



negotiating with food

setting the table for
mindful bodies
and non-objects

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June 2020

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In partial fulfillment of the requirements for the Masters Degree in
Interaction Design at the Faculty of Design, The Estonian Academy of Arts

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This thesis also bears the hands of others, whom I thank for their contribution.

Liis Tuulberg for introducing me to the world of fermentation in the first place and guiding me throughout this journey with so much heartiness.

Silver Saa and **Anna-Maria Saar** for sharing your time and knowledge with me.

Jonatan Sepp for making me talk, think, write, read, work, rest, remember, forget, laugh, scream, enjoy, question, and produce this work.

Tatiana Rubiano Goubert for fiery and fruitfull talks, and your stubborn enthusiasm.

Familiei mele pentru încrederea pe care o au în mine, dar și pentru suportul pe care mi-l oferă.

Tanel Kärp and **Nesli Hazal Akbulut** for your patience.

And for the openness of all participats in the interviews and experiments.

abstract

This master thesis is interested in transforming my own practice towards more considerate engagements with food. It is an attempt to explore what happens when artefacts offer experiences that go beyond seamless, comfortable, and positivist.

To uncover new ways of relating to food, I focus on the animated relationship between food and individuals during fermentation. Situated at the intersection between design, food, and philosophy, the study unfolds as an experiment and is informed by a research through design approach. Grounded in theories of phenomenology and correspondence, it draws on the lived experience of the mindful body during fermentation. It investigates the food that is disclosed through various sensorial and corporeal experiences: tasting, touching, feeling, hearing, smelling, and looking.

As I get to know food through fermentation, I propose that fermentation is a liminal space - what I call *the space in between*. It is an attempt to explore the idea that the fermentor and ferment are in a constant negotiation, where the mindful body and the food are mutually affecting their being-in-the-world. This closer look at the agency of food reveals something about our own agency as well - both are ever emergent from *friction*. In the context of fermentation, I suggest that time, (im)materiality, and openness are at the center of this proposed experience, because, in *the space in between*, food is always unfolding in some direction.

kokkuvõte

Käesoleva magistritöö fookuses on autori isiklik püüdlus luua sügavamalt läbi mõtestatud ja tunnetatud suhe toiduga. See on katse uurida, mis juhtub kui inimeste poolt loodud objektid pakuvad kogemusi ja elamusi, mis on rohkemat kui ainult lihtsad, mugavad ja positivistlikud. Avastamiseks uusi toiduga suhestumise viise, keskendub autor indiviidi ja toidu vahel toimuvale nn elustatud suhtele, mis fermenteerimise käigus ilmneb.

Uurimistöö näol on tegemist eksperimendiga, mis viib uurimust läbi kasutades inimkesksele disainile omaseid tööriistu ja metodoloogiat (*research through design*) ning mis paikneb disaini, toidu ja filosoofia kokkupuutepunktis. Tuginedes fenomenoloogia ja Tim Ingoldi poolt loodud inimkorrespondentsuse teooriatele, vaatleb kirjatükk teadliku keha (mõistusliku keha) läbielatud kogemusi, mis fermenteerimise käigus aset leiavad. Magistritöö uurib toidu ja selle mõju avaldumist läbi erinevate meeleliste ja taju kogemuste: maitsemise, puudutamise, tunnetamise, kuulmise, haistmise ja vaatamise.

Autor jõuab fermenteerimise kogemuse uurimise käigus väitele, et fermenteerimist saab käsitleda kui vahepealset ehk *liminaalset ruumi*. *Liminaalne ruum* tähistab siin seda, et fermenteerija ja fermenteeritav eksisteerivad koos ruumis, kus toimub pidev teineteisega suhestumine ning kus fermenteerija teadlik keha ja fermenteeritud toit mõjutavad teineteise maailmas-olemise-viise. Autor jõuab töö käigus järelduseni, et toidu agentsust (st võimet olemuslikult mõjutada toidu loojat ja tarbijat, kutsudes esile füüsilisi ja psühholoogilisi reaktsioone) vaadeldes saame teada rohkem ka inimeste endi agentsusest, nimelt mõlemad toimivad pidevas katkestuse ja taasloomise mõjuväljas. Autor väidab, et fermenteerimise kontekstis on kogemuse keskseteks toimimise faktoriteks aeg, materiaalsus ja avatus, sest toidu olemus ja tähendus on fermenteerimise *liminaalses ruumis* alati nimetatud faktorite mõjul muutumas, edasi arenemas.

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Excerpt from Sandor Ellix
Katz 2012: 39-40, "The Art
of Fermentation: An In-Depth
Exploration of Essential Concepts
and Processes from Around the
World"

This is not just about fermentation (even if, as a biological force upon our food, that is inevitable), but about food more broadly. Every living creature on this Earth interacts intimately with its environment via its food. Humans in our developed technological society, however, have largely severed this connection, and with disastrous results. Though affluent people have more food choices than people of the past could ever have dreamed of, and though one person's labor can produce more food today than ever before, the large-scale, commercial methods and systems that enable these phenomena are destroying our Earth, destroying our health, and depriving us of dignity. With respect to food, the vast majority of people are completely dependent for survival upon a fragile global infrastructure of monocultures, synthetic chemicals, biotechnology, and transportation.

Moving toward a more harmonious way of life and greater resilience requires our active participation. This means finding ways to become more aware of and connected to the other forms of life that are around us and that constitute our food—plants and animals, as well as bacteria and fungi—and to the resources, such as water, fuel, materials, tools, and transportation, upon which we depend. It means taking responsibility for our shit, both literally and figuratively. We can become creators of a better world, of better and more sustainable food choices, of greater awareness of resources, and of community based upon sharing. For culture to be strong and resilient, it must be a creative realm in which skills, information, and values are engaged and transmitted; culture cannot thrive as a consumer paradise or a spectator sport. Daily life offers constant opportunities for participatory action. Seize them.

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introduction

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Paraphrasing Sandor Katz, this work is “not just about fermentation, but about food more broadly” (2012: 39). And, I would add, by being about food, it is also about us and everything around us. We exist in the world through our bodies, so it is through them that we navigate the material world. The places around us are rich with sensory perceptions. While scents, colors, feelings are obvious, we can also find hidden tastes in these places. When we make food, we infuse ourselves with these local flavors. In fermentation, this idea is ever more visible, due to the microbial terroir¹ of microorganisms. As I am making my own ferments, new knowledge of the world becomes available to me. I get to know variation and abundance in the places closest to home. Food can taste “familiar but also like nothing you’ve ever had before, like an old comfortable sweater with bright new colors woven through the original fabric” (Redzepi and Zilber 2018: 11-12). It’s all about fun and experimentation, while getting to know your place on the planet in completely new ways.

As a designer, I am interested in the idea of knowing through our body, that information is stored not in the idea of an act, but in the corporeal doing of an act. As two forces meet, knowledge is produced by friction. Imagine biting into a pickle, the sound it makes, and the juices flowing in your mouth, the acidity. All the sensorial aspects of taking one bite. We know them, but do we really consider them?

Food is an *edible material*², and, I would argue, the material that we are in contact with most intimately. Herein lie so many opportunities for food and design - the contact. This brings me to the second clarification I feel I should make. When I say food and design, I don’t literally mean the design of new food. Food is a material that is perfectly designed by nature; I do not wish to pretend I can make it better. Also it is a noun, and, in the light of my interest for the involvement of the body, I would much rather prefer working with the verb, the action. What do we do with the food? What happens when we engage with the food in the form of cooking, tasting, eating?

The opportunity I see, is to use design thinking and techniques to reconsider the point of contact, the act of eating. Through the lens of the little knowledge I have gathered through cooking for friends and family, cooking professionally, and now fermenting, a more conscious use of my body has changed my way-of-being in the world. Frankly, it seems mildly absurd to me that what we eat, the way we eat, and what we think about food is so limited - it creates a narrow notion of what food is. But there is so much more knowledge to be found in food. By choosing to work with fermentation specifically, this thesis becomes concerned with the sensual and communicative aspects of fermented food, especially what interaction it asks for, what experiences it is able to offer and why. As such, the practice of fermentation becomes the embodiment of friction in food.

As a result, with this thesis, I treat friction and material agency as critical to (food) design. By exposing our mindful bodies to irregularities, we can begin to perceive and adapt to the complexity of the material world. Perhaps, it is time to leave our frictionless comfort zones and step into *spaces in between*, where food exists as possibilities; to pay closer attention to the narratives in food; to engage with food more than just the sum of its nutritive parts, more than something we can judge as cheap, convenient, or tasting “good” or “bad”. Essentially, this work turns into an attempt to let food perform and transport on its own terms, through materiality, time, and openness. Because when we learn about others, we learn about ourselves (Ying and Redzepi 2018).

¹ Terroir is a term used to describe the way that soil, weather, and geography affect wine. Microbial terroir represents the idea that the microbes indigenous to any given region will always have their say in the flavor of the final product

² Definition by Thesaurus. Retrieved from <https://www.thesaurus.com/browse/food?s=t>

structure of thesis

Using fermentation, this project communicates the transformative potential of food and hopes to offer the empirical foundation on which concepts of friction and material agency can negotiate their place in design practices. Accordingly, this thesis starts by asking: How do engaged relationships become part of everyday experience with food? In addressing this issue, the paper is divided in two parts. Part one deals with the theoretical background of this thesis, and it is built around three pillars: design, friction, and fermentation. These notions provide a scaffolding through which the work can be better understood. The reasoning of the work is presented here, pertaining to the each of the three categories: Why is this a relevant endeavour for the interaction design field? How does the concept of friction epitomize my point of view as a designer? And how is the practice of fermentation used to inform and achieve the design intention? Together, the chapters present how I draw from the theory of phenomenology, material agency, as well as critical use and the method of friction in design, to investigate the reflective practice of fermentation. This first part ends by supporting the aforementioned efforts through an appropriate choice of the research, the framework, and the data interpretation. In congruence, the methodological approach is different to a traditional design approach: there is no clear design brief, so, instead of departing from a research question, the work tries to produce its own via exploratory experiment dialectics. Encouraged by a programmatic approach, the research acts as a scope of investigation, where iteration and experiments are used to arrive at a research question. By virtue of this, the research question is still explored in many ways via activities of friction and critical use.

Part two covers the tangible results of the research: the knowledge which stems from the act of doing fermentation. In order to achieve my goal, this project unfolds as a case study into the phenomenon of fermentation. Interviews and experiments of exploratory nature are undertaken, and their results are presented in four chapters. In the first two I attempt to disclose the practice of fermentation as a way of being-in-the-world through food, rather than a mindless encounter with food. I equate fermentation with a negotiation between the fermentor and the ferment. In addition, I connect this negotiation to two necessary occurrences - the corresponding roles and the place in between. In *Corresponding Roles*, I treat the roles as fluid and mutually informing, dependent on the participating entities (such as mood of fermentor, or form of ferment) and in the service of a situation. In *the Space in Between*, I treat the space of fermentation as a space in between - a metaphor for working in a territory where forms are ever emergent. I then identify the characteristics of such places in between, describe the actions through which the ferment and the fermentor are able to affect each other, and the perceived results of these actions. Then, in *Discussion*, I look at the circumstances of *the space in between*, and propose that they can bring about change, motivated by the way fermentors perceive themselves, the ferment, and the surrounding. I then conclude with the last chapter, where a conclusion wraps the findings of the paper up in a discussion on the role of design in creating more engaged relationships between people and (food) artefacts. By investigating the idea of friction in alignment with material agency, this work attunes to discussions on the philosophy of communication and artistic production (Flusser 1999; Anusas and Ingold 2013; Colomina and Wingley 2016). Casting a phenomenological eye on design, the work reveals an idiosyncrasy in the attempt to design rigid experiences for knowable finite humans.

