a conceptual intention that distilled irony (typical of 1960s pop art) and incited critical reflection (a characteristic of that time). The concept of *ready-made* in design can be understood as *"the operation of relocating objects by moving them from one context to another"[19].* For this strategy to be effective at a semantic level, it was necessary for decontextualisation to take place with respect to its original use, inciting reflection and creating confusion, as in Duchamp's works, but also responding to the new function.

At the end of the 1950s, the Castiglioni brothers used this project method based on reutilization in the industrial production of furniture. As a result of this exercise, in 1957 their well-known works *Mezzadro* and *Sella*[20]*,* which were presented for the exhibition "Shapes and Colours in Houses Today" organised in Villa Olmo in Como. Both were the result of the association of different pieces from the artisan and industrial world, mainly from the transport sector. Although there was already a precedent[21], in the *Mezzadro* stool the Castiglioni used a suspended tractor seat to give it a use in another context by transforming the domestic space[22] **(fig. 03)**. Besides that, in the *Sella* they use a bicycle seat connected through a steel rod to a hemispheric support, "*capable of a 'dynamic balance'*"[23].

This piece, close to the world of 'juggling', is an example of functional adaptation, since it was designed as a 'telephone stool' for unusual postures, allowing the movement of the body **(fig. 04)**. Each stool was a milestone not only in terms of semantic innovation through its assembly methodology and its desire to decontextualise, but also constituted a new design methodology through reutilisation (here called *ready-made*) that responded to a functional end, like any other design piece. Innovative at the time, it was not until 1970 that Zanotta began to produce the *Mezzadro* stool and until 1983, the *Sella*.

These marketing dates are not surprising, given the social and economic context of that time. In the late 1960s and early 1970s, citizen and institutional movements began to emerge around the environmental issue[24]. The concept of 'ecologically sustainable development' was proposed in the 1967 UNESCO intergovernmental conference for national use and conservation of the biosphere[25]. Three years later, the first Earth Day was celebrated, from which the symbol of recycling designed by Gary Anderson became known and several volunteer programs on the ethics of reutilisation and recycling were organized. In the same year, the Environmental Protection Agency was created, as well as a series of laws aimed at protecting the environment.

Regarding the design point of view, in 1971 Victor Papanek[26] published his book *Design for real-world* (the introduction of which was written by Buckminster Fuller), which represented a significant ideological change, introducing a new discourse on design, ethics and ecology, and becoming a reference point over time (since it initially had less impact on the profession)[27]. The text, as Torrent explains, was *"a wake-up call reminding designers of their social responsibility and demanding that they carry out activities that respect the environment"*[28]. This book included a project by the author, carried out together with George Seeger, which consisted of a radio receiver for impoverished countries, based on the reuse of elements such as a discarded juice can **(fig. 05)**. Two years later, he launched *Nomadic Furniture* with James Hannessey, a manual promoting the environmentally friendly DIY philosophy. Papanek's vision spread through design schools and conferences, but without major changes in the professional practice of design at the time.

In 1972 the Club of Rome warned in its report "The Limits to Growth"[29] about the inversely proportional relationship between the planet's existing resources (limited) and the population (progressively increasing). This achievement of events provoked in many designers a feeling of ecological responsibility that had to revert into sustainable design and into visible actions in their field. As a result, the Global Tools association was created in Florence in 1973, which brought together various protagonists of Italian design associated with the radical groups SuperStudio and Archizoom and references such as Mendini, Sottsass, Pesce, with the aim of promoting the use of materials and processes that are responsible with the environment[30]. In this line, new designs began to emerge that exhibited these values, such as the Wiggle chair (1972) by Frank Gehry or the Consumer's Rest (1983) by Frank Shreiner (Stiletto)[31].

In 1981, Ron Arad founded his design studio One Off, in which he developed an interest in creating unique pieces, in some cases handmade, rather than large-scale mass production, typical of industrial design. Among them is his well-known Rover armchair **(fig. 06)**, a model that marks Arad's beginning as a designer, created from scrap metal from a junkyard. The armchair consisted

of a leather seat that came from a Rover V8 2L car and a support structure made of two curved Kee Klamps' steel tubes[32]. Interestingly, the first two copies were bought by the famous fashion designer Jean Paul Gaultier that same year. Despite the fact that from this moment on the armchair enjoyed great popularity, Arad produced a limited number of pieces, determined by the available quantity of usable seats.

This design piece that seems to be at the point where art (*ready-made/objet trouvé*) and recycling converge, did not intend to participate in either of them, as stated in the book *Ron Arad. No discipline*. In this text, he explains that his work has been misinterpreted "as an environmental statement" or "as a manifesto"[33]. The piece however responds to simpler questions: a greater ease of execution and a desire to create a different model (although it shared a certain formal resemblance to a 1924 chair by Jean Prouvé[34]). However, despite all this, Arad uses recycling as a design technique, from which he creates an iconic piece. Due to the social and cultural context in which ecological awareness was growing, the Rover chair became an example of reuse that transcended the designer's will. In fact, the limited edition of this model, due to the restricted number of pieces within its reach, causes it to be understood even more as an object with an ecological vocation that does not go beyond the line of consumption typical of the industrial design[35].

In the late 1980s, the environmental movement and recycling became more effective and viable when modern materials processing took off, despite having started its theoretical approaches three decades earlier. By the middle of the following decade, most developed countries had already begun to propose policies for environmental protection and waste management. In this context, the Brazilians Fernando and Humberto Campana created in 1991 the first Favela chair **(fig. 07)**, built with pieces of discarded wood glued altogether, inspired by the Brazilian favelas. In this model produced by Edra[36], the designers bet not only on the use of nearby materials and on the reutilisation of objects or components, but also on a design "born" directly from the material, a feature that characterized other of their works, as Torrent explains: *"In the conception of many of their products, first it is the material, then the form, which is derived from its properties; and finally, they approach the function taking into account the ergonomic conditions"*[37].

However, in this case, this design process not only conditions the formal result of the piece, but also provides a discourse, creating a narrative design with an emotional component, a differentiating feature of the end of the century products. The Campana brothers' design is impregnated with Brazilian culture, its roots and its tradition, from which, on the one hand, they extract the practice of reuse and, on the other, they preserve the artisan heritage, collaborating with local workers[38]. Due to the narrative capacity of their works, they have sometimes been considered as social claims of the reality of their country. His pieces manage to condense the local essence of Brazilian culture, but in a universal format corresponding to contemporary design, combining craft production and industrial technique[39].

In the same year as the Favela chair, Droog's Yew Remy[40] created his Rag chair **(fig. 08)**, made from different layers of clothing and fabric, which are compacted and joined together with several bands placed in two directions. The chair can be purchased ready-made but there is also the option for the user to recycle his own clothes, giving the product an emotional charge. Therefore, the operation is not just an exercise of reusing materials, but one that involves the user's emotion: *"Each piece is unique; a treasure chest of memories"*[41]. In this way objects would be brought back to life with a double meaning: that of reutilisation and that of the crystallization of the consumer's memory. This character causes that, in spite of being an artisan product, it is not considered of limited edition, since each piece is different according to the materials found and used, even according to the identity of its buyer through its recycled clothes.

This piece, as well as others by Remy[42], distills a new conceptual creativity that beacme the representative iconic theme of the design company Droog. This association has collaborated with designers now recognized as Hella Jongerius or Richard Hutten, *"delivering homeopathic doses of reflection on our behavior, habits and vices and virtues to act through things"*[43]. Due in part to the success achieved by the group, The Netherlands became the home of the new conceptual design and a point of attraction for research and experimentation, typical of Dutch design. One example is the Design Academy in Eindhoven, linked to many of the designers who have innovated in terms of the recycling and reutilisation of materials, such as Piet Hein Eek or Dirk van der Kooij[44].

THE DESIGN OF THE IMAGE

Today, recycling has become an industry, which, as such, moves with its parameters, benefiting from research and development to find new techniques, as well as experimenting with its weak points. In it, as has been seen, moved by ecological currents, many designers take recycling as their main story in the development of their work as an image or identity. This has happened, partly, because companies and movements, social and political, have also assumed recycling as a commercial or propaganda value. These practices leave other relevant aspects in the background throughout the history of design and objects of use. These are not only cardinal issues such as function or the study of form in relation to beauty or its ergonomics, but also other fundamental ones, perhaps more ethereal, such as symbolic, emotional or narrative character. Recycling is understood then, as one more requirement to design that complements the whole. It is a responsibility of the designer in his professional deontological task, moving away from the recurrent image of recycling as a stamp to be able in order to carry out an ecological design.

In this sense, after the analysis that has been carried out, different examples created during the 20th century can be contemplated in which different designers produce a list of pieces through the reutilisation of objects, their components or materials, with a purpose that transcends ecology, but from which they are not unrelated. In each case, the author uses recycling in the form of *ready-made* or reutilisation as a project strategy to tackle issues or problems of varying significance.

Stam uses the gas pipes (pre-existing parts) to solve a technical problem that allows to create an innovative shape with new features such as flexibility. Here, recycling, although remaining as an exercise of experimentation, meant a change of the constructive, functional and formal paradigm that even configured the image of modern furniture. The Castiglioni brothers carried out a *readymade* exercise, which was ironic, typical of the context (on one hand, that of consumption typical of the pop era and, on the other, of an ecological culture that was beginning to awaken). This assembly operation not only gave rise to a new formal image, but also achieved the decontextualisation of the objects, responding to a functional circumstance. Arad, however, carrying out a conceptual exercise, presented a piece built with discarded waste, constituting, far from being his main will, a true example of recycling. The piece is a sample of experimentation with new materials and forms. The Campana brothers use recycling as the thread of their narrative, based on Brazilian culture. Their aforementioned example becomes an image of a social reality and the result of the application of traditional artisan knowledge, but with a universal spirit. Finally, Tejo Remy offers a vision of recycling that involves the user in the project and gives the piece its identity through the reutilisation of its own clothes **(fig. 09)**.

These examples, which offer different approaches to the concept of recycling or reutilisation as a design strategy, have gone down in history as recognized milestones, especially in the field of formal innovation. But they have also contributed, probably with-

out seeking it, to the transmission of an ecological consciousness that has been growing as the century has progressed. The narrative of these cases is constructed by understanding the context in which each piece arises, interweaving the contributions of these designers with the advances and events that are emerging around recycling in design. This allows us to appreciate how, with the increase of sensitivities and movements at a social, political or business level, more products are emerging that incorporate recycling as another characteristic of the design process. Recycling was then a line of creation and a way of acting and, although it was initially proposed as an ideological attitude or a political positioning, due to the plastic characteristics of the results, it was gradually defined as a design strategy with its own entity.

This situation was probably accentuated because when some of these cases are produced (with the exception of the Arad and Droog part), the parameters and characteristics of reutilisation are dissolved by the industry. The exercises then become prototypes for recycling and reutilisation, since they are subsequently made with pieces edited directly by furniture companies. In the process of realization and commercialization they move away from their design genesis in which recycling appears as a design tool. On the other hand, this aspect reinforces the idea of considering reutilisation as a project methodology that allows design from the material itself. The result offers a strong and effective image on these products that awakens the awareness of other designers, attracted, among other reasons, by this character linked to their material reality.

Although the works analysed do not strictly comply with the values of recycling, they all constitute inspiring examples to continue with this line and have helped to create an image that allows this practice to become increasingly common nowadays. Beyond the desirable commitment of designers to these values, these projects use this strategy of using materials as a tool to solve other problems. And not only that, but through the manipulation of these elements they manage to understand this practice as a project strategy, trying to integrate all the objectives of a good design. Recycling, in this case, is not the only purpose or a marketing tool, but a way of doing, a way to raise awareness and a way of designing.

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Notes

01. Among the best known international non-governmental organizations are WWF (World Wildlife Fund) and Greenpeace, created in 1971. At an institutional level, the defense of nature was carried out by the so-called green parties, which initially emerged in the countries of northern Europe, such as Sweden, Denmark or France.

02. Budget lines for 'environmental education' have been invested in order to reverse the situation by raising awareness of nature's problems, increasing ecological knowledge, and providing principles for sustainable development.

03. The Earth Summit is the international meeting of heads of state to reach consensus on the environment and related issues. The first one took place in Stockholm in 1972 and was a milestone in the development and treatment of issues related to the protection of the planet. Subsequently, they have been held in Rio de Janeiro in 1992 and 2012 and in Johannesburg in 2002.

04. Environmental or Nature's rights, which are included within the branch of public law, emerged with the 1972 Stockholm Declaration with the aim of regulating the relationship between human beings and nature. These framework laws on the environment are in charge of protecting the planet from the actions of people, taking into account different aspects such as pollution, biodiversity or resources.

05. Sustainable development is understood as one which does not compromise resources, allowing the needs of future generations to be met. However, as stated by López Ricalde, López-Hernández and Ancona Peniche, this concept, since it was coined in 1983 in "Our Common Future" until today, has undergone numerous modifications and is currently a subject of debate. LÓPEZ RICALDE, Carlos David; LÓPEZ-HERNÁNDEZ, Eduardo Salvador; ANCONA PENICHE, Ignacio, "Desarrollo sustentable o sostenible: una definición conceptual", *Horizonte Sanitario* 2005, vol.4, n. 2.

06. *Greenwashing* is an evolution of the traditional term of *Whitewashing*. This concept is used to refer to the communication/image strategy of some companies that try to market their products, through deception or manipulation of information.

07. An increasing number of designers, companies and academic centers are devoting their resources to researching new materials. See the dedicated issue of the research journal of Elisava. *Temes de Disseny #34: Material interactions in the human-made mileu* or texts like FRANKLIN, Kate; TILL, Caroline, *Radical Matter: rethinking materials for a sustainable future,* Thames&Hudson, 2018 or MYERS, William; ANTONELLI, Paola, Bio Design: Nature, Science and Creativity, Moma, 2012.

08. BLANCO, Ricardo, *Notas sobre diseño industrial,* Nobuko, Buenos Aires, 2007, p. 130.

09. Cfr. FIELL, Charlotte and Peter, *The story of design: from the Paleolithic to the present*, Goodman, London, 2016, pp. 14-19.

10. According to Rosalia Torrent, the first cantilever chair made of iron could have been exhibited at the 1851 Universal Exhibition in London. TORRENT, Rosalía; MARÍN, Joan M., *Historia del diseño industrial,* Cátedra, Madrid, 2005, pp. 68-69.

11. The well-known cantilever chairs made by Mart Stam, Marcel Breuer and Mies van der Rohe became part of a debate about their ownership, which is typical of the period and of the changes that were taking place at the level of concept and production. Until now, stylish furniture was designed according to a model governed by formal (stylistic) parameters such as the Adam or Smith style chair, in which the intellectual property of each piece remained diffuse or in the background. However, with the introduction of new forms, new materials and industrial processes, the design process had undergone a modification that affected authorship. Curiously, contrary to what seemed to be the case in theory, if we take to account the democratizing character with which modern design had emerged, far from the individual artist's stamp. In order to deepen the conflict between the three authors, it is recommended to consult LÓPEZ MARTÍN, Pablo, *The Chair of Discord: Small scale as a field of experimentation in modernity. Breuer, Mies and Stam,* Doctoral Thesis directed by Emilio Tuñón Álvarez, Universidad Politécnica de Madrid, 2015.

12. See: KIRSCH, Karin, *The Weissenhofsiedlung, experimental housing built for the Deutscher Werkbund, Stuttgart 1927*, (Trad. Michael Knight), Dt.

13. VILLANUEVA FERNÁNDEZ, María; GARCÍA-DIEGO VILLARÍAS, Héctor; 'Tecnología posible', rita_redfundamentos, n. 12, November, 2019, p. 93.

14. TORRENT, Rosalía; MARÍN, Joan M., *Historia del diseño industrial,* cit. p. 19.

15. ARGAN, Giulio Carlo, *Walter Gropius and the Bauhaus,* Gili, Mexico, 1983, p. 51.

16. ZABALBEASCOA, Anatxu, *Chairs: history of the chair,* Gustavo Gili, Barcelona, 2018, p. 87.

17. DARDI, Domitilla; PASCA, Vanni, *Design history handbook,* Silvana, Cinisello Balsamo, 2019, p. 207.

18. BLANCO, Ricardo, *Notes on Industrial Design,* cit., p. 129.

19. Ibid, p. 155.

20. Other works made with similar parameters were the Toio lamp, produced by Flos in 1962, composed of a car headlight as a lighting element and a telescopic element similar to a fishing rod with rings through which the cable ran. Also, the Lampadina lamp made with a large luminaire and a film reel on which the cable is wound and works as a support. DARDI, Domitilla; PASCA, Vanni, *Design history handbook,* cit., p. 207; WHITE, Ricardo, *Notes on industrial design,* cit.

21. According to Charlotte and Peter Fiell in their book *1000* Chairs, there was already a precedent for a chair made from a tractor seat, designed by Benjamin Baldwin in 1953. FIELL, Charlotte and Peter, *1000 chairs,* Taschen, Cologne/ New York, 2005, p. 311.

22. The *Mezzadro* stool has both handcrafted and industrial components, with references to different types of transport. It recovers the theme of the world of agriculture thanks to using the seat of a rural vehicle such as the tractor. In addition, the cycling sector is represented in the fastening element while the nautical field is collected in the beech wood piece. https://www.zanotta.it/en-us/products/furnishing-accessories/mezzadro

23. The stool seals, also takes as a reference the world of transport, in this case cycling, combining this idea with the creation of a support that together with the two legs of the user allows to achieve stability. As the firm Zanotta states, "it is reminiscent of the milker's stool", returning once again to the connection between the rural and industrial worlds. https://www.zanotta.it/en-us/products/furnishing-accessories/sella

24. The role of Rachel Carson, who published the text *Silent Spring in* 1962, is relevant at the beginning of this decade. In this book, she described the harmful consequences of the environmental impact of chemical products on Nature. Her ideas influenced the ecological mobilisations of the decade. CARSON, Rachel, *Silent Spring,* Crítica, Barcelona, 2001.

25. TORRENT, Rosalía; MARÍN, Joan M., *Historia del diseño industrial,* cit. p. 411.

26. Victor Papanek, designer, anthropologist, teacher and writer, Austrian by birth and American by adoption, has been for many a reference point for responsible design, from a critical and ethical perspective. He is the author of several books, among which are PAPANEK, Victor; HENNESSEY, Jim, *Nomadic Furniture,* Pantheon Books, New York, 1973; PAPANEK, Victor; HENNESSEY, Jim, *How things don't work,* Pantheon Books, New York, 1977; PAPANEK, Victor, *The Green Imperative: Ecology and Ethics in Design and Architecture,* Thames and Hudson, New York, 1995; PAPANEK, Victor, *Design for the Real World: Human Ecology and Social Change,* (1st edition, 1971), Thames & Hudson, London, 2011.

27. MARGOLIN, Víctor, *Las políticas de lo artificial. Ensayos y estudios sobre diseño,* (Trad. Gabriela Ubaldini), Designio, Mexico D.F., 2005, p. 130.

28. TORRENT, Rosalía; MARÍN, Joan M., *Historia del diseño industrial,* cit., p. 411.

29. The Club of Rome is an NGO created in 1968 in Rome by a group of researchers, academics, scientists and politicians who shared a concern for the environmental situation and analysed the problem from a global, long-term perspective, taking into account different views and aspects (energy, resources, population). In 1972 the report 'The Limits to Growth' by Donella Meadows, a biophysicist and environmental scientist, was published. It concluded that if the situation at that time, taking into account parameters such as demography, resources and human action, did not change, the limits of the planet would end in a century.

30. TORRENT, Rosalía; MARÍN, Joan M., *Historia del diseño industrial,* cit. p. 411.

31. ZABALBEASCOA, Anatxu, *Chairs: history of the chair,* Gustavo Gili, Barcelona, 2018, pp. 87-88.

32. It was an economical scaffolding system created in the 1930s. ANTONELLI, Paola, *Ron Arad: no discipline,* Museum of Modern Art, New York, 2009, p. 27.

33. Idem.

34. FIELL, Charlotte and Peter, *1000 chairs,* cit., p. 502.

35. Vitra has launched limited editions of the Rover model in materials such as rust and chrome, thus forgetting the principle of reuse used by Arad.

36. https://www.edra.com/en/vis-prod/101174

37. TORRENT, Rosalía; MARÍN, Joan M., *Historia del diseño industrial,* cit., pp. 393-394.

38. His commitment to Brazilian society is not only part of the design process of the Favela chair, but also led to the foundation in 2009 of the 'Campana Institute': a center that deals with *"design as a tool for transformation through social and educational programs.* This project, in which foreign and national institutions, companies, organizations and public and private entities collaborate, has three objectives: *"the rediscovery of artisan techniques, the development of social inclusion and the preservation of the work of the brothers for future generations".* http://campanas.com.br/institute-2/.

39. The Campana brothers' work is characterized by the reinvention of traditional craft techniques, from a more contemporary perspective. Furthermore, the Brazilian reality is conducive to the incorporation of reutilisation as a tool for creating products, due to social differences, understood as an operation to exploit resources when there is a shortage. With these principles, the Campana brothers *"undertake a personal search for waste and production surpluses"*. MORTEO, Enrico, *Design: From 1850 to the present* (Trad. Barbara Burani), Electa Arte, 2009, p. 400.

40. The Droog collective was created in Amsterdam in 1993 by art critic Renny Ramakers and product designer Gijs Bakker, resulting in a series of conceptual objects. It was at the Milan Furniture Fair in 1993 when they presented, under the title 'Droog Design', a list of objects made with materials from the industry or created from the *ready-made* operation. Its repercussion caused a Dutch design trend recognizable in other countries, which launched a group of designers to fame, becoming a reference in the history of design. Droog defines itself as: *"a conceptual design company"* focused on issues that affect people in order to contribute to society with its products. The process is considered fundamental and they call their work "*anti-disciplinary*". https://www.droog.com/concept; WOODHAM, Jonathan Michael, *A dictionary of Modern Design,* Oxford University Press, New York, 2016.

41. https://www.droog.com/webshop/product/rag-chair

42. Among Remy's work there are other pieces that come from the reutilisation of objects and that are also part of the conceptual design world. Those include Milk Bottle Lamp (1991) or 'You Can't Lay Down Your Memory' Chest of drawers (1991).

43. DARDI, Domitilla; PASCA, Vanni, *Design history handbook*, cit., p. 244.

44. The Dutch designer Piet Hein Eek has developed a sustainable design based on recycling wood, which has resulted in 'imperfect' furniture, due to the method of craft production, made from discarded materials. See: FRASER, Max, *Boek: Piet Hein Eek,* BIS Publishers B.V., 2006 On the other hand, the designer Dirk Vander Kooij, also Dutch, has experimented with the recycling of synthetics from an innovative and current perspective, including 3D technology as a fundamental part of the process. This methodology is a proposal consistent with the needs of the planet but also adapted to the advances of new production systems applied to the field of furniture (https://www.dirkvanderkooij.com/pages/about).

This practice has also been used in other countries by a large number of designers, including the Englishman James Plumb, who has made a wardrobe from used suitcases, or the Spaniard Álvaro Catalán de Ocón, who has created his PET Lamp collection from recycled plastic bottles, among many others.

Images

01. Examples of reused materials in furniture design.

02. Gas pipeline structure and photographs of Mart Stam's chairs at the 1927 Stuttgart Exhibition. Source: Thonet and book *The Weissenhofsiedlung, experimental housing built for the Deutscher Werkbund, Stuttgart 1927*, by Karin Kirsch, 1994.

03. Drawing and photographs of the Mezzadro stool of the Castiglioni brothers, 1957. Source: Zanotta.

04. Drawings and photograph of the Sella stool of the Castiglioni brothers, 1957. Source: Zanotta.

05. Cover of the book *Design for real world,* 1971, by Victor Papanek and the inside page showing Papanek's radio project, made with a juice can.

06. Prototype by Jean Prouvé (left). Photographs and drawings of the Rover chair, 1981, Ron Arad (right). Source: FIELL, Charlotte and Peter, 1000 chairs, Taschen, Cologne/New York, 2005; *Ron Arad. No discipline,* New York: Museum of Modern Art, 2009.

07. Partial photograph of the side of the Favela chair by the Campana brothers, 1991. Source: Edra.

08. Rag chair, designed by Tejo Remy, 1991. Source: Droog.

09. Seating furniture made by the reutilization of objects, components or materials.

08

Ceramics. The protective matter

Eduardo de Miguel
Enrique Fernández-Vivancos

This article reflects on the material condition of architecture, understanding matter as the means of expression of ideas and the element which is capable of transforming them into a built construction. It focuses on the study of ceramics and displays it as a protective component that has come across its unique capacity for formal, functional and symbolic adaptation, which has enabled it to provide a contribution to the solution of new problems or to propose innovative approaches to its use. Through a number of visionary procedures which have been conducted with these materials since the end of the 19th century, and based on the possibilities of technology, its intelligent and rational use, its availability for recycling and the value of tradition, our aim is to provide an analysis which will help to conceive sustainable solutions from the same innovative force in order to tackle the major challenges and global commitments which have been undertaken.

MATERIAL AWARENESS

"Many tested images cannot live because they are mere formal games, because they are not truly adapted to the matter they must adorn". Gaston Bachelard, 1942[1].

In an increasingly compulsive, non-criteria-based era of globalised images, this statement is surprisingly valid and is a clear warning of the danger of allowing ourselves to be seduced exclusively by these, if we are not to fall into the trap of constructing trivial forms dissociated from the matter chosen to express them. Bachelard also clarifies that "for a dream to continue with sufficient constancy to generate a written work, so that it is not simply the celebration of a fleeting hour, it must find its matter, a material element must provide it with its own substance, its own rule, its specific poetics"[2].

These reflections, taken from an essay on the imagination of matter, could perfectly well refer us to the discipline of architecture. They show that for a thought to crystallize, it must necessarily transcend its immaterial dimension; that in order for a premonition, which by virtue of its intensity produces a work of architecture, and is not the product of an occurrence arising in a state of maximum elation, it is necessary to find the precise matter.

Gaston Bachelard, by means of these considerations, exhorts us to discover the radical link which is established between formal speculation and physical consistency, and makes us understand that the material condition of the constructed work is not the product of a whim, but the consequence of a process which requires the contemplation of the laws of construction in their final stage. It is true that it is necessary to go through different stages during the development of the project, and that in many of them matter can be dispensed with without it being affected, but in the end it becomes inevitable to consider the internal logic of the elements chosen to provide it with corporeality. From this perspective, matter becomes the means of expression of ideas and the element which is capable of transforming them into a constructed work[3].

