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SANTIAGO DE FRANCISCO VELA AND CAMILO AYALA-GARCIA
Universidad de Los Andes, Colombia

Émotions à la carte: Exploring emotional paradoxes through edible DIY-Materials for product design¹

ABSTRACT

The exploration of emotions has become a fundamental aspect of product design. Researchers in the design field have proposed approaches to Materials Experience that supports emotional exploration. The following article aims to demonstrate how, by experimenting with edible Do-It-Yourself-Materials, designers can tackle a deeper conceptualization of product development. A methodology is proposed to explore emotions through different design techniques with the use of edible materials. Three projects are analysed to understand the different opportunities to use these types of materials to create emotional, tangible experiences. This exercise sets a scenario for product designers interested in using emotions through edible material experimentation and achieving a more meaningful product development, by including emotional design in the project.

KEYWORDS

emotional paradoxes
edible DIY-Materials
product design
positive design
materials for design

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INTRODUCTION

The available research on emotions is grounded on appraisal theories that explore the effects of emotions on cognitive processes and persuasive behaviours for marketing purposes (Bagozzi et al. 1999). Exploration of emotion in design research has evolved in parallel, giving great insights to design practice. Crossley (2003) explains that in order to design with emotions, designers need to understand how relations are built between users and products. Understanding people's perception towards experiences is key to good design. If designers want to understand those perceptions, they need to start to comprehend emotions. Different multidimensional models on affect (Watson and Tellegen 1985; Russell 1997; Russell and Mehrabian 1977) and empirical studies on the psychology of emotions (Edell and Burke 1987; Holbrook and Batra 1987; Oliver 1994) have been used to measure and determine how people can be attracted to and be persuaded by advertisements. On a similar line of thought, design researchers have been using emotions to measure and evaluate human-product interaction (Desmet 2012; Fokkinga and Desmet 2013; Yoon et al. 2016) and food design (Akiyoshi and Costa 2012; Desmet and Schifferstein 2008) in order to gain insights into how users perceive emotions. All of these studies present strategies by which to create design that at once uses emotions, is made for emotions and in turn affects emotions. This article presents an exploration of methods and dynamics connected with food to enrich the use of emotions in product design.

The food design subject presented in this article is part of academic research, which aims to investigate different mediums that stimulate the understanding of emotions. The academic setting explores design approaches, such as food, spaces, artefacts and technology, as mediums to imprint awareness into the teaching of emotions. The first approach utilizes food as a medium in which participants explore edible ingredients in order to conceptualize and materialize emotions, and then turn them into experiential objects. The second approach utilizes artefacts as a medium in which participants embed emotions through formal and functional configurations that expand the significance of the artefact. The third approach utilizes spaces as a medium in which participants transform emotions into different habitable environments according to the activities related to each emotion. The latter approach utilizes technology as the medium in which participants construct positive experiences through behaviours, such as improving the experience of saving money by turning it into a reflective practice (de Francisco Vela et al. 2014; de Francisco Vela and Casais 2018).

The results presented are part of an academic commitment to expanding knowledge in the area of design and emotions in the School of Design at the University of Los Andes. The results presented aim to encourage design students and future designers to use emotions as a design driver. The use of emotional paradoxes and storytelling as design tools shows that it is possible

to break down the meaning of emotions in the early stages of a project and apply those insights to the final intervention.

When it comes to design inspired by emotions, the different emotional processes involved in the creation and use of objects are in an embryonal stage of study (Cupchik 1999). According to Rognoli and Levi (2011), the senses can be stimulated through the conscious use of materials in a product. Users perceive products based on the qualities that materials embed within the object. Materials are one of the most determining features that affect the product experience. Materials have the power to foster meaningful experiences by shaping what we perceive, feel, think and do. This concept is known as Materials Experience (Karana et al. 2014). According to scholars, Materials Experiences are experiences that people have with and through the materials that constitute a product.

This article presents an academic exercise as the first approach of this research where emotions are experienced through the use of materials – specifically edible Do-It-Yourself-Materials (DIY-Materials), to design a product. Three out of nine projects were selected to show the process of exploration and conceptualization, in which participants can express physically and tangibly the emotions of experiential objects. This exercise attempts to demonstrate the potential of food as a material in the process of conceptualizing emotions and designing products.