You are responsible for what you put into the world. And you are responsible for the effects those things have upon the world (Victor Papanek 1971)

³ In this thesis, the word “entities” is given an extensive meaning and refers to any subject or object or system, material or immaterial, animate or inanimate

⁴ Celebrated paradigms in western design read “good design is invisible”, “less is more”, “edit, edit, edit”, where the ability to design is sometimes seen as the ability to hide the process of designing itself so that the “artificial” feels “natural”

⁵ The notion of interiorities is borrowed from Anusas and Ingold (2013). It should be understood as the quality of a thing/entity to reveal its “energetic lines” (ibid) - i.e. its origin, composition, energy usage, age, consumption, availability, etc.

⁶ The notion of surface comes from Anusas and Ingold (2013). Used to differentiate objects from non-objects, surfaces are created by enclosing the meaning of a thing/ entity in vague and deceiving forms. These enclosed forms reduce the users’ ability to perceive the impact of their actions on the material world. A surface is achieved by casting the complex, interconnected and animated non-objects of nature into opaque, discrete and finished objects

thoughts on design friction fermentation

Before getting into the thick of this thesis, I attempt to clarify the connotations of three additional terms: design, friction, and fermentation. This is a necessary endeavor because they act as a scaffolding for this thesis. Therefore, in this section, I define and position how these three concepts are understood and used throughout the paper. They form the basic structure through which the reasoning of the work can be followed and the intention understood. Accordingly, this thesis departs from the discipline of design, as a field of knowledge. In order to gain understanding and knowledge about design practice, it aspires to explore the idea of friction in food through the practice of fermentation.

design

If to design is to make a conscious effort to manipulate a situation via tangible or intangible things, then design is very much concerned with creating narratives. All things tell a story. Because it invites change, design does not exist in a vacuum as an act detached from its consequences. Quite the opposite, design is the consequence - the narratives of use afforded by designed things inform and shape our understanding of the world. This point of view also denotes that the designer is trusted to do more than design mere viable, feasible, and desirable products. As Victor Papanek points out in the left side quote, designers are responsible for what stories are embodied in the prevailing arrangements of things. Therefore, if I follow this logic of responsibility, interaction design expands to all interactions within the material world around us and tends to borrow elements from both relational theories, because I look at all designed things not as mere interfaces, but as entities³ for relationships. In the context of this thesis, the work of prominent relational investigators such as Lynn Margulis (2007) and Tim Ingold (2012; 2015; 2017; 2018) shaped this research through the elementary idea of the *enmeshing* of life structures in symbiotic, cooperative relationships between species. Their ideas reject the privileging of human existence over that of non-humans. Ingold even ridicules the act of casting all other entities as non-human, as it make no more sense than calling humans non-raindeers (Ingold 2015). Thus, the design activity becomes a means for inviting communication, and designed interactions lend themselves to be filled with meaning, rather than propose one upfront. As such, design can also be used as a tool for research. In the context of this thesis, I employ design not only as a way to invite transformation, but to understand how it can be affected in the first place.

Traditional human-centered design exists insomuch as it is able to make life better. More often than not, it is concerned with creating *desirable* interactions. Especially after the horrors of WWII, when humanity was traumatized by the machine (technology), modern design was tasked to reconcile the two (Colomina & Wigley 2016). *Good design* becomes an *anesthetic*⁴ (ibid), shielding the human, by enclosing the inner workings of technology in detached outward forms. Losing most of their ability to communicate interiority⁵, interfaces become *surfaces*⁶ (Anusas and Ingold 2013) - finally, the human is alleviated from *friction*. Pushed forward

by post-war industrial design and architecture, this logic of form gained popularity and an unidimensional version of “better” emerged: designed surfaces must be seamless, naked, bare, clear, direct, pure, clean, healthy, moral. Therefore, the designed relationship is nothing but a superficial one with the *surface*, while the interface becomes a “hidden interiority” (Anusas and Ingold 2013: 59). What is out of sight, is also out of mind.

friction

A quick look-up in the dictionary defines friction as “the force that resists relative motion between two bodies in contact”⁷. Based on this definition, I position friction within design as an act of momentary resistance to pre-established ways of interacting. I argue that this disruption makes new possibilities of being together visible in the world (Laschke, Diefenbach, and Hassenzahl 2015). Therefore, my understanding of design is not hindered by friction, but benefits from it. Accordingly, the interiorities of entities are free to emerge and can be interacted with through interfaces, conjoining lines of human and artifact movement. This contrasts with anesthetic design, where flows such as resource depletion, pesticide use and monoculture in the context of the problems of intensive farming are rendered tangential to everyday life.

Friction also recognizes material agency. The fact that two bodies come in contact during friction is also in contradiction with the view on human agency as being exclusive. If both bodies in contact exercise force, then both bodies have agency. Consequently, when adding agency to both humans and non-humans, it is hard to sustain the idea of a unidimensional perspective of better as well as exclude the non-human subjects as being passive and lacking agency (Anusas and Ingold 2013). Alternatively, it can be understood that, if the human is able to affect his/her environment, then the opposite is also true - the human is affected by the environment. As such, the invisible becomes visible - a thought very much in line with the current developments not only in microbiology, but also ecology, agronomy, neurology, medicine, immunology, hematology, etc. It is becoming more and more clear that the invisible world of microbes plays a much bigger role in our wellbeing, than previously thought (Pollan 2013; De Palma et al 2014).

Within the emerging practices of design, the focus on visibility and material agency is used to address current issues such as sustainability, global warming, patterns of consumption, new materialism, waste, and pollution. As a result, in the effort to find alternatives to conventional ways of interacting with the world around us, new qualities for designed relationships emerge such as mediation, communication, and discursiveness (Anusas and Ingold 2013: 61). As opposed to hiding the complex systems of the material world behind seamless interactions (Auger 2018), the environment lends itself to be discovered and makes its energy flow⁸ directly perceptible - moving from passive use into critical use (Fraser 2017). As commented by Anusas and Ingold (2013), objects become verbs and not nouns. An apple stops being the object, but lends itself to be known and used as anything it can be - an orchard, a logistics system, a loving grandma, a pie, the smell of autumn, a sour taste, a crunchy sound, a fizzy drink, a tart pie, a pungent vinegar and so much more. Through added friction, our relationship to the environment can be seen as continually emerging, informed by “concrete experiences and sensual perception” (Heindenreich 2009: 1154).

⁷ This definition of friction is taken from the Merriam Webster Dictionary. Retrieved from <https://www.merriam-webster.com/dictionary/friction>

⁸ By energy flow I mean all elements that connect objects to their place in the material world. For food, it could be seasonality, place of origin, taste, but also the distance it traveled, the resources used, the energy it consumed, etc.

fermentation

Finally, fermentation represents the way I choose to bring friction and material agency into the human-food relationship, inviting opportunities for improvisation. Essentially, it is an ancient food preparation and preservation method, used in different parts of the world and in all human cultures. At the most basic level, fermentation is the transformation of food through enzymes produced by microorganisms - bacteria, yeasts, or mold (Redzepe and Zilber 2018). As such, it can be viewed as a collaboration between microbes and humans. Through fermentation, microorganisms extract the raw material they need from food, which transforms the complicated molecules of food into the extract raw material our bodies need from food. Much like a tool, it helps humans adapt and thrive in various environments, growing and transforming, until it becomes a part of us. In fact, fermentation is so tightly woven into the fabric of society, that highly important phenomenon in human cultures are centered around the products of fermentation: the collective coming together around alcohol, bread, coffee. Additionally, the fermentation process is also used to make certain foods palatable and less dangerous.

Nowadays, the production of fermented food makes up an enormous industry (Katz 2012). Almost anything can be fermented: grains, legumes, tubers, fruits, dairy, beans, seeds, nuts, meat, fish, eggs. And not just any product, but any part of the product can benefit from the fermentation process, minimizing waste; fish bones and guts can make fish sauce (King 2020); parmesan rinds can be used to culture butter (Doherty 2020). This list is even bigger if one considers non-food applications. Really, fermentation is only limited by human imagination. In fact, it is estimated that 1/3 of all the food we eat is fermented (Katz 2012). Perhaps, even you eat more fermented foods that you might think. Sure, kefir, beer, wine, sourcream, sauerkraut, kimchi are fermented, but so are olives, yoghurt, buttermilk, a lot of cheeses, cured meats (salami, ham, prosciutto, pancetta, sausages, etc.), kvass, kombucha, chocolate, vanilla, a lot of sauces (soy sauce, fish sauce, worcestershire, tabasco, sriracha, etc.), vinegar, miso, tempeh, and much more. Originally, even ketchup is a fermented paste, originally from Indonesia, known as *kecap* (ibid). If this list makes you salivate even in the slightest, that is because fermentation also produces some of the most satisfying flavours and textures we know, such as, say, umami and acidic tastes.

Throughout this thesis, when I talk about fermentation, I first and foremost have in mind the fermentation practice and experience that happens in a domestic environment or a small scale production unit. I am not concerned with settings of big scale industrial production. Furthermore, the aim is not to investigate the practice of fermentation itself, but to use fermentation to investigate the human-food relationships. With this in mind, due to the relational focus of this research and thesis, it is not that relevant how one defines fermentation, but what happens in the physical and psychological space between the fermenter and what is being fermented. The following paragraph represents a narrowing of the definition space and the aspects, which were considered within the context of this research. Here, the word fermentation is understood to represent the relationship and communication between humans and food.

Via fermentation, the thesis investigates how the dynamic between food and people becomes, both in physical and psychological space, through *embodied experiences* and *mutual affects*⁹ (Deleuze and Guattari 1987), which leads to the formation of *embodied knowledge*. As the previous mentioned terms are essential in understanding the intention of this work, allow me to break down and explain. Space is defined as physical insofar as there is sensual interaction taking place between the human and ferment; usually experienced through sight, touch, hearing, taste, and smell. Space becomes a psychological one, when the interaction invites mental processes (remembering, describing taste, inspiration, etc.) and emotions (fear, excitement, curiosity, etc.). By *embodied experiences*, I refer to the way the subjective body perceives and responds to ferments. *Mutual affects* are understood as the ability of the participants engaged in fermentation to affect each other. In short, how people and food interact. *Becoming* describes the outcome of the human-ferment interaction. However, the boundaries between them are not always clear and so, what is an experience or effect, can also be a *becoming*. Lastly, the term *embodied knowledge* refers to a type of knowledge, where the body knows how to act - a general example is cutting vegetables.