In the same text he also speculates on setting "a law of the four elements that classifies the various material imaginations according to whether they are linked to fire, air, water or earth"[4]. Interestingly, ceramics, the first sintered compound in history, is made up of these very four elements. It is a simple material, originated by the mixture of earth and water, and transformed through air and fire, which has extraordinary properties: it is hard, inert, stainless, fireproof, and water-repellent. These characteristics, together with the ease with which it can be moulded, giving it any shape, texture or colour, and the naturalness with which it registers the expression of the hand, and with it, of time and space, allow it an unlimited field of application **(fig. 02)**.

Used in all cultures and civilizations, it symbolizes the past millennium of a substance that man, with his ingenuity, has been able to process and use in the most efficient way, achieving results which outlast all technological innovation. The history of architecture is also linked to this fascinating material, and the situations in which it can be found are innumerable because of its immense capacity for specialization, largely to protect itself from the four elements of which it is composed: from the earth through the terracotta tile pavements that harden the ground on which they sit to defend themselves from impurities; from water through the flat or curved tile roofs which are shaped to conduct the rain and protect us from inclement weather, or from the glazed tile coverings which cover the walls with an impermeable layer to facilitate hygiene and prevent contamination; from air through brick walls with which solid buildings have been built to protect themselves from any threats; and from fire through refractory surfaces or lattices that let light through but prevent direct radiation from the sun's rays, in order to temper and preserve the privacy of interior spaces.

This reality, which shows the unlimited configuration potential of the ceramic materials used in architecture, allows for a distinction to be made between those designed to take on structural functions and provide firmness, and those designed to clad it in order to protect it from the elements. The first category includes the brick, a universal construction element designed in perfect harmony with the human body and whose origin dates back to the middle of the third millennium BC[5]; it is such a superb synthesis that it has not required significant modifications since it was first created and with just one piece, and a few accessories, it has allowed practically everything to be made. Nevertheless, the second one reveals the existence of an infinite number of pieces shaped to solve a specific problem in each case. This fascinating metamorphosis of matter, which involved reformulating dimensions, adapting thicknesses or engineering complex shapes, led to the renunciation of its load-bearing capacity, but it showed that the naturalness with which it is modified to safely respond to new demands belongs to its idiosyncrasy, resulting in an endless number of highly qualified wrapping skins which characterize the surfaces they cover, ready to defend themselves from almost anything.

If something can be said about this protective material, which is largely responsible for the colour and texture of our cities since it is present in floors, walls, ceilings and roofs, it is that it has

succeeded in responding honestly and intelligently to all the problems it has had to face, and in the process, and whenever possible, it has expressed the characteristics of a particular place and time with grace and ingenuity. It should be made clear that this "attribution of human qualities to materials -honesty, intelligence, elegance, ingenuity- is not intended to explain; its purpose is to heighten our awareness of the materials themselves and thus to reflect on their value"[6].

TIMES OF STEEL AND CLAY

The choice of a material is determined by the need to solve a functional problem, to respond to a desired shape or to produce a precise meaning, an aspect which is often forgotten at the expense of the other two, but as Richard Sennet reminds us, paraphrasing Lévi-Strauss, "symbolic value is inseparable from awareness of the material condition of an object"[7]. Coherently meeting these requirements calls for in-depth knowledge of its technical properties, expressive capacity and eloquence; three determining aspects in the qualification of space which allows it to achieve its raison d'être when, once placed, it provides an appropriate response to all of them.

The soft origin of ceramics, hardened in later processes, is one of its most attractive qualities since it confers all the possibilities of configuration and formulation of its technical characteristics. This particularity has made it an ideal material for continuous reprocessing and, if we consider the extraordinary lessons history has taught us, we can see that it has not stopped evolving over time and has always discovered a suitable way to do so, either by contributing to the solution of new problems or by proposing innovative ways of applying them.

However, the question that arises at the moment, in which awareness is being called for of the global commitment made at the Summit for Sustainable Development held in New York in 2015, and in which a set of 17 Goals to be achieved by 2030 was defined[8], is to find out what this direction should be. The challenges we have to face call for a radical change, in the shortest possible time, in certain harmful habits which are threatening the planet. In order to be fully aware of this vulnerable situation, it is necessary to find, within a short period of time, ways to straighten out this course and, although it is very likely that a large part of the future solutions will come from science and technology, we should bear in mind all those past experiences from which it is still possible to learn.

One of the most interesting episodes, and one that has many similarities with the current situation since it is a time of deep transformation, can be found in the innovations that took place at the end of the 19th century, when industrialised manufacturing processes were developed and which constitute the current basis of ceramic technology[9]. This revolution involved the mechanisation of all the production stages, from the processing and composition of raw materials, through the processes of configuration, surface treatment and decoration of the pieces, and concluding with the firing methods, giving rise to a new generation of ceramic materials that was unprecedented in the history of architecture[10].

Simultaneously, the rise of steel structures, which together with the invention of the elevator gave way to the new typology of high-rise buildings, had a decisive impact on the construction industry, two of its most important consequences being the need to lighten enclosures and partitions, and the obligation to secure structures against fire, and this is where hollowed-out ceramics proved to be unbeatable in responding to all these demands thanks to the development of a very wide range of highly specialised products [11] **(fig. 03)**. William le Baron Jenney, one of the main actors in the history of the American skyscraper, foresaw the arrival of times of steel and clay with which to meet the demanding challenges of its construction. "The hollow arch of refractory terracotta clay was invented, strong, light and less costly than the old methods, and more effective. With this material it was easy to completely cover the I-beam and form a flat roof that only required plastering and protection of the columns, because it could be easily moulded into the most convenient shapes for each purpose"[12].

It is not surprising, therefore, that a great many pioneering projects in the use of these modern materials emerged in a very short time, but the past experiences to which I was referring are not so much focused on the most outstanding or most influential achievements of the time, which were many and important, but rather on highlighting, through a particular series of actions, the radical nature of certain visionary procedures and attitudes that are still fully valid and which can be of great help in conceiving, with the same innovative force, the transformation that the new times demand.

A building that congruently exemplifies this impulse is Louis Sullivan's Prudential Building in Buffalo (1896) **(fig. 04)**. The building proposes an enclosure built in terracotta in accordance with Sullivan's theories on the organic function of ornamentation in architecture, incorporating floral embossing as a means of expressing the poetic and rational meaning of the construction[13]. Not only does he lighten the enclosure with the introduction of ceramics, but he also expresses this condition through his plastic proposal. To a large extent, this evanescent and lightweight appearance of the facade is achieved through the presence of the shadows contained in the natural forms which cover it, thus managing to dematerialise it and transmit the sensation that the building is protected by a vegetal fabric which allows the air to pass through its wicks. He gave life to a material as had never been seen before and Frank Lloyd Wright, his former collaborator, referring with respect and admiration to the authority with which he used terracotta, and in the face of the feeling that this dominion would never be achieved again, stated: "No. Materials never die. This material is only sleeping, waiting for some master to wake it up to life"[14].

One of the most interesting contributions made with the aim of preventing the buildings from being consumed by flames, and which stands out for the uniqueness of the approach, is that made by Rafael Guastavino when he eliminated the problem at its root and replaced, wherever possible, the steel structure with ceramic vaults due to its proven resistance to combustion. His great opportunity came during the construction of the Boston Municipal Library (1895), when Charles Follen Mc Kim, of the firm Mc Kim, Mead & White, discovered the advantages of his patent **(fig. 05)**. In his hands, this construction system, based on the intelligent arrangement of a simple material which was capable of assuming structural functions not originally foreseen - a small, thin scraper designed to cover surfaces - and characterised by its solidity, lightness in relation to the light it covers, speed of execution and economy of means when it was put into operation, was developed to a totally unexpected limit[15].

Another creative manifestation which is surprisingly original is the invention of the *trencadís* technique conceived by Antonio Gaudí and adopted by Catalan modernist architects. This innovative procedure, based on the reuse of ceramic fragments for their ornamental application in the covering of facades, reached its maximum expression in the Batlló house (1906) and the Güell Park (1914), both in Barcelona. To make these mosaics, all kinds of plates and cups made of broken white china, pieces of glazed tiles and disposable ceramic material were used to add chromaticism and colour to the sinuous walls and breathe life into them through the reflections of light on the glazed surfaces, with each piece adding its own particular nuance to the whole. Working with a recycled material adds a sublime factor to the character of the envelope because the use of pieces of the same colour, but from different sources, produces slight shades which provide a depth and warmth to the coating which is impossible to achieve by other means[16]. This is an unexpected enrichment resulting from the rational decision of using materials discarded by the industry as unusable.

Ceramic materials were widely used until after the Second World War, after which new construction systems based on standardisation and prefabrication were consolidated, giving way to glass, steel, aluminium, or concrete. However, the so-called second-generation architects have undertaken a critical review warning of the danger of forgetting the lessons learned from the humblest version of history, the one linked to popular wisdom, which has been able to build a strong identity through common sense and economy of means. This vindication of the vernacular, of architecture without architects, was not so much due to the purpose of recovering a heritage which was disappearing, as it was to recognize the value of the culture and traditions which make the places where we live unique.

One of the most lucid retrospectives, conducted with the aim of finding the best version of the path which allows us to move towards a better future, belongs to Josep Lluís Sert. He discovered a source of renewal inspiration in the harmony of the Mediterranean peoples, "the product of patience, love and time", and in his architecture "born to limitations and resolved with great simplicity in shapes"[17], which led him to use local materials in many of his works. Particularly fruitful was his collaboration with Joan Miro in the projects of his own studio in Mallorca (1956), the Maeght Foundation in Saint Paul de Vence (1964) and the Miró Foundation in Barcelona (1975). In all of them, he used ceramics as he perceived it to be a simple material - a piece of baked clay - but tremendously dignified and one of the most consistent in terms of its history and meaning. Among these three works, the interior and exterior handmade terracotta floorings of the Maeght Foundation stand out for their sensuality, completely impregnated with the expression of the craftsman who modelled them, making each of the pieces unique through routine and diverse movement while providing mastery of the trade **(fig. 06)**.

MATERIALS NEVER DIE

This brief journey, conducted with the aim of learning from past experiences, shows the enormous capacity for transformation of ceramics and, although throughout this time the industry has not stopped evolving and conceiving new products, the technological base, in essence, remains the same. This is why all these paths taken by the great masters of architecture since the end of the 19th century are still an endless source of inspiration. Their proposals, based on the intelligent and rational use of ceramic materials, opened up the innovative ways of using these materials which, in their essence, are still valid today.

The course taken by Sullivan, committed to the use of the most adventurous components of his time and adopting lightweight terracotta to squeeze it to its very end, is revealed in the figure of Renzo Piano, an architect with industrial hands who transforms all the materials he encounters. Among his most significant works are those made with ceramics: starting with the Ircam (1990) and the Rue du Meaux apartments (1991) in Paris, continuing with the Postdamer Platz (2000) in Berlin and the New York Times (2007) and concluding with the Central St. Giles (2010) in London and the Botín Foundation (2017) in Santander. In all of them, his innovative mark is revealed, and the close collaboration he establishes with manufacturers to tackle these challenges has managed to bring this noble material back to life, thus allowing us to appreciate its extraordinary expressive potential.

Following the trail that Guastavino walked, who did more with less thanks to ceramic vaults, and hand in hand with technology through the incorporation of sophisticated design and parameterized calculation programs into professional practice, there is once again a basis for continuing to explore the possibilities offered by a structural system that had supposedly been exhausted. In this field, renowned academic centres are conducting their own research, including the Block Research Group of the EHT Zürich[18], one of whose research lines focuses on exploring low-tech building systems made with local materials and traditional construction techniques. Part of these proposals were shown at the Venice Biennale in 2016 with a prototype of the *Droneport Project* promoted by the Foster Foundation **(fig. 07)**, which proposes facilities for drones, designed to facilitate the distribution of medical material in emerging countries which currently lack the adequate infrastructures.

Gaudí's brilliant commitment to reusing unusable material and dignifying it until it becomes the leading figure, could not be more in line with the times, since this behaviour is clamoured for through the so-called 3 R's of ecology: reduce, reuse, recycle. Within this context, albeit at a slower pace than desired, solutions committed to a system based on circular economy are beginning to emerge, as can be seen in the project *Ceramic Sustainable Urban Drainage System*, recently completed in Benicàssim (2019) and carried out within the LIFE programme promoted by the European Union for adaptation to climate change, and in which five different partners have participated: the university, technological institutes, local administration, manufacturers, and construction companies[19]. This proposal, which aimed at implementing a demonstrator to respond to soil sealing in cities by developing a sustainable urban drainage system, uses an innovative water-permeable ceramic paving stone made of low-commercial value tiles **(fig. 08)**.

And the commitment to valuing what is local, which in Sert's case arose from a personal reflection on the meaning of tradition, is now vindicated by the global urgency to find sustainable solutions to the problems we are facing. A claim which demands the restoration of common sense and the economy of means, and which we have rediscovered in attitudes such as that of Francis Kéré in his Primary School in Gando (2001) **(fig. 09)**; a precursor project of this new sensitivity built against the tide in the era of greater architectural excesses, which aspires to something as simple as giving an adequate response to the setting by using only the materials at hand. Fortunately, and with the help of a generation of emerging architects committed to sustainability, it is becoming increasingly common to find projects in which both the discourse and the proposals are coherent and of a high architectural quality of their own.

The need to create a responsible architecture which is consistent with social, economic and environmental factors opens up a new stage in which it is essential to set up alliances with all the sectors involved: the scientific-academic sector to research and determine potential new materials, the professional sector to come up with innovative ways of using these materials and the productive sector to transform these materials into concrete reality. At present, and thanks to the extraordinary qualities of ceramics, successful experiments are being carried out in the implementation of digital design methods, robotic manufacturing and 3D printing applied to the automated production of advanced ceramic systems[20]. The progressive incorporation of these new technologies, many of which are still in their experimental stage, will have an impact which is at least equivalent to that produced by the industrial revolution.

Since we are aware that we are facing a decisive crossroads if we want to meet the global commitments acquired through the Sustainable Development Objectives, the proposal of systemic responses from a holistic and interrelated vision is imperative in order to achieve a clear improvement in the economic, social and environmental integration. The challenges we face are of such magnitude that disruptive visions are needed to radically transform the current model, and to this end it is necessary to once again vindicate the profound meaning of concepts such as: sustainability, resilience, ecology or environment, worn out to a large extent by the misuse that has been made of them, and sometimes causing absurd scepticism, when more evidence exists of how urgent it is to address them.

As far as our activity is concerned, and as we have seen through all these inspiring proposals, there are plenty of reasons to confirm that change is underway and is irreversible, but decisive and

hopeful policies are still lacking to break the established inertias and accelerate the transition towards the new patterns of behaviour[21]. Times are coming full of opportunities behind the important transformations aimed at reducing environmental impact in all processes and in each of the different stages of our complex work. It is evident that a large part of these opportunities will come from technology, but those offering an attentive look at tradition should not be underestimated; if we keep to this legacy, architecture has always managed to be a driving force for innovation when, in investigating the root of the problems underlying the challenges to which we have to respond, it comes up against unexpected solutions.

To a great extent, these innovations have been related to the matter which allows to support the ideas pursued by the projects and to their intelligent way of disposing it according to the laws of construction. This is the most precise stage of the whole process before it becomes a reality, but it is also the one which allows it to be configured according to its particularities over which the architect should never lose control if he is to guarantee a full and coherent work at all scales.

> "Fired clay, even if not perfectly hardened by fire, is, with the exception of its fragility, the most imperishable material; it lasts much longer than stone or metal and it even provides greater solidity and quality in its technical use". Gottfried Semper, 1863[22].

This quality has allowed it to be one of the materials chosen over the centuries to give architecture its own substance, its own rule and its specific poetics. Few materials have such a noble and simple origin as ceramics, and few have developed such a wide and versatile spectrum of components for the purpose of protection. The times to come will bring new masters who will reawaken it, fascinated by the inexhaustible possibilities of technology, and hopefully also enriched by the common sense of tradition, with the aim of providing innovative solutions to ensure the greatest possible wellbeing, but on this occasion, moreover, taking into account those laws which ensure respect for the planet in order to preserve it for future generations.

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Notes

01. BACHELARD, G., *El agua y los sueños. Ensayo sobre la imaginación de la materia*, Fondo de Cultura Económica, Mexico, 1978 (1942), p. 10.

02. Ibid. p. 11.

03. As such, projects which fail to consider or assimilate construction as an inseparable part of the process, may end up being incomplete architectures by generating incoherent images since their lines are not adapted to the chosen material.

04. Ibid. p. 10.

05. The shape of the brick is born according to the anatomy of man: light, adapted to the hand and 1 foot long, 1/2 wide and 1/4 thick in proportion. GRANGEL, E., "Origen y tipología de los materiales cerámicos", *La ruta de la cerámica*, Asociación para la Promoción del Diseño Cerámico, Castellón, 2000, pp. 17 ff.

06. SENNET, R, "El relato del ladrillero", *El artesano*, Anagrama, Barcelona, 2009 (2008), p. 172.

07. Ibid. p. 162.

08. The Sustainable Development Goals call for universal action to eradicate inequality and extreme poverty, unsustainable consumption patterns and environmental degradation, and to strengthen institutions and global solidarity in order to protect the planet and ensure peace and prosperity.

United Nations, n.d., *Sustainable Development Goals*. Available at: https://www.un.org/sustainabledevelopment/ [Consultation: 27 February 2020].

09. ESTALL I POLES, V., PORCAR, J. L., "El desarrollo industrial y tecnológico durante el siglo XIX hasta el primer tercio del siglo XX", *La ruta de la cerámica*, Asociación para la Promoción del Diseño Cerámico, Castellón, 2000, pp. 144-154.

10. A sign of the impact of this change can be traced back to Eugène Viollet-le-Duc, a pioneer in claiming the need for a rational, standardised, hygienic and economic architecture, by foreshadowing a hopeful path in the new ceramic materials. "We had the chance to see, in the last exhibitions, to what extent Germany, and especially England, have perfected the manufacture of fired clay, bricks and moulded and glazed earth". VIOLLET-LE-DUC, E., "Décimo octava conversación (sobre la arquitectura privada)", *Conversaciones sobre la arquitectura, Vol II*, Colegio Oficial de Aparejadores y Arquitectos Técnicos de Murcia, Murcia, 2007 (1872), p. 327.

11. This situation gave rise to the flourishing of a new industry in the United States whose golden age, in which more than 30 companies were established throughout the country, spanned from 1880 to the Great Depression of 1930, and the birth of a new material called *architectural terra cotta* as a lighter and less expensive alternative to stone.

12. JENNEY, W. L. B., "An Age of Steel and Clay", in *Inland Architect and New Record*, 1890, vol. 16, no. 7, p. 76.

13. See WEINGARDEN, L. S., "Louis H. Sullivan's System of Architectural Ornament", *Louis H. Sullivan. A System of Architectural Ornament*, Rizzoli, New York, 1990, p. 24.

14. WRIGHT, F. L., PFEIFFER, Bruce B. ed., "In the cause of architecture V: The meaning of materials - The Kiln", *Frank Lloyd Wright. Collected Writings. Volume 1 1894-1930*, (originally published in The Architectural Record, June 1928), Rizzoli, New York, 1992, p. 288.

15. The ceramic vaulting system was so popular that the Guastavino Fireproof Construction Company founded in 1889 was active until 1962, 12 years after the death of his son Rafael Jr. The cathedral of St. John Divine in New York (1909) is one of his greatest achievements, as it has a 30 m span vault with a thickness of only 11 cm.

16. In the restoration of Park Güell (1987-94) undertaken by architects Elías Torres and Juan Antonio Martínez Lapeña, in collaboration with Cerámicas Cumella, 21 different shades of white were used. An intervention, which was not without controversy, for which they received the Europa Nostra prize in 1995. El País, 26/ 12/1994.

17. SERT, J. L., *Ibiza, fuerte y luminosa*, Ediciones Polígrafa, Barcelona, 1967, pp. 14 and 16.

18. ETH Zurich, 2009, *Block Research Group*. Available at: https://www.block.arch.ethz.ch/brg/project/venice-biennale-2016_droneport [Consultation: 27 February 2020].

19. Project LIFE15 CCA/ES/000091. *Ceramic Sustainable Drainage System*. Instituto Tecnológico de la Cerámica, n.d., *Life Cersuds*. Available at: http://www.lifecersuds.eu [Consultation: 27 February 2020].

20. Currently, renowned academic centres are conducting their own research, including: Material Processes and Systems (MaP+S) at the Harvard University Graduate School of Design, Garmazio Kholer Research at EHT Zürich, the Bio-Integrated Design Lab at the Bartlett School of Architecture at UCL and the Institute of Ceramics Technology at the UJI.

A reference book on the subject is BECHTHOLD, M., KANE, A., KING, N., *Ceramic Material Systems*, Birkhäuser, Basel, 2015.

21. According to the International Energy Agency, the building sector is responsible for 30% of global energy consumption and 28% of CO2 emissions.

International Energy Agency, 2020, IEA. Available at: https://www.iea.org [Consultation: 27 February 2020].

22. SEMPER, G., "La cerámica, la tectónica, la estereotomía y la metalotecnia, consideradas en sí mismos y en relación con la arquitectura (1863)", *Escritos fundamentales de Gottfried Semper*, Fundación Arquia, Barcelona, 2014, p. 311.

Images

01. Llorens Artigas modelling a vase in his workshop in Gallifa. Photograph by Catalá-Roca, F., 1970. Source: Arxiu Fotogràfic COAC, Barcelona.

02. Interior of a Hoffman kiln in the Oliva *La Salvadora* pottery factory. Photograph by De Miguel, E., 2019.

03. Pages 4 and 23 extracted from the catalogue *Fireproof Construction in Terra Cotta Hollow Tile*, 1914. Source: Canadian Centre for Architecture, Montreal.

04. Detail of facade of the east entrance of the *Prudential* building in Sullivan. Photograph by Boucher, J. E., 1965. Source: Library of Congress, New York.

05. Rafael Guastavino i Moreno on the arches of the Boston Public Library under construction. Photograph by Steven, E. F., 1889. Source: Boston Public Library, Print Department, Boston.

06. Craftsman making handmade terracotta in the Oliva *Decorativa* pottery factory. Photograph by De Miguel, E., 2009.

07. Full-scale prototype of a module of the *Droneport Project* for the 15th Venice Architecture Biennale. Photograph by Block Research Group, 2016. Source: ETH Zurich: Block Research Group.

08. Laying of the *ceramic* paving stone for the sustainable urban drainage system in Benicàssim. Photograph by Villalba, M., 2018.

09. Laying of ceramic pots on the roof slab of the school to introduce natural light inside. Photograph by Kéré, F., 2001. Source: Kéré Architecture.

09

What is Architecture made of? Contiguities and Serendipities with regard to water in the modern project

Juan Domingo Santos
Carmen Moreno Álvarez

This text describes the reunion between creation and the universal contiguity of thought, matter and form, and how certain forms of architecture are conceived of a single substance which is transferred to the elements that make up the work. This article questions the strictly technical condition of a large part of 20th-century architecture -especially that of the Modern Movement- with a "detached look" at the discipline from a technical point of view and taking into consideration the repertoire of materials. Although it is not possible to generalise and the routes taken by the contemporary architectural project are many and varied, we may speak of a certain line of thought derived from a universal contiguity (Ovid, Fourier, Calvino) present in certain architectural movements in history that mark a clear distinction between the building materials and the substance with which architecture is conceived. This text reflects on these questions taking water as an argument for creation in architecture.

CONTIGUITY AND SUPRAMATERIALS

In 1985, before his death, the artist Joseph Beuys created the work *Lemon Light* (Capri-Battery)[1] **(fig. 02)**. Upon a first approach, the installation is a modern metaphor that speaks of ecological balance and the balance that must be maintained between man-made objects and nature, and how the changes brought about by the latter may influence human creation. But beyond this ecological and environmental dimension, the installation is an in-depth look at the reunion of creation with the universal contiguity of thought, matter and form, a question that haunted the artist throughout his life and would become the main theme of his works and creations. The work shows how the qualities of a material may be transferred to others, endowing the set of elements that it consists of, with a body formed by a single substance. Beyond its appearance, the work has an extensive meaning, as it is part of the artist's (*Aktionen*) collection, inspired by the changing states of bodies and energy transfer from thought to matter. Works such as *Fat Chair* (1960), *The Honeypump at the FIU Workplace* (1974-1977), *Voglio vedere le mie montagne* (1971) or *7000 Oaks* (1982), are based on the energy that flows between different bodies seen as a single substance that envelopes objects and ideas beyond their own physical reality, and inform symbolically of the energy accumulated in matter[2].

The architects Herzog and De Meuron, who had collaborated with Joseph Beuys in some of the artist's projects, executed a building extension in a garden in 1984, linking the creation to a full-grown Paulownia tree **(fig. 03)**. The construction was influenced by the ideas of contiguity posed by Beuys in the *7000 Oaks* installation created for documenta 7 at Kassel two years ago. The result of the extension is a tree-architecture tandem that shares a participatory energy that engages them on a mutual basis. The curve of the pavilion, the circulatory movements in the interior and the use of plywood in its construction, demonstrate a series of decisions motivated by the presence and energy that emanates from the tree, which leads to both objects of a different nature to be "rooted", thus influencing the growth of the Paulownia tree and the life of the pavilion and its architecture from then on.

Years before the creation of *Lemon Light*, the writer Italo Calvino had already discussed, in his essay entitled *Ovid and Universal Contiguity* (1979)[3], the contiguity of all existing figures or forms (the firmament, gods, the animal or mineral kingdom, flora and human beings), establishing a closeness between the world of mythology -the gods- and the earthbound realm of human beings and nature. In his essay, Calvino situates the terrestrial world that Ovid speaks of in "a universe in which space is densely packed with forms which constantly swap size and nature (...), both intertwine around each other in a double spiral"[4], sharing the same substance. The idea of placing the action within a scenario of "blurred confines between different worlds", according to the text, involved overcoming the distance that that separates these two antagonistic states of nature. By means of contiguity, mythology and quotidian reality may be transmuted into a single body, encountering associations and similarities through stones and other terrestrial materials that take shape as mythological beings[5].

