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Objects in the Familiar: Systemic contexts of production

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Objects in the Familiar: Systemic contexts of production

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The importance of systems thinking is often emphasised in the context of current global challenges, but the discussion around systemic interrelationships can often have an abstract and inaccessible feel. This paper starts as an invitation to have a discussion around concepts related to systems thinking in a more accessible setting. It does this by bringing ideas around systemic perspectives into an embodied mode while exploring the design process of a familiar artefact, i.e., biscuits. The familiarity with the process frees the designer-researcher to focus on the interrelationships and wider considerations in the process of conceptualisation and production. This then offers a way to easily access the notion of complexity and introduces complementary ideas around visually mapping relationships. The paper visually traces the internal dialogue inherent in creating biscuits as edible design objects and also as products of a process. In doing so, it helps contextualise the ways in which designers design objects that take part in systems and, in turn, the ways systems often influence how the product is produced. The intermingling of design and research modes is used as a reflexive learning opportunity following a developmental approach and has synergies with Research through Design (RtD). Practice, research, and visual documentation bring to light the presence of a set of pre-acquired, dynamic yet blurry knowledge constructs that seem to be part of implicit processes of negotiation and selection, which I call *pre-sets.*

Pre-sets consist of both explicit and implicit knowledge constructs that influence choice-making in variable proportions in the design process. While significant research was conducted on materials and methods during the process, final decisions included knowledge constructs that were present before this research. Pre-sets seem to be combinations of preconceptions, previously gained practical and conceptual knowledge, and previous lived experience that can be continually changed or modified due to various factors. They are present throughout the conceptualisation process, can guide experience and interaction with various systemic levels, and are operationalised in varying degrees through the process of designing. Since the object needed to be produced in certain ways that satisfied notions of sustainability, which in themselves are changing, the exploration also lays out the negotiation and tensions present in creating sustainability-oriented products.

Keywords: systemic thinking, design process, production, sustainability, visual approaches, pre-sets, research through design, RtD, developmental approach, democratising design, design in the everyday, food design

RSD: Cases & Practice, Economics & Organizations, Methods & Methodology

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Introduction: design in process

It is often hard to confront the sustainability crisis in a practical way, as the discussion around systemic interrelationships can seem abstract and inaccessible. In crisis mode, the talk is centred around “the end of the world,” but many people are more concerned with “the end of the month,” and the network of modern systems can take on an abstract feel (Chomsky & Pollin, 2020). Focusing on products and services alone can become problematic when the socio-material micro-contexts of these new products or services are not considered (Ilstedt & Wangel, 2013).

Systemic perspectives are often perceived as abstract because they emphasise information sets and relationships. This paper invites you to consider that one can also adopt a mode of being systemic in practice by embodying the principles. This paper first

introduces the concept of designing a familiar artefact in an everyday setting to increase accessibility and interest. It then introduces visually complementary ideas around mapping relationships, which enable the notion of complexity to be accessed more easily.

An everyday setting

A room with various implements required to produce food. It is equipped with specific outlets for waste disposal and energy use.

> *I wiped my hands on the apron and surveyed the kitchen table with growing dismay. The tabletop overflowed with flour, butter, pencils, paper, corn, coffee, seaweed, and potato peel. On top of it all, my laptop was precariously perched and trying to hold its own. I was trying to conceptualise a 'sustainable biscuit' while making it and recording the process at the same time. I had to remind myself that this was just my kitchen. While making biscuits with some conceptual sustainability underpinning, this was but an insignificant task in the vast complex entanglement of the world. A world that now requires us to make numerous choices about diverse ways of living. These choices need to not only respond to the current situation of unsustainability but also aspire to be flexible and desirable over time.*

In the everyday, food is routinely made and consumed and cooks rarely refer to their food as design. However, research into everyday practices or ways of doing has been accepted as designerly, especially when design artefacts are understood as intervening in everyday practices (Neubauer, 2022) and involve using particular methods and tools in communities. These design activities take place in mundane daily routines and can include cooking, textile design, traditional clothing, and carpet production (Hillgren et al., 2011) and can be called "bottom-up" (Manzini, 2014).

Questioning what constitutes ways of doing and their intersections in particularities of practice have led interaction designers to explore the implications of human-food interaction (Comber et al., 2012). In pedagogy, a new approach to culinary education in the New Zealand tertiary sector recognises knowledge as being constructed by the learners in ways that allow it to be meaningful to them and relevant to the design problem they are solving (Woodhouse & Mitchell, 2018).