In the research, I look at the relationship between humans and ferments as a phenomenon to be explored. Much like design, fermentation is a process that invites *transformation*. To ferment is to *negotiate* a situation into a desirable one. When fermenting, one pays attention to the environment, and exerts influence through variables such as temperature, humidity, light, time, bacteria culture, and taste. And the environment exerts an influence back through the same variables, affecting the process, the sensorial experience, and thus the human. Even more, there are variables which don't belong to any of the two, and stand in between the self and the environment, all while being informed by both: the microorganisms that exist on our skin, in our mouth, on our bodies, in the air, on any surface, that inevitably always affect the process and the outcome¹⁰. Both are in a continuous dialogue and with each new *becoming*, they redefine each other. It is this *negotiation* between humans and food that I want to capture, so I ask: How can food offer more active engagements? How can food make its agency visible?

⁹ In this work, the construct of affect and affection comes from Deleuze and Guattari (1987) and, thus, it is not reduced to emotional responses, but rather the ability to affect in a general sense

¹⁰ That is, if the fermentation is happening in a non-laboratory setting

part 1:

mindful bodies and non-objects

1.

design

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research question and objective 21

What if design is only design inasmuch as it challenges contemporary definitions of human? (Colomina and Wigley 2016)

The previous chapter introduces the underlying ideas from which this thesis departs and discusses them briefly under the terms of design, friction, and fermentation. It positions design as a storytelling activity, whose designed artefacts are capable of communicating and building relationships. By doing so, it points to how traditional design is concerned with subduing entities to surfaces and constructing superficial relationships. Next, the idea of friction is brought in to destabilize anesthetic surfaces and activate agency. This friction is followed up and applied to the human-food relationship in the form of fermentation. Therefore, departing from the discipline of design, this research argues the transformative potential of food through the idea of friction. This chapter further elaborates on the design aspect and reviews the relevance of this master thesis's work for the field of interaction design. Firstly, it offers the context of this work, which is centered around the landscape of food and design. Then, it offers the reason for approaching food from a design perspective. The last two chapters position the work within the field of design and reveal its objectives and guiding questions.

context

Better is contingent on context. When talking about food, better-designed interactions have left the world in a crisis. From an ecologic point of view, the food system we designed is failing, but we manage to miss the signs because of the seamless interface we put on it (Monteiro 2019). We have more information than ever, but designed our way out of knowing how to interact with the natural world. To put it in the blunt words of Ingold (2012), “never in the history of the world has so much information been married to so little wisdom”. Let me use some of this information to paint a picture of the current context of the global food scape.

There are over 80,000 species of edible plants in the world. Of them, 150 make it in our habitual meals, while fewer than 20 species now provide 90% of our food (Zilber 2019). Meanwhile, we have “successfully” recruited most animals for human societies. Humans represent roughly 32% of vertebrate biomass, while the other 65% are animals we keep to eat. Staggeringly, this leaves less than 3% for all the vertebrate wildlife (Morton 2016).

It is now common practice for food to get wasted because it does not meet aesthetic standards. Which makes it common practice for farmers to overproduce in order to meet these “quality” standards. This means that food is deliberately produced to be wasted. As for the food that does make it into our houses, this also gets wasted due to an increasingly poorer ability to judge if food is edible or not (Neff et al 2019).

Meanwhile, much of the food that we do end up eating makes us sick. While issues like obesity and heart problems are yesterday’s news, new studies make a direct link between what we eat and how we feel and think (Katz 2012; Bengmark 2013; Foster and Neufeld 2013; Pollan 2013). A cliché, indeed, but a very true one - we are what we eat.

Cast as a product of consumer culture, fruits, vegetables, and plants lose their seasonality, place, and sometimes even their taste. They just are. They don’t *become*.

Do we even know food anymore?

The current state in which food reaches us and the experiences it provides systematically obstructs humans from perceiving the depth of our engagement with the materiality of the world. Increasingly, food is detached from the material world - complexities are hidden out of sight and we don’t see food as a season, a place, a technique, a person anymore. Why follow a logic of form where food, which exists in the material world as irreplicable, wild, and alive, is cast as homogenous, efficient, and sterile? This lack of friction promises freedom from knowledge gaining or decision-making. And it is particularly worrying because in the wake of climate change we need to redesign not only our systems, but our relationship to food entirely. Don’t get me wrong, I am not arguing against exotic fruits in supermarkets. What I find inappropriate though, is to organize our societies primarily around them (Katz 2012). In the long run, this is detrimental to any sustainable development, both of the self and the environment because it supports “a cultural perception which disconnects the consumption of natural resources from its natural context and environmental impact”, (Heindenreich 2009:

1147) Accordingly, chef Samin Nostrat proposes that we should “let geography and tradition guide your choice of what to use” (2017: 108). This is also the perspective that this thesis joins with; it looks for opportunities which make it possible for material engagement to go beyond “abstract knowledge” and become a practice of “concrete experience and sensual perception.” (Heindenreich 2009: 1154). I imagine a space where dynamics create friction. I imagine the “chaos” of what happens when everybody gets agency to understand the plurality of “better”. And I imagine the collapse of the industrial idea of something homogenous as something “good”.

reasons for a phenomenological inquiry into fermentation

Fermentation, like design, is a process that invites *transformation*. And, while the obvious transformation is that of the food, what I am more interested in, is how the change of food affects the dynamics between the food and the individual. Surely, there are thoughts, emotions, movements that are born out of the gradual intensifying of taste, or the fading of color. And are thoughts, emotions, and movements not the interest of interaction design? Is design not concerned with telling stories? Is interaction not the story of what entities are and what they can do together? For this reason, this research looks at the relationship between humans and ferments as a phenomenon to be explored.

The reason to look at this relationship is to review the *communicability* of design artefacts in general and how individuals relate to food specifically. If human centred design follows a logic centred around seamlessness, commodity, and simplicity then are we not at a conflict with the complex, seasonal, systematic ways of nature? Isn't our human centred design creating *objects*? Isn't it aiming for stagnant, disconnected entities? And isn't there an alternative? For if we ask for our food to be plenty, cheap, uncomplicated, and easy to acquire and to consume, then we are not asking for real food. We are not asking for a relationship, nor an understanding. We are not asking for growth, nor life. Not for ingredients, nor knowledge, nor culture. We are asking to be oblivious and we are asking for overkill. “Thus the land of plenty is also the land of the lazy. And the lazy have the additional luxury of denying the uneasy truth behind their easy meals” (Fabiani 2019).

Perhaps, this is my attempt to challenge the current values through which we employ food to be abundant, cheap, convenient, effective, and visually perfect. More important, to break the boundaries to which consumer culture has reduced food to: an object - an abundant, cheap, convenient, effective, and visually perfect object. Because, really, why do we need these stories to be true? I want to find ways to expand the possible roles people and food take in the axis of their relationship. In what other ways can we know food, and perhaps ourselves? As such, the practice of fermentation is used to conduct a research through design that aims to explore the transformative and relational nature of food. During fermentation, roles are fluid and improvised rather than static and pre-established. What this thesis aims to uncover is what motivates the active engagement between the ferment and the fermentor.

positioning the work

The aim of this research is aligned with a focus on the communicability of designs articulated by Villem Flusser. His thoughts bear great influence on my design objectives and his question is a starting point for my research: “Can I give form to my projected designs in such a way that the communicative, the inter-subjective, the dialogic are more strongly emphasized than the objective [...] and the problematic?” (Flusser 1999: 58–59). The opportunity I see emerging out of this new space of inquiry is to find ways to expand the possible roles people and food take in the axis of their relationship. I imagine a space where these roles are fluid and improvised rather than static and pre-established. Alluding to jazz and improv theater, the narratives of use should emerge organically; informed by the human and food interaction.

Therefore, instead of designing objects, my design intent is to develop entities for relationships. In doing so, Flusser (1999), Anusas and Ingold (2013) agree that the challenge to be addressed is design practices themselves, “because cast in the form of objects, material culture creates a problem of obstruction: More specifically, it impedes the tracing of relations along the paths of our activity in the world” (2013: 60). Reducing interaction to the surface of objects means that we lose sight of the complex relationships life demands, thus rendering knowledge, practices, and interdependency tangent to human life (Auger 2018). Our relationship with only the surface of food is proving problematic - through this separation we have lost the agency to *become* together with food. Most of us have lost our ability to see what a humble carrot means and what it can *become* - food is a *surface*. Most fruits and vegetables have lost their ties to seasonality, place or nutrition, to the extent that the act of feeding ourselves has become a surface in itself - deep inside our hidden interiority, we are starving our microbiome. Moreover, the look and the surface of food has become an obsession, a fixation: concerning packaging, the standards for aesthetics in the supermarket and the restaurant scene, and much more. For this reason, part of this work is meant to deconstruct these surfaces and explore how and what design approaches can visualize the possibility of *becoming*.

Another aim of this work is to investigate how individuals relate to food. For this, the practice of fermentation is used because of its transformative and relational nature. However, the final intent is not to change mindsets about fermentation, but to encourage discussions of human-food interaction. Fermentation is “less the topic but the medium” of the reflection, as Ingold says (2017: 16). It is used to challenge and break the *surface* of food and invite new textures, new uses, new meanings, new narratives. In short, opportunities for “tracing of relations along the paths of our activity in the world” (Anusas and Ingold 2013: 60).

Within the field of design, there have been many emerging design approaches that focus on interrogating rather than affirming. Needless to say, this makes for a very messy space, where voices from design to architecture and beyond, agree and disagree, prove and disprove, comfort and urge, and in the end, give birth to as many labels as there are opinions. An inclusive but not exhaustive list contains Calm Design¹¹, Discursive Design¹², Critical Design, Critical Making, Critical Use¹³, Speculative Design¹⁴, Design Fiction¹⁵, Aesthetic of Friction¹⁶, Architecture Against Death¹⁷, Responsible Design¹⁸, Life-Centered Design¹⁹, Adversarial

¹¹ See for example Amber Case, *Calm technology: Principles and patterns for non-intrusive design*, 2015

¹² See for example Bruce M. Tharp and Stephanie M. Tharp, *Discursive design: Critical, speculative, and alternative things*, 2019

¹³ On a discussion on Critical Design, Making and Use see Hélène Day Fraser, *Critical Design, Critical Making and Critical Use*, 2017

¹⁴ See for example Anthony Dunne and Fiona Raby, *Speculative Everything*, 2013

¹⁵ See for example Bruce Sterling explaining the concept of design friction in an interview with Slate magazine, retrieved from <https://slate.com/technology/2012/03/bruce-sterling-on-design-fictions.html>

¹⁶ See for example Marc Hassenzahl and Matthias Laschke. "Pleasurable troublemakers." *The gameful world: Approaches, issues, applications*, 2015: 167-195

¹⁷ See for example Shūsaku Arakawa and Madeline Gins. *Making dying illegal: Architecture against death: Original to the 21st century*, 2006

¹⁸ See for example Mike Monteiro, *Ruined by design: How designers destroyed the world, and what we can do to fix it*, 2019

¹⁹ See for example a discussion with Jane Fulton Suri from IDEO, *The future is life-centered*, 2019, retrieved from <https://www.mixed-methods.org/episodes/2019/7/24/the-future-is-symbiotic-jane-fulton-suri-ideo>

²⁰ See for example Carl DiSalvo, *Adversarial Design*, 2012

²¹ See for example Alastair Fuad-Luke, *Slow Design: A paradigm for living sustainably*, 2004

Design²⁰, Slow Design²¹ etc. I chose to not position my work within a particular approach, but instead borrow and situate this project in a place that blurs the lines and lands somewhere between Aesthetic of Friction and Critical Use; what elements I borrow from each is discussed later in the paper (in the chapter on Friction). This is the place to mention that, as it produces insight rather than product (Lindley 2015), the impact of a critical design project couldn't and shouldn't be measured by standards such as "usefulness", "innovation", "market need".

research question and objective

Unlike traditional design practices, this research is not built around a definite research question to which, through the design process, a clear answer is to be provided. Rather, it starts within a topic of interest - food - and, during the design process, I engaged in "programmatic approaches" (Eriksen and Bang 2013) to navigate this space towards a clear focus. The research departs from the belief that in any human-food relationship there is a space for interactions of all sorts, beyond what is currently the norm. So as the starting point of the project I ask: Can we, through the design of friction, visualize this space and encourage more active engagement with food?