Both Beuys and Calvino, two contemporary and influential figures in their respective fields, spoke of the universal contiguity of matter, concepts and form to develop their creations in the second half of the 20th century. In Beuy's case, the idea of contiguity is the extension of the vital experiences of the artist and his *Aktionen*, flows that connect the past, present and future to overcome the trauma of the war that would accompany him throughout his life and would be a part of the artist's works in the use of unstable materials that represented states of transformation in permanent evolution[6]. In Calvino's case, it was the intellectual construction of a body of literature conceived by means of a flow of transitory and continuous states that freely and indistinctly, move between different realities. Both creators approached their works through a dimension that transcended materiality, basing their ideas and realisations on the transubstantiation of the work and the natural energy that was conferred on humanity beyond its physical reality, a unique and symbolic substance that links thought, matter and form by the contiguity of the elements that make up the work.

After the Second World War, the artists of the European avant-garde movements of the second half of the 20th century recovered their interest in the disintegration of organic material in general and the transmutations of the human body, and idea that would extend to other physical elements of Nature. Recycled waste materials that continued to deteriorate after the work was finished became present in their works in an evolutionary and transformative process. Tapies and Saura in Spain, Dubuffet in France, Bacon in England, Kounellis in Greece, Auerbach and Beuys in Germany, among others, explored the disintegration and dissolution of matter, with special interest in

questions that linked thought, energy and transformation, in a material that converts itself into primordial substance that is transferred, taking on different forms in the process[7]. Later on, in the early 21st century, art would extend these questions to a body of work of a higher order, more interested in social questions that included collaborative processes within social, cultural and political contexts, involving persons, the city and their environment by means of projects with a strong civic background as the motive. The mythical and symbolic conditions that move a people to create the historical edifices of the past would be replaced by a symbolic terrestrial dimension of human beings and social conflicts. Works such as *When Faith Moves Mountains* by Francis Alÿs, an installation created in Lima in April 2002, where 500 volunteers gathered to move a 500 metre sand dune ten centimetres from its former position by using a simple shovel[8] ; or the collaborative practices of Beuys in *7000 Oaks. Urban forest instead of city administration* (1982), an installation that brought together the citizens of Kassel to plant 7000 oaks along with as many basalt stones in different public areas of the city[9]; are collective explorations of communication and social cooperation that may be transferred to other places, and have the power to congregate around them and for a common substance, diverse questions with a utopian characteristic of raising awareness that demonstrates "what we are capable of doing together" **(fig. 04)**.

Beyond Calvino's literary arguments and the artistic experiences of Beuys and other contemporary artists on the contiguity of matter, in *Argumentos. Sobre la contigüidad en la arquitectura* (2001)[10], the architect Juan Luis Trillo makes a series of reflections on supramaterials as an argument for creativity and the activity of transubstantiation used in creative artistic and scientific processes, situating these processes at the crossroads and the borders between different worlds as energetic spaces for creation. In the book, these questions are transferred to architecture, considered to be a "cross-cutting action" of the architectural project that governs the conception of the work beyond the pragmatic consideration of building. He deals with contiguity as a "zipper" that unites varied items, energetic actions that permit the conversion of thoughts, objects, situations or memories into material forms conceived of a common substance. Concepts such as transference, contamination, metamorphosis or transubstantiation (in the line of Beuys or Calvino), are used to overcome the limits posed by the discipline of architecture and its construction, taking recourse to the ability of the architectural project to imagine connections or arguments in the "borders separating different worlds", with relations that extend its meaning and give architecture a vital and symbolic dimension.

WATER AND STONE SUBSTANCES OF ARCHITECTURE

Universal contiguity has been a characteristic of certain moments of artistic codification throughout the history of architecture, which have led to the conversion into symbols of a series of experiences that overcome, by means of intellectual abstraction, the simple pragmatism of construction. Pre-Socratic substances such as air, fire, light, water and even stone or earth, to which may be added phenomenon such as humidity, temperature or sound, constitute a group of elements and actions that may be defined as no materials and form part of an essential thought that envelops architecture with an energy dimension that can bring together and consolidate the constructive consideration of the work around them. Some historical architectures conceived around a single substance such as the Roman Pantheon of Agrippa and the mathematical relationship between light and geometry, the Acropolis of Athens, built of stone carved from the hill on which it stands, the Inca city complex of Machu Pichu, a complex, hydrological, urban and agricultural system built on dry stone terraces in the Andes 2400 metres above sea level on astronomical lines and paying reverence to the mountains –gods– that surround them, and the Alhambra in Granada, around water and an idea of the garden of paradise on earth; they are bearers of an original sublime energy that is unleashed from the architectural project beyond questions of programming or simple constructive materiality. Light, stone and water to conceive of a series of architectural projects based on experimenting with a supramaterial that endows them with meaning and a symbolic dimension. The almost immaterial condition of these basic materials, especially that of water and light which neither age nor possess memory, are in a state of continuous flux and possess neither formal nor material stability -in contrast to stone- have the ability to erode and transform objects, leaving their traces behind as they pass over them, extending their material condition with new relations and forms, becoming "pure content" owing to the effect of a greater substance.

Some historic architectures have used water as a creative substance that is representative of an unearthly landscape. This is the case of the palatial, religious and ceremonial complex of Tipón in the Incan civilisation near Cuzco, an admirable system that distributes water for agricultural irrigation and co-exists with religious constructions and the royal palace among beautiful gardens on stone terraces **(fig. 05)**. Or we might speak of the Alhambra of Granada, of Islamic Spain, a palace of water among patios, gardens and walls as a metaphor for paradise. All of these architectural complexes transcend their daily uses to become places dedicated to the veneration of water. In these architectures, water is the substance that moulds the landscape and the space at different levels and with different manifestations. In the case of the Alhambra, its presence takes on different aspects, it may be symbolic, metaphorical or abstract, it may act as an analogy to certain forms and situations that evoke paradise at the same time that it regulates the temperature of certain rooms and patios in perfect synchrony between the phenomenological, the artistic and the technical, in addition to possessing sublime poetic and emotional connotations[11].

Light and water create different effects and establish links with an extensive and varied iconographic repertoire in the Alhambra. There are mirrored reflections, transparencies, dissolution and multiplication of forms, image refraction, weightlessness and lightness, broadening the perception and meaning of the palace and garden architecture which extends beyond its material limits. The evanescence created by water in the interior spaces and the patios diffuses the borders between reality and fiction to create imaginary dream-like landscapes **(fig. 06)**. The effects of water in these spaces is truly beautiful and astounding, not only due to the aesthetic appearance that it creates, but also because it questions the bases of certain concepts that have been traditionally linked in Western culture such as solidity/opacity and lightness/transparency. By contemplating the use of water in the Alhambra, it is possible to propose a dissolution of the conventional associations of this type with new associations that take us to a fascinating world where the opaque may be light, and what is solid, transparent[12]. Occasionally, this use of water also becomes a subtle alteration of artistic elements when they become, along with white marble, the substantial material of the work of art, as is the case of the fountain in the Court of the Lions.

The Alhambra is an aesthetic experience conceived of a unique substance that makes it timeless. What makes it truly special is its ability to trap time in a place where life is present in every corner and at all moments, through a surprising contiguity between nature, architecture and ornamentation, as the symbol of a culture. It is difficult to forget the sensations evoked by these spaces full of life that preserve humanity in their architecture.

This symbolism present in the Alhambra and in some leading historical architectures, was reduced in 20th century architecture and especially during the Modern Movement, to a strictly technical problem and construction to a collection of materials and established solutions, in comparison to the architecture of other periods that had a symbolic nature[13]. Few architectural styles of this period have taken into consideration pre-Socratic substances when conceiving of an architectural project. Water, similar to other supramaterials, was

not deemed to be a substance relevant in architecture as compared to concrete, steel or wood which can be put together in a logical building process. Water almost always appears as an additional body (a pool, a tank, or as part of the landscape) in the works of this period, or it is dealt with from a strictly technical point of view. There are very few examples that include it as an essential substance of the architectural project and at the same time, are a source of connections and transfers between the different elements that represent the work. Its use has been reduced to mere contemplation and to establish sensory experiences around water, almost always in exceptional situations[14]. We may at least find some cases, where water has become the identifying substance that shapes the architecture in contiguity with it and its transformations, a process that is open to the possibility that a "miracle" of transubstantiation of ideas, shapes and materials to achieve a single form in the work, as in the alchemist's laboratory[15]. This is the case of Farnsworth House (1950) designed by Mies van der Rohe, which was conceived of as a machine that would float among the trees in the landscape with the flooding of the River Fox; of the remodelling of the Querini Stampalia Foundation (1961) by Carlo Scarpa, where the ground floor and the garden emerges and submerges under water, its shape blurred by the natural flooding and changes in the water level of the Venetian Lagoon[16]; or the Casa de la Lluvia (House of Rain, 1979) in Cantabria by Juan Navarro Beldeweg, a resonance chamber that only be seen in its entirety when it rains and by the changes wrought by rainwater on the material and the appearance of the house[17] **(fig. 07)**. But above all, we can find the universal contiguity between matter, idea and form mentioned by Calvino in his essay, in the pools of Piscinas Das Marés (1966) by Álvaro Siza, built within the rocky limits of the coast and with water from the Atlantic Ocean itself, as if it were a tank that had been filled with a basinful of the same water, thus diluting its form in contiguity with water from the ocean over which it extends. Water within water for a project based on the transubstantiation of a single material till it arouses fascination within an enclosed space that blurs its borders[18] **(fig. 08)**. Few creations such as these undertook an action based on a universal substance in the 20th century that would direct the project design in line with the added landscapes that Beuys would later demonstrate in his work *Lemon Light* and which the critic Jean Louis Cohen would define as "making environments the building matter (substance) of the work"[19].

Continuing with this line of thought and action, it is possible that the interest and relevance of the paths laid by Dimitri Pikionis to connect Athens to the hill of the Acropolis and the Filipappo hill (1954-1957) are largely due to a project undertaken from a perspective of contiguity with the landscape's material, stone **(fig. 09)**. The work is a cultured manifestation of contemporaneity on the territorial contiguity of time and matter. The layout of paths on the rocky geography designed by Pikionis constitutes a narrative on the different time periods of the city of Athens. The work establishes a new harmony with the landscape through a united project in stone that consists of extending the use of urban waste material proceeding from the demolishing of old buildings and other materials unearthed during archaeological excavations, all the way to the top of the Acropolis, creating a landscape in contiguity with the city and the natural stone hill[20]. The passage though the archaeological site is a passage from geological material to urban and architectural material that changes shape and state and extends unevenly over the topography. The group of elements that make up this network of paths formed by natural stone and sculpted stone with multiple forms and geometries, laid out between trees and land, physically and symbolically connects the city of the past and the city of the present through roads with different levels and landscape connections. The connection between both cities is not only physical, but it also extends to memory in a process of territorial restoration, stone upon stone, and in a transmutation of matter in space and time[21]. The works and essays of Pikionis speak of a certain "universal life" of matter that transcends its physical nature and, as mentioned by Alberto Ferlenga in his essay *Signs*, finds general commonalities between the different uses and forms of expression of stone: "the combination of different experiences is not a desire or a reference for architects, rather it is part of a mechanism by which places all over the world state their similarities and differences at the same time"[22].

Although it is not possible to generalise and the routes taken by the contemporary architectural project are many and varied, we may speak of a certain line of thought and a more conceptual action in recent architecture, in line with the actions of Dimitri Pikionis or Álvaro Siza, who establish a clear distinction between the building materials and the substance with which architecture is conceived. We are speaking of the transubstantiation of forms and materials inherited from a cultural tradition specific to places and their history, where time and matter play a different role. If construction in the Modern Movement entailed adding, melding, overlaying..., in an ordered and sequential process of assembling materials that ended with the final finish, now it would be the primordial substance (thought/argument) that conceived the work that would give form to the architecture. Persons, history, objects and pre-existences, along with materials and nature, become the materials for the architectural project seen within a single substance and a concrete order of links to life, beyond an established set of building systems.

SERENDIPITIES. EPILOGUE

In the year 2009, in the region of Lanjarón located at the foothills of the Sierra Nevada, a project to recover certain abandoned constructions next to a river was carried out, with the goal of re-establishing the memory of a village and its links to water[23]. The work is the result of a series of environmental, symbolic, urban planning, architectural and social implications, that takes water as the guiding thread of a heritage project where many different aspects of life in a village and its history with water play a role. The project makes an appeal to the relationships with this material good, on the basis of a series of contingencies with the environment, the recovery of certain pre-existences and the incorporation of fortuitous events and encounters that took place over the course of the works, working its way into the local history of its inhabitants through a collaborative citizens' process. In this entire process water becomes the substance that establishes contiguity with the different "materials" that constitute the activity into a process open to experimentation **(fig. 10)**.

Given the few available resources, the activity has consisted of recycling and reusing a series of architectural works and other surrounding environmental elements, adapting old sheds and the flows of water from the canal and the river by means of a simple system of passages and spaces built for water, which are flooded according to the irrigation times for the nearby crop fields. This creates a scenery based on water and architecture that changes its appearance with the passage of the day and the agricultural tasks that are carried out in the surroundings.

The project highlights its narrative condition to incorporate a series of facts and experiences that have shaped the architecture in a continuous process that is open to experiences under the topic of water. The building elements and solutions are a result of participatory processes and certain meteorological accidents that occurred during the construction. The tree trunks that are spread over the floor of the square and flooded with water from the irrigation canal are from recycling large fallen eucalyptus trees after a storm that lasted for days hit the nature reserve in this area, similar to the 17 orange trees that are planted in this space that tell a wider tale; that of 17 persons from Lanjarón, and the water that shelters and provides shade to this place that pays homage to water.

The space is accessed from the courtyard of the former slaughterhouse by means of a wooden pavilion that evokes the cover of the stream of La Capuchina, an 18th century construction that housed the first spring of water in Lanjarón and whose recovery, as well as the contents displayed inside, is the result of the mayor's invit-

ing the town's inhabitants to open their closets and cupboards and to shake the dust off their ancestors' belongings with links to water. This resulted in the unearthing of a photo of this symbolic space that no longer exists today, that once covered the source of the water.

This landscape intervention, similar to works such as *When Faith Moves Mountains* or *7000 Oaks. Urban forest instead of city administration*, is inspired by the metaphorical and symbolic power of certain actions to appeal to the memory of a people and their past. In this case, the link to water as the basis of their existence and a demonstration of how collaborative practices can create strategies for action that give shape to architecture where water, more than an issue of the discipline, is treated as a cultural topic with the ability to frame a series of wider relationships and decisions. The act of building a space "among all" has saved the natural environment from urban speculation and led to the comprehension of the activity as the recovery of a scenic, architectural and material heritage that includes the citizens in different ways, from the youngest to the oldest, who contribute to the retelling of a living and contemporary story linked to water.

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Notes

01. The original work which measures 8x11 cm is part of the Scottish National Gallery's collection. See AA.VV., *Joseph Beuys*, Museo Nacional de Arte Reina Sofía, Madrid, 1994.

02. Beuys was of the idea that there was a global energy principle that extended to all matter in the universe and to the mental energies produced by the individual. In a speech made eleven days before his death when he was awarded the Wilhelm Lehmbruck Prize, Beuys spoke of the future of artistic creation as a notion of energy that not only captures the material and physical aspects but also extends to the spiritual, the immaterial.

03. In the later years of his life, the writer Italo Calvino (1923-1985) began collecting, in a series of essays, his "classics", which include the essay on Ovid and metamorphosis under the title "Ovid and Universal Contiguity". The essay was published along with other texts in a collection titled *Perché leggere i classici*, Mondadori, 1991.

04. CALVINO, Italo. "Ovid and Universal Contiguity", in CALVINO, Italo, *Why Read the Classics*, Tusquets (marginales 122), Barcelona, 1993, p. 25.

05. OVIDIUS NASO, Publius, *Metamorphoses* (Complete work in three volumes), Editorial Gredos, Madrid, 2008.

06. The materials used by the artist are uncommon in the world of art but common in daily life: animal fat, wax, honey, felt or copper, unstable materials that are susceptible to an imminent transformation with minimal energy. The art historian and curator of exhibitions Kristien Stiles, in her speech entitled Accesorios *para la memoria. Las Aktionen de Joseph Beuys* at the MACBA in Barcelona in 1999, explained that Beuy's (1921-186) interest in the changes of state in matter and the transubstantiation of his works in autobiographical and are derived from the fable he describes in his biography of how he was saved from death by nomadic Tartars after his fighter plane crashed in the Crimea during the Second World War. His body was wrapped in animal fat (tallow) and felt (materials used by the artist in his works) until he was healed in a process of union of materials. For more information on the materials used by Beuys in his installations and the material and physical degradation of the artist's work, see the article: BARKER, Rachel y BRACKER, Alison, "Beuys is Dead: Long Live Beuys! Characterising Volition, Longevity, and Decision-Making in the Work of Joseph Beuys", in *Tate Papers*, Autumn 2005, n. 4.

07. Other artists such as James Turrel or Dan Flavin worked on the immaterial condition of light with installations that were very close to architectural projects based on sensory experiences that transformed the perception of space.

08. The project was executed in Ventanilla, a shantytown in the outskirts of Lima under the dictatorship of Alberto Fujimori who had been overthrown. The goal was to carry out an epic action as a response to a social and political problem that had spilled over into the streets with civilian protests on the streets. The project is a metaphor of collective power by means of a geological action performed within the framework of the Bienal de Arte Iberoamericano in Lima 2002, with the collaboration of students from the National Engineering University of Lima. For further information on this project and other collective and social actions, read the article by MANONELLES, Laia, "When Faith Moves Mountains: Political and Poetic Utopias", in *Revista de Estudios Globales y Arte Contemporáneo*, 2016, No.1, pp. 205-230.

09. The action was created for documenta 7 at Kassel in 1982 and ended with the placing of the final basalt piece next to the oak on the day that documenta 8 was inaugurated in 1987, five years later. The last oak was planted by Beuy's son after the artist's death the previous year. For further information on this work and citizen participation, see, DOMINGO SANTOS, Juan, "7000 robles", in DOMINGO SANTOS, Juan, *La tradición innovada. Escritos sobre regresión y modernidad*, Colección Arquia/Thesis, No. 38, Fundación Arquia, Barcelona, 2013, pp. 293-307.

10. The book is an essay on contiguity in different artistic fields and especially in architecture. This pages discuss contiguity

as an instrument to overcome constructive rationality that is based on strict functional logic that results from the consideration of the material and not from experience or its relationship with other questions beyond the field of architecture. TRILLO DE LEYVA, J.L. *Argumentos, sobre la contigüidad en la arquitectura*, Universidad de Sevilla, Seville, 2001.

11. AA.VV., *El Manifiesto de la Alhambra*, Revista nacional de Arquitectura, Madrid, 1953.

12. AA.VV., *El Manifiesto de la Alhambra 50 años después. El Monumento y la Arquitectura Contemporánea*. Colección Monografías de la Alhambra, No. 1, Patronato de la Alhambra y Generalife y TF Editores, Madrid, 2006.

13. JUEZ JUARROS, Francisco, *Símbolos de poder en la arquitectura de Al-Ándalus*, Universidad Complutense de Madrid, Faculty of Geography and History, Madrid, 1999 (PhD thesis).

14. As is the case with significant iconic architectures in the modern period, the pavilion built by Mies van der Rohe for the Barcelona International Exposition (1929), or the Fallingwater house by Frank Lloyd Wright where water forms part of a backdrop for the architecture, or in Luis Barragán's creations in the scenic area of las Arboledas (1961), and in some of his domestic spaces (Casa Gálvez, 1954, and Casa Gilardi, 1976). There, the union of light with water gives a theatrical effect to the landscape and the interior spaces which change their appearance with the seasons throughout the year, as is the case with the religious projects executed by Tadao Ando: Church on the Water (1988) and the Water Temple (1991); becoming sensory experiences in a spiritual connection between architecture and nature.

15. DE BALZAC, Honoré, *The Quest of the Absolute*, Nórdica Libros, Madrid, 2018.

16. AA.VV. *Scarpa: Carlo. La Fondazione Querini Stampalia a Venezia*, Electa, Firenze, 2006.

17. The idea of a house "bathed" in rainwater was already present in an installation executed by the architect in the year that he began designing the house. The installation is a conceptual piece consisting of a small model of a house with gabled roof in copper, and a coil system that lets the water continuously slide off the roof by the walls, inundating all the surfaces of the house, the floor and its surroundings. The result is a particular vision of an object moistened by the light artificial rain that establishes a continual link between the form of channelling the water, the walls that it flows on and the horizontal surface of the floor on which it falls.

18. CURTIS, William, "Álvaro Siza: una arquitectura de bordes", in *El Croquis*, 1994, No. 69-69 "Álvaro Siza 1958-1994", pp. 32 - 45.

19. COHEN, Jean Louis, "Architecture Without Capital Letters", in *AV Monografías*, 2016, No. 186-187 "Álvaro Siza 1995-2016", p. 10.

20. See ÁLVAREZ ÁLVAREZ, Darío, "El paisaje como obra de arte total. Dimitri Pikionis y el entorno de la Acrópolis", in *RA* 2011, No. 13, pp. 37 - 50. Further information of interest can be found in, DI PALMA, Bruna, "Ri (n) tracciare relazioni. Strategie progettuali per le rovine archeologiche monumentali di pozzuoli", y ASCOLESSE, Marianna, "La strada del bene comune. Il segno del passato nel presente", en AA.VV. *I Campi Flegrei. L´Architettura per i paesaggi archeologici*, Universidad degli Studi di Napoli Federico II, Dipartamento di Architettura, Naples, 2016.

21. In 1936, the author Níkos Kazantzáki wrote *The Rock Garden* on the Greek island of Aegina, where he used to spend the summer, similar to his friend Pikionis. The book contains the author's experiences of his trip to Japan and China with descriptions of the Eastern cultures and their relationship to nature. It is possible that the book had an influence on Pikionis's architecture and the way in which he used stone as a wider dimension than the solely technical one.

22. FERLENGA, Alberto, "Signe", in AA. VV. *Paesaggi di rovine. Paesaggi rovinati*, Sapienza Universitá di Roma, Rome, 2014, p. 298.

23. The work was executed by the architect Juan Domingo Santos in collaboration with the members of his study, the municipal gardener, the mayor and the inhabitants of Lanjarón, within a series of actions aimed at recovering the landscape bordering the River Lanjarón that descends from the Sierra Nevada. The project, which was titled Museo del Agua (Museum of Water) began with the search for a place favouring the presence of water under natural conditions.

Images

01. Querini Stampalia Foundation, Venice (Italy), 1961-1963. Architect: Carlo Scarpa. Photo of the entry gate with *acqua* alta or high water.

02. Joseph Beuys, *Lemon Light* (Capri-Battery), 1985.

03. Plywood House, Bottmingen (Switzerland), 1984-1985. Architects: Herzog & de Meuron.

04. Joseph Beuys, *7000 Oaks,* Kassel (Germany), 1982. The photo shows the artist planting the first oak next to a basalt stone accompanied by a group of citizens.

05. Archaeological park of Tipón, The Temple of Water, Cuzco (Peru) 15th century. View of a water channel from the mountains and the distribution layout in terraces (Author photograph).

06. Alberca Patio, Generalife, The Alhambra, Granada, 13th century. The patio of the palace stands on a former irrigation canal (Photo: Antonio Cayuelas Porras, 2017).

07. Casa de la lluvia (House of Rain), Santander, 1979-1982. Architect: Juan Navarro Baldeweg. Installation and pencil sketch on white background of the house created by the architect in 1979.

08. Piscinas das Marés, Leça de Palmeira, Matosinhos (Portugal), 1966. Architect: Álvaro Siza.

09. Layout plan of the stone paths laid by Dimitri Pikionis for the archaeological area around the Acropolis of Athens, 1954-1957.

10. Museo del Agua (Museum of Water), Lanjarón (Granada), 2009. Architect: Juan Domingo Santos. View of the square with orange trees, the entry pavilion and the interior filled with water. (Left photo: author. Centre and right photo: Fernando Alda).

10

He Who Listens to Matter: Approaching the Paraguayan Craftsman as a Contemporary Builder

Jose Luis Uribe

This article focuses on the formation of a cultural portrait of the Paraguayan craftsman, a key component in the development of the architectural style of this small Latin American country. In a totally precarious social, political and economic context, the abundant material culture of Paraguay has led to the emergence of the figure of the artisan who can manipulate abundant, locally available materials and transform it into architecture. This process is developed in collaboration with the architect through an exchange of technical experiences based on trial and error, resulting in a unique way of making architecture.

THREE STATES OF ARCHITECTURE IN ONE SPACE

In 1932, the Museum of Modern Art in New York (USA), led by Phillip Johnson and Henry Russell Hitchcock, opened its doors to the public to stage the '*Modern Architecture: International Exhibition.*' Models, plans and photographs guided the experience of touring the exhibition, which in those years grouped together a series of architectural practices that had in common the form of a project, devoid of regional characteristics, and that confirmed the international development of this style.

Thirty-two years later, the exhibition '*Arquitectura sin Arquitectos*' (Architecture without Architects), curated by Bernard Rudofsky, was mounted in the same space. Between November 9, 1964 and February 7, 1965, the exhibition introduced visitors to architecture with a regionalist nature, based on anonymous construction projects from different areas around the world. Rudofsky's exhibition focused on recognizing primitive architectural expression conceived from the everyday life of its inhabitants. This architecture is embedded in different contexts, and its formal expression meets the immediate needs of the population while simultaneously adapting to local climate, topography and materiality concerns; or in other words, constituting an architecture made with local hands and common sense.

Moving forward to the twenty-first century, in 2010, the exhibition *'Small Scale, Big Change: New Architectures of Social Engagement'* presented eleven projects and works located on the five continents at the Museum of Modern Art in New York (USA). The exhibition was curated by Andres Lepik and was made up of architectures that promoted a new way of living in the built environment of peripheral and neglected communities. The design and construction process exhibitions were developed through collaborative work between the architects and the communities. Both the architect and the inhabitants of the community are recognized as co-creators of social, economic and political transformation, as shaped by small-scale works.