METHODOLOGY

Materials and emotions

The use of materials to stimulate emotions has been used in the past (Wick 2000; Ostuzzi et al. 2011; Rognoli 2010) and is considered the means from which emotions get their physical form as materials. Also, the physical properties of materials embed a series of sensorial qualities that allow the user to feel different sensations while interacting with them (Karana 2009; Rognoli 2010). Stimulating the senses through materials to spark emotions is critical, as the designer gains control of the different qualities of the material and provides experiential alternatives to what is commonly produced in the market. Examples of this are DIY-Materials.

The DIY movement is expanding beyond products to include the materials from which the products are made. Designers around the globe are engaging in different experimental journeys that encircle the materials development field before developing their own projects. The design process includes the phase in which the material is developed, and this phase influences the whole creative pathway. Self-made material sources are providing designers with a unique tool to develop new languages and new products with original and fresh Materials Experiences (Rognoli et al. 2015). This DIY-Materials theory is grounded in the development of a code system and categorization, with a set of rules to organize information around this particular class of materials (Ayala-Garcia 2019). It is composed in a language that allows seeing everything that surrounds it from an alternative perspective. Living in a world of matter, everything we can touch, smell, see, hear and taste creates our lives. With this DIY-Materials theory in hand, it is possible to use food as a material with specific experiential qualities that highlight emotions that could be turned into products.

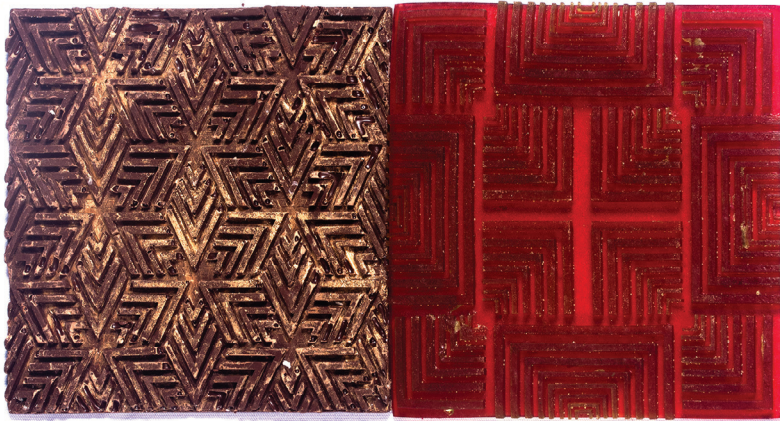


Figure 1: Chocolate and jelly tiles composition that shows the contrast between chocolate (brittle) and jelly (elastic).

Food recipes inspired by emotions

The course is built upon a previous academic experience where students conceptualized emotions to design food interventions. Most of the interventions were recipes, but some of them got to the point of edible products. An edible product is an object made of food ingredients that has a function beyond being edible. ‘Complexity in simplicity’ by Gustavo Lozano Cárdenas as an example is a project using chocolate tiles, created with geometrical patterns inspired by the respect paid to precolonial ancestors. The tiles explore different configurations of patterns, but also different uses of chocolate (Figure 1). Projects like this one inspired the latest editions in which we included the DIY-Materials theory as a tool to allow conscious interaction with edible matter in order to draw attention to particular emotions. Based on previous experience, the course was divided into four main parts. In the first part, participants were stimulated to create emotional paradoxes combining a positive emotion with a negative one. In the second phase, they explored those emotional paradoxes through digital media and visual tools to create a design concept. The third part comprised the experimentation and tinkering phase, where the design students got engaged with the physical materiality of edible food. Finally, they developed an emotional experience through edible food.

The course started with a categorization of three possible tracks to explore emotions and food. The tracks were edible objects, multisensorial recipes and upcycling of ingredients. Each team was free to choose one of the tracks and explore them using the following parts proposed in the course.

THE FOUR PARTS OF THE METHODOLOGY

Part one: The emotional paradoxes

Paradoxes are contradictions in terms. The Greek root of the word etymologically means ‘counter-opinion’. Paradoxes are not logical contradictions, but are instead riddles that ask people about a possibility where the truth in a moral universe lies in tension between two contraries (Arvatu and Aberdein 2015).

According to Sainsbury (2009), paradoxes can be fun. In several cases, they are easy to propose and spark an immediate provocation and attempt to solve them. Paradoxes can also be serious. Paradoxes tend to raise serious problems. History has shown that some paradoxes are associated with crises of thought and revolutionary advances.