Throughout the design process, informed by research, interviews, and experiments, new questions arise:

- What aspects of food can offer more active engagements?
- What aspects of design can support reflective relationships?

- How does fermentation afford communication between humans and food?
- What aspects of fermentation create reflective relationships?

- How can mutual agencies become visible during ferment-fermentor engagement?

2.

friction

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The previous chapter on design proposes that a phenomenological inquiry into the practice of fermentation is relevant to the field of interaction design. Looking at the relationship between humans and ferments as a phenomenon to be explored further aids me, as a designer, to investigate the communicability of (food) design. The opportunity identified is to find ways to expand the possible roles people and food take in the axis of their relationship. Thus, the purpose of this chapter is to introduce the concepts dealing with design and communicability, which shape my focus and primary research. In the first section, I offer a design digest and subverts the credibility of human-centered design, and proposes a consideration of the concept of friction. Then, in the following section, I construct a case for friction in design. Here, I address a big part of the research objective - how can friction deconstruct surfaces and visualize the possibility of becoming? Subsequently, I discuss and describe the characteristics of friction that help do so and how they are integrated into the practice of design.

a design digest

Traditional human-centered design (from now on referred to as HCD) exists inasmuch as it is able to make life better. This idea of better was carefully crafted by post-war ideologies of the likes of Adolf Loos, Le Corbusier, Walter Gropius, Bauhaus, the Eameses, Henry Dreyfuss and many others. And, as they insist, better is achieved only by removing friction between humans and designed artifacts. As such, industrial designer Henry Dreyfuss writes in the epigraph of his 1995 book *Designing for People*: “When the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed”. This aesthetic is now celebrated under the name of good design and has anesthetic properties: smooth surfaces are seamless, naked, bare, clear, direct, pure, clean, healthy, moral - they are employed to “eliminate friction, removing bodily and psychological sensation” (Colomina and Wigley 2016, 89).

Flusser (1999), Anusas and Ingold (2013) warn against this logic of form because it represses our interaction with entities to their surfaces, subduing engagements that go beyond external appearance. Such opaque objects obstruct their users because discursiveness becomes a “hidden interiority”, (Anusas and Ingold 2013: 59). Such objects adhere to “a logic of form that reduces our ability to perceive the depth and scope of our material involvement with the world around us” (ibid: 58). When the focus of the design is on the object, the intent automatically becomes one of application - creating more and more “useful” objects (Flusser 1999). Although scientific and technological progress is achieved this way, these objects, through their use, do more harm by obstructing their users due to their lack of meaning. Consequently, human gestures fall out of rhythm with the natural world (Auger 2018).

Additionally, when the mantra of *human-centered design* is “chanted as the way to approach any question” (Colomina and Wigley 2016: 102) I cannot help but think it a naive and fragile approach for two more reasons. First of all, it presupposes a “knowable human” (ibid: 102). In reality, humans are messy, irrational, highly biased creatures and without this *indeterminacy*, there would be no context for design to happen (ibid; Csordas and Harwood 1994). But this transparent homo desigare - much like the economy’s homo economicus - limits designers from engaging with the complexities of (human) nature (Dunne and Raby 2013: 38). Therefore, in its truthful form, HCD is a cunning activity concerned with designs for plotting and deceiving ourselves (Flusser 2013).

Second, as the name would suggest, HCD situates this “knowable human” at the center of the design process. By doing so, it celebrates only the design which reaffirms this human - the so-called *good* design. And what is the promise of good design? To help “knowable humans” to “better” the world (the use of so many quotation marks here is intentional and intended to stress the dubious nature of HCD). This promise proves problematic not only because it negates all agencies except that of the human’s (Anusas and Ingold 2013), but because it negates the plurality of agency in humans themselves (Ginsberg 2018). Ingold (2015) also finds it odd that “on the one hand, there are the humans who are restless mutable, animate beings, but on the other side the non-humans all seem to be emplaced, fixed, and durable entities that have been enrolled in order to help provide” for the human. Something - the restlessness of everything, but the human - got lost. Thus, it is imperative to stop and ask:

This is the design that is the basis of all culture: to deceive nature by means of technology, to replace what is natural with what is artificial and build a machine out of which there comes a god who is ourselves. (Flusser 1999: 19)

Where do these narratives for “better” scenarios come from?

Insofar, from a modernist perspective, the mission of design aligns with and operates within the needs of the industry (Mitrovic 2015). Therefore, human-centered means “market-centered” and, evidently, better is not concerned with the well-being of the human, but that of the market (Colomina and Wigley 2016: 123). As Flusser (1999), Anusas and Ingold (2013) point out, this is evident in the way mainstream western practices aspire to fashion the world matter in the form of *objects*, suspended from their meaning in the world. Seen from this perspective, Colomina and Wigley (2016: 103) are right to deduce that “design had never been about giving someone or some group what they ask for but what they wish they had asked for and retrospectively pretend that they did ask for”.

a case for friction

Seeing how traditional design has recently been under a lot of critique, I then naturally wonder if its shortcomings do not have their origin in this initial denial of friction. While design is offered as an antidote, to what is not yet clear. The very insistence on the virtue of frictionless design hints that things might not be so simple and questions arise: “What is better? For who? And why?” (Ginsberg 2017). Similarly, Colomina and Wigley wonder “What is the human that needs this smoothness so bad?” (2013: 93-94) and make a point I couldn’t agree more with: that the aesthetic of traditional design has contributed to the creation of a collective allergy to friction (ibid). In a nutshell, the design of anesthetic surfaces shaped neglect (Auger 2018). Already, practitioners in the field are trying to reframe design questions and incite a deeper look into the intimate relationship between “design” and “humans” (see Istanbul Design Biennale 2016; Colomina and Wigley 2016; Auger 2018; Monteiro 2019).

Much of the thinking in this research is influenced by the philosophy of Vilem Flusser on what constitutes a more responsible approach to design: “Objects of use are therefore mediations (media) between myself and other people, not just objects. They are not just objective but inter-subjective as well, not just problematic but dialogic as well” (Flusser 1999: 58). This approach is furthered by sociologist Elisabeth Heindenreich (2009), who urges practitioners to “make ‘visible’ the invisible processes of flow” and design “concrete experience and sensual perception.” Operating as such, design can be a signifying practice that generates, analyses, distributes, mediates and reproduces social meaning (Mitrovic 2015: 9). It can prove capable of being responsible, moving past reaffirming modern society into questioning “what understanding of human life is embodied in the prevailing technical arrangements” (Feenberg 2002: 19). So I ask: Once design becomes interested in alternative instead of better, couldn’t it be used to redefine our relationships now and in the future?

A literal call to friction in design is made by Laschke, Diefenbach, and Hassenzahl (2015). They coined the term “The Aesthetic of Friction”, which, in their words, “aims at creating friction (mainly through choice) to highlight and suggest behavioral alternatives to established routines. However, it does so in a light, often naïve, understanding or even ironic way” (Hassenzahl and Laschke 2015). Laschke et al’s act of making behavioral alternatives visible speaks of the same dialogic property proposed by Flusser (1999) and Heindenreich (2009). It is through this dialogic property

that designs gain agency, making their technology visible, engaging humans in conversations and proposing new narratives of use. They theorize a set of principles, which invite reflection: (1) situatedness - they benefit from and are part of a story, (2) alternative - “offers an alternative in line with ideal of self” , (3) freedom - they rescript moments of choice, and (4) meaning-making - invite people to reflect on the goal of the act (Hassenzahl and Laschke 2015).

A concern emerges here as they also recognize that, while scoping for reflection, friction can provoke resistance from users (Hassenzahl and Laschke 2015). They resolve this by trying to ease the interaction with an addition of principles: (5) naivety - don't outsmart the users, (6) understanding - “they embody to embody a better Self, but allow for transgression” , and (7) irony/ ambiguity - they never create choices, but subvert existing ones (Hassenzahl and Laschke 2015). When designing with these principles in mind, the *hidden interiorities* and energy flows are revealed and more engaged relationships form which are “effective in deepening user's perception of environmental connections” (Anusas and Ingold 2013: 62). For this reason, these principles will be revisited and considered throughout the development of this research.

Fig. 1
Matthias Laschke's The
Never Hungry Caterpillar.
(Image credits: Matthias
Laschke's The Never
Hungry Caterpillar 2011)



Above, Matthias Laschke's *The Never Hungry Caterpillar* is an extension cord that does not hide the energy which flows within. The movement of the “bodily” gestures of the caterpillar are responsive to the draws of energy of the plugged-in device and is “intended to engage its owner into a dialogue about wasting energy with devices in stand-by” (2011). Once users engage with the material agency of the material world, more active relationships can form, while gaining a deeper understanding of resource consumption.

On a similar logic of thought to that of *The Aesthetic of Friction* operates the majority of Critical Design practices. A similar intention prevails - the underlying act of suspending a narrative via friction, to invite a critical inquiry through artifacts that appear mundane, familiar, and ironic. In this space, one practice seems to gain more ground and popularity: Speculative Design, pioneered by Anthony Dunne and Fiona Raby (2013). And rightfully so, as this practice proves very apt at provoking. In this territory live the critical works of Dunne and Fiona themselves, Julian Bleecker, Nick Foster, Bernhard Hopfengärnter, James Auger, Superflux, Jan Boelen, and Sputniko! to name a few. However, this approach proves a bit problematic, as reflection in this space falls short of agency. What I mean, is that effecting change is not visible enough because the alternative realities

proposed are situated within a speculated “detached space”. Recognizing this drawback, practitioners such as Dr. Alexandra Daisy Ginsberg, James Bridle, and Case Amber are careful to situate themselves more or less outside of the practice of Speculative Design. Concerning the interrogation of better, their practices stand out. While, on a meta-level, their themes and methodologies differ, what they have in common is that they prefer working with present narratives. While this could be considered similar to the use of speculated narrative in the alternative presents of Speculative Design, their approach differs fundamentally, in that their focus is on existing objects. The intention is to break their *surfaces* and make their ties to the material world visible. They attribute this choice to the fact that present narratives inspire more agency than future ones.