It's interesting to study these three exhibitions since they display and contrast three unique states of architecture exhibited within the same space, but shown with more than thirty years between them. The first state is characterized by the universality of functional architecture that seeks a common architectural language, determined by the uniformity of smooth, polished, unadorned surfaces, where architecture does not assume information that the immediate context can provide. The second state is characterized by geographical, landscape and material particularities that are recognizable in a given cultural context and that influence the architectural object, or in other words, tailor-made architecture. Finally, there is a third state of architecture, where the architect is recognized as a social and constructive articulator, who mediates implementation by using the craftsmanship present in the hands of its inhabitants and anonymous builders.

Considering the latter, this essay invites us to study architectural practices that develop in areas which are poor economically, but rich in local material culture. This viewpoint articulates a project logic based on access to material culture and the artisanal value of human capital. An architecture of place. A small-scale architecture with a lot of control over what is built; where architects develop an architecture of global interest based on the values of each of the cultural contexts where each project is located. An architecture based on working with the hands. A healthy art in the hands of the craftsman.

PARAGUAY AS A CONTEXT

We will approach Paraguay as a case study, scrutinizing the way it approaches the creative process as part of an architectural project method where the artisanal dimension has primordial value. Contemporary Paraguayan architecture relies on the skill and intelligence embedded within the hands of its masons, stonemasons, potters and carpenters. These anonymous craftsmen have contributed to the renewal of Paraguay's architecture, which has been recognized with awards from the Swiss Architectural Award 2008 (Sweden), the Golden Lion at the 15th International Architecture Exhibition of the Venice Biennale 2016 (Italy) and the Moira Gemmil Prize for Emerging Architecture at the Women in Architecture Awards (UK) by Gabinete de Arquitectura. Paraguayan works have also been awarded prizes by the Ibero-American Biennial of Architecture and Urbanism (BIAU) and the Pan-American Biennial of Quito (BAQ), as well as active participation in the Latin-American Biennial of Architecture (BAL). The hands of Paraguay's artisans, its scarcity of resources, and its generous material culture have created an architectural narrative which has garnered the attention of international critics. Part of the value of this architecture is based on the organic nudity of its built surfaces and the raw expression of its works **(fig. 02)**, terms that communicate 'an honest architecture' in Ruskin's words, free of gadgets intended to feign other materials rather than celebrate those with which they are actually formed, and which the author defines as an architectural lie within his lamp of truth[1].

Contemporary Paraguayan architecture is articulated through innovative construction methods, where the risk of experimentation assumed by the architect and the technical contribution of the craftsman create a unique fusion not seen in other areas of the world. The Paraguayan territory provides a wide variety of materials which are

rich in their ability to provide plastic expression, but remain resistant to mass production. Thus, the geographical context of Paraguay has influenced the formation of construction methods based on a process of testing, accumulating and hoarding materials, with the hut being one of the first constructions that allowed its indigenous inhabitants to take refuge from the inclemencies of climate in that territory **(fig. 03)**. Later, with the arrival of the Jesuit missions, Paraguay began to incorporate trade skills imported from Spain, a process characterized by the mass and weight of its architectural components. The stereotomy of the base is incorporated into this culture **(fig. 04)**. The native, who was already a skilled weaver and potter, approached these new techniques and constructive elements which were previously alien to their territory and landscape. We can see the emergence of a culture geared towards doing with one's own hands. The sum of techniques and materials continued to develop as Paraguay's culture took shape as an established nation.

Within Paraguay, the colonizers found ways to develop their skills using new materials and construction systems[2]. This relationship between apprentice/official/master coincides with the idea of craftsmanship as put forward by Sennett, whose aim is to establish intellectual learning based on trained practice over time and constant repetition. We can also highlight the great capacity of Paraguayan craftsmen to adapt to the economic, technological and material conditions of the time.

Considering this last precedent, recognizing a learning process based on a system of trial and error which seeks to improve imported construction systems which place themselves in a foreign context, such as the Paraguayan territory, acquires value. In this way, a Hispanic-indigenous fusion process can be established through practical interactions centered on the trades that are characteristic of this process of mestization, such as weaving, carpentry, stone-working and tapestry. Transculturation between these two races affected the popular architecture of Paraguay, which can be seen in the use of new materials and the crossbreeding of construction techniques such as the use of palm tiles, *canteada* stone or *tapial* walls. In this sense the *jovai* butt, as a mixed architectural typology, promotes new constructive systems for the inhabitants.

In Paraguay, handicrafts are the result of racial crossbreeding, the same transculturation process that involved language and the manifestations of art, beliefs and religion. This is how Paraguayan culture began to develop. To understand the evolution of indigenous culture and its crossbreeding with Spanish, we will focus on the studies of Salo Vera, a priest. Vera states that Paraguayans think in Guarani and translate it literally into Spanish, two systems of thought and communication which are structurally different. He also recognizes two types of Paraguayans: the urban and the rural. Both have the same fundamental culture based on their Guarani and Spanish heritage. Vera sets out the factors involved in the development of Paraguayan behavior and ways of thinking: 1) the two types of culture from which the Paraguayan comes, 2) use of the Guarani language, 3) appreciation of the ecological and sociological environment, as well as its predominant character. These elements define the characteristic behavior of the Paraguayan craftsman **(fig. 05)**.

THE PARAGUAYAN CRAFTSMAN AS AN ANONYMOUS BUILDER

To get closer to Paraguayan artisans, it is appropriate to review part of the exhibition '*Fotógrafos de Arquitectura*' (Architectural Photographers) which was included in the activities of the XI Ibero-American Biennial of Architecture and Urbanism held in Asunción (Paraguay). The exhibition consisted of the photographic work of Leonardo Finotti (Brazil) and Federico Cairoli (Argentina), who promoted the architectural scene in Paraguay through a rotation of works in specialized publications, but under very different states It's interesting to review the photographs that Federico Cairoli selected for the exhibition, since they don't focus on the contemporary architecture of this country, but rather on the value of the carnal, the physical, the crude and primitive that is characteristic of the human dimension that builds that architecture. The silent gaze of an Argentine photographer treasures the value of the human in the anonymous Paraguayan builder, capturing various moments during the construction process: the tranquility of bodies at rest during a work break **(fig. 06)**, the process of applying plaster to a masonry wall using mortar **(fig. 07)**, an improvised work table built from wooden props, or a work installation for the masons based on the same constructive logic as the work in progress **(fig. 08)**.

The Cairoli frames avoid the physiognomy of the Paraguayan builder. The craftsman is noticed in every photograph, but only partially. The photographer is entertained: he recognizes the artisan within a group by means of a general shot, captures fragments of his anatomy, or simply records his absence from the work installation. The only photograph that shows the face of one of the artisans is the intense look worn by an anonymous worker who participated in the construction process of José Cubilla's Casa Takurú **(fig. 09)**; a figure hidden by the shadows that compose the atmosphere of the work, and where the shadow of the artisan is projected on the textured surface of the *tapial* wall.

The cultural portrait of the Paraguayan craftsman allows us to enter into his attitude towards work, above all understanding that contemporary Paraguayan architecture stands out due to the value of the craftsman's trade and his work with common and humble constructive elements. Many bricklayers move between cities in Brazil and Argentina offering their services as builders; their trade is highly valued in the area. As to the Paraguayan's working capacity, Saro Vera points out: "He is capable of working hard. He doesn't take into account the time or the sacrifice when there is a need. But here we don't take necessity as something inevitable, but rather as something that arises from commitment. The Paraguayan works in the worst conditions without protest. He has never led an easy and comfortable life on the *tapial* wall"[3].

This description venerates the Paraguayan artisan and the conditions under which he develops his trade, whether that be withstanding high temperatures in different Paraguayan cities, or demonstrating patience and constancy during each stage of constructive exploration during the work. The latter is due to the fact that the artisans try to move around the site in the most comfortable way. This is not a romantic vision of the figure of the artisan, but rather seeks to establish a contemporary image of the anonymous builder.

Generally, Paraguayan artisans mobilize in groups for different works, working and transferring their knowledge. It took a long time for the local architects to find a common working method with the craftsmen, in order to establish an architecture with a local language, alien to external references, attentive to local materials, climate and the needs of the inhabitant. The idea of the group allows to concentrate a system of work that clings to the oral and material culture, maintaining the tribal attitude typical of the Guarani Indians. The factors mentioned above make it possible to state that the intelligence of the Paraguayan worker comes from his proximity to the trade and his peers. It is a constructive intelligence that arises when operating with the wood, the earth or the stone that is available in the territory, just as a social intelligence is recognized when working in constant collaboration **(fig. 10)**.

Further on this point, researcher Estelbina Miranda outlines how the craft process is learned in Paraguay –normally under a framework of informal education– and reflects:

"The person is educated according to the lifestyle he or she experiences every minute of his or her life. This education is inconsistent, in the sense that the members of the community do not deliberately set out to educate, but arises from the spontaneous and inescapable contact of the learner with his or her surrounding world. Learning takes place without order or precise methods; it occurs naturally and spontaneously. It is a broad education. We learn by living and interacting with those around us"[4].

Miranda emphasizes that transmission of knowledge about the craft is determined by cultural elements that make up the artisan's immediate environment. The constant interaction of the artisan with his domestic environment, and the transformation of his daily spatiality from the repeated actions he executes on the materials, articulates his constant learning.

On the other hand, the Paraguayan artisan, as an anonymous builder, as well as the materials he handles, is malleable. He can adapt to different situations typical of construction work in order to carry out his work well. Salo Vera concludes:

"As a man who is committed to reality, it is easy for him to adapt to any circumstance in life or to any environment. If his environmental reality is changed, he immediately assumes it. He has a remarkable inner ductility that allows him to become, in a short time, practically another person with new manners, languages and interests"[5].

Salo Vera's description is important since making architecture in Paraguay implies avoiding the many financial, political, climatic and human variables that constantly delay the constructive development of a work. Considering these margins of action, it is the adaptability of the craftsman that allows each work to be carried out successfully, understanding the work as the conclusion of an associative process in which both the architect and the craftsman are the authors. Bernard Rudofsky cites Pietro Belluschi and his definition of communal architecture as an art produced by the spontaneous and continuous activity of an entire people with a common heritage[6].

Craftsmen, together with Paraguayan architects, tend to group around a common purpose, which has meant a slow process of mutual learning developed in instances of trust in the middle of the work process. This creates a constructive laboratory where many aspects of the architectural expression of this country are decided in situ **(fig. 11)**.

To help the reader appreciate the cultural environment in which the Paraguayan artisan operates, the following describes a day of work for a Guarani master builder from dawn to dusk. It's interesting to trace and relate his routine. This story is written in prose, with a desire to convey a slow story. The structure is similar to "*Un hombre*"[7] (A Man), one of the first poems written by the Chilean anti-poet Nicanor Parra.

It's 6:00 in the morning,
The craftsman wakes up.
He looks in the mirror and grooms himself,
Takes his bag and *tereré*.
On his old motorcycle,
Drives 90 minutes to Asunción,
And gets to the job site.

It's 7:30 in the morning.
The sun beats down on the worksite.
The craftsman gets comfortable,
Hangs his bag on a tree branch,
Places the *tereré* on a wooden easel,
Eats breakfast, drinks a coffee.
Sometimes he exchanges it for a *cocido* (stew).
The work day begins.

The clock strikes 9:30.
It's time for the *terere rupá*.
The craftsman rests.
Talks to his workmates,
Drinks some *tereré*,
And returns to work.
The sun beats down on the skin.

It's noon, *jakarú* time.
The craftsman washes his hands in a bucket,
Removing the remains of concrete.
He groups together with his colleagues,
They eat under the shade of a tree.
Some eat *puchero*, an abundant soup of meat and beans,
Others eat manioc and bread.
They eat with their hands;
they don't need cutlery.

They comment on the results of local soccer.
It wasn't a good weekend for Cerro Porteño.
Olympia had better luck.
They still talk in Guarani.
The craftsman takes a nap on a cold concrete slab,
Wakes up to the sound of a radio.

It's 2:00 p.m. He gets on with the job,
An old song by Agustín Barboza can be heard.
The artisan returns to work and does not stop until 17:00.
It's been a rewarding day,
The concrete is left to set.
It's Friday, and the architect is visiting the site.
It's also payday...

You don't hear Guarani anymore,
You only recognize the phonetics of the *jaropá*,
They talk and brainstorm about a notebook,
The discussion involves a prefabricated brick plate.
The architect leaves, waving his raised arm.
The Master Builder gives out the weekly pay,
A good reason to go for a beer or drink *caña*.

The craftsman leaves the worksite,
And heads to the nearest bar.
He's attracted by the sound of a Paraguayan *cumbia villera*,
The table is filled with bottles and glasses.
The discussion about Cerro Porteño versus Olimpia is back.
They speak in Guarani,
Beer is ordered in *jaropá*.
It's getting late, they must return home.

The craftsman gets on his motorcycle.
The landscape becomes blurred,
His wife is waiting, she's not very happy.
They argue in *jaropá*.
The craftsman lies down on his sofa,
Turns on the TV,
The news broadcasts the goals of Olympia.
The craftsman falls asleep with the TV on.

If Federico Cairoli's photographs allow us to get closer to the Paraguayan craftsman and his working environment, then the description in prose allows us to go deeper into the human dimension of an anonymous builder who establishes a daily collaborative relationship with the Paraguayan architect. In this sense, the artisan is not a pawn, but assumes the figure of a contemporary builder **(fig. 12)**.

CLOSING NOTES

The work of the Paraguayan artisan is honestly expressed through the surfaces of projects which lack ornaments and plaster. They are exhibited with the sincerity which is typical of skinless architecture. This allows us to understand contemporary Paraguayan architecture as *primitive*, taking into account the reference of Adrian Forty, who believes "primitive concept" is not a politically correct term because it tends to denigrate that which it describes (Forty, 2019,09).

Nonetheless, Paraguay's architectural strength is in the primitive, paradoxical beauty found in denigrated structures typical of architecture built on the margins –with a limited budget and recycled materials– contributing to the current state of contemporary Latin American architecture and the value of the local.

On this point, it is worth referring to a conversation that the author of this article had with Carlos Pita, former editor of *Obradoiro* magazine, who answered the question: "What does Latin America bring to the contemporary condition of architecture?" in a lost hotel room located in the historical center of Asunción. Pita answered:

"I once read an interview with Sam Peckinpah when he was showing the film '*The Wild Bunch*' (1969). A lady complained that the movie had a lot of violence and was very explicit. The director told her*: "Excuse me, ma'am, but when you get shot... you bleed".* I believe that Latin American architecture is an architecture that bleeds. It faces reality, and above all, transforms it. Latin America's contribution to the contemporary condition of architecture is the fact it is able to produce an architecture with strong roots in the local. It smells of earth"[8].

Considering Pita's words, it is worth noting that the value of Paraguayan architecture and its contribution to Latin American architectural style is based on constructive experimentation, where the architect and the craftsman investigate technical innovation through a process guided by trial and error. This process shows the risks that Paraguayan architects assume in each of their work processes, which in a totally handcrafted manner pushes each construction system to the extreme in order to explore the formal, structural and constructive possibilities of a particular material.

Considering the previous point, we can affirm that, in the contemporary architecture of Paraguay there exists a school of thought based on artisanal knowledge. This has made it possible to place Paraguay within the international architectural scene, joining an extensive network of new contemporary Latin American architectural manifestations. This small country has contributed to the discipline by valuing the construction process of the work, based on the craft of its master builders and the value of accumulating constructive experiences instead of simply dictating them from the architectural drawing. Carrying out a review on a global scale, Paraguay has contributed a reality that joins the practices currently developed in India (Studio Mumbai), China (Wang Shu) or Burkina Faso (Keré Architecture). Peripheral contexts, where political contingency and the economic crises of recent decades have forced the focus of the contemporary architectural scene, promotes an architecture that focuses on the technique present in the hands of its masons, stonemasons, carpenters, blacksmiths and potters. It is not a novelty, but a way to place oneself in front of new scenarios offered by a world in constant change.

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Notes

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08. Extract from the conversation between Carlos Pita and the author of this article, in Asunción, on October 8, 2019. Recorded and transcribed document.

Images

01. "Slippers". The photograph has been captured during the construction process of the Coral housing of Grupo Culata Jovai. Source: © Federico Cairoli.

02. Texture of the prefabricated brick panels in the telethon children's Rehabilitation Center, work of the Gabinete de Arquitectura. The image shows the pouring of the mortar between the bricks and the appearance of the patina proper to the passage of time. Source: © The author of the article.

03. Harvest the mate in the ribera of Paraná, in Paraguay. Source: © Metal engraving by Hurel, drawing by Fuchs.

04. Bell Tower located in the mission of Trinidad, Paraguay. Source: © Adolfo Maria Friedrich.

05. Builder drinking terere under the shade. The photograph was captured during the rest time of the construction process of the Cootrapar Cooperative in Villa Hayes, a work by Elgué studio. Source: © Estudio Elgué.

06. "The hour of rest". The photograph has been captured during the process of the Ykua Bolaños Memorial, by Francisco Tomboly and Sonia Carisimo. Source: © Federico Cairoli.

07. "Slippers". The photograph has been captured during the construction process of the Coral housing of Grupo Culata Jovai. Source: © Federico Cairoli.

08. "Workman". The photograph has been captured during the work process of the Faculty of Architecture, Design and Art of the National University of Asunción, designed by the Gabinete de Arquitectura. Source: © Federico Cairoli.

09. "Portrait of a worker". The photograph has been captured during the construction process of the Takuru House of José Cubilla. Source: © Federico Cairoli.

10. Construction of the retaining wall of the Sotoportego House, work of the architectural laboratory. © Laboratorio de Arquitectura.

11. Fixing the ceramic panels with glue mortar, during the commissioning of the ceramic sunshade of the Clinic and Housing, Work of Estudio Elgué. Source: © Estudio Elgué.

12. Rest time during the construction process of the San Francisco House, of the Gabinete de Arquitectura. Source: © The author of the article.

11

Pioneer materiality. Material Experimentation in the Domestic Architecture of A. Lawrence Kocher

Luis Pancorbo
Inés Martín-Robles

This text studies 3 architectural experiments developed, independently or associated with Albert Frey, by the North American architect A. Lawrence Kocher during the 1930's. These experiments were based on material innovation within the construction processes. The experiments were fostered by different industrial material producers to study the feasibility of the implementation of materials in the field of architecture: aluminum was tested in the *Aluminum House*, fabrics in the *Canvas Weekend House*, and Plywood in the *House of Plywood.* All of these buildings pioneered the idea of transforming the detached single-family house into a laboratory to experiment with materials produced by industries not traditionally associated with building technology. The later move by Albert Frey to the West Coast may have initiated a new chapter in material experimentation through the Californian residential architecture developed in the following decades.

CONTEXT. A. LAWRENCE KOCHER AND PREFABRICATION DURING THE AMERICAN GREAT DEPRESSION

The economic and social context in which this research is situated is that of the Great Depression, beginning with the stock market crash of 1929 and extending until the entry of the United States into World War II. Some of the effects of this crisis were a shortage of housing and impoverishment which put access to existing residential stock out of reach for many Americans. This condition resulted in the implementation of policies by public administrations and private industry that favored mass scale construction of housing, shortening construction deadlines and the reduction of costs. It is in this context that the figure of A. Lawrence Kocher takes a central role.

Kocher, who is usually overlooked by the critics analyzing his work in partnership with Albert Frey[1], was an accomplished scholar of both American vernacular architecture and modern industrialized construction[2]. Born in 1885 in San José, California, he studied history and architecture at Stanford, Pennsylvania State, MIT

and New York University[3]. Kocher had established a practice before his partnership with Frey and was the managing editor of Architectural Record magazine between 1928 and 1938. During this time, he transformed the magazine into a forum for modern architecture. Meanwhile, he also published numerous studies on American vernacular architecture[4].

Kocher remained open to a broad array of traditional and modern architectural precedents, while he advocated for modern architecture in his own designs prior to his association with Frey[5]. He was the author of a series of articles on standardized building element dimensions, minimal housing and prefabrication published in Architectural Record, some of which were written with Albert Frey.

Kocher's work as a pioneering pedagogue of the *Design-Build* concept is also relevant[6]. His teaching career includes the Pennsylvania State University, University of Virginia[7], Carnegie Institute of Technology in Pittsburgh, and Black Mountain College in Asheville, North Carolina.

Within the field of professional practice, Kocher can be considered one of the first modern architects of the East Coast for his works prior to his association with Frey, such as the Sunlight Towers or the Rex Stout house in Stamford (Connecticut) both of which were completed in the year 1929 and were designed in partnership with Gerhard Ziegler[8]. Finally, Kocher was a principal mediator and sponsor of the embrace of modern European architects in the American architectural field. His role as Frey's partner adds to his collaboration with Ziegler and coincides with his correspondence which facilitated Walter Gropius' arrival at Harvard.

The meeting between Kocher and Frey exemplifies the combination of two ways of understanding the interaction between industry and architecture that occurred in America upon the arrival of numerous European architects. The objective of the European Modern Movement could be summarized as a plastic experimentation seeking to obtain new forms and new architectural types compatible with new ways of life. The objective of design for European rationalists, and by extension for Albert Frey, is the architectural object itself and industrial production is subordinated to the demands of design. Industry would play a double role as facilitator of these formal experimentations and as an abstract reference for new forms. In contrast, American architecture until the 1930s, aligning itself with the rest of the country's productive activities, is an activity totally subordinated to industrial efficiency. From the formation of the American System of Manufacture to the arrival of Fordism, the focus of innovation shifted in America from the design of the object produced to the design of the production system[9]. Constant improvements in the means of production mean that the design objective ceases to be how to produce a better object and instead becomes how to better produce an object (faster, cheaper, in greater quantity)[10]. In an article about Kocher we can read the following quote in which he says that his objective as an architect, teacher and researcher is: "*Fact-finding investigation of the meaning of 'architecture' and 'the architect' with a view of discovering how architectural design may best be produced*"[11].

This quote indicates that Kocher's emphasis is on the means of production of architecture over design itself. The technical dimension of architecture occupies a preeminent place in all facets of its activity. His eagerness to experiment with new technological means and new materials guides both his professional practice and his writing and teaching.

The joint endeavor of Frey and Kocher produces a conceptual confluence that makes it especially valuable as the root of a new type of American architecture that is trying to answer two questions simultaneously: How to design new forms and architectural objects based on industry and how to optimize the industrial production of architectural objects based on design. Next, we study three built works by Kocher. The first two were designed in collaboration with Frey **(fig. 02)**.

ALUMINAIRE HOUSE

The first of the homes produced by Kocher and Frey is also the best known: *Aluminaire House* **(figs. 03-05)**. In 1930, A. Lawrence Kocher enjoyed a remarkable academic reputation and served as managing editor of Architectural Record. In September of that year, Kocher was commissioned to design a facility for the annual Architectural and Allied Arts Exposition, sponsored by the Architectural League of New York, to be held at the Grand Central Palace in New York in 1931. Kocher partnered with newcomer Frey for this job[12], and together they produced a single-family home to be displayed at full scale. The house was intended to be industrially reproduced at a cost of $ 3,200. It was conceived as a laboratory to test new materials, prefabricated systems of industrialized construction, and a series of reconfigurable spaces transformed by moving furniture.

A peculiarity that speaks of the condition of the *Aluminaire House* as a technical object[13], is that during the entire assembly process there was never any engagement with a construction company. The house was designed to be able to be assembled and disassembled in a short period of time. The architects coordinated different contractors who donated the materials for the work exhibited in New York. All these subsystems formed a technological collage in which all the joints were screwed together. The use of aluminum was promoted by the Aluminum Company of America. Aluminum was used in the visible structural elements; the rest were made of steel. Aluminum was also used as a facade cladding material and as a heat reflecting membrane beneath the exterior cladding and roof. The house pioneered the use of aluminum in all these applications and was also the first non-industrial building to use the Ferrobord-type folded steel decks. All of the building materials were donated by different industrial companies[14].

The different uses of aluminum in the house have few precedents in the history of architecture[15]. The first case of use of aluminum as a facade cladding is recorded in the Roman church of *San Gioacchino* (1890-1898) by the architect Raffaele Ingami, in which aluminum is used as an external covering for the dome. Aluminum was used by Otto Wagner in 1903 on the facade of the *Die Zeit* newspaper agency and in 1906 as an interior covering on the Vienna Savings Bank. In the United States, Francis Plym's patents for aluminum window frames were first established in 1905, and the aluminum frame progressively replaced wooden frames. As for the structural use of aluminum in the field of architecture, there is only one precedent built in the United States, the new spire for the Smithfield United Church, Pittsburgh, designed by Henry Hornbostel in 1926. Richard Buckminster Fuller produced his designs for the Dymaxion House (1929) prior to the *Aluminaire House*, but these designs did not actually materialize until after World War II with the Wichita House, which was constructed entirely of aluminum. The first prototypes of the aluminum monocoque caravan of the Airstream company were manufactured in 1936, 4 years after the *Aluminaire House*. However, aluminum had already been widely used in aircraft construction, especially in the structure of airships in the late 19th and early 20th centuries. Thanks to the invention of *Duraluminium* by Alfred Wilm in 1910, aluminum was established as a basic material in airplanes as well; from 1936 on, airplanes were built exclusively in this material[16].

The *Aluminaire House* has overall dimensions[17] of 28'-9"x22'-8" (8.76x6.91 meters) and a neat area of 102 m^2 excluding garage and terrace. It has 3 floors with a reduced distance between finished floors measuring 9 feet or 2.74 meters. The structure is made up of six 5" (12.7 cm) columns supporting double-C shaped aluminum beams which are 7" (18 cm) deep and 5-3/4" (15 cm) wide. The beams which are not exposed are made of steel. These main beams cover two 14'-10 "(4.52m) center spans with two 3'-2" (0.97m) side cantilevers. The joists cover 13'-4+1/2" (4.08 m). A prefabricated

flooring from Truscon Steel Co. called *Ferrobord*[18] with 1+3/4" (4 cm) depth, 8" (20 cm) width and 12 '(3.66 m) manufacturing length is laid on top of the joists. The floors were fire-protected with 1" (2.54 cm) wood fiber panels from Thermax Corporation. The walls are a mix of balloon frame and non-structural steel frame with 2"x2" (5x5 cm) wood and steel angle studs at a distance of 1 foot (30.48 cm) encased in a rigid insulating panel on each side of half an inch (1.27 cm) thickness. The interior finish was fabric and the exterior cladding was a waterproofed paper covered with corrugated aluminum sheets screwed to the insulating panels. The flooring was multicolored linoleum. All together the materials of the house are extremely light. The total weight of *Aluminaire House* is only 47,310 pounds (21,459 kilograms) including appliances, furniture, and mechanical systems[19].