We used paradoxes to spark creativity, grounded on the studies of Fokkinga and Desmet (2012) that posit the use of negative emotions to enrich experiences. An example of the use of emotional paradoxes is the collection of products designed by Ferrari (2013) called *Darker Shades of Joy*. The first one, called *Mr Piggy*, is an imbalanced piggy bank that breaks when it is full. The paradox behind it is 'the excitement of distress'. The second one, called *Dot.*, is a connect-the-dots-puzzle calendar that reveals the figure at the end of the month. The paradox behind this is 'the enjoyable frustration of delay'. The third one, called *Alla Goccia*, is a set of shot glasses that one has to drink in order to put the glass down. The paradox behind this is 'the fun side of annoyance'.

Similarly, during the course, participants selected positive and negative emotions randomly. They could present the paradox using a combination of emotions. For example, if the emotions were fascination and anger, the paradox could be 'the fascination of anger' or 'the anger of fascination'. In both cases, the exploration would bring the students to design concepts to develop a product according to the tracks proposed by the course. The concept arises from the abstraction of the paradoxes, a vehicle to propose how emotions can be sparked through physical means.

Part two: Visual communication of emotional intentions

The exploration of the paradoxes was meant to be broad. The first exploration exercise was to tell a story about the paradox. Each team had to create a conceptual universe around the emotions and define the narrative line of it. The importance of this story lies in the creation of an understanding of the proposed emotions (Erickson 1996), consequently identifying an inflexion point of climax, in which a plot is revealed according to the paradox. The teams started with a 500-word story and had to reduce them to 250 words to end up with a 100-word story. The reason behind this was to cut out the washers and highlight the essence of the emotions. Once the stories were reduced to their essence, participants started exploring the visual and aesthetic universe of the proposed emotions. First, they created bidimensional mood boards (Lucero 2012) that recreated a punctual part of the story. In the iterations of those mood boards, some teams created three-dimensional mood board models, to start experimenting with materials. Others decided to make the mood boards interactive by adding layers of images and creating multiple compositions. The next exploration was the creation of 30-second videos that embedded the conceptual essence of the story within the aesthetic universe of the mood boards (for the playlist of three concept videos, see <https://youtu.be/VZ7tO3gB160>). In this process, participants iterated the stories, mood boards and videos to come up with ideas that could be used for the experimentation and material tinkering phase.

Part three: Experimentation and material tinkering

With a strong concept in hand, which can reflect a pathway towards an emotional intention, teams started to experiment with physical matter. In this

Stuffed Cup

Idea explanation

- What is it?: An amaretto cocktail cup made of a solidified liquid like water, sugar or caramel.
- What is the expected experience?: Feel the fragility when making a decision.
- What shape does it have?: A shape susceptible to break.

Relation to the paradox

- What elements are taken from the story?: At the end of the story, the main character is faced with a decision that breaks the balance of the story. Any decision that he can make has a negative outcome in the end, but he has to make one.

How it is going to be developed

- What is needed for building it?: Mould or a process to mould the liquid that will turn into a cup.
 - Where it is going to be validated?: Test if people are willing to drink from the cup or will wait until it melts and mixes with the amaretto.
 - What will be the process to follow?: Definition of the ingredients: Water to make an ice cup, caramel or sugar and test stability, durability and usability.
-

Table 1: Ideation template – Example of a concept for the confusion of desire ideation.

phase, they had to get hands-on with the materials. For inspiration, a creative session with the participants allowed for an exploration of different characteristics of the concepts. For instance, they had to think about the smell, taste, texture, form and sound of the concept. Furthermore, they had to make a list of food recipes that were aligned with the concept, followed by the ingredients that were more suitable for the experimentation. In this phase, material tinkering processes (Parisi et al. 2017; Parisi and Rognoli 2017; Maccagnan and Pollini 2017) are crucial. In the physical tinkering process, the teams gained knowledge of the material by understanding its behaviour and capabilities.

The results of the explorations allowed the teams to focus on three ideas to start the development stages. Those ideas are listed in a template (Table 1). From that point onwards, the teams experimented and combined different food ingredients to give shape to their ideas. Some had to explore moulding and shape giving; others explored how to improve the physical characteristics of certain materials, while others still explored the aesthetic aspects, together with the functionality. Every tinkering iteration phase was characterized by a maturation of the material samples, combined with the challenge of maintaining coherence with the emotional paradox and design concept. The guidance of the material created in the previous phase was crucial. In the end, the teams presented their final ideal for approval to start designing the final pieces, which will become part of a final exhibition.