Fig. 2
Dr. Alexandra Daisy
Ginsberg’s *The Substitute*.
(Image credits: Dr.
Alexandra Daisy
Ginsberg, Video still from
The Substitute, 2019)



Pictured above, Ginsberg explores the paradox of “our preoccupation with creating new life forms, while neglecting existing ones.” (Ginsberg 2019). After the death of the last male northern white rhinoceros, we found ourselves comforted by the thought that, in the future, biotechnology could bring it back. Ginsberg, however, puts the promise of biotechnology under a big question mark and draws our attention to how science and design work keep a singular detached view of the material world. The rhino learns to be a rhino by interacting with its environment, which, in wild life, tends to be other rhinos - so if this network is gone, will this still be a rhino?

Taking critical interrogations of our relationship with objects even further, H el ene Day Fraser coined Critical Use, situated beyond the footprint of Critical Design (2017). Here, the focus is on engagements and use practices of artefacts for both design and research purposes (Fraser 2017). The main difference with the majority of Critical Design practices is that it moves the user from a “detached space” into ongoing participation (ibid). Unlike Speculative Design, an existing narrative of consumption forms the basis of the design activity. A disruptive artifact is introduced to stretch this narrative beyond a spectacle and into active participation.

When put to Use/used the designed artifact confounds [...] They have to deal with the uncertainty of the form and their ability to maintain usual relations with space, time, and the social encounters that shape them. They have to improvise, tell stories, create new structures, new body movements (to go through doorways, up stairs, round corners) [...] And as they document and move forward they identify new sets and patterns that might be accessible. They consider new

approachable behaviors, criteria, and aspects of use that make things meaningful and allow the user (themselves and others) to engage with a wide range of qualities of the environment (social, political, ecological) in different ways. (Fraser 2017: 11)

The specificity lies in how Fraser sees artefacts: as *quasi-disrupted forms* they are not the results of the process, but a means to achieving it (ibid). The use of friction invites confusion, surprise, doubt, introspection, improvisations, and, most importantly, reevaluation of knowledge. In this logic of Critical Use I see the reflection of Ingold's concept of thinking through making - that knowledge comes from our practical and observational engagements with the material world (Ingold 2012).

Dealing with food, Dutch designer Marije Vogelzang, seems to draw on similar ideas as those of Critical Uses in her practice to invite reflection. I say this because her work aptly uses food to construct new and unexpected narratives. She transforms not the ingredients themselves, but how they are perceived, engaged, and consumed. The contact with food is made visible by accentuating certain acts of eating, creating the right amount of uncomfortable friction to start reflection and point towards discussion.

Fig. 3
Marjie Vogelzang's Eat
Love Budapest



In "Eat Love Budapest" participants are fed dishes by Roma women while listening to their life stories. However, there is a curtain between the two, so the visitor can see only their hands as they feed him/her. The dishes served are cooked by and have personal meaning for each Roma woman. I find that the powerful aspect of this experience lies in its integrity - Marjie Vogelzang is creating a space which amplifies the already existing correspondence between humans and their food: that consuming food is always weaved with relationships and meaning, making the dish inseparable from the people who cooked it and their stories. When she brings the dish and the Roma women together behind the curtain, she is aptly rearranging and exaggerating a certain dimension to articulate these relationships. Even more, the performance aspect adds to the quality of the engagement and the experience of being fed by a stranger belonging to a prejudiced ethnic minority invites friction and reflection.

conclusion

Building on this practice of Aesthetic of Friction and Critical Use I argue that we are currently in a passive interaction with food. And I ask what is better about this. Is the current human engagement with food practices leading to better humans? Better diets? Better lives? Better relationships? Better planet? Better understanding? Better health? Better jobs? Better taste? Given the extent of transformation an ingredient can take, how much involvement it can allow, and how much longevity it can earn, we are barely scratching the surface. Moreover, from a scientific point of view, we are ninety percent bacteria (Pollan 2013). Once this becomes visible, then the question of better loses even its human context - is "dead" food better? Is a starving microbiome better? Are engineered probiotics better? Is fermentation better? Through friction and critical use of fermentation, I want to propose that, when we understand relationships to be in perpetual dialogue between mutable entities, definitions of better are, in fact, obstacles. The next chapter opens up the practice of fermentation and it aims to give an overview of what fermentation is. Then, it presents what aspects of fermentation interest this thesis, and how a phenomenological approach is suited for that.

3.

fermentation

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the practice: what does it *do*? 34

 microbial transformation 34

 material transformation 36

 meaning making 38

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the phenomena: what to look *at*? 40

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It is important to recognize, however, that fermentation is a natural phenomenon much broader than human culinary practices; cells in our bodies are capable of fermentation. In other words, humans did not invent or create fermentation; it would be more accurate to state that fermentation created us. (Katz 2012: 1)

As the last chapter highlights the importance of experiences that go beyond affirming, the design opportunity I see emerging out of this new space of inquiry is to find ways to expand the possible roles people and food take in the axis of their relationship. In view of this, this chapter discusses the subversive nature of fermentation and positions it as a topic and means of researching friction in (food) design.

Being centered on communicability, the practice of fermentation is the embodiment of friction in food. It is often misinterpreted as not efficient, clean, homogenous, predictable, or convenient (ironically, a closer look at fermentation proves that fermentation can be supremely efficient, clean, convenient, and predictable). The properties associated with ferments fall rather on the side of messy, smelly, tedious, funky, wild, and accidental. But most importantly for this research, fermentation is the act of knowledge making, by recognizing the agency of non-humans (microbes) and trying to work together with them. The ferments bare the hand of microbes, as much as that of the human. Quite literally. *Son-mat* is a term derived from Korean culture, which translates as hand-taste. It is a word used by Korean grandmothers to describe the taste of something that is made by the hand and the taste of those who made it (Zilber 2020). The becoming happens together. Truly, there is probably not another food process which involves people and the material world so intimately and actively. In the next sections of this chapter, an argumentation for this point of view is made. Still, while the information is inclusive, it is by no means considered exhaustive for a couple of reasons. Firstly, fermentation is a complex process, and can be a very lengthy topic, so I will deal only with the information important for this thesis. Also, due to the imposed quarantine and sudden restriction to certain resources, the thesis focused mainly on the Lactic acid fermentation of vegetables; therefore, the majority of the discourse is situated within this territory.

²² Environmental variables that can be manipulated include temperature, humidity, light intensity, time, but also condiments

²³ By breaking down sugars into more stable forms. For example milk into cheese, or grapes into wine

²⁴ For example in the case of soybeans, they take less time to cook through if they are fermented before cooking (Katz 2012)

²⁵ During the fermentation process, bacteria break down sugars and starches, pre-digesting the food and rendering it more nutritious and digestible. This is why starch is resistant to digestion in flour but less so in bread

²⁶ This method produces sauerkraut, kimchi, yoghurt, pickles (in salt brine, not vinegar brine), and sourdough bread

²⁷ This method produces wine and beer

²⁸ This method produces vinegar and kombucha

the theory: what *is* fermentation?

To ferment is to manipulate the environment²² in order to facilitate the growth of specific strains of microorganisms (yeasts, molds, bacteria) with the intent of changing the flavour, perishability²³, energy efficiency²⁴, or digestivity of food²⁵ (Katz 2012). To perform this transformation, microorganisms need energy, which they obtain from microbial-friendly environments where there is enough sugar available (usually in the form of carbohydrates from food). Under such circumstances microbes engage in metabolic processes and convert sugars into either alcohol or acids. Based on the specialization of microbes to convert certain substances into others, there are three main types of fermentation: lactic acid²⁶, ethanol/alcohol²⁷ and acetic acid²⁸.

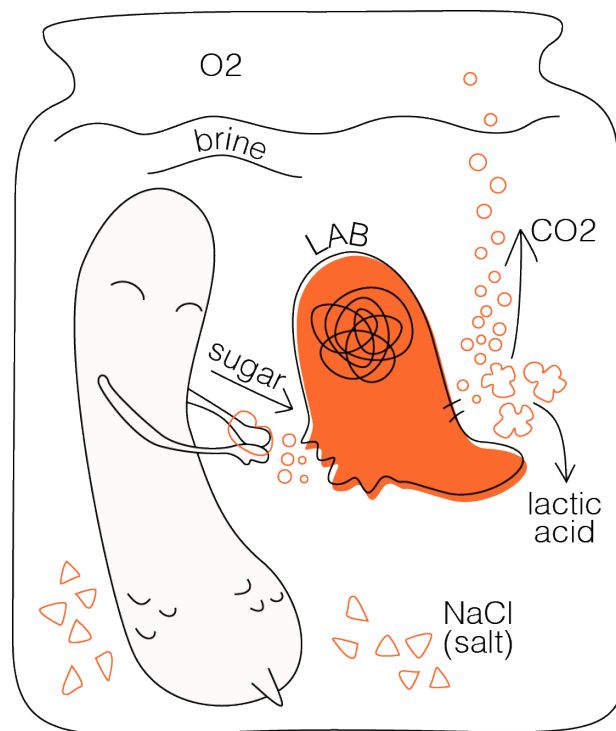


Fig. 4
General representation of the metabolic process during the lacto-fermentation of vegetables. With the help of nothing more than salt, LAB are able to perform amazing transformations

Due to the time constraint of the thesis, as well as the imposed national quarantine and sudden restriction to resources, this thesis dwells mostly in lactic acid fermentation (from now on referred to as lacto-fermentation). Therefore, before getting into the phenomena of fermentation, I proceed with a general overview of what lacto-fermentation is. Luckily, this type of fermentation is pretty straight forward. In a nutshell, the process can be reduced to a couple of fundamentals. Start with a given amount of produce, weight it, add 2% salt by weight, and wait. The waiting time depends on personal taste, as in what is the preferred sourness of the final product: the more time it passes, the more the ingredient's own taste gives way to sourness. Also, it is good to know that anything with sugar can be lacto-fermented (Redzepi and Zilber 2018).

Now let's see how this transformation takes place. Lacto-fermentation is made possible by the lactic acid bacteria, also known as Lactobacillales or, in short, LAB (Katz 2012; Redzepi and Zilber 2018). As stated above, bacteria rely on sugar for their metabolic process. Therefore, LAB consume carbohydrates (mostly in the form of sugar) and generate lactic acid and CO₂, as a by-product of their metabolism (see Fig. 4). This is where the sour taste of pickles, sauerkraut, kefir, and sourdough comes from. Also, CO₂ is behind the aerated sourdough, the fizzy pickle or fizzy beer.

Furthermore, lacto-fermentation is also supported by the addition of salt. In general, LAB are acid- and salt-tolerant bacteria (Redzepi and Zilber 2018). More so than bacteria which are detrimental to fermentation. Therefore, the addition of a % of salt in fermentation aims to create an environment for the propagation of lactic acid bacteria in the detriment of others, in order to keep the ingredient edible for longer. Already, knowing that anything with sugar and added salt can be lacto-fermented, brings so many questions: why restrict this transformation to the occasional pickle or sauerkraut? Why even restrict a sweet plum to be sweet, and why not discover it anew?

Fig. 5-6
Visual and audio cues on how the process is developing. Transformation of cauliflower ferment after 2 days due to the natural by-products of the fermentation process. Very active and long bubbling as a result of CO₂ build-up; the visible haziness of the brine is due to a combination of lactic acid and yeast - a sign that LABs are alive and well.