The different stages of this itinerant home's existence are especially valuable to understand its character as an object which is more technological than architectural. To begin the story, we paraphrase the brief timeline offered by the architects in their candidacy for the *R.S. Reynold Memorial Award* 1960[20].

The project was developed by Kocher and Frey between November 1930 and April 1931. The house was assembled in the exhibition hall between April 11th and 18th 1931 and exhibited from the 18th to the 25th of that same month. It was dismantled in just 6 hours on April 26th, 1931. The house was next purchased by the architect Wallace K. Harrison and its disassembled pieces which had been numbered with chalk were transported in a single truck to a new location on Long Island. According to Joseph Rosa, the house was stored in the open air in its new location and a torrential rain washed off the chalk numbering. This incident increased the time and cost of the reconstruction, and it meant that the house was assembled in a way which did not guarantee structural stability[21].

The buyer of the house, Wallace K. Harrison, was a partner in Allied Architects, the firm which designed Rockefeller Center in New York. Harrison was later the designer of the Alcoa Building in Pittsburgh[22] (1953), which explored the possibilities of aluminum as building material. He may have been influenced by his experience as owner and occupant of the *Aluminaire House*. In 1931, Harrison and his wife Ellen purchased an 85-acre plot of land in Long Island. As they did not have enough money to build a new home, they chose a ready, cheap solution: encouraged by their friend Kocher, they bought the *Aluminaire House* for just $1,000. The couple lived in the reassembled house for 8 years until they could complete construction of their own, "permanent" residence. During the period of the Harrison's occupation, *Aluminaire* was the object of successive extensions, which also reflected the different phases of the new house's construction.

Having played its part as a "nursery home", *Aluminaire* was moved and reassembled on the slopes of a small hill elsewhere on the Harrison's land. Adapting it to the slope, it was used both as a guest house and for storage. It was allowed to deteriorate slowly over the course of more than 40 years. The Harrison property changed hands twice and *Aluminaire House* came to be forgotten and abandoned, until 1986, when a new owner asked for permission to demolish it. After a great media campaign led by Joseph Rosa, the house was purchased by the New York Institute of Technology. *Aluminaire* was disassembled once more, so that it could be restored to its original state and was then rebuilt in 1987 by professors and students on the campus of the NYIT School of Architecture in Central Islip, Long Island. In 2004, the NYIT sold the land and the house was donated to the *Aluminaire House Foundation* founded in 2010. In 2012, it was dismantled again and stored in a container. The foundation has long been seeking a new site for the house's reconstruction and the most recent plans for reassembly are set for 2020 in a park in Palm Springs, California.

The leaps in this migratory biography speak clearly of an industrial object that is completely alienated from geographical specificity, from constraints arising from a site, a climate or a given cultural medium. The *Aluminaire House* is not an architectural object; it is a technical object which, like an automobile, a motor home or a prefabricated house sold via catalogue, does not undergo any formal alteration due to its friction with a certain physical location. It does quite the opposite; a place must be transformed in order to allow the object to settle without modification, and measures must be taken to ensure that it functions correctly.

There are various characteristics which explain Aluminaire's constant fluctuation between assembly and disassembly, and they can all be classed as technological: experimentation with new construction materials, use of construction subsystems that are prefabricated and assembled in situ, its designed assembly with a low level of technical complexity enabling assembly by non-specialized workers, and a production process with interchangeable parts that are coordinated but independent.

Meanwhile alienation from the site does not suppose independence from tradition. As we have argued, the house is well situated in the contemporaneous line of American industrial and architectural research, which focused on portable housing. It also demonstrates the undeniable influence of Le Corbusier and Pierre Jeanneret. It is strongly linked to two of their residential works which Frey collaborated on most intensely: *Villa Savoye* and the *Loucheur* houses.

KOCHER CANVAS WEEKEND HOUSE

Subsequent to the positive media attention garnered by the *Aluminaire House*, Kocher received a commission from Charles Everett of the Cotton-Textile Institute to research the potentials of cotton as a building material. In 1932, Kocher and Frey presented two residential proposals for the *Cotton-Steel Houses*: one was for a weekend house and the other was a more conventional family residence comprised of five rooms. Both proposals shared a lightweight construction system and presented an exhaustive experiment in the use of cotton. The project description lists the uses of cotton within and enveloping the house: cotton is used as a waterproof finish for interior and exterior walls, as a finish for floors and ceilings, as a finish for doors, furniture, and banisters, and it forms both dividing curtains and awnings. Despite the project's original name, the structure depicted in the publications of the *Experimental Weekend House* **(fig. 06)** was comprised of balloon frame walls and wooden floor structures. The *Experimental Weekend House* was never built.

This theoretical exploration was accompanied by several proposals published in *Architectural Record* by the architects during those same years.[23] In the April 1934 issue of *Architectural Record*[24], Kocher and Frey published a project titled *Subsistence Farmsteads*, designed to be located on farms owned by urban or unemployed workers who would like to have a garden for their own consumption, which would not compete with productive farms. Regarding construction, Kocher and Frey proposed a wooden structure and used cotton intensively in a solution practically identical to the one proposed for the *Cotton-Steel Houses*. This project can be seen as a parallel experiment using the same construction systems proposed in the *Experimental Weekend House*. The *Experimental Weekend House* functioned as a prototype for the *Canvas House*, built on Long Island in 1935 as a vacation home for Kocher himself.

The *Canvas Weekend House* **(figs. 07-09)** had slightly more generous dimensions than the Experimental Weekend House. It featured a prefabricated spiral staircase which provided access to all floors. The structure was a near replica of its prototype, but it used 4" (10 cm) diameter steel columns to support a primary structure of wooden double beams. The exterior face of the balloon frame was enclosed using wooden boards arranged on the diagonal to provide lateral bracing. The walls were insulated with an intermediate layer of aluminum foil. On the interior walls were comprised of plywood

boards finished with cotton canvas. The exterior façades and roof were painted with lead paint and finished with water and fireproofed cotton canvas which, as seen in photos of the construction process, was applied horizontally from bottom to top and fixed with copper headed nails every 6" (15 cm). Images of the house's construction, published in Alfred Roth's book *The New Architecture*[25], show that construction of the deck was extremely conventional. The House made interesting use of color, which is described in various publications but is impossible to appreciate in the black and white photographs of the time[26]. The building's façades were painted with aluminum paint; the pillars and handrails were painted green; the window frames were painted red to match the color of the awnings; and the rooftop solarium was green to avoid the glare caused by the reflection of sunlight. In contrast, the materials on the interior were left in their natural state. This profusion of color was a completely distinctive trait of the house and contrasted with the sober monochrome palette of the *Aluminaire House*. This house was demolished in the 1950's.

The use of fabric in architecture is of course as old as the discipline, but the *Canvas House* is a pioneer in its use of textiles as waterproof material for facades and roofs. This use is an import from the nautical field, since similar solutions were already used on the decks of American navy ships in previous years[27].

HOUSE OF PLYWOOD

Following the pattern of collaboration between industry and architecture established by the Aluminaire and canvas homes, Kocher designed the *House of Plywood* for an exhibition entitled *The Town of Tomorrow* at the 1939 *New York World's Fair* **(fig. 10)**. The design was commissioned by the *Douglas Fir Plywood Association*. In this house he investigated the use of plywood as an architectural material. The construction was financed in the same way as the *Aluminaire house*; materials were donated by various companies that were listed in a promotional brochure. Although this house was not formally related to the previous projects developed by Kocher, it shares a common interest in prefabrication and material experimentation.

The use of plywood has parallel histories in Europe and in the United States. The first European patents were those of Otto Hetzer (1901 for straight beams and 1906 for curved parts). The use of the material became widespread in central Europe after the Universal Exhibition in Brussels in 1910. The patent reached to the United States in 1923 but had little success. The first building to use the patented material, a gym in Peshtigo, Wisconsin, was built in 1934.

Meanwhile, in the United States, the Portland Manufacturing Company had been manufacturing plywood doors and boards since 1905[28]. The market expanded into the automobile industry and grew into 17 plywood factories in the American Northwest producing approximately 33 million square meters of board per year. These manufacturers associated in 1933 forming the *Douglas Fir Plywood Association*, which struggled to survive until 1938, when they managed to market plywood as a standardized commodity rather than a collection of individually branded products. In addition, a new waterproof adhesive developed that same year resulted in approval of outdoor use[29].

It was at this time that the Douglas Fir Plywood Association commissioned Kocher to design the first of many demonstration houses for their products. Plywood house modeled the use ofsub-base for flooring and finishes (PlyScor), ceilings and walls (PlyWall), furniture panels (PlyPanel), and facade finishes (PlyShield).

The list of companies that donated other materials for the Plywood House included the Truscon Steel Company, which, supplied the steel sashes as it had done in Aluminaire and Canvas Weekend House. A further 1o companies, including General Electric donated materials and supplies.

The house was organized on one level and although modern, it was less radical than its predecessors. It had an L shape in which separate sides were devoted to day and night activities, leaving the access areas between them. The living area had a clerestory and greater height and was capped by the kitchen and a semicircular dining room. The program was more ambitious than in the previous houses; it included two bedrooms, one bathroom, a living room, dining room, kitchen and mechanical room. The estimated budget for the construction was between $ 4,000 and $ 5,000.

Since the 1939 New York World's Fair in which the Plywood house was exhibited, over a million houses have been built with dry-mount plywood systems[30]. This trend accelerated with the advent of World War II and restrictions on the use of other construction materials such as steel.

CONCLUSION

At the beginning of the text we have indicated the role of these houses as transmitters of the modern European tradition, especially of Le Corbusier's architecture, and as a means for its integration into the American industrial system, but we must also highlight their pioneering role in various other aspects.

On the one hand, these houses inaugurated the use of a series of materials from other fields into architecture. Aluminum, cotton canvas, and plywood were previously nonexistent or very minor materials in American construction technology. The Kocher and Frey homes opened up a new spectrum of application of these materials which results in numerous new applications.

On the other hand, the houses also inaugurated a new type of material sensitivity, which, driven by the precariousness of the Great Depression and its need for innovation, reached a programmatic character in most of the subsequent American domestic architecture. This new light materiality gives modern American residential architecture a character of provisionality and temporality and reconnects it with the nomadic tradition of American domesticity studied by many authors[31], hybridizing it with the modern European tradition.

The influence of these houses can be traced in the experimental houses built at the Chicago World's Fair in 1933-34, especially in George Fred Keck's House of Tomorrow and Crystal House. After Frey's move to California in 1934 we can trace this influence on the Case Study Houses. These houses share the type of minimal and ephemeral materiality. This similarity is in some cases literal. The Eames House for instance, uses exactly the same construction systems as the Aluminaire House, except for the use of aluminum[32].

A. Lawrence Kocher also inaugurates a new relationship between industry and architecture. This new model, based on the construction of domestic prototypes in which to investigate not only new space systems, but new building systems and materials coming in many cases from other disciplinary fields. The scope of this new relationship between architecture and industry extends not only to the professional field, but also to the pedagogical field, with the implementation in the American architecture schools of the "Design-Build Studio"[33] system, in which Kocher is also a pioneer.

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Notes

01. For instance, Joseph Rosa, quoting Phillip Johnson, says that: "*It was commonly known that "Frey was the designer and Kocher was the writer and the front man*". ROSA, J. *Albert Frey, Architect*, Rizzoli International Publications, Nueva York, 1990, p 26.

02. Ibid.

03. According to K. Edward Lay, Emeritus Professor of Architecture at the University of Virginia, in his text: "History of the A. School. A School Built Upon the Foundation of Mr. Jefferson's Principles of Architecture", Kocher attended also to classes in the Bauhaus in Germany, without specifying dates. We have not found further references to this fact in our research. https://issuu.com/uvaschoolofarchitecture/docs/aschoolhistory_1a757995fd80a6. Accessed 3.9.2019.

04. As his article, divided into 15 chapters and entitled "Early Architecture of Pennsylvania", published between 1920 and 1922 or his articles about the American Cottage of 1925 and 1926.

05. See the projects delivered along with Gerhard Ziegler: Sunlight Towers 1929 and the house for the writer Rex Stout in Connecticut 1929.

06. The design-Build is present nowadays in almost all the American Architecture schools. *Design-build* is a kind of architectural education in which the student not only designs the buildings but also builds them.

07. Kocher was the director of the Department of Architecture at *Pennsylvania* and Dean of the School of Architecture of the University of Virginia. According to Lawrence Wodehouse, Kocher's hiring at Virginia was announced in the University student's magazine (*College Topics*) in the issue of October 1st, 1926 and his resignation in the same magazine dated June 14th of 1927, Although he remained linked to the University until 1928. WODEHOUSE, L. "Kocher at Black Mountain". *Journal of the Society of Architectural Historians*, Vol. 41, No. 4 (Dec) 1982, 328-332. P 328.

08. Joseph Rosa considers this house to be the first in using on-site casted concrete in the East Coast. ROSA, J. *Albert Frey, Architect*, Rizzoli International Publications, Nueva York, 1990, p 26.

09. See: HOUNSHELL, D. A. *From the American System to Mass Production, 1800-1932: The Development of Manufacturing Technology in the United States*, John Hopkins University Press, Baltimore, 1984.

10. The best example of this is the Ford Motor Company, which produced the same model, the Ford-T during 19 years, increasing annually the production from 10.666 units in 1909 to 1.911.705 units in 1925 and decreasing the price from the initial $850 to $260 in 1925. Source. R.E. Houston, Ford Production Department, 3 de Agosto, 1927. https://www.mtfca.com/encyclo/fdprod.htm

11. GOODMAN, A. "Making Prefabrication American. The Work of A. Lawrence Kocher". *Journal of Architectural Education* 71(1): January 2017, p 22.

12. In many news referring to the exhibition, Albert Frey's name is omitted or misspelled Herbert Frey. For instance: Helen Appleton Read. "Exhibition at Grand Central Palace Fails to Emphasize International Style-House Machine Outstanding Exhibit". Brooklyn Eagle. April 17th 1931.

13. This is the only architectural work listed in the *National Register of Historic Places* that is protected without including the site in which it is rooted. This gives a clear idea of the migrant character of this house and its design totally unrelated to a specific location.

14. The list of manufacturers that appears in the exhibition brochure lists 46 participating companies. The main suppliers were: *Jones & Laughlin Steel Corp*. y *McClintic-Marshall Corp*. that supplied the steel structure, *Truscon Steel Co*, that installed all the window steel frames and decks, *American Window Glass Co* y *Mississippi Glass Co*. which supplied the glasses and *Aluminum Company of America* that supplied the aluminum elements..

15. These historic precedents have been obtained from: RODRIGUEZ CHEDA, Jose Benito. "El Aluminio en la construcción". *Tectonica 22. Aluminio*. ATC Ediciones, Madrid, 2006. Kocher and Frey used aluminum as termal insulation also in the Ralph-Barbarin House in 1932.

16. Duraluminium is an alloy of aluminum, magnesium, and copper with a mechanical strength similar to that of medium strength steel.

17. The dimensions of the house responded only to the needs of the room where it was going to be exhibited. Among the project documentation there is a plan of an external staircase that served to access the terrace during the exhibition and offered alternative access and exit to visitors, avoiding crossings in the circulation of the public.

18. In document number 39 of the Project, it is named wrongly as "ferroboard".

19. We do not include in this weight the Alberene stone floor for the first floor (8,000 pounds) as it rests directly on the ground. To give a reference to the weight of the Aluminaire House: a Classic Airstream trailer weighs 10,000 pounds including furniture, appliances and full water tanks.

20. John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection. Box 4. Folder. "Aluminaire House. List of Materials. Description. Handwritten notes, Typed transcripts of news & periodical articles".

21. As explained by Joseph Rosa in his book on Frey. Ibid. P 28.

22. As partner at the firm Harrison & Abramovitz. The Alcoa building is located across the street from the Smithfield United Church of Christ in Pittsburgh.

23. In 1931, Kocher and Frey designed a proposal for *Low-cost Farmhouses*. Published in *Achitectural Record* in January of 1934.

24. Kocher, A. L: Frey, A. (1934) *Subsistence Farmsteads*. Architectural Record. Vol 75, No 4. Abril. 349-352.

25. Roth, A. (1940) *The New Architecture. Examinated on 20 examples*. Zurich: Verlag Dr. H. Girsberger. P 11-16.

26. Ibid. p 12

27. The American Navy used waterproofed, fire retardant, and painted cotton canvas on the decks of certain vessels.

28. Previously, plywood patents already existed in the United States, although they had had no commercial success, such as John K. May 1986.

29. Invented by chemist James Nevin, who worked for the Harbor Plywood Corporation of Aberdeen, Washington.

30. *Dri-Bilt With Plywood.* Source: https://www.apawood.

org/apas-history . Accessed 22-1-2020.

31. Authors like Reyner Banham or John Brinckerhoff Jackson. The impermanence of American housing is paradigmatic and continues today. The relevance of this fact is increased if the social context of this country is taken into account, in which a tenth of the houses is a portable accommodation and almost all the rest is built with light and transportable systems derived from the balloon frame. WALLIS. A. D. *Wheel State. The Rise and Decline of Mobile Homes*. Oxford University Press, New York-Oxford, 1991, p. 13.

32. ZHAW Institut Konstruktives Entwerfen. *At Home In Steel*, Park Book, Zurich, 2019.

33. Kocher developed this kind of workshop at the Schools of Architecture of Pennsylvania State, Carnegie Institute of Technology de Pittsburgh y Black Mountain College en Asheville, Carolina del Norte.

Images

01. Lawrence Kocher y Albert Frey. Kocher Canvas Weekend House. Spiral stair. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

02. Lawrence Kocher and Albert Frey during the presentation of the *Cotton-Steel Houses*. 1932. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

03. Kocher and Frey. Aluminaire House. Project floor plans. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

04. Kocher and Frey. Aluminaire House. Built house at the *Architectural and Allied Arts Exposition*. Source Metal Progress. June 1931. Pag 94.

05. Kocher and Frey. Aluminaire House. Picture of the house as erected at W.K. Harrison's property. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

06. Kocher and Frey. Experimental Weekend House. 1932. Pictures of the model. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

07. Kocher and Frey. Kocher Canvas Weekend House. 1935. Pictures of the construction. Source: Roth, A. (1940) *The New Architecture*. Examinated on 20 examples. Zurich: Verlag Dr. H. Girsberger. P 11-16.

08. Kocher and Frey. Kocher Canvas Weekend House. 1935. Picture of the finished construction. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

09. Kocher and Frey. Kocher Canvas Weekend House. 1935. Floor plan and facade sections. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

10. Kocher. House of Plywood. 1939. Promotional brochure. Source: John D. Rockefeller Jr. Library. Williamsburg. A. Lawrence Kocher Collection.

12

Steiff Factory, 1903. The story of a pioneer

Blanca Lleó

Progress in all its facets evoked collective enthusiasm a century ago. Back then, glass and steel architecture was held to be the symbol and expression of the highest aspirations of material and spiritual freedom. With the passage of time, our conscience and sensibilities have undergone a change and it is today with a sense of guilt that we hold ourselves responsible for having incentivised an incalculable waste of energy owing to the uncontrolled use of those shining materials. *Man is a god when he dreams and a beggar when he reflects*. These lines of Hölderlin's poetry exhort us to look back to the horizon, since we do not know what past awaits us. This article takes us back to the incandescent beginnings of glass architecture in order to discover an unusual creation, the Steiff factory of 1903.

"What was the first modern building?" asked Alison and Peter Smithson in 1980.

The response had lain implicit years ago in their *family album* entitled "The Heroic Period of Modern Architecture (1910-1929)"[1]; that selection of pioneering works of modern architecture designed by young architects between 1955 and 1956, that deliberately opened with seven photographs of the Fagus factory by Walter Gropius and Adolf Meyer.

All origins are mythical and all myths are human creations. The modern architecture movement is no exception and its beginnings, now more than a century old, were as mythical as the birth of Venus. In the same manner that Boticelli's sublime work of art embodied the advent of the goddess of love within the Renaissance, a carefully curated image of the Fagus factory was, for decades, a powerful symbol of the moment when the new architecture was born.

This article deals with a practically unknown building that, being older than the Fagus, opens up a new perspective through which to rethink the incipient 20th-century architecture. We are talking about the Steiff factory, an unusual work of great purity and admirable social significance, a visionary creation conceived and executed in 1903, that incorporates exceptional architectural innovations. This edifice, far removed from the landmarks highlighted by the official genealogy of the modern architecture movement, was the first glass box inhabited by manual workers in the course of their daily tasks. What is truly surprising is that this architecture has been ignored and passed over by historians and critics throughout the 20th century[2], or perhaps it was an intentional act of silencing.

The first news about this factory would not appear until the end of the previous century and the start of the 21st century, in brief quotations and in a couple of highly technical articles that highlight its façades as the first curtain wall in history[3]. With regard to its construction, the works published in German by Anke Fissabre and Bernhard Neithammer are especially significant.[4] Within the English-speaking world, a recent historical text in English links the Steiff factory to various earlier and contemporary buildings.[5]

It is our opinion that the aforementioned references to the technical and historical aspects of the work are insufficient, as in order to understand the true scope of the Steiff factory it is essential to carry out a complete and detailed architectural analysis. At the same time we must present the significant achievements made by Margarete Steiff in her career. In the following sections we shall deal with both questions, highlighting the paradigmatic nature of this work within its historical context and revealing its significance as the embodiment of the ideas of a female industrial entrepreneur and a pioneering designer.

In the year 1903, the unexpected and dazzling success of the Steiff brand led its owner to erect, within months, a new three-storied building. The radical modernity of the building's architecture must have seemed remarkable in Giengen, a medieval town located 80 km from Stuttgart and therefore isolated from the leading cultural and industrial circles of Germany in those times. Historical documents show that the streets and squares of this small provincial city constituted an unchanging secular landscape of traditional buildings.

In one photograph from the period –where we can also distinguish the later extensions built in 1904 and 1908 in the background–, we can perceive the radical contrast between the traditional architecture of the access pavilion and the new glass building, the main object of interest in this work. Situated in the area that permits access to the factory and facing the historical city, the two buildings constitute a sign of the times in the commencement of a century marked by great changes **(fig. 02)**.

In the lower section of the factory's original location **(fig. 03)**, dated the 20th of February 1903, a single signature is visible under the license stamp: that of Margarete Steiff –*Die Bau Unternchmerin*–,[6] whose determination and leadership allowed her to overcome all impediments posed by the building inspectors to the creation of such a radical new form of architecture such as this one.

Who is the person behind this initiative and whose signature appears on the document?

Margarete Steiff was born in 1847 in Giengen an der Brenz, a town in South Germany, located at the borders of Bavaria. Her career as a creative entrepreneur and social reformer has been recognised and is currently a subject of study in business schools for having revolutionised the world of toys and collectors, with a personal project that she began in the later decades of the 19th century and which continues to be an international landmark after more than 125 years. Nevertheless, the unique architecture that supported this project -as an important part of her ambitious creation- has not been, until recently, studied with the same diligence.

This young German lady began her professional career around 1877 by designing a small elephant in coloured felt sewn by hand. This simple object, initially meant as a pin cushion for seamstresses, was spontaneously discovered by children as a new toy filled with unexpected sensations. The curiosity and emotions evoked by the exotic and soft animal made it an instant hit leading its creator to soon sell 5,170 units.

Thus began, almost casually, a considerable business venture. Margerete invented the world of the soft toy, something apparently banal that nevertheless was a signifier of the enormous change that was taking place with regard to childhood in 19th-century society. The thought was taking hold that little ones were not cheap labour but citizens of the future and therefore, had to be taken care of and educated. This consideration of infancy was something new, as George Steiner points out: "young children in medieval and Renaissance art were diminutive adults [...]. The child is a discovery of the eighteenth and nineteenth centuries, he is 'invented' by libertarian and romantic sensibility and Rousseauist theories of education".[7] The adage on which Margarete Steiff's entire business enterprise rested was "only the best is good enough for children" and her designs are a testament to this emerging change in thought: the cold tin soldiers and distant porcelain dolls would give way to soft stuffed toys, full of warmth and fantasy.

After that first toy elephant and now firmly established since 1888 in her first workshop, Margarete's hands and imagination would create many more animals: tigers, pigs, camels, dogs, donkeys, bears, and others **(figs. 04 and 05)**.

Four years later, in 1892, she decided to publish her first catalogue, as part of her strategy to enhance her already expanding firm. It offered an extensive collection of animals that had been created until then and included her famous bear in four colours and two sizes. The following year, encouraged by the impact of the project, she exhibited her products at the Leipzig Fair and on 3 March 1893, she registered her company, the Filzwarenfabrik Giengen/Brenz. By then she was already employing fourteen female workers, of whom four worked in the factory and the remaining ten at home, thus balancing their work with their domestic lives.

In the following years, Margarete Steiff would make her first contacts abroad, beginning with the Harrods chain of stores in London where in 1895, her toy animals were already being sold.

In 1902 an extraordinary set of circumstances would provide a new boost to the company, culminating in the creation of the architectural project that was the Steiff factory. A seemingly insignificant episode was a determining factor in this story and that was the trip to Europe made by Hermann Berg, a seasoned trader of toys in search of new items. At the Leipzig fair, this American –who was also the brother of Alban Berg the composer– would fortuitously encounter, at a small stand, the Steiffs' most recent product, the jointed bear. With an unerring intuition, he decided to buy 3,000 units of this new toy in order to introduce it in the United States **(figs. 06 and 07)**.

Almost at the same time, on the other side of the Atlantic, a memorable event was about to take place, one that would be highlighted in all the media, in the form of articles, illustrations and caricatures. President Theodore Roosevelt, a consummate hunter, had just made a magnanimous and honourable gesture, one that would have a deep significance in the midst of the heightened social tensions then prevalent in the country : on an organised hunt in the state of Mississippi, the head of state walked away from a helpless young bear that was offered to him as a hunting trophy **(fig. 08)**.

The Steiff toy bear would appear at exactly the right moment in the right place, and the symbolic association between the American president and the toy bear would last until today **(fig. 09)**.