Part four: Food as material to spark emotions

Once participants had defined their idea, they started the production and detailing of the pieces. For this part, the teams needed to decide on specific ingredients to explore what matched their ideas. Iteration was focused on stabilizing the functionality of the ingredient as a material. The teams had to come up with ways to design special moulds or specific production processes for their products. For every iteration, teams had to check and reflect if the outcomes of the detailing were aligned with the paradoxes. For the detailing

and adjustment of the ingredients as materials, the teams had two weeks before the final exhibition. In the end, they had to expose their projects in an open exhibition and ensure that the audience could interact with the objects or recipes that they had created.

The four steps of the method allow a designer to translate an emotional intent into physical means. By following each step, designers can creatively produce physical ideas with the aid of matter, where depending on the confronting paradoxes of a specific emotion, sensorial intentions may emerge. In the results, we aim to expose how this approach can open the possibilities to use materials to sensitize designers in the process of creating a project. Tangibilization of ingredients through edible DIY-Materials also allowed participants to explore multiple sensorial dimensions that are not usually explored by designers, such as smell or taste, complementing the usual sensorial dimensions of texture and appearance.

RESULTS

During the course, it was possible to see how the different participants understood not only the capabilities a designer has to materialize emotions, but also how relevant it is for the design field to work towards a more conscious exploitation of human emotions to create meaningful experiences. During the four phases explained above, the different participants were accompanied in a process of knowledge of emotions and became aware of the importance those emotions represent when they are highlighted with visual and physical tools. From a total of nine projects (Table 2), the three most significant for this article were selected; the ones that during the four stages were able to develop a conscious design of emotions through DIY-Materials. Also, the projects where participants expressed physical and tangible emotions with experiential objects.

Project one: Multilayered edible wrapping package – The anger of fascination

This project was developed by María Paula Ramírez Jaramillo and Alejandra Arenas Durán, second-year design students.

Wrapping packages are creating particular disgust among people due to the use of plastics instead of keeping the natural skin of certain fruits and vegetables. Examples of peeled bananas wrapped in stretched film are making people rethink their behaviour when buying this type of product that does not need to have additional packaging. Superfluous wrappers are the result presented as a multilayered edible wrapping package made of bioplastics that can be torn to reach the product annoyingly, or it can simply be eaten.

The team wanted to emphasize the paradox by exploring different ways to create covering layers to materialize the annoyance of unwrapping something without reaching it (Figure 2). The ‘anger of fascination’ is that impulsive curiosity that drives people crazy and cannot be stopped until the wrapper is removed.

During the material exploration, the team tried three different calibres of wrapping that could replace the film. For the experimentation, they wrapped different fruits such as apples, kiwis, mangos, strawberries and pears, preserving their texture, consistency, flavour, temperature and colour. These experiments were later served as finger food in the final exhibition. These kinds of

Emotions				Materialization			
Positive emotion	Negative emotion	Paradox	Explanation of paradox	Concept filtering	Track(s)	Ingredients	Results
Courage	Annoyance	The annoyance of courage	Feeling of having to deal with something even though one does not want to	Disgusting but pleasant textures	Edible objects or objects made of food	Aloe vera, ginger, beetroot, orange peel, chamomile	Ornament of facial beauty
Desire	Confusion	The confusion of desire	Feeling of not knowing what decision to make	Cocktail drinking experience	Edible objects or objects made of food	Caramel	Caramel glass for amaretto sour
Dreaminess	Distrust	The distrust of daydreaming	Feeling of not being able to distinguish between reality and fiction	Surrealist meal	Multisensorial recipe	Smoothies	Experiential illusion of a last blended supper
Enchantment	Embarrassment	The enchantment of disgrace	Feeling of being useless and empty while being hopeful	Materiality exploration	Upcycling of ingredients	Pineapple + avocado, mango + guava, passion fruit + avocado + vanilla	Temperature-resistant fruit textile
Fascination	Anger	The anger of fascination	Feeling of curiosity for finding out something without doing it	Annoying package	Edible objects or objects made of food	Collagen, isinglass	Multilayered edible wrapping package for fruits
Love	Sadness	A sad love	Feeling of an unpleasant ending	Bittersweet food	Multisensorial recipe	Flavoured ice and cake	Disastrous dessert
Lust	Envy	The envy of lust	Feeling of frantically falling in love with oneself	Ostentatious desire	Edible objects or objects made of food	Isomalt, caramel, chocolate	Edible jewellery and lingerie
Pride	Shame	Proudly shameful	Feeling of deterioration despite the beauty	Decorative functionality	Upcycling of ingredients	Red beans, flour, collagen	Statue bird food
Worship	Shock	Shocked worship	Feeling of oblivion and the ephemeral character of life	Rituals for coping with love grief	Multisensorial recipe	Tortillas, tequila, salt, lemon, chilli	Interactive installation of food preparation

Table 2: Table of emotional paradoxes and results.