Just as art can form part of everyday life and can be developmental in nature, Ingold sees design as a collective achievement, as part of designing environments for life. “Design, in this sense, does not transform the world. It is rather part of the world’s transforming itself” (Gatt & Ingold, 2013, p.146). For this exploration, I use the process of designing sustainable biscuits as a reflection of my interest in sustainability and seek to visually unravel complex choice-making in the design process to show the operationalisation of certain kinds of knowledge that I conceptualise as pre-sets.

I also use the process as a reflexive learning opportunity to illuminate the pathways of learning that follow a developmental approach. This approach is characterised by an interest in the human capacity to create and innovate rather than in achieving specified competencies. It also underlines knowledge acquisition through practice where the researcher can be a generator, a self-observer, an observer of others and a co-researcher (Attia & Edge, 2017). The approach also has synergies with Research through Design (RtD), a view of design research that takes “pride in its aptitude for exploring and speculating, particularising, and diversifying, (..) its ability to manifest the results in the form of new, conceptually rich artefacts” rather than move towards convergence and standardisation (Gaver, 2012). Here, I argue that not only do we learn from this process of practice, but we also operationalise previously learnt knowledge during this process. Glanville (2006) explains this as an addition of observations or evidence that we collect through living and building an understanding, which is then tested through practice in a process of confirmation and enrichment. I started this design project as a vehicle to explore the nuances in trying to apply systemic thinking to practice. The visual documentation I used to capture the process and thinking helped me reflect on different mapping techniques and how they connect with my creative process. When I discussed this project with others, both the familiarity of the object and the visual layouts showing the systemic questioning pattern were well received, and the visuals seemed to increase the understanding and willingness of the audience to connect to the idea of thinking systemically.

A developmental consequence arising from both the product design and the research process was my observation of pre-sets, a set of imprecise pre-acquired knowledge constructs that place human biases in friction with analytic thought and bring up questions around who is designing and their mindset towards sustainability. The act of drawing out my thinking while making the object was also a mechanism that helped tease out other implicit systemic processes of knowledge application that were in play.

Biscuits as objects

> Crumbly, crispy, snap …
> To dip or not to dip.

I started as a researcher with a practitioner background, looking for practical and approachable ways to explore the complexity surrounding sustainability. I decided to use a brief that was part of the master's curriculum in Sustainable Design at the University of Brighton[1] and decided to adapt the boundary conditions to suit my query. I had the practice of making biscuits regularly, and my familiarity with the product fulfilled the criteria of making the exploration accessible. The learning opportunity as a researcher started with my intention to connect biscuit-making to sustainability and then in tracing how I negotiated the options that emerged from taking certain directions. The simplicity and familiarity of the product were a deliberate choice, as was the visual presentation and explanation of the process. These were originally hand-drawn and went through changes, adjustments and re-draws in the process of making, reflecting the observation that designers tend to have conversations with the self to deal with complex situations via the medium of drawing (Glanville, 2007). The visual representations also succinctly convey the apparent choices and the complexity of simultaneously zooming in and out through levels of thinking and making.

[1] In the program, the brief is a preparatory exercise for students to help develop their own model of sustainable design, later used in the futures module. Students are asked to "present their project in the form of a biscuit," asking them to consider how their topic could be conceived through the making and consumption of a biscuit.

I first present the reflexive design process in stages, the product as an outcome of a process, the design of which involves implicit systemic recognition during the conceptualisation stage.

Figure 1 illustrates some of the different ways I explored the concept of making a biscuit. There were questions about the traditional meaning of a biscuit as an object and my view of the biscuit that is coloured by where I live. When does a biscuit become a biscuit? Does it need a form? Perhaps the most sustainable biscuit is a conceptual biscuit, as the acquisition of a material form involves consumption for production. The questions of how sustainability can be incorporated into the process and enable acknowledgement of certain innate ethical and practical boundaries brought up more layers of complexity. I questioned my preconceptions and explored the notion of materials versus ingredients. I wrestled with the more practical aspects of the effort, time, and budget.