Fig. 7-8
Visual cues on how the process is developing. Transformation of cauliflower ferment after 2 days due to the natural by-products of the fermentation process. The visible haziness of the brine is due to a combination of lactic acid and yeast - a sign that LABs are alive and well.

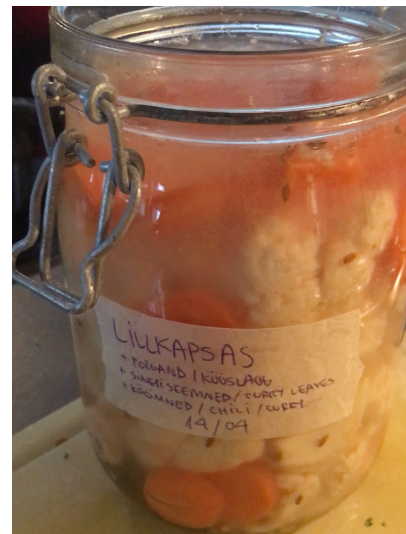


Fig. 9 (left)
Visual cues on how the process is developing. The visible moment when my sourdough starter is ready: the bubbles and the fact that the mass is double in size means that the starter is already producing the necessary CO₂ to be used in baking



Fig. 10 (right)
Visual cues on how the process is developing. Discoloration due to oxidation in the radishes in the top of the jar, most likely because they were sitting out of the brine for 2 days.



the practice: what does it *do*?

Fermentation does more than just change the tangible materiality of food and keep it edible for longer. It transforms the relationship between food and humans on a deeper level. In their initial form, food molecules are too complex for human bodies to record and process on their own. This means that alone, our bodies cannot record the sweet and umami taste of starches and proteins, nor can they digest certain proteins to assimilate their nutrition (Katz 2012; Redzepi and Zilber 2018). However, microorganisms can break down these large molecules through fermentation, rendering them into more soluble forms (Chava, Chavan, and Kadam 1988). In a nutshell, when fermented, food becomes more delicious and nutritious; only think about the intense savouriness of an older (longer fermented) cheese.

Essentially, fermentation is a collaboration between microbes and humans. Through fermentation, microorganisms extract the raw material they need from food, which transforms the complicated molecules of food into the extract raw material our bodies need from food. That is their job, but, in order to do so, they need certain environmental conditions. Now, this is our job - to pay attention, provide, and intervene. It is a symbiosis, one that needs both parties actively engaged in the transformation of food.

With this in mind, this section discusses what the practice of fermentation can *do* - both in itself and as a practice in the context of this thesis. While not an exhaustive list of fermentation related phenomena, the following are the aspects that shape the focus and direction of this research. They are chosen because they have a potential to inspire ways of building active engagement with food. The length or order of the paragraphs should not be taken as an indicator of importance or priority; rather, they are discussed in the order which they unfolded during the research; their length is due to some topics demanding more context than others.

microbial transformation

First and foremost, it is impossible to talk about the uniqueness of fermentation without talking about microbes. They are everywhere, but become especially visible during fermentation. This is evident even in the origin of the word itself: derived from the latin “fervere” which means to boil, fermentation is meant to describe the human observation of the active bubbling of the ferment (Katz 2012). However, this apparent boiling has nothing to do with heat and everything to do with microbes - it is caused by the CO₂ by-product of fermentation. In the meanwhile, the more science evolved, the more we could see what we previously couldn't. It turns out that more than 90 percent of the living matter on earth consists of microorganisms and viruses (Mann 1991). And things get even crazier when we look inwards - the average human body hosts 100 trillion of microorganisms, which form communities all over the inside and outside of the human body. These microbial communities are referred to as “microbiota” - there is one in the belly button, one in the vaginal flora, one in the armpit. The biggest one is the gut microbiota, with tens of trillions of microbes (Bengmark 2013). These communities are responsible for regulating our bodily functions. Alternatively, the sum of all these communities and their collective genes is known as the “microbiome”.

This invisible world paints an interesting picture of the human body - we now know that for every one human cell there are nine microbial ones, which makes us ninety percent bacteria (Margulis and Sagan 2007; Katz 2012; Pollan 2013). This speaks of our interconnectedness with the surrounding world on a deeper level, and blurs the boundaries we place on food when we think of the latter as edible, nutritious, efficient, healthy. In fact, without exaggerating, microorganisms are the safekeepers for humanity and life as we know it. In a conversation with Charles Mann, Lynn Margulis speaks of the ability of bacteria:

Microorganisms do things undreamed of by clumsy mammals like us: form giant supercolonies, reproduce either asexually or by swapping genes with others, routinely incorporate DNA from entirely unrelated species, merge into symbiotic beings—the list is as endless as it is amazing. Microorganisms have changed the face of the earth, crumbling stone and even giving rise to the oxygen we breathe. Compared to this power and diversity, [...] pandas and polar bears were biological epiphenomena—interesting and fun, perhaps, but not actually significant. (Mann 2013)

This ability to swap genetic information by *lateral transfer* is what makes bacteria “genetically fluid” (Katz 2012: 29). In short, this indicates that they possess a formidable ability to adapt to their environment (Margulis and Sagan 2007; Pollan 2013). Think of it like this - genetic information is like a set of tools bacteria carry around that help them survive their environment. Whenever they come in contact with other bacteria, they can share these tools, while continuously building and updating a library of these. As soon as a tool is rendered useless because of changes in the environment, they can drop it and pick up a better one. So, the more bacteria come in contact with the environment via other bacteria, the better access they have to evaluate and adapt to their surroundings. This gives an initial idea about the need to design for openness and inter-species communication because “coevolution affects all beings involved, too infinitely compounded to be predictable. We cannot *control* coevolutionary fate; we can only *adapt* to shifting conditions as best we can” (Katz 2012, 14).

Given all this, *diversity* in the human gut microbiota is what determines a healthier organism. Here I refer to the gut because the biggest concentration of bacteria in humans is in the gut microbiota, and also because of the gut’s proven ability to influence not only the body (Bengmark 2013), but also the brain (Foster and Neufeld 2013). Unfortunately, western modern diets are starving our microbiota because “we are eating for one instead of a trillion (Pollan 2013: 19). The product of a system which celebrates homogeneity, efficiency, and sterilization, processed food can be described as dead food; devoid of microbial genes that encourage genetic stimulation and endow “us with functional features that we have not had to evolve ourselves.” (Katz 2012: 58). In short, without bacteria-rich living food, humans cannot adapt to their environments. Thus, we deny bacteria their space at great risk: scientists are attributing most modern western diseases²⁹ (from obesity to depression) to the manifestation of poor microbiota (Katz 2012; Pollan 2013). Therefore, if the intention is to evolve, the way to do so is not by detaching ourselves from the material world via surfaces, but diving deep into it. Herein lies another glimpse of how food and people can become together - viewing eating not as a singular act fixed in point and time, but a “tapestry of interwoven lines” (Anusas and Ingold 2013: 66).

²⁹ The literature refers to diseases affecting digestion (Leser, Thomas D., and Lars Mølbak 2009), metabolic system (Pollan 2013), immune system (Bengmark 2013) and physical health (Mazmanian, Sarkis K., June L. Round, and Dennis L. Kasper. 2008), cognition, mood, and social relationships (Moeller, Andrew H., Steffen Foerster, Michael L. Wilson, Anne E. Pusey, Beatrice H. Hahn, and Howard Ochman 2016)

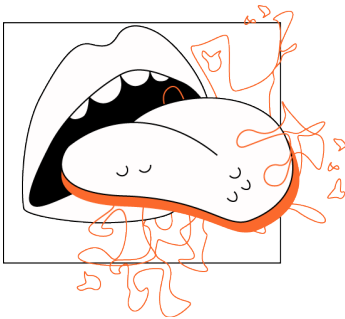
Nowadays, the world of bacteria has gained a lot of momentum and their presence has become acute. However, while critical, it would be a mistake to talk about bacteria as good or bad. If they are to teach us anything, that is to live in *symbiosis*. And, in a symbiotic relationship, roles are not fixed - a mutually beneficial relationship can become parasitic (Yong 2016b). There is no unidimensional better. Thus, the human effort to catalogue and streamline the environment leads to wrong conclusions, insomuch as the question is one of causality and not of affect. Insofar, the intentions have been to identify which certain bacteria is to blame for what disease, and then try to eliminate it (Mazmanian et al 2008; Irvine 2012; Specter 2012). Or, alternatively, which bacteria to celebrate and try to promote, for example in probiotic yoghurt (Yong 2016a). This approach proves problematic because bacteria live in symbiosis and cannot be understood outside of their ecosystem (Mazmanian et al 2008; Irvine 2012; Specter 2012). Their roles are fluid and respond to the changes in the ecosystem. They are not part of causal relationships, but of networks. As Sandor Katz writes, “without denying that specific probiotic bacteria may turn out to be powerful therapeutic agents, it seems shortsighted to get too caught up in the search for perfect probiotic strains when we know how genetically fluid bacteria are. In bacterial populations, what we define as specific species and strains do not necessarily remain stable” (2012: 29). For this reason, efforts to categorize and celebrate some bacteria over others are futile and, more often than not, result in harm done (Mazmanian et al 2008). Therefore, while fermentation can be instrumental to attaining specific health goals, this research pursues the aspects which succeed in inviting, communicating and sustaining diversity.

material transformation

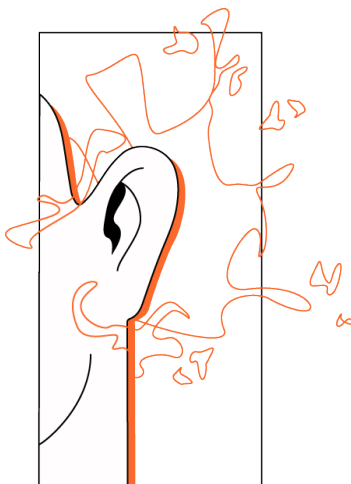
Fermentation is a sensorial practice, highly experiential and interactive. It unfolds and is guided by the communication between the ferment and the fermentor - this communication happens via sensorial embodied experiences of taste, smell, vision, hearing, and touch. The human senses and emotions become the way to actively navigate this sensorial and corporeal space; they are deeply engaged, trusted, and followed. This relationship grows and transforms over time, with accumulation of knowledge, confidence, and creative freedom.

Similar to the terroir of wine, *microbial terroir* is a term which is used to describe the way in which microbes indigenous to any given region will always have their say in the flavor of the final product. What this means, is that any ferment is a tale of time and place. In addition to that, the fermentor’s own microbiome can also influence the taste, which is known as *hand taste* (already discussed on page 31). Therefore, the quotidian act of fermentation gives individuals a way to engage with the world, as fermented foods become an expression of the fermentor and of the place he/she lives in. The transformation of taste, texture, sound, color, and smell offers plasticity to ingredients, as they become open to numerous ways of being. During fermentation, the presence of bacteria introduces variables, thus, this process is characterized by *adaptation* and not control. The fermentor and the ferment are *mutually affected*. It is precisely these intimate moments, the sensual and communicative aspects of fermentation, that this thesis is interested in. As it moves forward, the research is especially concerned with the way food is perceived during fermentation; what interaction it asks for; what experiences it is able to offer and why.