Figure 2: Stills from the video that shows how Superfluous Wrapping works. (See video here: <https://youtu.be/jhqfjAkC-bk>.)

packages can redefine the experience of packaging food, but also create new food showcases.

Project two: Statue bird food – Proudly shameful

This project was developed by Sara Ávila Quintero and Laura Fernández Cardona, third-year design students.

Statues are ornamental objects that represent human or animal figures. They are landmarks that symbolize and pay homage to historical figures or events. Statues are perceived as static elements that provide shelter to different kinds of animals, such as small birds and pigeons. The Bird Food Statue is the result presented as an alternative use for statues that could also be used to feed animals. The more the animal eats it, the more it reveals the hidden face of the statue.

The team wanted to emphasize the paradox by exploring statues as silent witnesses of situations that happen regularly. The aesthetic of the sculptures embeds the intention to highlight the characteristics of shame and pride. ‘Proudly shameful’ represents the two faces of statues. The outside one brings hope and joy, while the one on the inside carries fear and despair.

During the material exploration, the team worked with kidney beans, splitting the skin from the legume. They created two kidney bean materials, to be used as a moulding material for the statue. With the skin, they created the inside of the statue shaped like a devil. This part was inedible for pigeons. With the pulp, they created the outside, which was shaped like an angel (Figure 3). This part was intended to be used as food for the pigeons. While the pigeons were eating the outside part, the one that brought hope and joy, they were simultaneously revealing the shameful side.

The Bird Food Statue was placed in Bolivar Square in Bogotá and was devoured by the pigeons that inhabit the place. This kind of intervention can propose a new alternative to dealing with animal feeding.



Figure 3: The shape of the angel expressed the hopeful and joyful part of the statue.

Project three: Caramel glass for amaretto sour – The confusion of desire

This project was developed by Luis Felipe Ortiz Gallego and María Paula Pabón Forero, third-year design students.

Experience in food design is essential, especially for venues and events. Eating and drinking are beyond the mere activity of alimentation and present multiple scenarios to create artefacts that can mix with the food. *Caramel glass for amaretto sour* is the result presented as a container that is also a mixer for a cocktail.

The team wanted to emphasize the paradox by exploring the decision-making moment of drinking an alcoholic drink that gets stronger as time passes, and it mixes with the glass. The 'confusion of desire' depicts the entanglement that someone has to endure when having to make a tricky decision that always has a downside.

During the material exploration, the team worked with solid ingredients, which could be transformed into liquid and back into solid again. Inspired by *Shaping Sugar*, a project that uses sugar to create glasses (Desnoyers 2013), they used caramel, a derivative of sugar, to mould cups (Figure 4). During the process, they researched the proper combination of ingredients for a cocktail and experimented with the amount of caramel and the way it would mix with the beverage. Commensals could have their drink without waiting for the caramel to blend, could wait for a stronger caramel-flavoured drink or could bite the cup to create a different experimentation of the flavours. Also, there was the chance that the cup could dissolve completely, and the commensal would have ended without the drink.

The caramel glass was used to make a toast on the day of the exhibition. Most of the guests had the chance to experience the amaretto sour sweetened with the caramel glass and had to choose when to drink it or eat it.



Figure 4: Process of the caramel glass with different composition of caramel (Left). Final cup filled with Amaretto (Right).

DISCUSSION

The presented academic-based research aims to develop within one of the four approaches in the research of design inspired by emotions in the School of Design of the University of Los Andes. In these approaches, we present the exploration of alternative tools to sensitize students to express emotions and design for and with them. It is one of the possible pathways in which design and emotion can meet, particularly in this case, by the use of edible self-made materials as the medium. The exercise fostered participants to explore multiple ways to translate emotions into stories, concepts, ideas, materials and experiential objects. The primary input was the use of paradoxes as a creative starting point. Forcing the relation of two emotions encourages participants to go beyond the simple definition of the emotions, creating connections that gave way to more in-depth approaches.