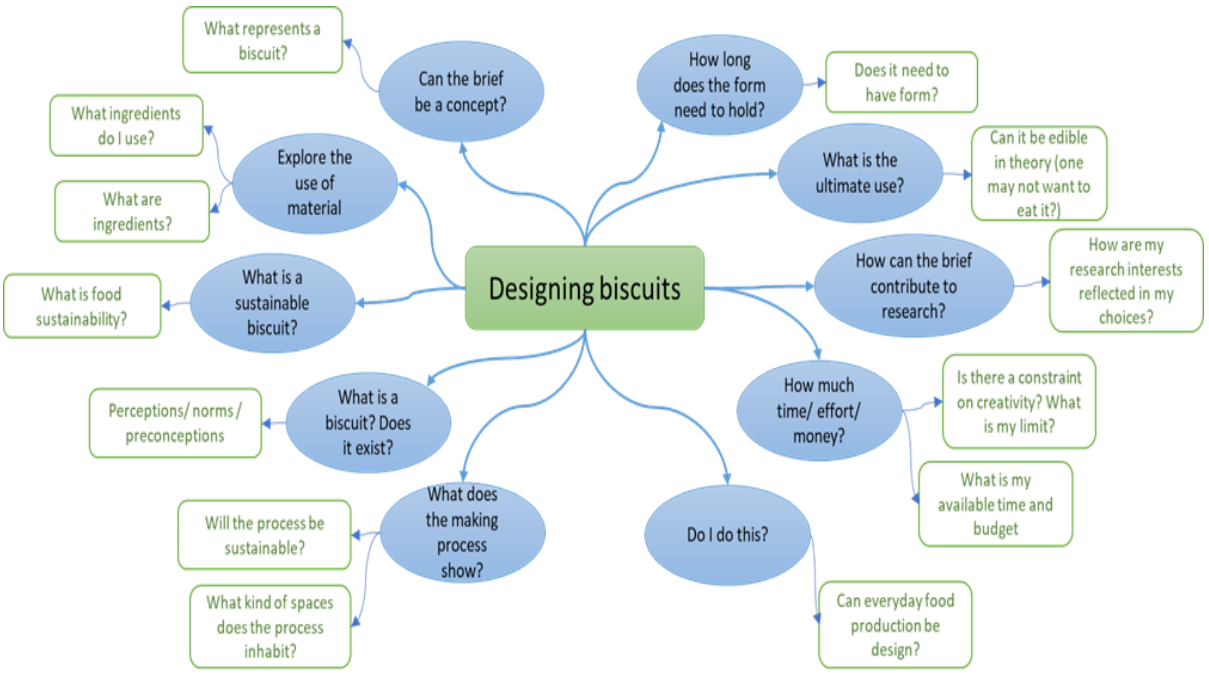

Figure 1. Initial Explorations.

The presentation style is influenced by mind maps, where the attempt is to illustrate ideas and to present the directions of intent and evaluated actions. This is, of course, based on memory and previous knowledge structures, which, when organised, help communicate them, and the process leads to further meaningful learning and knowledge construction (Willis & Miertschin, 2006). The project, at this point, was conceptual. Often the conceptual part of design is described as problem-solving, and one common strategy is to break it up or decompose it. Explicit problem-decomposing strategies are described (Ho, 2001) as important factors in design efficiency, but they rarely tend to acknowledge the implicit knowledge that is required to decompose a problem explicitly. This overlooking of implicit knowledge can hinder the process of designing for sustainability. Reflecting on the biscuit brief, even before the design of the biscuit itself could be explored, one needed to know what a biscuit was and how it was produced before questioning what it means to design one sustainably. Producing a biscuit or even engaging with the concept of a biscuit was more micro-level as an individual design. Yet, as an object[2], the biscuit might live in the macro-level context of cultural understanding. Questioning it conceptually also places it in a macro context. My goal was to explore the material mode of systemic thinking, so I chose to incorporate form. However, the sustainability boundary condition, along with the material considerations, meant that the process I knew in advance would need constant evaluation. Making drastic changes in the production process could challenge the structure's integrity. Once I had a conceptual idea for my physical object, I needed to work out the materials needed and keeping in mind sustainability intentions, I needed to explore the systems that gave me access to them.

[2] Glanville defines Objects as self-referential systems or self-observers for participation in the Universe and having two roles of both being self-observing and self-observed. They can be ‘thought of as a conceivable and is not necessarily a physical’ (Glanville, 1980). However, for this paper, I use the term ‘object’ as being more closely aligned to artefacts.

Producing biscuits

What do I come from?
Where do I go?

After deciding to create a physical biscuit, I found myself creating a linked but peripheral picture of the activities of the systems that needed to be in place to conduct the production activity. These included activities like material acquisition, processing, and disposal that are structural and depend on other systems that impact sustainability. I visualised my thinking for this part of the design process through hand-drawing inspired by rich pictures. (Figure 2).