This happy coincidence would make Margarete's toy -which had just landed on the New Continent- an overnight national icon dubbed the Teddy Bear, in recognition of the President's action. From then on, demand would shoot up in the United States of America, making it essential for the German factory to expand its workspace in record time.

It is now more than a hundred years ago that the Teddy Bear became famous and it is still a collector's item today. Six generations underway, the family enterprise created by the Steiff matriarch in 1893 continues to be in full production, and the original building of 1903 is still in use as the workspace.

To place this work within the historical context of architecture -where, as we have already mentioned, it is not even mentioned-, we must remember that from 1900 onwards, Germany was the centre of European architectural culture, and a determining factor in the evolution of the modern movement would be the founding of the Werkbund in 1907, whose goal was to elevate the

work of artisans by linking it to art and industry. It is evident that the birth of the Steiff factory in 1903 was possessed of a visionary spirit that placed it ahead of the events highlighted by history, situated as it was additionally, in an unfavourable environment in time and place. Conversely, the Faguswerk of W. Gropius and A. Meyer would conveniently be hailed by the orthodoxy as the seed of the modern architectural project.

The earliest texts on the history of the modern movement in architecture would not be published until the 1930's. It was then that the important texts of Nikolaus Pevsner and Sigfried Giedion[8] would develop a genealogy and establish the now legendary glazed corner of the Fagus-Werk, built between 1911 and 1913, as its undisputed beginnings. In the two decades that passed between the execution of the work and its historiographic narration, the Fagus was established as an undisputed canonical work, an accolade that would remain for another twenty years until the post-war period when the first critical revisions were made, within the framework of a lively architectural debate that would question the symbolic value of the famous corner.[9]

Bruno Zevi, the Italian architect and historian would be one of the first persons to question it. In the illustrated pages of his 1953 *Poetics of Neo Plastic Architecture*, , alongside the usual photos of the Fagus, he published other *hostile*, images that depicted the dubious and classist side of Gropius' work. Zevi thus shed light on the partial and biased perspective of historiography, at the same time that he questioned the veracity of the modern values of perspective by pointing out that some views of the Fagus factory denoted "certain traditional persistence and a lack of ease in drawing. One who judges the architecture by their complexity and not by a few photographs, will realise the unsteadiness in the volume, the anomaly of a wall box attached to the laboratory glass by means of such a clumsy insertion that not even the decorative horizontal incisions can hide it; a narrative writing, the epigone of the *Arts and Crafts* and of *Art Nouveau* [...]. The foundation of the Factory is decidedly anti-rationalist, it breaks the unity of the wall, it forces a horizontal order and encumbers it with cornices, moulding and a strident portal".[10]

The last page of this book that was decidedly controversial at the time is especially insightful. It depicts twenty one images of the corners of other emblematic architectural works. The sequence begins with the Temple of Concordia in Agrigento, dating back to the 5th century BCE, and ends with the Roma Termini Station of 1951. Between these two are included views of corners of the Duomo in Milan, the Palazzo Vecchio in Florence, the Ca' d'Oro in Venice, the Ducal Palace in Urbino, the Strozzi Palace in Florence, the church of Santa Maria della Pace of Bramante; in addition to works by Auguste Perret, Josef Hoffmann, Erich Mendelsohn, Willem Marinus Dudok, William Lescaze, Le Corbusier and Giovanni Michelucci.[11] Within this series of photographs focusing on the dihedrals of the façades, the omission of the Fagus corner is especially eloquent and meaningful.

As we know, in 1960 the British architect and historian Reyner Banham openly questioned Gropius' work as a standard of modernity, by unmasking the partial and even biased visions of those early historians who were fans of the German aspect of the modern movement. Banham had no compunctions about using expressions like "dirty laundry" and "zones of silence" to refer to the way in which those exceptional witnesses established the birth and genealogy of modern architecture.[12]

In the 1970's, other critics would bring forth new interpretations, among which are Manfredo Tafuri's perspicacious enquiries and fruitful uncertainties with regard to the beginnings of modern architecture. By then, the argument regarding the truth or falsity of the mythical Fagus photo had become irrelevant faced with the discussion on the validity of the modern project, sentenced to death by some who, like Tafuri, sought to "demonstrate its complexity and its fragmentary nature" at the same time that they proposed to "discover its shortcomings, contradictions, betrayed goals, errors",[13], as, according to the incisive Italian historian, "if criticism did not proceed like this, it would continue to collaborate in the creation of myths that may have been required [in other times] –as necessary and indispensable forces to force the situation– but now must be eliminated".[14]

In line with Tafuri's discourse, the goal of this article is to unveil one of these deficiencies and to correct a mistake, by rescuing the Steiff Factory of 1903 from oblivion, as a pioneering work of architecture that is an authentic display of modern architecture.

The launch of Steiff's new production space in Giengen would be as frenetic as the dazzling success of its most famous toy, the Teddy Bear. The result would be an innovative and radical form of architecture that was as modern as the mode and the times when it was built.

It is important to remember that until that moment and for decades, Margarete Steiff had meticulously developed an entrepreneurial project of a marked social bent that focused on child welfare and female workers. Her perseverance, innovative creativity and revolutionary social vision would ultimately take shape as a construction whose symbolic expression of humanistic functionalism would be the modern dream pursued by architects in the decades to come.

The Steiff factory is an architecture without an architect, nothing extraordinary in the early 20th century when frequent industrial, engineering and artistic contributions were made to the nascent architecture. Times of change in which great masters such as Mies van der Rohe, Le Corbusier and Walter Gropius would never complete their official studies nor obtain the degree of architect, as they deemed the prevailing 19th century education system to be obsolete and useless.

Obtaining the building license in 1903 was not easy, as technicians claimed that whoever worked in a fully glazed building such as the Steiff Factory would be at risk of losing their eyesight. Eventually, the ministry of commerce and industry of Württembergian and the local authorities offloaded the responsibility on to the shoulders of the company and give them permission to build.

The façade turned out to be so effective that within the same decade, when two considerably larger buildings had to be built, the same glass enclosure system was used, albeit with a wooden frame structure instead of steel. Today it may be unreservedly said that the Steiff Factory built in 1903, possesses the first curtain wall in history, fifteen years prior to the Hallidie Building in San Francisco, which is generally thought to be the oldest curtain wall of all time.[15]

This research focuses on the first volume built within the Steiff complex, called the east block, a precise prism of three storeys, with an area of 12.00 x 30.00 m, and 9.40 m high. Its metallic structure of riveted steel beams braced for wind resistance was created by Eisenwerk München AG, in collaboration with the Steiff family, and represents the most advanced structural technique of the German industry of that time.

The floor is divided into three bays by means of two lengthwise porticoes. Each bay consists of six columns composed of two U-shaped beams, connected by small sheet metal strips. Thus, each elevation has an open plan surface measuring 360 m^2, solely punctuated by eight slim pillars, as the remaining four are embedded in the lateral façades **(fig. 10)**.

The four corners of the building house L-shaped pillars, reinforced by riveted steel plate and angle sections, while nine I-section columns run along the two longer façades. This entire steel structure connects the load-bearing beams to the foundations, said beams also consisting of metallic elements, arranged in five transversal compartments.

Both the horizontal cross-beams that connect the pillars as well as the slanting braces that may be seen behind the glass ensure the three-dimensional rigidity and the wind bracing of the entire building **(fig. 11)**.

The skeleton, which is made entirely of prefabricated steel, was erected in a few days and ensured an architectural design that was light, resistant and precise. It is important to highlight that in 1903, the industrial production of this material had only been recently implemented, especially with regard to standardised laminated profiles. If we take into account the distance between Giengen and the centres of production, then this work acquires especial value as its architecture was a display of avant-garde technology.

How was it possible to have such an advanced system of building in such a place and at so early a period of time?

The building is undoubtedly the incarnation of a revolutionary spirit, not only in its technological aspects but also in its aesthetic and social aspects, as the constructive solution, the rationality and the abstraction of its form is a clear response to its utilitarian nature and to the needs of its occupants and is therefore, an unprecedented expression of true modern functionality.

The will to innovate that is reflected by the Steiff Factory was born several decades ago with the invention of a new product –the stuffed toy bear– and with the foresight of its distribution in what was then an emerging international market of mass consumerism. Thus it is evident that this architecture symbolises, in the early stages of the modern project, the enthusiasm for change and progress that has always characterised the pioneering career of its founder, Margarete Steiff.

There has been speculation regarding the authorship of the Steiff project, hinting and even outright claiming that it was the work of the male members of the family, specifically, that of her nephew Richard, who was only three years old in 1880, when Margarete founded the Steiff company, and fifteen when the pioneering businesswoman had progressed to selling her famous toy bears by catalogue. The data presents irrefutable evidence that displays the leadership of this admirable woman in all aspects of the creation of the Steiff company, from its beginnings, with the design and development of the products to the development of the modern buildings constructed in 1903, 1904 and 1908.

In the second half of the 19th century, an ambitious businesswoman would have encountered innumerable obstacles. Margarete, who was born in 1847, was aware of this from a very early age, which is why she created, from the start of her activity, a strategic company structure involving those who would eventually become her heirs. The six Steiff nephews were trained under the matriarch for different responsibilities within the firm and it was she who would assign them, from a very early age, the responsibilities of different areas of management, finance, sales, marketing, development and new Steiff products. In one humorous photo, we can see them all -with imposing moustaches, of course- perched on small toy elephants of varying sizes. **(figs. 12 and 13)**. The picture, on one hand, shows the symbolic value of the legendary felt pachyderm that in a bygone 1877 a young Margarete would create all by herself, and on the other hand, it is a clear expression of a decided family-based plan meant for a future industry even before this new generation of Steiffs was born.[16]

The four façades of the Steiff Factory are completely covered with glass, and in contrast to the Fagus Factory, there are no signs of traditional architectural elements or links to the past that might diminish its radical and continued polish. This concise glass box, –known back then as the "aquarium of the virgins" owing to the many young women who worked inside– still shines brightly today as a symbol that heralded a new age.

The building skin consists of two glass layers 3 mm thick separated by a chamber of 25 cm that houses the metallic structure. The 60 x 90 cm panes are supported by a grid of T-shaped steel mullions, measuring 25 x 35mm. A series of straps attached to the metallic structure resolve the tension caused by the wind on the delicate panes of the façade.

The outer glass layer runs continuously from the base of the of the building to its roofline, while the interior layer spans from the top of each floor slab to the bottom of the next slab. Thus the outside glass layer does not have the usual interruptions owing to a vertical structure or to the presence of fittings. This double skin of glass with a chamber therefore constitutes, as we have already mentioned and as reiterated by several studies on façades, the first curtain wall in history **(fig. 14)**.

It is worth remembering that in both the AEG Turbine Factory of 1909 built by Berhens as well as the renowned Fagus by Groupius in 1911, not only is the glass façade –which is surrounded and supported by the building's load-bearing structure– interrupted, but in both cases, it also consists of a single glass layer. In spite of not being acknowledged throughout the 20th century, even when we adhere to the most orthodox historiographic criteria, it is evident that the 1903 Steiff Factory is a pioneer and the most modern of the three factories.

This new building that appeared almost overnight in Giengen and at such an early stage in history, is additionally an unparalleled example of glass architecture insofar as it houses people and not machinery, as a place meant for the welfare of its occupants who were mostly women carrying out respectable manual work.

Lighting is essential for the good vision of those who perform tasks as detailed as hand sewing and assembly, especially in the early 20th century when available artificial light was scarce and of low quality.

Within the building, the daylight that entered through the glass façades lit up the entire factory floor. In early times, before the installation of curtains to reduce the excessive glare, the glass was painted over with lime wash in summer and removed in autumn to allow the glass panes to recover their original transparency. The appearance of the building would therefore change according to the time of the year and the hour of the day. As Colin Rowe brilliantly says, "that which is transparent ceases to be what is perfectly clear to become that which is clearly ambiguous".[17]

Cross-ventilation was achieved by means of box windows that could be opened and closed and were inserted into the four façades, thus ensuring air circulation without breaking the sealing or altering the isolating capacity of the curtain wall **(fig. 15)**. Additionally, in order to ensure an optimum temperature inside, it had a new heating system that used low-pressure steam.

The glass used in the façades was not transparent but translucent. Apart from being cheaper, the textured cathedral glass used in the Steiff Factory provided the interior with a homogeneous lighting and without strong contrasts, a diffused lighting that was required for the precision work carried out by expert hands there. Margarete Steiff who had created alongside her employees unique pieces of great quality since 1880, was aware of this fact and this choice was undoubtedly influenced by her wish to provide her workers with the best possible working conditions, both inside and outside the company. "Transparency may be a quality inherent to a substance or it may be a quality inherent to an organisation".[18] Another explanation for the use of translucent glass may be the need to protect themselves from the gaze of the competition, similar to the introduction of the famous button in the ear of the *Knopf in Ohn* Teddy Bears, by Franz, another of Margarete's nephews, to protect the brand from forgeries.

From the outside, the volume exudes a mysterious and suggestive effect: moving shadows are visible without giving away the objects and figures behind the façade **(fig. 16)**.

Access to the two upper floors of the building is provided by means of a ramp that unfolds outside as a continuation of the streets and roads of this new urban area. The inclined plane hugs the building and provides an ascending route from which one can have a moving view of the surroundings: the medieval city, the railway tracks and the river Brenz. This innovative solution replaced the more common staircase and facilitated fluid and unrestricted access for goods as well as the people who worked in the factory. But above all,

it gave access to its owner, who had been restricted to a wheelchair since she was a child owing to poliomyelitis contracted at an early age. Having a ramp was also advantageous from a financial viewpoint as being an external element of the building, it did not count towards the licensing fee and freed the company from the need to invest in energy and mechanical means to move cargo and goods **(fig. 17)**.

But the real discovery that emerged from this type of external perimeter-based connection was the liberation of interior areas, laid out in completely isotropic spaces. The floor thus possessed an absolute clarity and continuity as the absence of staircases, elevators, gaps and partitions, meant that the entire surface area could be used without restrictions. In this as in other architectural aspects, we rarely find modern antecedents of working spaces with the same degree of functionality, building arrangement and spatial quality as those of the Steiff Factory.

In the interior, photographs from the period show how this architecture promotes an egalitarian work organisation where employees are organised in groups perpendicular to the façade without a hierarchical order or a specific assignment of work stations. In the corner of one of these long wooden tables we can see Margarete in her wheelchair, sewing just like any other worker. Half-finished or finished toys are strewn all around, in baskets and crates. The images transmit a sense of cooperative organisation that is also displayed in the company celebrations as portrayed in the other old photo **(figs. 18-20)**.

The open plan arrangement, without fixed work stations or rank-based structures -as opposed to the habitual assembly lines- are extremely advanced concepts for its time and foreshadow a completely new social order and work organisation that would not be implemented until many decades later.

From the beginning of her activity, Margarete Steiff had shown herself to be a unique and exemplary businesswoman, who was willing to come up to formulas that would allow women to work and fulfil their domestic and child-rearing tasks at the same time. Additionally her initiatives were of great efficiency, resulting in a spectacular increase in factory production. For example, 973,994 Teddy Bears were handmade in 1904, in addition to another two million toy animals of exceptional quality, by 400 employees who worked at the factory and 1800 women who worked from home in addition to their domestic duties.[19]

The external ramp is a reflection of this dynamism, which became a symbol of the firm's unstoppable growth. This powerful diagonal that ran all along the façade -an element that would be used by Le Corbusier, the Russian Constructivists and others in later decades- is an accomplishment and an artistic expression of continuous movement and the accelerated changes of modern times when "rapid changes in technology, globalisation, communication technologies and changes in the social fabric dominated conversations and newspaper articles; then as now, cultures of mass consumption stamped their mark on the time, the feeling of living in an accelerated world, of speeding into the unknown, was overwhelming"[20] **(figs. 21 and 22)**.

The movement of persons and goods in constant circulation on this innovative inclined plane that embraced the façades contributed to a new perception of architecture, changing and open, that is manifested by means of its innovative transparency in the vivid presence of actors and objects within an intermediate space between the interior and the exterior of the factory.[21]

When Margarete Steiff died at the age of 62 in 1909, the large stuffed toy factory had been extended by two larger buildings that shared the same façade system as the first volume **(fig. 23)**. By then, the entire glazed surface of curtain wall occupied 1.5 ha.

Margarete never knew of Gropius or of the Fagus of Alfeld (1911-1913) which was built after her death, as they both belonged to completely different periods and social environments. Nevertheless, it may be said that the pioneers of modern architecture in Germany, and in general, those related to European avant-garde movements, may have learnt of this pioneering project and may have even visited Margarete's factory in Giengen, where they would have been surprised by its radical crystalline purity.[22] We shall probably never know if the most renowned historians and critics of Central European modernity were aware of the Steiff Factory, what is certain is that they made no mention of it.

The Steiff Factory did not exist in the history of architecture until the end of the 20th century,[23] being relegated to obscurity for nearly a hundred years. On the contrary, the Fagus Werk, the legendary protagonist of the history of architecture, achieved the highest possible heritage recognition when it was included in 2011 in the UNESCO's World Heritage List, in spite of the recurring doubts that have been cast over the years on its value.[24] Nevertheless, it may be affirmed that the achievements of the Giengen building are a step beyond anything achieved by the Alfeld factory complex. Or to put it in other words, the Steiff Factory of 1903 is the realisation of a series of modern ideals that the Fagus, built between 1911 and 1913, was never able to achieve fully.

This work has allowed us to see, once again, how much is left to discover of 20th-century architecture, an extremely fertile and innovative period in the history of architecture, both with regard to ideas and projects and works. Within the last century, and especially in the first decades, there was an infinite number of manifestations and changes that had multiple influences, creating an unusual kaleidoscope of contributions to architecture and a large variety of expressions in construction, such as had never before been witnessed.

Given the homogenisation created by planetary globalisation, it is unlikely that such diversity shall ever come to pass in similar splendour. Nevertheless, we believe in the growing plurality of perspectives that are able to bring to light unpublished events or remarkable authors and architects of the past that are as meaningful and eloquent as the Steiff Factory of 1903.

With the conviction that we only see what we can think of, we may congratulate ourselves on the social and cultural progress that gives space to all that it diverse. We affirm the emblematic value of the Steiff Factory against the established Fagus factory, because the contrary is also true. But this was already stated by the poet Hölderlin in 1795[25].

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Notes

01. SMITHSON, Alison and Peter, "The Heroic Period of Modern Architecture", in *Architectural Design*, December 1965, pp. 590 (re-edited in SMITHSON, Alison and Peter, "The Heroic Period of Modern Architecture Begins", in SMITHSON, Alison and Peter, *The Heroic Period of Modern Architecture*, Rizzoli International Publications Inc., New York, 1981, pp. 9). Within the collection of works mentioned by Alison and Peter Smithson in this article, only two other projects are displayed with the same profusion of photographs as the Fagus: Le Corbusier's Villa Savoye and the Tugendhat by Mies. With this repertoire of references, the new generation makes it clear that faith in its origins still persisted in the 1950s, as stated in the article "The Heroic Period of Modern Architecture is the rock on which we stand" (re-edited in SMITHSON, Alison and Peter, "Prelude to the Heroic Period of Modern Architecture", in SMITHSON, Alison and Peter, *The Heroic Period of Modern Architecture*, Ibid., pp. 5).

02. In 1932, to be precise, two references were made to it in German: a short article that dealt almost exclusively with the difficulties of obtaining the license, and a footnote in a page of a book. Both are insubstantial, solely mentioned in the article by Robert and Brenda Vale.

03. ALBRECHT, Peter, "Fábrica Steiff, 1903. Steiff Factory", in *a+t revista trimestral de arquitectura y tecnología*, 11, Vitoria-Gasteiz, 1998; SCHITTICH, Christian (ed.), *Building Skins*, Detail/Birkhäuser, Múnich/Basilea, 2006; GÖSSEL, Peter (ed.), *The A-Z of Modern Architecture*, 2 volumes., Taschen, Köln, 2007; MURRAY, Scott, *Translucent Building Skins. Material Innovations in Modern and Contemporary Architecture*, Taylor and Francis Group/Routledge, New York/London, 2013; FORTMEYER, Russell Martin, and LINN, Charles, *Kinetic Architecture: Design for Active Envelopes. Images Publishing Group*, Mulgrave, Vic, 2014.

04. FISSABRE, Anke, and NEITHAMMER, Bernhard, "The invention of Glazed Curtain Wall in 1903-The Steiff Toy Factory", in the *Third International Congress on Construction History Cottbus*, in KURRER, Karl-Eugen, LORENZ, Werner, and WETZK, Volker, Brandenburg University of Technology, May 2009, pp. 595-602.

In 2016, the same authors published in German the book *Die Steiff Spielwarenfabrik in Giengen/Brenz*, Geymüller, Verlag für Architektur, Aachen, 2016.

05. VALE, Brenda, and VALE, Robert. "Gropius and the Teddy Bear: a tale of two factories", in the *Architectural Research Quarterly Journal*, vol. 20, 4, December 2016. The article may be consulted at https:// doi.org/10.1017/S1359135516000518 (published on 27 April 2017, accessed on 12 July 2019), pp. 345-356.

06. The construction entrepreneur

07. STEINER, George, "De mortuis", in STEINER, George, *George Steiner at The New Yorker* [1981], Siruela, Madrid, 2009, pp. 103.

08. PEVSNER, Nikolaus, *Pioneers of the Modern Movement. From William Morris to Walter Gropius*, Faber & Faber, London, 1936, and GIEDION, Sigfried, *Space, Time and Architecture. The growth of a New Tradition (The Charles Eliot Norton Lectures for 1938-39),* Harvard University Press, Cambridge Mass, 1941.

09. TOURNIKIOTIS, Panayotis, *The Historiography of Modern Architecture* [1999], Reverté, Barcelona 2014. The evidence of Gropius' influence on historians and his leading role is visible throughout the history of architecture in the first half of the 20th century, given the great prestige and influence that he wielded as mediator between institutions and generations.

10. ZEVI, Bruno, *Poetics of Neo Plastic Architecture* [1953], Victor Lerú, Buenos Aires, 1960, pp. 18-19.

11. Ibid, Figures 163 to 183.

12. "The Faguswerke at Alfeld, designed from 1911 onwards by Gropius and Meyer and in construction until 1913, is frequently taken to be the first building of the Modern Movement [...]. The modernity [...] is visible indeed, only on parts of two sides, where the machine-shop and power-house present

glazed walls [...]. These two blocks are in such strong contrast to the unadventurous neo-Classical regularity of the rest of the buildings that one may suspect that [...the partial modern aspect] must have been an unsought consequence [...] of the functional programme", in BANHAM, Reyner, *Theory and Design in the First Machine Age* [1960], Paidos Estética, Buenos Aires, 1985, pp. 84. Banham also expresses it in similar terms in "History and Psychiatry Archit", *The Architectural Review*, London, May 1960.

13. TAFURI, Manfredo, *Theories And History Of Architecture. Towards a concept of architectural space* [1968], Laia, Barcelona, 1972, pp. 12.

14. Ibid, pp. 11.

15. See Notes 4 and 5.

16. Richard Sennet analyses the great changes in the production systems and in the demand for merchandise that was increasing in the second half of the 19th century, when companies were learning the art of stability that would ensure their longevity with an increase in the number of employees in SENNETT, Richard, *the Culture of the New Capitalism*, Anagrama, Barcelona, 2006, pp. 29 on. With regard to the process of training, he also states that "The German word Bildung names a process of personal formation which fits a young person for the lifelong conduct of life", in Ibid, pp. 23. This was the training imparted to the Steiff "brood", meticulously programmed by Margarete. The Prussian model of military organisation was currently being implemented in Germany, "large corporations operated increasingly like armies where every one had a place and every place a defined function", in Ibid, pp. 26.

17. ROWE, Colin, *Mannerism and Modern Architecture and Other Essays*, Gustavo Gili Barcelona, 1978, pp. 156.

18. Ibid, pp. 157.

19. VALE, Brenda, y VALE, Robert, *op. cit*., pp. 346.

20. BLOM, Philipp, *Años de vértigo. Cultura y cambio en Occidente 1900-1914*, Anagrama, Barcelona, 2010 [*The Vertigo Years: Change and Culture in the West, 1900-1914*, Basic Books, New York, 2008].

21. Seven decades later, the Pompidou building would employ this strategy on a large scale with its famous escalators that, full of visitors and passers-by, symbolised a new culture of masses: "the ornamental crowd" as the generator of a façade in constant change.

22. It is well known that both Gropius and Mies considered factory buildings to be a modern referent. We know of their interest in the impressive factories built by the German architect Albert Kahn on the other side of the Atlantic post 1909. During his first trip to the USA in 1928, Gropius visited, admired and photographed them, and Mies studied the glass and steel structures when in the 1940's, he commenced his stay at the MIT in Chicago.

23. Peter Albrecht is the author of the first and the only article published in Spanish on the Steiff Factory. It is a brief bilingual text in Spanish and English that presents and highlights the value of this building, by means of a detailed technical description of its structure and façade. Nevertheless, the author commits an important error when he states that Richard Steiff "one of her sons [...] planned, along with his father, the new factory complex of 1903 and the extension of 1904". We can see from the very first paragraph of the text, how the true creator of the project is relegated to obscurity: In 1880, the seamstress Margarete Steiff founded a company for the artisanal production of felt elephants intended, at first, to serve as pincushions". Instead, he attributes the authorship of all the creations, including the innovative building, to the male members of the family: the father, the brother and also sons –which, by the way, Margarete never had any–, in ALBRECHT, Peter, "Steiff Factory", *A+T: revista trimestral de Arquitectura y Tecnología*, 11, 1998, pp. 4-9.

24. The director of the Bauhaus Archive, Annemarie Jaeggi, has also expressed her doubts in this regard. In her book on the Fagus published in 2000, this renowned author joins the criticism made by Banham and Zevi –now more than fifty years old–, confirming the biased appreciation for the work that is present in historiography, by means of selective photographs. In her text, Annemarie highlights Gropius' desire to surpass Berhens, focusing on the limitations of his achievements, in these words: "I was fascinated by the idea of achieving with new building methods [...] a lightness in contrast to the accentuated weight of the earth [...] so significant in older building methods". Jaeggi continues by observing that, although Gropius had tried to find "a radical solution without compromising", he could not avoid the pylon effect with the two stairwell towers in the Fagus façade, in JAEGGI, Annemarie, *Fagus-Industrial culture from Werkbund to Bauhaus*, Princeton Architectural Press, New York, 2000. pp. 7. See also HENZE, Kathrin, *Fagus. La historia de una fábrica* [doctorate coursework at Universidad Politécnica de Madrid, 2005-2006], Arquitectos de Cádiz, non-commercial, limited edition, Cádiz, 2006, pp. 43.