3.
fermentation
37



3.
fermentation



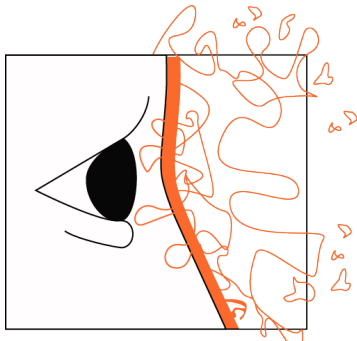
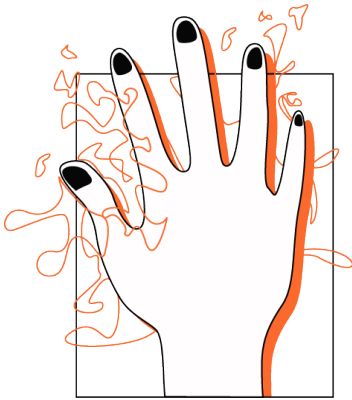
TASTE. From a flavour point of view, fermentation creates strong, compelling flavors (Katz 2012: 137). Fermented products have an essential flavour quality, which is mostly described as umami (i.e. cheese, salami, miso, soya, etc), but also sour and acidic. Umami flavour has quite a nice story to it - it is discovered by the Japanese chemist Kikunae Ikeda in 1908, during his attempt to understand what makes his wife's soup so tasty (Lindemann et al 2002). The term translates as a "pleasant savoury taste", and its flavour profile is very rich, lingering, and deeply satisfying (ibid). In addition, fermentation also produces acidic flavours, which have an equally strong impact on the experience of taste because acidic taste produces the most saliva in the mouth. Thus, acid is an "integral part of some of our most pleasurable eating experiences". (Nostrat 2017: 106). This interplay between umami and acid makes eating ferments a very potent and sensual embodied experience, with a lot of opportunities for the ferment to affect via taste.

However, the tasting experience is as strong as elusive. Most of the time, the taste of fermented food is familiar, but only for a second. Then, I have to chase after the taste, find the proper words. Especially when I use foods that I know quite well, their fermented versions surprise me. I find their indeterminism refreshing and challenging. When I taste a ferment of grated carrot, lemon, and thyme, I am never able to reproduce the taste in speech in a satisfactory way. I simply lack the words. The closest I come to describing the taste is "zing". And that is because it is the only word that captures the flavour as a movement, as it quickly appears and disappears in my mouth. In that moment, my body is knowledgeable, and it knows before my mind. Through taste, I learn that food has a fluidity of meaning: a carrot can be more than the one I know to reproduce. Thus, "carrot" is no one place in time and space, but a multitude of emerging alternative realities, accessible only from within, by engaging with one's senses. For this reason, where one constructs the boundaries around what is edible or palatable, is highly subjective and relies on embodied knowledge - both of self and the ferment.

SMELL. The unpleasant smell of fermentation keeps fermentors away from poisoning themselves with rotten food. Just like taste, one learns how to navigate the space between fresh and rotten by smelling. Also, similarly to how taste contains multitudes of experiences, so does smell. As throughout this thesis I am involved with mostly lacto-fermented vegetables, the smells that I get to experience are mostly acidic and sour. Quite pungent and mostly intensifying over time. However, far from rotten, these smells carry earthy, spicy tones, sometimes warm, depending on the spices inside. In contrast, rotten smells accommodate sweet tones, sometimes almost alcoholic.

Smelling is something that I do much often now that I am fermenting. It comes before tasting. Most of the time, it also comes before seeing, as the kitchen is filled with the smells of the ferments. Since it is the sense that has the strongest connection to memory (Willander and Larsson 2006), I find that smell motivates my creativity and reflection the most. I can imagine what the taste is like based on the smell. However, interestingly, smell does not always match the taste. While sometimes smell is a good indicator for the taste, other times (especially with older ferments) the smells are much stronger than the actual flavour. This asymmetry furthers the fluidity of form.

SOUND. During my lactic fermentations, I can hear the microbes at work. For example, cabbage makes for a very active ferment, so even on the second day, when I open the jar, the build-up of CO₂ makes the act sound like a burp. Akin to opening a fizzy drink, the burp is followed by the movement of numerous bubbles rushing to the top, animating the whole jar. This really makes the ferment sound and look alive.



TOUCH. The texture is most obvious during the making and the tasting of the ferment. Being involved mostly in lacto fermentation of vegetables, most of my fermentations require a good amount of time spent massaging the ingredients. During this act, the body and the material move in correspondence - the texture softens and gives out liquid as the hands tire. This is another way of knowing the food, by their will to give in to pressure; perhaps correlated with their water content because cabbage and onion are stubborn, whereas red radishes and cucumbers are more malleable.

APPEARANCE. During fermentation, colors usually dilute into a common shade, influenced by the pigments of the food. Sometimes, colors can get very bright (beetroot, red cabbage, plums); other times, they are toned pastel shades (red radish; cucumbers, white cabbage). However, due to chemical reactions, colors can also be surprising. For example, my favourite part about how fermented cucumbers look like, is the garlic I add for flavour. While most of the ingredients give their colors away, settling in for a shade of faded green, the garlic does its own thing - it becomes electric blue. This happens because garlic contains sulfur and amino acids, which, when combined, can create blue pigments. When they come in contact with the acid produced by LAB during lactic fermentation, this reaction is more likely to take place and release the color.

Ferments also move around or grow. Pushed by the buildup of CO₂, the fresh young sauerkraut rises to the top, inviting me to push it back down. The older one however, sinks to the bottom. My sourdough mother expands and doubles her size after every feeding, letting me know it is alive and well. Then, it slowly collapses back to her initial size, announcing that she's ready to eat again.

meaning making

Eating is a highly subjective experience. Chances are, my preference for saltiness is not the same as yours. Therefore it seems rather odd that, in consumer culture, the meaning attributed to food is rather homogenous, dualistic, and frankly, boring. Food is rarely allowed to exist outside of universal definitions, or to take on new meanings. Rather, its ability to maintain its given meaning is encouraged and measured. Ascribed to a number, food is good before or bad after; healthy or unhealthy; cheap or expensive. Other times the norm is a size, color, or how good it looks in a picture. Food is enclosed in a surface and becomes an object. Milk is milk; kefir is kefir. However, underneath the surface kefir is fermented milk - soured milk, almost rotten. Same goes for grapes and wine, coco beans and chocolate, flour and bread. Some of the tasties and most important foods in our diets are fermented - they are allowed to rot, renounce their current form, and become something else. So why put a boundary on any of the foods we encounter? Through fermentation, fermentors can use their mindful bodies via taste, texture, smell, touch, and hearing to change what perishability means, what doneness means, what rotten means, what alive means.

To ferment is to undergo something yourself - an investment into a project turns into an investment into your own future. This is a stark contrast to the intentions of modern design to sell already made "betters" to people. Therefore, I might go as far as to say that, in this way, fermentation is the opposite of human-centered design. Fermentors make their own "betters", and they do so by being in an active relationship with the ferment: they

experience the ferment through their senses (embodied experiences) and engage in mutually affecting each other (mutual affect). The result of these interactions between fermenters and ferments are always evolving, helping to construct knowledge. Fermentors become more aware of food's ability to act and become, and thus, more engaged narratives of uses emerge. This would imply that, akin to categorizing microbes, labels we currently attribute to food "don't work as definitive badges of identity" (Yong 2016b). Rather, these categories are more like temporary "states of being, like hungry or awake or alive, or behaviours like cooperating or fighting" that "describe how two partners relate to one another at a given time and place" (ibid). It suggests that more active engagements can test and expand the current boundaries we place on ourselves and food.

knowledge creation

Being an extremely ancient and complex practice, fermentation is an accumulation of wisdom. Even without the current scientific knowledge of microbes, fermentation is successfully practiced for thousands of years (Katz 2012). This is, perhaps, because it implies a different kind of knowledge, a more empirical one, that stems from the knowing body. Practitioners don't have to master the science behind - instead they rely on active engagements, exploring and understanding how to nourish and nurture it. The widespread application of fermentation stands as a testimony of this embodied knowledge. What is interesting, is that over the years, different human communities and cultures learn to ferment independently and differently from each other. This attests to the omnipresence and ubiquitousness of fermentation, while still situating it in close proximity to the body of the fermentor and its surroundings.

Also, from a historical point of view, acquiring this type of knowledge has a completely decisive effect on how people live for one additional reason: preservation. If one can preserve food longer (especially the very indispensable but perishable fats and proteins such as meats, fish, milk products), the whole dynamic of life changes. One can have more nutritious meals, more time for things that are not related to food acquisition, more food available in dry or cold periods. In short, through fermentation, one can experience food and its surrounding differently. Fermentation does not teach how to control, but how to align one's interests with that of the surrounding world: preserve the abundance of summer for harsh winter days. The fermentation practitioner quickly learns that "the drive for absolute control leads to unanticipated forms of disorder" (Pollan 2013, 20). Non-humans are not our servants and we are not the masters.

the phenomena: what to look *at*?

Food affords to be experienced (tasted, smelled, etc.) at any point during the process to decide it's "doneness". This encounter with new tastes and smells leaves an impression and invites the fermentor to think and perceive when and why a ferment is done. With time, the fermentors taste affords for more unusual flavours, which in turns affects the perception of the ferment, and leaves a new impression on what is a preferred taste. It is through dialogues such as these that food and fermentor become together. Gaining this embodied knowledge leads to new ways of being-in-the-world. By allowing food to transmute through fermentation, mere food ingredients may start signifying thoughts, actions, places, people, and sustain more active engagements. Here I ask: What world is disclosed through the act of fermentation? What aspects of the act of fermentation afford reflective relationships?

The previous chapter discusses the importance of the experiences that constitute fermentation - such as making and consuming the ferment - as a source for inquiry. This current chapter underlies the main theoretical background from which I derive to explore and interpret the findings. Firstly, I give a general sense of what phenomenology is and how I am looking at fermentation from a phenomenological point of view. The process of fermentation is understood from a phenomenological standpoint, where the ferment and the fermentor are relational and mutually affecting each other. Through their *patterns of use*, food directly affects experiences, thus, agencies should be considered when talking about relationships between the ferment and the fermentor. After that, the emphasis on embodied experience opened the research to the theory of correspondence, where agency is seen as a negotiation between humans and food. While the aforementioned concepts explain how food and humans interact, the Deluzian notion of becoming is understood as the knowledge of the world, which results from this negotiation.

investigating a phenomena

In the beginning of the research, the discussions with my informants always carry a primal and ambiguous undertone, something as present as it was elusive. I become endlessly curious about what that is that they are communicating beyond their words. What is happening in those moments of contact between the ferment and the fermentor? What animates this reciprocal relationship? I didn't know it yet, but it is then, as I am furthering questions about the *lived experience*³⁰, that I make my first steps towards viewing fermentation as a phenomenon to be explored. Afterwards, as I start experimenting with fermentation myself, the initial interviews are constantly revisited and re-understood, using my own lived experience as a meditation and reflection. My understanding of others and their experiences transforms, influenced by the kind of experiences I find myself in. It is for this reason that a phenomenological approach allows me to research and communicate fermentation in the fluid and animated ways in which the informants and I experience it.