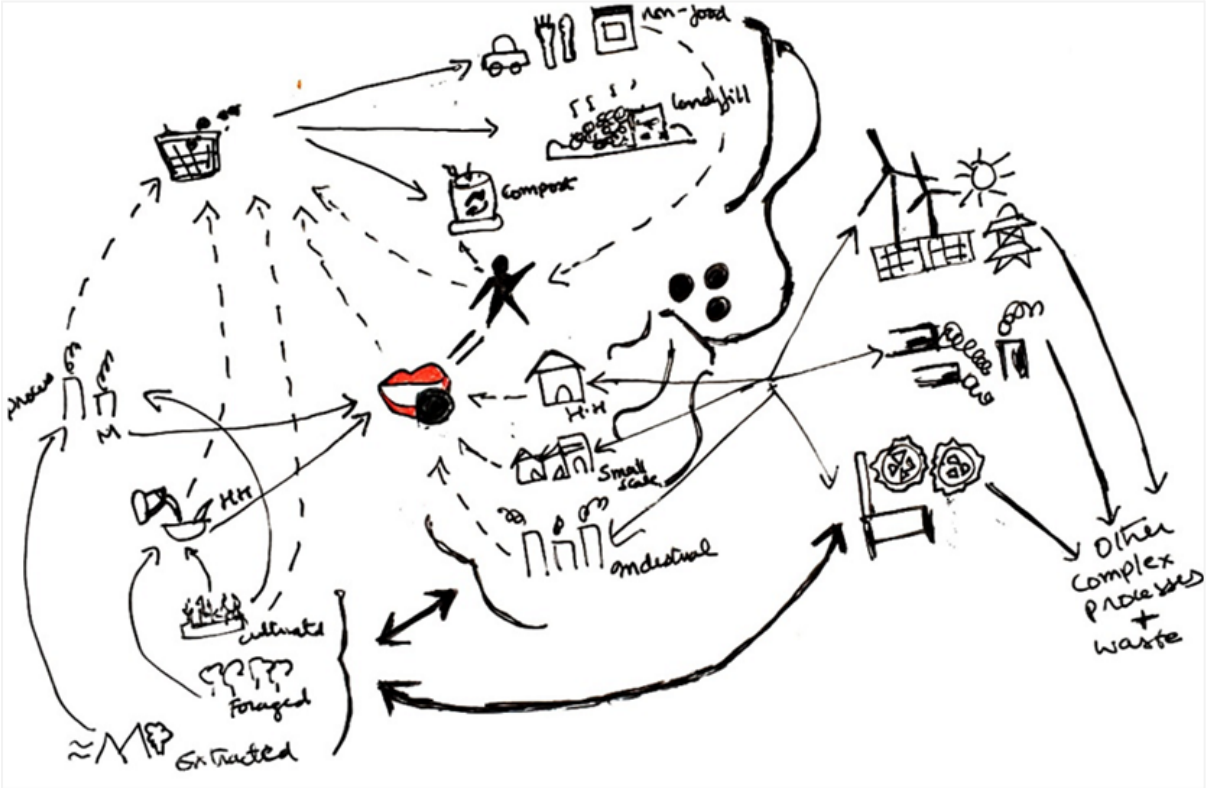

Figure 2. Pictures.

When trying to represent the linkages that affected my design activity, the practicalities of the design situation became much more apparent as I sought to visualise them and record them physically. They became more real, and the focus was heightened. This helped me further explore the connections and acknowledge the complexity of sourcing, processing, and waste management. The problem very quickly became multi-layered. There was an implicit understanding that I was designing the biscuit in an individual sense, as a micro project, but as I worked through the process, the biscuit was an entity that could be seen in a more industrial macro sense of supply chains, production techniques and global sourcing of raw materials to name a few.

While some design actions followed a particular intention, others were based on what was already available or known. In practice, it was clearer that while, on the one hand, the designer designs an object that will take part in the system, the system, in turn, can influence and direct the way in which the object is produced. The practice of using the visual in research "unravels, disturbs and connects with processes, embodied practices and technologies" (Rose & Tolia-Kelly, 2012, p.3) and gives us a sense of the complicated processes and connections in a micro sense that would increase in complexity when scaled up. I now had both a concept and a contextual placement of the systems surrounding the object. The next step was to place it in a process of production.