25. HÖLDERLIN, Friedrich, *Hyperion or The Hermit in Greece* , Hiperión, Madrid, 1982, pp. 30.

Images

01. Front. Steiff Factory. Giengen, Germany. 1903.

02. Steiff Factory. Panoramic view of the complex with extensions circa 1910.

03. Steiff Factory. Signed and stamped licensing plan. 1902.

04. Margarete Steiff and Teddy Bear. Anonymous art.

05. Margarete Steiff and her workers in 1888 in front of their first workshop built in the traditional style by her brother Fritz, a builder like their father.

06. Teddy Bear circa 1903.

07. *"Teddy bear" in all sizes. The best toy ever invented. These bears are sensitive and serviceable.*

08. Theodore Roosevelt, sketch of his honourable deed. The Washington Post, 1902.

09. Theodore Roosevelt and Teddy Bear. Photo montage.

10. Steiff Factory. Floor layout. 1902.

11. Steiff Factory. Structure execution in laminated steel sections. 1903.

12. Margarete Steiff's nephews; Paul, Richard, Franz, Hugo, Otto and Ernest.

13. The male members of the Steiff family on elephants, Margarete's first symbolic creation.

14. Steiff Factory. Giengen, Germany. 1903.

15. Steiff Factory. 1903. Corner detail of the volume with four glass façades.

16. Steiff Factory. Curtain wall façade with translucent double glazing (*cathedral*).

17. Steiff Factory. 1903. Ramp access from the outside.

18. Margarete Steiff in her wheelchair working on the manufacture of toys.

19. Steiff Factory. Interior. Workers' celebrations circa 1903.

20. Steiff Factory. Interior. Margerete sewing in the left corner.

21. Steiff Factory. Plan of the sloped floor from the access ramp.

22. Steiff Factory. Workers posing on the building's access ramp.

23. Steiff Factory. View from the avenue of the extensions between 1904 and 1908. The traditional architecture of the small city of Giengen makes for a contrasting background.

13

Material quality in organic architecture. Enrico Tedeschi's building for the Faculty of Architecture in Mendoza

Silvia Alvite

Alongside the theoretical flourishing of an organicist architectural trend around the concept of space, promoted since the mid-1940s by some Italian architects, a parallel line of research developed the path of biostructures as support systems integrated into the envelope. In Argentina, both sides had experimentation channels during the 1950s, and a case that uniquely condenses the maturity of those proposals is the building of the Mendoza Faculty of Architecture, designed by Italian architect Enrico Tedeschi between 1960 and 1964. The project explores systematicity, constructive rationality and organicity, rejecting material neutrality in favour of the exploration of a tactile field in which the limits of space are perceived blurred by effects of shadows, transparencies and dynamism accompanying a soft naturalistic mimesis.

FORM, SPACE AND MATERIAL IN ORGANIC ARCHITECTURE

In architectural theory and practice, naturalistic analogies have always been a source of inspiration; according to Waenerberg, they have been applied both to figurative imitation and to structural forms, or compositional strategies[1]. One such analogy was disseminated in Italy by Roman architect and critic Bruno Zevi, during the mid-1940s. His theory on "organic architecture" rejected the formal definition regulated by classical proportions, volumetric composition, and any kind of standardisation, holding instead as its core value the definition of inner space as the origin of external form. This was a position which –as explained by Hvattum– sought to defy the mechanical idea of form as imposed from the outside, through the idea of form as self-regulated from the inside, by means of an organic process[2]. Zevi´s proposal intended to replace the aesthetic choices of totalitarian regimes by others which would promote individuality, formal freedom, and space as the essence of architecture; to this effect, his chief model was the work of American architect Frank Lloyd Wright[3]. However, the idea that space represents the raw material of architecture was discussed among the very advocates of the Italian organic movement. Samonà argued that it was actually a combination of space and matter, since Wright's architecture could not be explained by the geometric form of its inner spatial configurations, but by the continuity and plasticity of a "spatialised matter"[4]. On the other hand, Argan considered that, in order to apply Wright's ideas to design, we ought to understand that he was attempting to exalt nature in architecture, through a process by which "matter takes form", in a re-interpretation traversed by geometry and the rules of reason[5]. As Pope remarks, organicist thought in architecture tries not to visually imitate a natural element, but to develop an interaction between the architectural object, and the natural and constructed environment, by means of imitating the functional relations in nature[6].

ENRICO TEDESCHI AND THE EXPRESSION OF SPATIAL CONTINUITY

One protagonist in that Italian discussion group was Roman architect Enrico Tedeschi (Rome, 1910 - Buenos Aires, 1978), whom in his youth briefly developed his professional activity in Rome, during the 1930s. After the Second World War, he worked as an urban planner in some plans to reconstruct Italy; together with Zevi, Piccinato, and other Italian architects, he was part of the *Associazione per l´Architettura Organica* (APAO), as well as of the executive board of *Metron* journal. In 1948, he emigrated to Argentina, where he became a distinguished professor at different universities. While he mainly devoted himself to teaching, he was a versatile figure within the disciplines of architecture and urbanism, as a designer, theorist and urban planner. His greatest academic achievements were attained as dean of the Faculty of Architecture at the University of Mendoza, between 1961 and 1972. Afterwards, he dedicated his last years to research, advocating an ecological approach to architecture through the development of solar energy technologies applied to house design.

In the 1950s, Tedeschi was a representative of organic architecture, by way of his pedagogical programmes and publications in Spanish. He promoted the same spatial ideas posed by Zevi, albeit without his politically-tinged arguments, inappropriate for the Latin American context. Through a call to formal freedom, Tedeschi opposed figurative abstraction as a design tool, identifying it with a standardising homogeneity; instead, he affirmed the re-valuing of the human factor and its singularity, in order to "[...] overcome the cubist experience, which values above all volume and proportion"[7]. In 1955, he devoted a critical essay to the figure of Frank Lloyd Wright, highlighting in his work the use of materials in their natural expression, an affinity with landscape, a free formal expression, and the role of space in plastical generation[8]. Some years later, he further developed this approach, adding certain aspects defined by an environmentalist matrix which drew him near to a particular interest in structures and climate. Those were times in which psychological and perceptual factors had been brought into the methods of the architectural project, incorporating the variables of viewing space in movement and transparency[9].

Tedeschi was sceptical that technology could solve aesthetic issues, although he neither favoured an artisanal or vernacular view in relation to materials. He was interested in industrial improvements, and welcomed the experiments with modular prefabrication systems developed in post-war Europe. The success of these systems, according to Tedeschi, was that standard elements, regulated by networks, yielded flexibility, growth capacity and aesthetic interest, so long as they did not become monotonous:

> "This is the system we have so strenuously tried to avoid in recent years, so as to achieve expressions of spatial and plastical continuity, closer to our dynamic view of the outline"[10].

On the occasion of publishing an article on structural design in architecture, Tedeschi illustrated the search for aesthetic value and creativity in structures with the examples of Wright's

Johnson Wax building in Wisconsin, and architects Bijvoet and Duiker's Open Air School in Amsterdam; in both cases, a constituent structure of the envelope –emphasised by the dissolution of a solid appearance in volume– was the mainstay of the global expression[11] **(fig. 02)**. His interest in structural expression led him to cherish the studies of contemporary engineers, who combined technical expertise with formal principles taken from the biological world[12]. In his most well-known didactic work, *Teoría de la arquitectura* [*Theory of architecture*], Tedeschi referred to works by Torroja, Nervi and D'Arcy Thompson, and put forward arguments for optimising form in view of a better structural performance of the material; however, he observed that the engineers' approach to design was, in general, devoid of sensitivity to the human scale, an aspect he deemed essential to architecture[13]. Nonetheless, Tedeschi did not consider there was a rivalry between disciplines, since he neither espoused a formal and spatial search dissociated from the material's very own efficiency and nature, a problem he saw in Oscar Niemeyer's works in Brasilia, as opposed to Pier Luigi Nervi's structures in Turin:

> "Let us see how the vault of Turin is transformed by its elegant fanned supports, whose shape bring to mind the stems of palm trees; the extraordinary finesse of the vertebrate arches and of the ribs joining them, where the structure's naturalistic and organic sense is reaffirmed: the strong sense of human scale –so prone to become lost amid such structural dimensions–, created by the lateral balconies and galleries; its lavish illumination, making the ceiling transparent and soaring. Our admiration becomes multiplied"[14].

Engineer Nervi was a close figure to Tedeschi. Both of them had been part of the School of Organic Architecture in Rome between 1946 and 1947; shortly after, Nervi developed the design and structural calculation for the roof of the University Campus's Communal Centre in Tucumán, Argentina, a project Tedeschi also took part in **(fig. 03)**. Giulio Pizzetti –another Italian engineer who lived for some years in the country– also spread, from his chair at the University of Buenos Aires, the methodologies of structural design based on empirical model testing, and, among other works, he collaborated with architect Amancio Williams on the experimental design of hollow vaults for the hospitals of Corrientes (1948-53)[15]. Regarding Argentine architect Eduardo Catalano, who took part in the project of Tucumán, he emigrated to the United States in the 1950s, and devoted a significant research period to structural studies based on modules and continuous, warped surfaces **(fig. 04)**. Though not many, the structuralist experiences were well known to Tedeschi.

THE BUILDING FOR THE FACULTY OF ARCHITECTURE OF THE UNIVERSITY OF MENDOZA

In the 1960s, Enrico Tedeschi had the opportunity to experiment with this world of technical-formal exploration, when he took part in the creation of the Faculty of Architecture of the University of Mendoza, and served as project director for the construction of its premises, in collaboration with engineers Diego Franciosi (design and assembly of prefabricated elements) and Roberto Azzoni (general calculation)[16]. The design effectively solves a most elegant seismic structure achieving a complex material rationalisation, a feature which, as noted by Codina, results in a technical innovation not based upon traditional construction uses and expertise for the material[17]. Intending to work on low construction costs, they made use of prefabricated parts manufactured by SCAC company: some of them were intended for buildings –such as beams and precast tiles, made of prestressed and reinforced concrete, used for the mezzanines and the roof–; while others were originally intended as urban lighting poles, but were used in this work as segments for a network configuring the main sides of the volume at the front and rear façades[18]. The latter elements, made of spun concrete, have a conic development, since their cross-section diminishes as they become higher. This was an essential feature in defining the design, given that they were used as elements in a network whose cross-section diminishes along with the vertical development of the building's façade. The network's diagonal layout owes mainly to the aim of reducing deformation, which stems from the need of seismic resistance. The progressive reduction of the conic pieces' cross-section, together with the dynamic effect of the pattern's diagonal direction, generate the perception of an ascending movement, an effect which allows a regular, mechanically-constructed composition to have an organic appearance. A key moment in the process, according to the author himself, was when he had to reflect upon the design of the joints between the poles:

> "[...] if we gave a simple, continuous solution to the joints articulating these conical poles in the diagonal network, would we not achieve that organic, natural character suggested by the environment's park, by means of presenting these columns as elements born from the ground and becoming thinner as they grow, just like tree trunks?"[19]

The design of the joints and the supports blurs the distinction between the parts, and adds to the network's impression of growth, as if it were a great, single piece, whose naturalistic inspiration is intentional, for we can appreciate both a tree-like figure and an anthropomorphic figure **(fig. 05)**. Codina's studies on the project reveal that underlying this façade's composition is the golden ratio, integrating the network's slope angle to a 2.44 m modular system, yielding 3.20 m vertical intervals between the upper levels of the slabs. A mathematical order which would represent a rationalisation of certain natural logics, just like Argan saw in Wright's design processes **(fig. 06)**. However, the design's organic character is not only a consequence of geometrical knowledge, but also of other holistic and material factors: first of all, each element is integrated into a greater complex, wherein each part occupies a definite position, bringing about a network arrangement, a relational –not hierarchical– structure among the elements. The relation between structure and space, through the permeability of both the pattern and the transparent surfaces behind, avoids the wall curtain façade and simulates a diaphragm between the inner and outer treatment **(fig. 07)**. The structural mass becoming lighter in weight as it ascends allows for the illusion of natural growth. Finally, the concrete's greenish colour enhances the visual effect of continuity between building and surroundings **(fig. 08)**.

The design of articulations exhibits a delicate attachment between the pieces, leaving no room for brutalist interpretations **(fig. 09)**. As Adagio remarks, the building is part of a set of works completed during the 1960s, which coincide with a process of great development in the reinforced concrete industry in Argentina, and with an interest in prefabrication, combined with on-site, artisanal construction techniques[20]. Nonetheless, unlike other contemporary local works, the systematisation of the pieces, the construction process and the structural design do not explain the project's global concept, whose objective is not giving materials a central role. The dominating aspects, instead, are the effects of multiple reflections, a result of the shadows cast by the external structure towards the parallel surfaces of the rear glass walls enclosing the workshops, and towards the flat perpendicular planes formed by the front galleries, clad in a reddish smooth cement. The organicist conception we find in this design shifts the focus from figure to material, since here formal ideas are not limited to a figurative naturalistic analogy, but yield results of great haptic sensitivity. This orientation can be better understood if we consider that in Tedeschi's theory of architecture, architectural *form* is defined by a triad comprising the concepts of *space*, *plastics** and *scale*; wherein *plastics* contributes "the formal character of the constructed elements limiting space", not only owing to their geometrical properties, but also to material qualities, such as texture, light and colour, always serving a spatial purpose[21]. On the occasion of explaining the mushroom columns designed by Wright for the Johnson building, Tedeschi asserted:

> "[...] their relevance as technical facts is surely inferior to their relevance as plastic forms which determine an eminently new and rich special (sic) situation. This is not an invention which any construction could benefit from, as is fitting to a truly technical work; it is instead a unique piece, created with outstanding constructive mastery for a spatial purpose, and for a single building".[22]

The unique pieces of the building for the Faculty of Mendoza are its joints and the V-shaped supports, exclusively conceived and made on site for this project. The plasticity and lightness of the structural elements allow for a hybrid language –halfway between tectonic and textile– which evinces a concern over the deep interweaving of form, material and technique; yet without forgoing a necessary dose of abstraction, proper to the principles of a more orthodox modern architecture, unforgiving in the categorical determination of its volumetry and in the functional flexibility of its ground plan. However, the building's appearance as object is evaded; from a certain distance, its façade is perceived as part of the landscape, while its horizontal expansion is, depending on the observer's point of view, more or less recognisable **(fig. 10)**. This is in part due to the fact that volume is never discerned in its four sides, since two of them are dividing walls and, being clad in clay brick, emphasise the interruption of the network's continuity on both sides. In the vertical direction, on the other hand, the connection with the roof is solved in a softer way; despite the network being placed behind, from a certain distance it acquires continuity among the tiles and the tilted poles, for their thinness and bending closes its extremes concavely **(fig. 11)**.

The project was positively received in the critical assessment of the history of modern architecture in Argentina, because it is conversant with prevailing themes in the country's professional practice. However, it was conceptually anticipating not an idea, but a set of ideas on the subject which are quite current; as observed by Stan Allen, it works just like some architectural tendencies based on geological metaphors in the 21st century: they are open assemblages and porous envelopes whose iconic shape or defined contour is not as relevant as the relation they develop between different parts, and between inside and outside[23]. A landscape conception of architecture which, though with different features, Tedeschi himself had found in his travels around Cuzco, in Latin American baroque architectural culture[24].

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Images

01. Detail of conic pieces' juncture, joint, crossbeam and concrete slab. Fotography of the author, 2011.

02. Enrico Tedeschi. "Contemporary structure in architecture". *Nuestra Arquitectura*, 287, June 1953, p. 152.

03. Pier Luigi Nervi. Tests for the roof structure of the University Campus's Communal Centre in Tucumán, Argentina. 1948. Ciudad Universitaria de Tucumán, UNT, San Miguel de Tucumán, 1950, p. 31.

04. Eduardo Catalano. Structure design on a double-curved surface. Gazaneo, J.; Scarone, M., Eduardo Catalano, Instituto de Arte Americano e Investigaciones Estéticas (FADU-UBA), Buenos Aires, 1956, figure 40.

05. Enrico Tedeschi. Building for the Faculty of Architecture of the University of Mendoza, Mendoza, Argentina, 1960-64. Elevation 1:50. Archive: Universidad de Mendoza.

06. Enrico Tedeschi. Building for the Faculty of Architecture of the University of Mendoza, Mendoza, Argentina, 1960-64. *Architectural Review* 829, Mach, 1966, p. 170.

07. View from inside the entrance hall towards the garden. Fotography of the author, 2011.

08. Detail of conic pieces' juncture, joint, crossbeam and concrete slab. Fotography of the author, 2011.

09. Diagram of articulation of the structural elements. *Summa* 85, January, 1975, p. 73.

10. Distant view from the entrance to the front garden. The building's porous quality is highlighted by the illuminated interior. Teoría de la arquitectura, *Nueva Visión*, Buenos Aires, 1969, 2nd edition, figure 40.

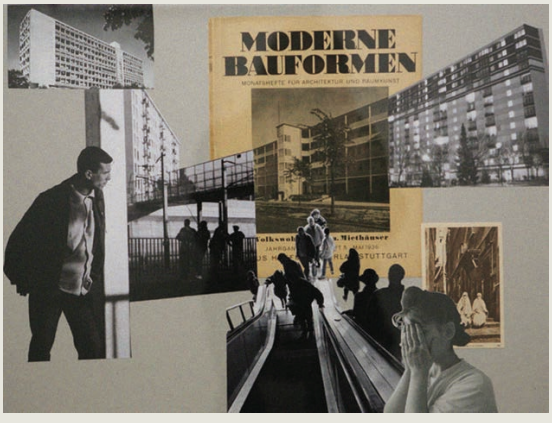
11. View of the structure towards the junction with the roof. Fotography of the author, 2011.

14

Rescatando la *machine à habiter*: la villa palladiana en la segunda vida de los *grands-ensembles* transformados de Lacaton y Vassal

Ana Tostões
Jaime Silva

A partir de algunas de las cuestiones planteadas en la llamada "Ontología orientada al material", como la Estética y ética de la sostenibilidad, este trabajo sostiene que la acción de reciclar viviendas sociales representa un modelo de regeneración social. En 1995, la galardonada película *La Haine* reveló al mundo el caos diario en el que vivían los habitantes de los *grands-ensembles* (viviendas sociales francesas de la posguerra): el desempleo, la criminalidad y la violencia eran algunos de sus compañeros habituales. Ante esta realidad incuestionable, el Estado responsabilizó rápidamente a los modelos urbanísticos y arquitectónicos, poniendo en marcha un ambicioso plan de demolición-reconstrucción que sigue vigente a día de hoy. Desde 2004, los arquitectos Anne Lacaton y Jean-Philippe Vassal se oponen activamente a esta política injustificada. Han demostrado, no solo mediante la literatura sino también a través de su obra, que los *grands-ensembles* merecen una segunda vida. Tomando como su principal "materia prima" el contexto ya construido, han rescatado sucesivamente la *machine à habiter* del movimiento moderno llevando los espacios de transición de la villa palladiana a cada uno de los apartamentos habitados.



París, año 1995. Un grupo de tres hombres jóvenes toman un tren al centro de la ciudad. Al amparo de una noche seductora, caen en una espiral de drogas, delincuencia y violencia, extendiendo una telaraña de agitación por los tranquilos barrios *bobo*[1] de París. Al amanecer, uno de ellos acaba siendo "accidentalmente" asesinado por un policía con prejuicios. Probablemente proceden de Chanteloup-les-Vignes, una ciudad satélite situada a las afueras de la capital francesa, construida para alojar viviendas sociales después de la Segunda Guerra Mundial. Colosales bloques residenciales

degradados, que como fortalezas opresoras dominan un paisaje sin servicios y albergan a familias pobres, la mayoría de ellas originarias de las antiguas colonias francesas. Los padres cobran un sueldo ínfimo, o incluso están desempleados, y sus hijos son abandonados al azar, sintiéndose completamente alienados de sus conciudadanos jóvenes. Un niño en una escuela de Chanteloup-les-Vignes no podría estar más desconectado de sus compañeros que estudian en las periferias de clase media colindantes, propias del más auténtico "sueño americano". Además de esta precariedad, las calles son peligrosos campos de batalla entre los locales y la policía. La tensión los acompaña día tras día. ¿Cómo podrían haber escapado estos tres jóvenes de un destino inevitable? *Jusqu'ici tout va bien*.

Este modesto informe nunca podrá igualar el poder de su origen, la increíble película en blanco y negro *La Haine* (1995), dirigida por el ingenioso Mathieu Kassovitz (1967). No obstante, permite atisbar la realidad que representa, definitivamente un paradigma de la vida, durante los años 90[2], en estos bloques de viviendas sociales dejados de la mano de Dios, conocidos como *grands-ensembles*[3]. Estas comunidades, mal consideradas por la opinión pública, eran cada vez más problemáticas debido a los altos niveles de desempleo, fracaso escolar, seguridad, criminalidad y violencia, entre otros[4]. ¿Acaso el gobierno francés ignoraba por completo una realidad tan innegable? Bueno, se podría decir que no, pero eso no significa tampoco que el problema se abordase de forma seria. En aquel momento, resultaba más sencillo encontrar un chivo expiatorio. Teniendo en cuenta la triste realidad de la creciente degradación, devaluación e incapacidad de los *grands-ensembles* –sin duda tres pilares importantes de la establecida "tierra de nadie", anónima y lentamente despojada de su orgullo comunitario–, el gobierno francés llegó a la conclusión de que la causa de todos los problemas sociales radicaba principalmente en su modelo urbanístico y arquitectónico, construido durante los días de gloria del movimiento moderno. Un modelo extremadamente nocivo cuya única solución era poner en marcha un ambicioso programa nacional de demolición-reconstrucción[5]. Para reactivar la vida de estas comunidades debían borrarse todos los recuerdos del pasado y erigir, en su lugar, un nuevo barrio de baja densidad totalmente irreconocible. Sin embargo, la radicalidad del programa estatal se apoyaba en dos supuestos implícitos de carácter cuestionable. El primero era que las políticas sociales aplicadas hasta entonces por los responsables políticos influían poco o nada en las problemáticas sociales que surgían en los *grands-ensembles*. Era más fácil ver el urbanismo y la arquitectura, que tienden a descuidarse por completo, como criaturas demoníacas capaces de causar terrores indescriptibles. El segundo era que el modelo urbanístico y arquitectónico de los *grands-ensembles* carecía de remedio. Ninguna transformación podría salvarlo.

A principios de los 2000, insatisfechos con la solución planteada por la nueva política, el dúo de arquitectos franceses Anne Lacaton (1955) y Jean Philippe Vassal (1954), junto con el arquitecto Frédéric Druot (1958), deciden ir en contra de la corriente establecida e investigar sin prejuicios las posibilidades de renacimiento que podría ofrecer este patrimonio[6]. En otras palabras, dar un paso atrás y analizar la validez del otro camino posible[7]. En lugar de considerar un escenario de destrucción total, ¿cuáles podrían ser los beneficios de trabajar con lo ya existente? Para ellos, al menos el segundo supuesto inherente al programa estatal era una completa falacia. Con financiación otorgada por el Ministerio de Cultura, elaboraron un estudio, posteriormente conocido como estudio *Plus* (2004), que no solo mostraba implícitamente que la mayoría de estos problemas no provenían de la mera responsabilidad de la arquitectura, sino que también presentaba un sólido conjunto de intervenciones transformadoras destinadas a revitalizar estas comunidades de manera más eficiente y económica[8]. El contenido de este estudio gozó de una acogida tan positiva que impulsó un debate a nivel nacional y europeo sobre el futuro de estos edificios[9]. Además, también sirvió como plataforma para divulgar sus ideas sobre esta cuestión, lo que les dio la oportunidad de analizarlas en un amplio número de proyectos construidos y no construidos, como la transformación de viviendas en Petit-Marroc, Saint-Nazaire (2004, Francia - no construido); el estudio para la transformación de viviendas en Arlequin, Grenoble (2010, Francia - no construido); la transformación del edificio Mail de Fontenay en La Courneuve (2010, Francia - no construido); la transformación de la torre de Bois-le-Prêtre en París (2005-2011, Francia, con Frédéric Druot); la transformación de una torre de apartamentos en La Chesnaie, Saint-Nazaire (2006-2014, Francia) y, por supuesto, el Premio Mies van der Rohe 2019, la transformación de 530 viviendas en Burdeos (2011-2016, Francia, con Frédéric Druot y Christophe Hutin).

En marzo de 2015, al término de una conferencia celebrada en Harvard, los arquitectos Anne Lacaton y Jean Philippe Vassal explicaron a los asistentes estos mismos proyectos de transformación a través de la siguiente observación:

> "Cuando vives en un bloque humilde, tu espacio está limitado por paredes con ventanas que miran al vacío. No son condiciones muy agradables para el día a día. Deberías poder vivir allí como si vivieras en una villa, incluso en un 10.º o un 15.º piso"[10].

¿Cómo puede ubicarse una villa en un edificio de gran altura? ¿Cómo se puede conectar un modelo rural y burgués con un contexto urbano y desfavorecido? ¿Cómo puede tomarse como referencia para la reanimación de un modelo del que es prácticamente antagónico? No solo la audiencia presente en la conferencia, sino también nosotros, leyendo más tarde este comentario en su transcripción publicada, nos quedamos intrigados[11]. Perplejos, abrimos intuitivamente *The four books on architecture* (1570)[12], de Andrea Palladio (1508-1580), y colocamos una de sus villas junto a una de las transformaciones de los arquitectos franceses. La conexión era incuestionable. Para nuestra sorpresa, estos dos casos, tan alejados en el tiempo, compartían una serie innegable de similitudes espaciales que nunca se habían estudiado. ¿Podría el éxito de estas transformaciones estar ligado a mecanismos arquitectónicos desarrollados hace casi cinco siglos?