Paradoxes were not the only novel approach. Having to evaluate the paradox through edible DIY-Materials as the medium enabled participants to have new perspectives on the topic of understanding emotions in design. For instance, stories helped in identifying the *raison d'être* of the emotional combinations. The process started with describing, depurating and extracting these elements that were later used to build-up the design concept. Another powerful exploration was the elaboration of the aesthetical universe. With a defined narrative, participants imagined how their stories were staged. The aesthetical universe was bonded to the paradox, so if the *raison d'être* of the paradox implied a sense of torment, the looks of the aesthetic displayed that sensation. It is a way to connect the paradox to the design concept. Each exploration was a step up the ladder towards conceptualizing and narrowing down the possibilities to end up experimenting with specific edible materials. One of the main concerns of giving them the chance to pick common edible DIY-Materials before the explorations was that participants would go for the obvious materials, denying the opportunity to understand those ingredients,

beyond the common. For example, love is mostly related to sweet things; however, if one explores the sad part of love, a bittersweet feeling starts to arise.

As seen in the previous examples, each group selected materials that were far from common sense and explored emotions and perceptions with an in-depth examination of sensorial qualities. When DIY-Materials are used as the medium to convert emotions into physical sensations, it is possible to materialize those emotions.

The 'anger of fascination' encountered in biopolymers the possibility to relieve stress by tearing apart layers; the 'proudly shameful' encounter with kidney beans shows how temporary sculptures can become food for animals; and finally, the 'confusion of desire' encounters in caramel the possibility to explore multiple ways of tasting and enjoying a drink.

CONCLUSIONS

It is no mystery to anyone that emotions are a fundamental part of human interactions and, therefore, by including them within the design processes, they can provide great value. Bagozzi et al. (1999) explored the role of emotions in marketing. They highlighted a couple of areas that imply future research on that topic. Nevertheless, marketing is not the only area where emotions can be applied. Following Desmet and Schifferstein's (2008) studies in the food industry, Desmet's (2012) exploration on positive emotions, Rognoli (2010) who expands the universe regarding materiality and Ayala-Garcia (2015) who studies the uses of food as a medium to explore and understand industrial manufacturing processes, this research builds on emotions through edible materials as a tool for design. To use emotions as an input to design, there is a need for an exceptional understanding of the emotions, especially because emotions do not happen in a void. Using materials to foster this exploration, and to help students and future designers grasp the importance of the use of emotions as input to design interventions. The exercise showed that for each case, the exploration is personal and depends on the context given or defined. One great tool was the creation of stories, even though they added new variables. Stories allowed the teams to focus on the elements of the emotions that most appealed to them. Even though the stories are open and subjective, they also help to convey ideas (Erickson 1996). There are many ways to use emotions in design, but the exploration with edible DIY-Materials helped expand the universe of conventional ideas and take designers to a level of experimentation in which they could use their capacities at their full potential. The projects presented were able to exceed in exploring new formal configurations, functionalities and meanings applied to the experiential objects. Creating an edible wrapping material for storing food, a statue to feed animals or a cup that serves as a drink holder and mixer, are all evidence of a profound conceptualization of the emotions and not a superficial application.

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CONTRIBUTOR DETAILS

Santiago de Francisco Vela is a designer and professor in the School of Design at the University of Los Andes in Bogotá, Colombia. He has been working in the field of emotions and positive design fostering emotional experiences and positive behaviours through product design. His areas of interest involve design for well-being, financial and social innovation, and behavioural design. He has collaborated with the Delft Institute of Positive Design. He is currently developing a research project aimed at creating bio-currencies for transition ecosystems based on farmers' well-being in the Amazonian Piedmont.

Contact: Faculty of Architecture and Design, Universidad de los Andes, Cra. 1 N° 18A – 12, Bogotá, 111711, Colombia.
E-mail: s.defrancisco@uniandes.edu.co

 <https://orcid.org/0000-0002-3927-7926>

Camilo Ayala-Garcia obtained his Ph.D. degree on the topic of Do-It-Yourself-Materials as triggers of change at Politecnico di Milano. He began his professional career in Colombia back in 2001, where he earned experience in the product design field developing several projects for renowned local and international clients. He started to divide his time between being a tutor at Domus Academy and working for some years as a product designer for Donegani & Lauda studio and Cammarata Gioielli, both in Milan. He devotes his research to the development of local materials and products, with several patents granted as well as various published academic contributions.

Contact: Faculty of Architecture and Design, Universidad de Los Andes, Cra. 1 N° 18A – 12, Bogotá, 111711, Colombia.
E-mail: c.ayala954@uniandes.edu.co

 <https://orcid.org/0000-0001-6679-0605>

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