Object to product

Working with the concept and choosing the final form attributes included selecting the basic raw materials and a space to create that form. This space needed the right set-up and the capability to allow the form-making experiments to occur. Issues around structural integrity, taste, texture, and presentation needed to be addressed before arriving at what form I thought could be "good enough." The decision process is mapped in figure 3. The map considers the factors that came into play and shows that one decision opened the need for many more decisions in materials, techniques, spaces, and presentation. These then led to further choices and adjustments. As I reflected on the materials and the process, I acknowledged that my prior experience with certain ingredients, their material applications, the making process, and my preferences had an impact on the direction of the research.

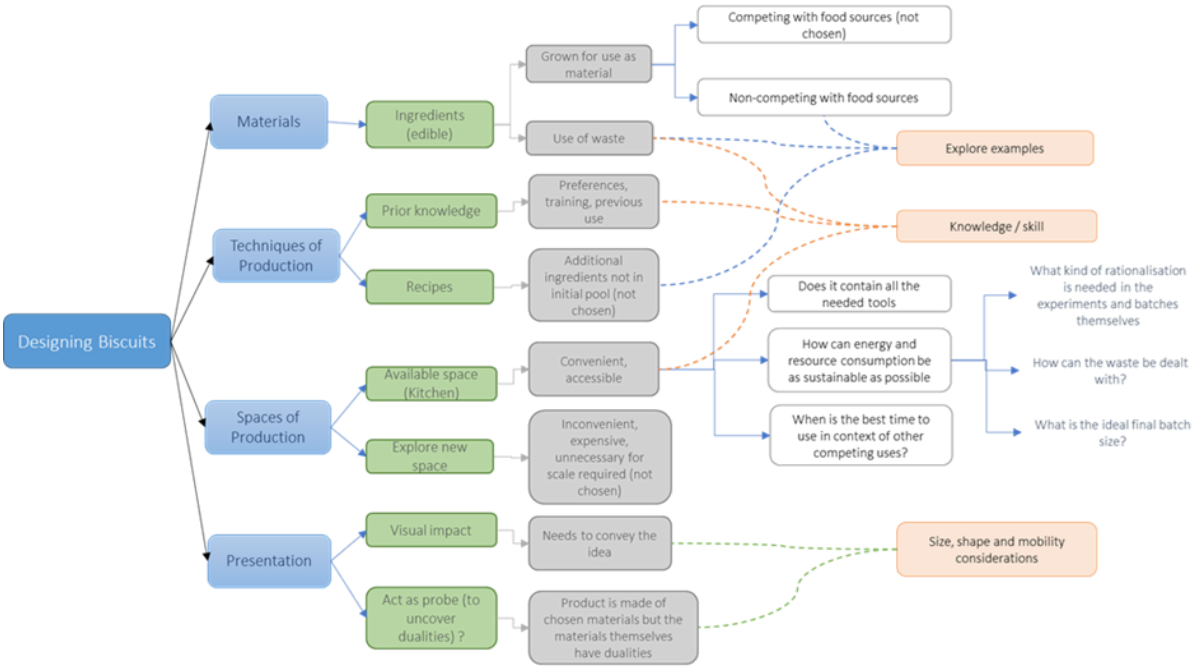

Figure 3. The make.

The techniques, combinations and proportions did not follow any pre-configured recipes due to my familiarity with them. One condition I set for myself was to work with ingredients that are also considered sustainable material substitutes. These included corn, potatoes, pineapple, and seaweed. I was conscious that these ingredients are part of the food supply and alternative use for them as materials could result in a detrimental impact on other systems and processes, like food scarcity or an unprecedented rise in the price of staple foods for certain communities. For example, in the case of biofuels, the sub-optimisation of biofuels is both a threat to bio-diversity due to monoculture crops and also has an unwanted price impact based on competition with food supply (Runge, 2014). While I had set a definite micro goal of making a biscuit, the considerations that the process required often meant I was moving across different levels of various sub-systems, contextualising the biscuit as an object with certain boundary conditions, and making decisions across them even when the actual product did not look complex.

Much of the conceptual activity had a basis in questioning my response to the nature and form of the biscuit and how the ingredients/materials worked with each other. To reflect this, I made a conscious choice to represent the conceptual deconstruction as a visual in the final output using photograms of the materials along with the baked biscuits (Figure 4).