A pesar de la relación aparentemente obvia, para comprender la conexión es necesario analizar primero los principales hilos que definen la metodología de Lacaton y Vassal en cualquier proyecto. Solo si se observa la base que sostiene su práctica se puede tomar conciencia de la actitud particular hacia los *grands-ensembles*. Es decir, solo sabiendo lo que buscan en un edificio determinado, más específicamente el tipo de producto arquitectónico deseado y el objetivo principal del que surge, se puede entender la conexión entre la villa palladiana y la transformación de los *grands-ensembles*.

MÁS ALLÁ DE LOS SÍMBOLOS: EL LUJO COMO UN PLACER

En cuanto al primer punto (el producto arquitectónico deseado), Lacaton y Vassal siempre buscan crear un edificio que pueda interpretarse como un "sistema de capacidad"[13]. Es decir, un grupo correlacionado de elementos arquitectónicos (un "sistema") que, como los componentes de un equipo informático, trabajen juntos para el logro de un único fin. Un fin que, en el caso de Lacaton y Vassal, y no del ordenador, por supuesto, tiene como objetivo una alta "capacidad" arquitectónica[14]. Si recordamos que el significado de "capacidad" está relacionado con la habilidad de contener algo, nos podemos dar cuenta de que Lacaton y Vassal desean simplemente un edificio que sea capaz de contener de forma eficiente y agradable la vida humana en sí misma, más allá de una respuesta elemental a cualquier programa. En otras palabras, para el dúo francés, un "sistema de capacidad" es un conjunto de elementos arquitectónicos interconectados que trabajan juntos para contener la vida de forma adecuada[15].

La Escuela de Arquitectura de Nantes (2003-2008) es un ejemplo eximio. Su generoso "sistema", definido por una estructura de hormigón resistente y espacialmente flexible, extraída de los aparcamientos **(fig. 02)**, establece una "capacidad" arquitectónica que, al igual que una navaja suiza, va más allá de las funciones clásicas de los expertos. Además de los puestos de trabajo previstos, se pueden organizar fácilmente conferencias, talleres, fiestas, construir una casa en el interior y conducir un coche hasta la azotea; infinidad de actividades diferentes pueden tener lugar bajo el mismo techo. Aquí apenas existen límites para la educación. Es una escuela, pero también es mucho más que eso. Es un "sistema" autónomo a su función original, no solo capaz de acomodar infinidad de usos no contemplados en el programa, sino también adaptable a las inevitables modificaciones programáticas a largo plazo, o incluso reemplazos, sin necesidad de intervenciones importantes[16].

¿Por qué Lacaton y Vassal querrían aportar más a un proyecto de lo que necesita esencialmente? ¿Por qué alguien se molestaría en ir más allá de lo que exige el programa? La respuesta radica en el segundo punto, el objetivo principal del que surge este deseo: el "lujo"[17], como lo han denominado con frecuencia.

Traducido del latín *luxuria*, derivado de *luxus*, el concepto de "lujo" proviene etimológicamente del término "exceso"[18]. Esto es, un excedente de lo estrictamente necesario para la supervivencia del hombre en la tierra. Sin embargo, debemos realizar en este punto una desambiguación. Para Lacaton y Vassal, esta comprensión elemental del excedente no está relacionada en modo alguno con el desarrollo que tomó en su supuesto contemporáneo y más prosaico. Es decir, no lo ven como una simple acumulación de materia (sustancia) de alto valor simbólico y económico. Un exceso, tal como han capturado las fotografías de Lauren Greenfield (1966) **(fig. 03)**, que se entiende como una afirmación de poder. No; para Lacaton y Vassal, el concepto de "lujo" es algo muy diferente. Para ellos, la idea de "lujo" está relacionada con un excedente que se toma no por su valor simbólico, sino por el impacto que la "capacidad" establecida por su organización "sistemática" puede provocar en el bienestar del usuario[19]. Y con esto, uno se refiere al trascendente "placer de habitar"[20] que suscita el libre uso de estos espacios generosos, con vistas agradables, transparencias y luminosidad, ambiente y comodidad. En resumen, como se percibe en la casa de Cap Ferret (1996-1998) **(fig. 04)**, el "placer de habitar" surgió de una alta "capacidad" arquitectónica.

MATERIAS PRIMAS

Por ahora, se podría argumentar que esto es una mera utopía. Naturalmente, cualquier buen arquitecto está interesado en proporcionar lo mejor a sus edificios y sus habitantes, pero no cuenta con el presupuesto necesario para hacerlo. El aumento que supondría en los gastos de construcción, cuando se compara con la oferta que uno suele recibir de cualquier arquitectura convencional, haría inviables estos deseos. ¿Cómo se alejaron Lacaton y Vassal del *statu quo*?

La sorprendente realidad es que encontraron una forma de darle la vuelta. Para materializar esta utopía de generosidad, cuyo objetivo es aportar "más" con el mismo presupuesto que cualquier construcción convencional, recurrieron a lo "no convencional". Es decir, para poder obtener los activos necesarios para proporcionar este excedente (el verdadero responsable del "lujo" deseado), Lacaton y Vassal no solo decidieron desarrollar y utilizar un conjunto muy preciso y eficaz de principios operativos, sino que también intercambiaron sin prejuicios la fuente de las materias primas arquitectónicas con las que trabajaron. Por un lado, se propusieron trabajar siempre centrándose en el rendimiento, la optimización, la sostenibilidad, la precisión y la economía. Por otro lado, empezaron a ver el contexto en el que intervenían como una fuente de materias primas gratuitas, pero de un valor incalculable[21]. Ya fuesen construidas, como en el caso del Palais de Tokyo (2001-2012) o no construidas; naturales, como la casa de Cap Ferret, o sociales, como la plaza Léon Aucoc (1996). Esta actitud explica por qué inician cada uno de sus proyectos no con la *tabula rasa* común, sino con un análisis minucioso de las problemáticas y del potencial latente encontrados en el contexto en el que intervienen[22].

Las materias primas y la forma en que se trabajan son sin duda dos puntos clave para explicar el éxito de la metodología aplicada por Lacaton y Vassal en los *grands-ensambles* franceses. Presentada por primera vez en 2004 a través del mencionado estudio *Plus*, elaborado junto con el arquitecto Frédéric Druot, fue su actitud pionera hacia este patrimonio particular la que desencadenó, por primera vez, un importante debate y una disputa por lo que parecía ser su futuro inevitable. Dado que las clases políticas consideraban que la pobreza, la criminalidad y la violencia eran consecuencia de estas grandes estructuras de viviendas, fueron en determinado momento el objetivo de un programa de demolición-reconstrucción. Sin embargo, durante lo que parecía ser un camino inevitable, el estudio elaborado por los tres arquitectos franceses arrojó luz sobre una opción alternativa. Demostraron que en lugar de aplicar una postura de demolición-reconstrucción, si se trataban los edificios existentes y a sus habitantes como parte de un "sistema de capacidad", se podía llegar a una solución no solo más eficiente, sino también menos costosa[23].

El estudio no tardaría mucho en dar sus primeros frutos. Tan solo un año más tarde, los tres arquitectos ganaron el concurso para la transformación de la torre de Bois-le-Prêtre y pudieron construir el primer ejemplo de un enfoque tan original. Esta torre de 96 apartamentos, construida entre 1959 y 1961, fue diseñada originalmente por el arquitecto francés Raymond Lopez (1904-1966), integrando un complejo residencial más grande (el *grand-ensemble* Porte Pouchet) situado en el centro de la ciudad de París, cerca de su límite norte, junto al Boulevard Périphérique[24]. El diseño de la torre se inspiró en un sofisticado modelo *immeuble-tour*, desarrollado por primera vez por Raymond Lopez y Eugène Beaudouin (1898-1983) para la exposición Interbau de 1957 de Berlín. Un modelo que ejemplificaba el paradigma que, en aquel momento, regía la construcción de las vivienda social colectiva francesa: la asociación entre una industrialización sin precedentes de la construcción con el detonante de la cultura arquitectónica del movimiento moderno[25]. Ambos adoptados para intentar reducir la importante crisis de alojamiento que se sufría entonces. En este edificio ejemplar no solo se aplicaron las medidas de racionalización y estandarización vinculadas al *existzminimum* para lograr la máxima comodidad con el mínimo uso del espacio [26], sino también el desarrollo de nuevas soluciones de construcción junto con la mejora de las metodologías de prefabricación y estandarización, constatadas no solo en su estructura de túnel en hormigón armado, sino también en su sistema de módulos de fachada ligeros, prefabricados y estandarizados, intercalados de forma aleatoria por pequeños balcones para lograr un ritmo similar al del "Super-Chess" de Paul Klee (1937)[27] **(figs. 05 y 06)**.

Lamentablemente, debido a la degradación provocada por el tiempo y el uso, esta rica base moderna se transfiguraría por completo mediante una recalificación aplicada en 1990 **(fig. 07)**. Su ciega búsqueda de una óptima insonorización y eficiencia térmica daría como resultado el revestimiento de este cuidadoso sistema de fachada con tablas de aislamiento amorfas y de colores vivos, que también conducen al cierre de los balcones originales[28]. Esta fue la realidad que se encontraron Druot, Lacaton y Vassal cuando, en 2005, comenzaron a trabajar en el proyecto de transformación de la torre. Como en los trabajos anteriores de Lacaton y Vassal, realizaron un análisis imparcial antes de tomar cualquier decisión relativa al proyecto. A partir de este análisis, identificaron como elementos con potencial su solidez constructiva; su minimalismo arquitectónico; su potencial de vistas y transparencias; el potencial de densificación de sus territorios circundantes no ocupados; y, sobre todo, el valor de la

intimidad y la personalización desarrollada en cada uno de las viviendas habitadas[29]. Asimismo, identificaron las siguientes problemáticas: el espacio reducido de los ambientes domésticos; su falta de conexión con el exterior, y el carácter monofuncional del edificio[30].

Estas son las "materias primas" que más tarde se tomarían como elementos principales para el desarrollo de la solución de transformación. Para el reprocesamiento, los arquitectos recurrirían entonces a tres grandes principios de modelación: conservación, reciclaje e incorporación. Desarrollarían el proyecto en primer lugar conservando todos los elementos beneficiosos ya presentes en el contexto; luego, reciclando todo lo perjudicial para conseguir un resultado favorable renovado, y por último, complementando (incorporando) los dos pasos anteriores con los nuevos "materiales" que faltaban para obtener el "lujo" deseado[31].

ANDREA PALLADIO: UNA LECTURA MÁS ALLÁ DE LA FORMA

Hagamos una pausa. ¿Qué tiene que ver todo esto con el interés inicial de Anne Lacaton y Jean Philippe Vassal de transformar cada una de las viviendas de los *grands-ensembles* en una agradable villa? ¿No parece que el vínculo es inexistente? Sorprendentemente, nada más lejos de la realidad, porque aún no hemos hablado del espacio que se "modela" con estas "materias primas", y, más aún, de cómo puede relacionarse con el "lujo" arquitectónico responsable del "placer de habitar". Aquí es donde la villa cobra protagonismo.

En realidad, la elección de este antiguo tipo de habitación como modelo para la transformación de la torre no es en absoluto fortuita. La ideología que respalda su *raison d'être* está compuesta por premisas muy similares a la interpretación de Lacaton y Vassal del término "lujo". En realidad, el propósito de construir una casa en el campo, que gracias a su proximidad a la naturaleza permite el descanso y la recreación del propietario burgués que desea escapar de la ajetreada e insalubre vida de la ciudad, tiene también como objetivo final el establecimiento del "placer de habitar"[32]. Un "placer de habitar" que no surge de la satisfacción de las necesidades domésticas básicas, o de lo contrario uno se habría quedado en su casa de la ciudad, sino de los encantos que brinda la naturaleza, o al menos su proximidad, tal como se describe en el "Concierto campestre" de Giorgione (1509). Esta ideología se ha mantenido casi inalterada a lo largo de los siglos desde que apareció por primera vez en el imperio romano[33], y probablemente su mayor explorador haya sido Andrea Palladio. Este puede ser el motivo por el que podamos encontrar un vínculo tan sólido con estas transformaciones de *grands-ensembles*.

Sin embargo, tomando como ejemplo la villa Foscari[34] **(fig. 08)**, este gran maestro parece situar el "placer de habitar" en la base de la ideología de la villa, no a través de la disposición del paisaje exterior, sino de la creación de espacios que funcionan como intermediarios entre los ambientes domésticos y la naturaleza. En otras palabras, explorando dos importantes espacios de transición ubicados en el *piano nobile*: el salón central y su posterior *loggia* de entrada[35]. Juntos definen un "sistema" que no solo permite la transición gradual entre el exterior y las cámaras privadas (ubicadas en las alas laterales), sino también en los diferentes niveles de esta transición, dos espacios complementarios, que por el alto potencial recreativo y relajante de sus características permiten, según el propio Palladio, los más diversos tipos de usos: la *loggia*[36], con su espacio exterior pero cubierto, que al mismo tiempo se abre a la brisa, los olores y los paisajes de la naturaleza; y el salón interior[37] **(fig. 09)**, con sus grandes dimensiones (cubre casi 1/3 de la superficie del *piano nobile*), su ambigüedad climática, su acceso a la mayoría de las habitaciones restantes y su apertura a los jardines y al paisaje. Son lugares para comer, leer, cantar, pintar, descansar, recibir a amigos o conocidos, dar un banquete, celebrar un baile, organizar un concierto, una boda o incluso un funeral, al mismo tiempo que se disfruta de la sombra, el sol, la lluvia, la brisa, las vistas, el olor de las flores y la protección de los árboles... Son un auténtico elemento polivalente de la vivienda que permiten a sus usuarios hacer lo que les plazca cuando quieran. Este es el placer de habitar vinculado a la villa, traducido mediante el "sistema de capacidad" orquestado por Palladio.

No es de extrañar que Lacaton y Vassal, algunos siglos después, mostrasen este mismo interés por la creación de espacios de transición en sus proyectos de viviendas individuales. Sin embargo, no debemos olvidar que la sociedad y las soluciones de construcción han cambiado radicalmente desde entonces y que, además, los clientes de Lacaton y Vassal, incluso para viviendas individuales, cuentan con recursos más modestos. Por ello, en uno de sus primeros proyectos, la casa Latapie (1991-1993), decidieron desarrollar un ambicioso espacio de transición a través de una solución muy original, que sentaría precedente para la mayoría de sus proyectos posteriores. De la mano de una pareja que tenía un terreno en los suburbios de Burdeos, en el que querían construir una casa prefabricada de 75 m^2, el dúo francés de arquitectos utilizó su ingenio para ofrecerles un espacio para soñar[38]. Lacaton y Vassal demostraron que con casi el mismo presupuesto podían construir una casa el doble de grande, de 180 m^2, y mucho más útil[39]. Para ello se valieron de un "sistema de capacidad" que los arquitectos denominaron "espacio doble"[40]. Consistía en duplicar las zonas domésticas reservadas a las funciones de habitabilidad elementales (salón, cocina, dormitorios y baños) mediante un "espacio extra" no programado[41] **(fig. 10)**. Un "espacio extra" que, al igual que los espacios de transición de una villa palladiana, podía utilizarse libre y alternativamente para la relajación o para las actividades de ocio más diversas; un espacio para el "placer de habitar".

¿Cuáles eran entonces los principios espaciales que, en el caso francés, le imprimirían su deseado carácter transitorio? En realidad, eran similares a los de Palladio: fluidez, transparencia, luminosidad, ambigüedad climática y libertad de uso. ¿Cómo podría construirse teniendo en cuenta las limitaciones económicas del cliente y el nuevo paradigma constructivo? Simplemente mirando fuera del cuadrado invisible. Cambiando el uso asociado a un objeto determinado, tal como el dadaísta Marcel Duchamp había hecho con su *ready-made* de *objects trouvés*[42]. Un urinario pasa a ser una fuente, un invernadero agrícola asequible se convierte en un jardín de invierno doméstico **(fig. 11)**. *Voilá!* Lacaton y Vassal vieron en estas estructuras utilitarias la luminosidad, la transparencia, la ambigüedad climática y la libertad de uso que buscaban para sus espacios de transición doméstica a un precio factible. Una verdadera navaja suiza de la vivienda, o más bien una navaja "francesa" de la vivienda, que sirviese para usos tan dispares como un salón multiusos o un voluptuoso jardín. En resumen: para lo que quisiesen los propietarios.

LA UTOPÍA AMERICANA HECHA REALIDAD

Todavía debemos responder a una pregunta final: ¿Cómo trasladaron, en la transformación de la torre de Bois-le-Prêtre, este modelo aislado y rural a un contexto aglomerado y urbano?

La respuesta está oculta en el utópico "teorema de 1909"[43] **(fig. 12)**, que más tarde fue abordado, muy probablemente sin conocer esta primera experiencia, por Le Corbusier a través de las *immeuble-villas* (1922). En este proyecto, inspirado por el cruce de su admiración por el monasterio de Ema, en Florencia, con los desarrollos arquitectónicos de su casa Citrohan (1920), el arquitecto suizo demostró que se podía trasladar el modelo de la villa al edificio de viviendas colectivas, "simplemente" superponiendo una sobre otra varias células habitacionales definidas por las características del modelo rural[44].

Fue la misma solución de traslado, es decir, apilar varias villas, al igual que Legos, una sobre otra, de la que más tarde se apropiarían para la transformación de la torre de Bois-le-Prêtre[45] **(fig. 13)**. Sin embargo, dado que los arquitectos franceses pretendían

preservar los apartamentos existentes, que no podían sustituirse por la solución de *tabula rasa* de Le Corbusier, recurrieron a un modelo diferente de célula habitacional: el "doble espacio" desarrollado originalmente en la casa Latapie. Si se toma la vivienda existente como la mitad elemental de este "sistema", solo hay que añadir su jardín de invierno complementario, ahora también unido por un pequeño balcón **(fig. 14)**. Algo que lograron fácilmente colocando una nueva estructura, casi como una segunda piel, alrededor de la fachada del edificio original: se apilaron a lo largo de las alturas del edificio en sus fachadas más grandes, orientadas al este y al oeste, módulos prefabricados de acero, cada uno con una base de 7x3 m (definiendo un jardín de invierno de 2 m de profundidad y un balcón de 1 m de profundidad), de acuerdo con la métrica de la estructura original[46].

De este modo, los jardines de invierno se encontraban entre dos líneas de ventanas correderas: una interior, de cristal, que sustituía a la antigua fachada y conectaba el jardín de invierno con la mayoría de las habitaciones de la vivienda, y otra exterior, de láminas de policarbonato corrugado y translúcido, que funcionaba como transición entre el jardín de invierno y el balcón. Estas dos líneas de ventanas encerraban un espacio que, como en la casa Latapie, funcionaba como un diafragma que se podía utilizar libremente **(fig. 15)**.

Al final, sin ser conscientes de las similitudes y sin haber tomado a Palladio como referencia directa para su trabajo, Lacaton y Vassal desarrollaron una solución que culminó en un sistema de relaciones espaciales y proporciones, aunque no verificadas a nivel geométrico, muy similar al *piano nobile* de la villa Foscari. En ambos casos, el corazón de la casa está definido por un espacio de amplias dimensiones, correspondiente a 1/3 de la superficie total, marcado por una cierta ambigüedad climática, que no solo sirve para acceder a la mayoría de las habitaciones restantes, sino que funciona como transición entre estas y el exterior **(fig. 16)**. Da a la *loggia* en la villa y al balcón en la transformación de la torre.

La analogía entre las viviendas transformadas y la villa Foscari acaba por atestiguar la existencia de un conjunto de características arquitectónicas que parecen tener una tendencia intemporal a responder de forma eficaz a las necesidades humanas psicológicas más primordiales asociadas al "placer de habitar". Además, también demuestra que es posible trasladarlas a un contexto urbano sin perder su significado. De este modo, nos lleva a considerar que la clave de la villa es el uso de los espacios que actúan como transición hacia el exterior, y no tanto el entorno circundante. No obstante, esto no significa que la importancia de la naturaleza desaparezca en el edificio. Como se puede comprobar en la transformación de la torre, la naturaleza sigue siendo una de sus principales influencias: en el aire fresco y en el sol que entran libremente por el jardín de invierno; en el silencio y en las impresionantes vistas que brinda la altura del edificio y, por último, pero no menos importante, en la inevitable contaminación de los balcones y jardines de invierno con los más variados tipos de plantas y flores, los mejores representantes de la propia naturaleza.

Por lo tanto, es una solución de transformación que demuestra que no todo está perdido en lo que respecta a los *grands-ensembles* franceses. Puede seguir siendo una materia prima útil y, sobre todo, muy sostenible. Comprende una serie de principios valiosos, planteados en el movimiento moderno, que solo deben completarse o readaptarse. Simplificándolo, podría decirse que la eficiencia funcional ya estaba más que establecida, y lo único que faltaba eran las características que nos distinguen a nosotros, los humanos, de las máquinas. Más que responder a las necesidades básicas para nuestra supervivencia, la *machine à habiter* del movimiento moderno aún carecía de las características que nos permiten "ser" en lugar de "permanecer". En otras palabras, las características que definen la base que nos puede brindar la capacidad de sentir el placer de habitar un espacio, de disfrutar de la vida. Algo que cobra más importancia cuando se tiene en cuenta que los habitantes de los *grands-ensembles* no cuentan con los medios para disfrutar habitualmente de los placeres de la clase media: ir a un restaurante, al cine, al teatro, a un concierto, a Disneyland o incluso de viaje al extranjero[47]. Por eso el "sistema de capacidad" desarrollado por Lacaton y Vassal mediante la incorporación del jardín de invierno y el balcón es un "lujo" tan valioso: uno puede crear su propio jardín, celebrar una gran cena o incluso una fiesta; jugar libremente con sus hijos o crear su propio refugio utilizando el mismo espacio. Para estas personas, su casa es quizás la herramienta más preciada de la que disponen para ser felices. Una herramienta que, al final, no necesitaba ser reemplazada, sino reparada.

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Notas

01. Abreviatura de la expresión francesa *bourgeois bohème*. Su traducción literal es "bohemio burgués" y se utiliza normalmente para designar a parte de los parisinos residentes en el centro de la ciudad: gente rica y culta que lleva una vida bohemia y de espíritu libre.

02. Lamentablemente, como denuncia la galardonada película *Les Misérables* (2019), dirigida por Ladj Ly (1978), esta realidad sigue definiendo profundamente estos barrios.

03. Inmensos complejos residenciales normalmente situados en los suburbios (*banlieue*) de los grandes centros urbanos. En Francia, la mayor parte de esta arquitectura fue construida y administrada por un grupo de instituciones públicas, cada una de ellas responsable de una ciudad, después de la Segunda Guerra Mundial, denominadas Offices publics d'habitation à loyer modéré (OPHLM).

04. Para entender mejor la problemática asociada a estos barrios, véase el Anexo 1 de la ley francesa n. 2003-710, del 1 de agosto de 2003. – *Loi n. 2003-710 du 1er août 2003 d'orientation et de programmation pour la ville et la rénovation urbaine*, [en línea], [Consult. 7 dic. 2018], disponible en https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000428979&categorieLien=id.

05. *Programme national de rénovation urbaine* (PNRU), traducido como Programa nacional de renovación urbana, aplicado a través de la ley francesa n. 2003-710, del 1 de agosto de 2003. Tanto el PNRU como su sustituto, el *Noveau programme national de renouvellement urbain* (NPNRU), traducido como Nuevo programa nacional de renovación urbana, implementado en 2014, están gestionados por la Agence nationale pour la rénovation urbaine (ANRU), o Agencia nacional para la renovación urbana, creada para este fin por la mencionada ley. – Ibid.

06. Como complemento al presente estudio, que se centra únicamente en el papel desempeñado por Lacaton y Vassal, también sería necesario un estudio adicional que pudiese arrojar algo de luz sobre la práctica de Frédéric Druot y su consecuente influencia en el desarrollo de las intervenciones en los *grands-ensembles* analizadas.

07. Para entender mejor la temática de cómo tratar de forma contemporánea el patrimonio de vivienda social del movimiento moderno, véase: TOSTÕES, Ana, "Modern Built Heritage Conservation Policies: How to Keep Authenticity and Emotion in the Age of Digital Culture", *Built Heritage*, 2018, vol. 2, n. 2, pp. 17-34; TOSTÕES, Ana and KECHENG, Liu (eds.), *Docomomo International 1988-2012: Key Papers in Modern Architectural Heritage Conservation*, China Architecture & Building Press, Beijing, 2012.

08. Estudio que en 2007 sería publicado por Gustavo Gili con una introducción escrita por Ilka y Andreas Ruby. – DRUOT, Frédéric, LACATON, Anne y VASSAL, Jean-Philippe, *Plus*, Gustavo Gili, Barcelona, 2007.

09. El estudio llegaría a tener un enorme impacto en el cambio de opinión sobre el futuro de este patrimonio, lo que tendría diferentes consecuencias en el ámbito de la construcción en toda Europa, ejemplificadas por el proceso de rehabilitación del complejo de Lignon (construido originalmente entre 1963 y 1971), en Ginebra. Para obtener más información sobre este caso en particular, véase: GRAF, Franz y MARINO, Giulia, "Modern and Green: Heritage, Energy, Economy", *Docomomo Journal*, 2011, n. 44, pp. 24-31.

10. LACATON, Anne y VASSAL, Jean-Philippe, *Freedom of use*, Harvard University Graduate School of Design/Sternberg Press, Cambridge Mass/Berlim, 2015, p. 51.

11. La transcripción de la conferencia de 2015, celebrada en Harvard, fue publicada ese mismo año por Harvard University Graduate School of Design/Sternberg Press en un libro llamado *Freedom of Use*. Ibid.

12. PALLADIO, Andrea, *The four books on architecture* [*I Quattro Libri dell'Architettura*], The MIT Press, Cambridge/London, 1997 [1570].

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02. Anne Lacaton y Jean Philippe Vassal, School of Architecture (2003-2008), Nantes. Plano a nivel +19,45 m y sección longitudinal.

03. Lauren Greenfield, Ilona at home with her daughter Michelle, 4 (2012).

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09. Andrea Palladio, villa Foscari (c.1555), Malcontenta. Hall.

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16. Arriba: Andrea Palladio, villa Foscari (c.1555), Malcontenta. Plano del piano nobile. Abajo: Frédéric Druot, Anne Lacaton y Jean-Philippe Vassal, transformación de la torre Bois-le-Prêtre (2005-2011), París.