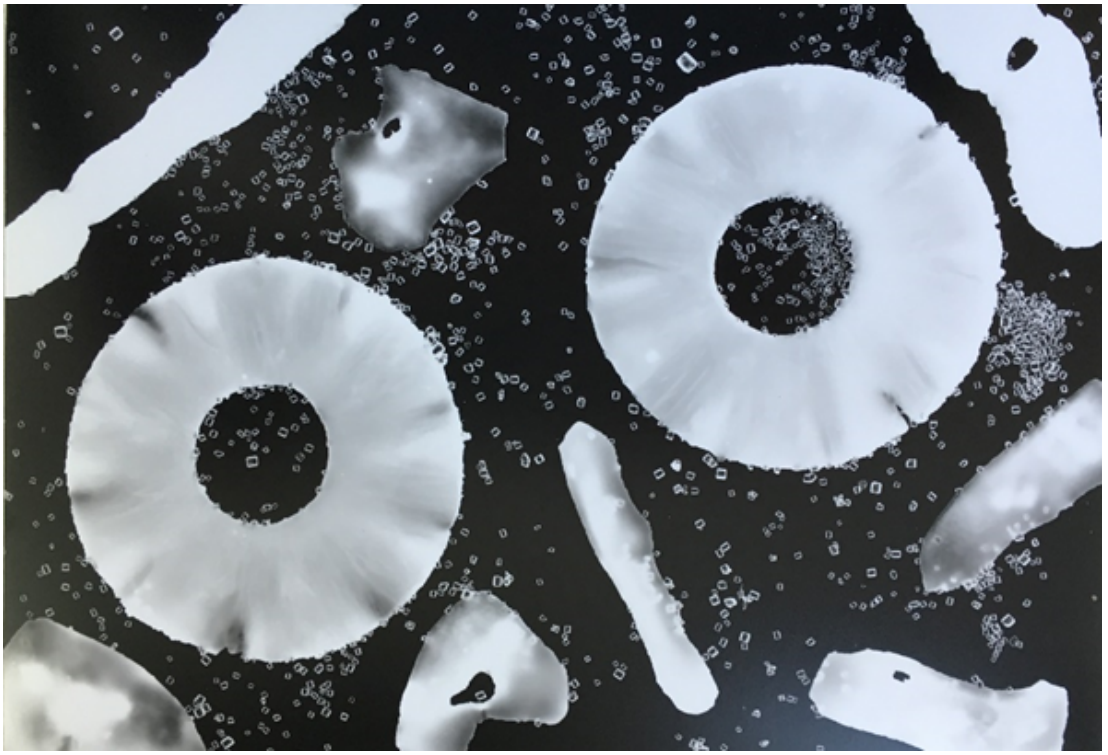

Figure 4. A photogram representing the materials.

Different visual elements were used in this exploration, depending on the design process stage and the nature of the query in progress. I started with a diagram that was spread out to show the knowledge structure around the problem before making some choices. This was then explored through hand-drawing a picture that helped unpack more of the complexities and make system-level connections. Once these were acknowledged, the practical making process was visualised as a more hierarchical diagrammatic representation of a decision-making process. Finally, the aesthetics and

as an element of a gentle probe to incite thinking on the nature of so-called sustainable materials, the title *Ingredients to materials, a matter of perspective* was chosen, and deconstructed photograms were included.

The biscuits were edible and shared with a group of sustainability researchers. However, while they incited a lot of curiosity, they were not deemed tasty or tempting. While I deliberately did not set myself the added goal of 'tasty', this is another challenge for the sustainable designer. To be a success, not only must the design be sustainable, but it must also be desirable in the view of the recipient.

Negotiating decision-making and visually tracing the internal dialogue inherent in creating biscuits as edible objects and as products of a process further helped explore the design process itself by making the material networks visible. These further contextualised ways in which design and research are part of systemic interrelations and where designed objects become part of systems that influence their design and production. This practice of researching through designing helped uncover the presence of pre-acquired knowledge, which was applied in implicit processes of negotiation. I will now conceptualise this as pre-sets.

Conceptualising pre-sets

> I know, but how?
> Do I know? and why?

Working towards sustainability is an ongoing systemic challenge, it defies simple definitions and is often time-dependent and based on available information. The biscuit was a useful tool to visually explore the process and context of decision-making, where the artefact is placed in an investigative and deliberate design process. The use of previous knowledge in a seemingly intuitive way and its impact on making connections and decision-making emerged as a key part of the exploration. While materials choice with respect to biscuit-making and some of the factors that influenced these choices were researched, decisions included knowledge constructs that went beyond the specific acquisition of information or knowledge during the current design process. The actual selection also required a pre-conditioning and an understanding of the selection criteria within context, in the sense that it was necessary to have sensitivity to the

existence of differences in this field in order to recognise the differences in the first place (Goodbun & Sweeting, 2021). This sensitivity is the result of pre-exposure to the contextual matters that surround sustainability, materials, designing, and systems. Using the terms "tacit" and "propositional knowledge," Niedderer (2007) discusses that there is an implicit prioritisation of propositional or explicit knowledge over tacit knowledge due to the language-based mode of propositional knowledge. Certain kinds of formats of knowledge associated with practice, also called practical, experiential, personal, or tacit knowledge, that evade verbal articulation also play an essential role in the ability to excel in practice as well as in research (Niedderer, 2007).

I argue that design processes, particularly in the context of sustainability, operationalise both pre-acquired propositional and tacit knowledge already present in varying proportions – I call these knowledge constructs *pre-sets.* Pre-sets are also different from design fixation, which is a premature commitment to a particular problem solution and occurs in the traditional sense where designers rely on everyday knowledge (Purcell et al., 1994). Pre-sets are sets of knowledge that are a combination of implicit and explicit pre-conceptions, previously gained practical and conceptual knowledge, and previous lived experience that is operationalised during the design process in conjunction with situational explicit learning and application mechanisms.

Pre-sets seem to involve some amount of adaptiveness and could involve the active construction of viable understanding (Glasersfeld, 1998). Their presence can be blurry in the sense that while they get operationalised, the extent of involvement is variable, and they can be unconscious or tacit. While external constraints might be more concrete, the fit in terms of internal constraints of what is a "fit," or in this case sustainable, is very much variable due to the complexity and gaps in understanding if and how we know.

The intermingling of pre-sets with current knowledge acquisition and its varying levels of influence during choice-making came up at different points during the biscuit design process – and sometimes were noticed after the choice had been made. For instance, while I conducted significant research into materials like corn, seaweed and potatoes that were specific to my project in the sense that they were edible and yet had acquired some sustainability credentials as materials, the knowledge that there were such materials in existence was part of my pre-set. The biscuit-making process, the

decision-making on proportions and even the selection of space and methods, although researched specifically for the project, already had a head-start due to the presence of knowledge constructs acquired before this project. However, in some areas, I chose to go against my instinctive choices deliberately and instead do more research. Pre-sets can hence also be seen as combinations of pre-conceptions, previously gained practical and conceptual knowledge and previous lived experience that, when identified, can perhaps be diluted. These pre-sets were present throughout the conceptualisation process. They guided experience and interaction with various systemic factors and were operationalised through design.

If we see the operationalising of knowledge constructs as an embodied sense of relative place as in the French sociologist Pierre Bourdieu's development of the concept of Habitus, then the web of complex processes that links the physical, the social and the mental (Hillier & Rooksby, 2005) gives rise to questions around privilege and bias. This is because the concept of habitus can be seen as a mechanism of naturalising or a "mechanism through which the principles of social organisation are embodied such that humans are capable of spontaneously generating an infinite array of appropriate actions" (Noble & Watkins, 2003). However, in sustainability, "appropriateness" is often in question as well. Habitus is criticised as static by some (Noble & Watkins, 2003), and others argue for habitus to be regarded as an adaptive construct (Hillier & Rooksby, 2005). While there are definite linkages between the two, more embodied research will need to be done to tease out the differences, as habitus has mostly been conceptualised and applied in the sense of identity and in the reflexive sense of a person's understanding of self as relative to the web. The identification of pre-sets was initiated by the application of systemic thinking on an object as an embodied practice towards developing a sustainable product. So, while the habitus of a sustainable designer can be adopted, the pre-set is also operationalised to varying degrees during the process of design rather than just seen as part of the designer's identity. Design briefs do not always link to designer identity, especially in a more open participatory sense of design. Pre-sets can be modified actively or passively and continually – and might change with every experience, expression, or embodiment. A very small change in a particular pre-set could affect, for instance, a particular material choice or a production choice. However, it may not have a major impact on the identity of the

designer. This idea of pre-sets needs further investigation due to its complex nature, which combines both propositional and tacit pre-acquired knowledge in ways that are both dynamic and blurred. Every pre-set is likely to be different with different proportionalities of operationalisation. The way they change, the nature of the change and perhaps even the openness to change can also be further influenced by numerous other factors, including culture, ideology, conscious and unconscious knowledge, availability, observation, schooling, childhood experiences, exposure to a variety of influences and many other factors. Perhaps certain elements can also be consciously or even unconsciously suppressed. Dusch, Crilly and Moultrie discuss that, according to McLennan (2004), the action of designing is always informed by the mindset of the person conducting the design activity. So designing for sustainability should perhaps not be understood just as a design discipline (e.g. graphic or industrial design); it should instead be seen as an underlying notion with the potential to inform all design activities (Dusch et al., 2010).

Conclusion and considerations

Acknowledging that one of the challenges towards designing sustainably is the perception of systemic thinking as abstract and inaccessible, this paper introduces the concept of designing a biscuit to trace the adoption of a mode of thinking systemically in practice. It introduces visuals to offer up a way to access the notion of complexity more easily and introduces complementary ideas around ways of mapping relationships.

The paper documents how the processes of researching and designing, as well as visually recording and questioning, make material networks even more visible and help contextualise systemic interrelations. Designed objects become part of systems that, in turn, influence their design and production. This integrated and embodied method helped uncover the presence of a set of pre-acquired, dynamic, and yet blurry knowledge constructs that seem to be part of implicit processes of negotiation and selection. These are conceptualised as pre-sets. This paper is an effort to find a way to develop a systemic sensibility through material practices and contributes to the literature focussed on addressing the grand challenges of sustainability and inclusion.

However, this paper is a single instance of a process recorded and shared. Repeating this might change the choices and open other insights. Dynamic learning and repeated cycles of experimentation might mean the modification of selection criteria due to the change in pre-sets and, by extension, product changes. In addition, the linkages visualised in the paper are deliberately simplified. The paper considers the interlink of social and ecological systems using visual description, which is experimental and illustrative[3].

While the paper evaluates the biscuit as an object and then a systemic product, it does not consider the cultural representation of biscuits globally. The paper is written through an individual designer mode. Familiar design objects of the everyday might be based on collaborative and community designing. When design takes place in a collective sense, the process of embodying a systemic mode might become much more complicated and yet perhaps more culturally rewarding.

In conceptualising pre-sets, questions arise around the possibilities of cultivating a sustainability-oriented pre-set. How can one change previously acquired pre-sets that do not serve us anymore? Enacting systemic change is not easy, and working across multiple contexts and levels need new ways of both creating new knowledge constructs as well as applying that knowledge in practice. In the context of sustainability, weak attempts to address sustainability challenges might occur when the conception of the "object doesn't change significantly in the face of new experiences." Instead, they are just censored "so that they fit the already familiar, without modification" (Glanville, 2006). Perhaps pre-sets can be further related to the construction of structures of knowledge or experience that need adjustments and accommodations during operationalisation to respond adequately to current experiences that do not, or cannot be, made to fit.

[3] Viewpoints and definitions around a social-ecological system (SES) date back to the late 1980s and they were further developed as an analytical framework to generate insights on how to interpret, respond to, and manage feedback from complex adaptive systems. Three common frameworks are recognised, one with a descriptive focus and two with a more diagnostic focus compatible with modelling (Colding & Barthel, 2019).

Such questions are relevant for both designers and researchers in sustainability as sustainable solutions in everyday situations often attract design inspiration from life experience. These can benefit from the developmental approach to learning. According to Manzini, the key issues related to the connectedness of the new world and the transition towards sustainability practices in the community have resulted in the need for design processes to operate in new and different ways, where expert and non-experts can co-exist and create physical, relational, or service-oriented outputs that include both the local and global dimensions of society (cited Angelucci, 2017).

Sustainability is a complex and systemic design challenge placed in an interconnected and complex space that is social, economic, institutional, and all-pervasive. Designing for sustainability thus takes design, and by extension, the concept of the designer, into a much broader context where the designer is formed by all that was, is, and will be. The larger system has a considerable influence on the way the object is produced, and the designed product becomes a contextual object taking part in a system that forms part of the interconnected system and, in turn, influences both the system and other objects that enter it. As a possible initiator, the designer needs to be aware of working with and within various workstreams that have individual cause-and-effect trajectories, all of which have the potential to impact and shape sustainability. There is then a need to understand and implement the design process by embodying a systemic mode while at the same time constantly re-evaluating the pre-sets that exist within our different identities as designers, researchers, makers, creators, and product owners that influence this mode. Perhaps then, we will be able to rethink the way in which we see objects, place them in the context of sustainability and systemically change the way these, as products, occupy the commercial consciousness.

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