³⁰ Lived experience is a concept in phenomenology that refers to the understanding and representation of the experience of those who lived it. It is an interpretive process, situated in the body of the individual, when knowledge is accessed through experience

Immediately appealing is that, within phenomenological tradition, there is a rejection of deterministic and objective approaches that try to model people's behaviors and identity into rigid frameworks. This is important because it gives me a theoretical anchor to explore friction as an agent against homogenization within design practice. Notably, phenomenological methodology is in itself fluid, modeling itself after people's experiences, recognizing them to be subjective embodiments and thus unique. Particularly, "an essential characteristic of embodiment is interdeterminacy" (Csordas and Harwood 1994: 4 cit Merleau-Ponty 1962). Subsequently, in the phenomenological view, the more an experience is cast in an abstract and systemic way, the more it is distanced from its essence (Jackson 1996). This is one of the main sources of struggle and frustrations that occurs during this thesis. The phenomenological "attempt to describe human consciousness in its lived immediacy, before it is subject to theoretical elaboration or conceptual systematizing" (Jackson 1996: 2) collides with the designerly ways of casting experience into Cartesian models and graphs.

Staying true to itself, phenomenology itself is more of an attitude, a way of being and doing, than a systematic model. It is rooted in different schools of philosophy, and various disciplines have borrowed from them to forward approaches on what constitutes *being-in-the-world*³¹ (Heidegger 1962). From these discussions, I find interesting the focus on embodiment proposed by the French philosopher Merleau-Ponty (2012). He attributes our being-in-the-world to our bodily being, and suggests that consciousness is initiated by the body's "I can" rather than the mind's "I think that" (ibid: 139). As he puts more emphasis on the body than Husserl and Heidegger, he treats it in a similar respect to how this thesis treats the fermentor's body during fermentation: as the perceiver, the knower, the agent. In Merleau-Ponty's phenomenological thought, the body is not detached from the mind. On the contrary, the body is mindful - a joint vehicle for understanding and gaining knowledge. Our embodied relationships play a role in how we gain understanding of the world (Csordas and Harwood 1994). Therefore, phenomenology looks at the body-as-subject rather than the body-as-object, i.e. the interdependent body exists in a dynamic environment, acting as an agent and being acted upon by other body-as-agents in a collective meaning making (Gallagher nd).

³¹ Being-in-the-world is the term Heidegger used to describe an entity who is not distinguished from the world, but is inseparable from it. He offers the image of the craftsman as that of being-in-the-world, who knows his craft by engaging in his craft, rather than explaining it (Heidegger 1962)

Stemming from my understanding of phenomenology, in this work I rely on the fact that the quality of our being-in-the-world is the result of mutual relationships with the material world and with each other - which are always under construction. Thus, a design study into the phenomenon of fermentation can broaden the understanding on what food can offer to lived experiences. Fermentation is a body-centered practice, where *being* is informed by the explorations of the sensorial body: fermenting exists alongside tasting, touching, feeling, hearing, smelling, and looking. As the ferment and the fermentor come in contact, friction produces information: How does taste make me feel or act? Do the colors intimidate or give confidence? What texture feels right? What does salty mean? What is the action of time? Or temperature? Can I taste the hands of the maker? Can I smell the place it came from? These are all questions which invite the agency of both humans and food into the discussion of experience and propose that they are dependent on one another, co-shaping their *being-in-the-world*. The way in which food is able to manifest its agency is further elaborated in the next paragraph. Essentially, it is through such arguments that I hope to persuade you of the idea that the fermentor and the ferment get along, not in the absence, but in the balance of friction in their affects.

Such a phenomenological glance at the relationships between human bodies and ferments suggests that they are not only entwined, but responsible for redefining each other (Verbeek 2005). Above I introduce the idea that, more than just being recruited for human interests, food has agency of its own. To demonstrate, I use the concept of acquired taste - through prolonged exposure, a negotiation occurs, where what is at first considered unpalatable becomes pleasant. The unfamiliar taste affects embodied experience, but at the same time the process also happens in the opposite direction, as the unfamiliar becomes familiar. As a result of this negotiation, a redefined taste emerges, but a temporary one that is already on its way to becoming something else. Therefore, the potential of our contact with ferments lies, to me, in how they can affect the fermentor's experiences of the world, how they negotiate, and what roles fermentors and ferments assume as a result of these negotiations. More than its ability to preserve or enhance food, I am interested in fermentation's ability to create unfamiliar spaces that are navigated by food and people together.

the body's correspondence

In this chaos of mutual affects it becomes possible to decentralize the agency of humans. Rather than casting all that is non-human in the paradigm of the object (Ingold 2015), the material world gains agency. Material agency proposes an already-given situation where "material culture must be conceived as co-constitutive of human action, thought and understanding" (Kirchoff 2009: 207 cit Verbeek 2005: 112). Entities such as food become tools for understanding the world (Kirchoff 2009; Anusas and Ingold 2013). Thus, in the context of this thesis I argue that ferments manage to expand "the bodily sense of awareness" because of their "material properties" and the fermentor's "embodied way of being-in-the-world" (Kirchoff 2009: 207). In the context of human-artefact interaction, Kirchoff (2009) discusses the conditions of material agency as (1) agency is "asymmetric and relational" and (2) material entities "mediate and transform human understanding". Making a reference to the example of acquired taste, (1) refers to the embodied experience of being and becoming as subjective in relation to the human context i.e. what I experience as spicy might not coincide with that of a Thai's person. (2) speaks of the fact that any knowledge about the world is a mediation of the human through artefact i.e. my understanding of spicy is mediated by my exposure to it. (Kirchoff 2009: 205).

In design theory, material agency is usually used alongside affordances. The theory of affordances was elaborated by J.J. Gibson (1972), but popularized in design by Donald Norman (1988). It claims that our perception of the world is shaped directly or indirectly through affordances. Gibson defines affordances as entities which invite their users to certain actions or patterns of use i.e. a chair affords someone to sit on it (1979). From a theoretical point of view, affordances seem a pertinent explanation of perception, so I planned to use them alongside phenomenology. However, it proved to be a short lived dalliance. The theory did not work when applied to the practice of this thesis. On one hand, if entities are to be considered fluid (as this thesis aims to do), that must mean affordances are as well. However, Gibson's affordances cast entities as knowable and immutable. This contradiction became obvious during this research on fermentation, which proves to be not an exploration of already given shapes, but a continuous involvement in shaping. What food can become is not stumbled upon, but witnessed. In the field of ecological anthropology,

Ingold arrives at a similar critique: “For perception, as I would now understand it, is not just a matter of exploring a world of objects that are already there, or that have already—so to speak—precipitated out from the formative processes that have given rise to them; it must also be about being present and aware in the very moment of formation itself” (2018: 42).

Here I stop and wonder. Perhaps this explains why Norman and the design community took such a liking in affordances - it almost seems like behind the facade of material agency there hides a human-centered approach. I thought I have found neutral ground in design theory, yet still the same problem transpires: an active perceiver acts in a solidified environment of objects “every one of which is fixed in a rigid and invariant form, rendered inert, ready and waiting for the perceiver to come on the scene and to suss out its affordances” (Ingold 2018: 42 cit Ingold 2011: 12). Seeing how to act in the world is a matter of attuning to it, much like sailing a boat on an open sea, Ingold proposes to reinsert “both environment and perceiver in the current of real time” (Ingold 2018: 43). I agree with this view and, instead of affordances, in this thesis I make use of the concepts of mutual affect and material agency to highlight that fermentation opens up a space for materials to exist without being resources for human objectives.

The aforementioned notion of fermentation space is important because of what is understood by it and implied through it. To explain what should be understood, I will borrow an image depicting space that comes from the geographer Doreen Massey. She argues that space is not a single plane on which lives are led (as in a human society), but rather “the simultaneity of stories-so-far” of lives carrying on and responding to one another - as in a society animated by humans, animals, plants, materials together (Massey 2005: 130). Similarly, the space of fermentation is animated by bacteria and humans carrying on and responding to one another. In such a space, entities are allowed to do what they can do, not only what the perceiver thinks they can do. This brings me to what is implied by the existence of this space - a disruption of the ontological hierarchy between humans and the material world. Here, I bring two concepts that Ingold proposes: the meshwork and correspondence (2015; 2017). The meshwork is to acknowledge that all living beings are intertwined in a meshwork of life - the consequence of living in Doreen’s space. It then follows that, with every relationship we get into with another being, we enter an act of correspondence, “by which beings or things literally answer to one another over time” (Ingold 2017: 14). What this proposes is that relationships are built on constant negotiation: during fermentation I am constantly attending to what ferments are “telling” me (via smell, touch, taste) so I correspond my actions to it. The other way applies: it is a never-ending relationship because I am always in this loop of receiving and giving. Thus, in fermentation, the moments of contact, the mutual engagements with other beings become significant; it is then that both the ferment and the fermentor are making themselves in the world.

Ingold’s correspondence rests on three principles: “of habit (rather than volition), ‘agencing’ (rather than agency), and attentionality (rather than intentionality)” (2017: 9). He goes on to explain habit as “going undergoing” (ibid), the act of subjecting oneself to an experience. Once enacted, fermenting is animated less by my self-imposed procedure, rather it becomes difficult to draw a line where I stop and fermentation begins. Like so, I become my fermentation and engage in negotiation, where any change enacted is not change from the outside, but transformation from within. Casting aside action as volition, in Ingold’s view, the omnipresent

noun agency becomes a volatile verb - agencing. What is to be understood here is that agencing is a process in which “agency is not given in advance to action, like cause to effect, but is rather ever forming and transforming from action itself” (2017: 17). It functions closer to a question than an answer because ends are not given, but emerge from the negotiation itself. The quality of these first two principles lies in the third one: they are fundamentally attentional. If to correspond is to answer to one another, then what perpetuates the movement forward is to live not with intention, but with attention. This talks about the ability to listen and and go along with the “concurrent movement” of materials (2017: 9). Similarly, to ferment is anything but being able to impose a reckless form on ferments. Literally, the fermentor takes an attentional stance and becomes aware with the ferment. For this reason, this thesis will articulate experience and perception through similar positioned understanding of negotiation, agency, and attentionality.

³² Interesting to me, as a student of interaction design.

Furthermore, deriving from the aforementioned principles, he also makes a very interesting³² distinction between interaction and correspondence (Ingold 2015; 2017). His argument is that interactions still infer immobile participating entities: they are back and forth movements within a network of enclosed beings. He then proposes that the essence of sociality emerges once these enclosed beings are unraveled as stories and their interactions are put into the dimension of time (his correspondence, see Fig. 11). This longitudinal process implies that there is indeed a different I that arrives then the one that departed: with every act “I am not so much changed as modified, in the sense not of transition from one state to another but of perpetual renewal”. (Ingold 2017: 16). I believe that an endeavour such as this inquiry into the practices of interaction design can benefit from Ingold’s proposed distinction. Drawing from phenomenology and Ingold’s correspondence this research includes Merleau-Ponty’s mindful body and concepts that encourage us to live creatively in a world not yet established. What happens if we retract our grip and let objects be themselves in their animate, mutable ways? And then if we let food be food, what can it become once it lives outside of objects recruited for consumerist societies? What can we become with it?

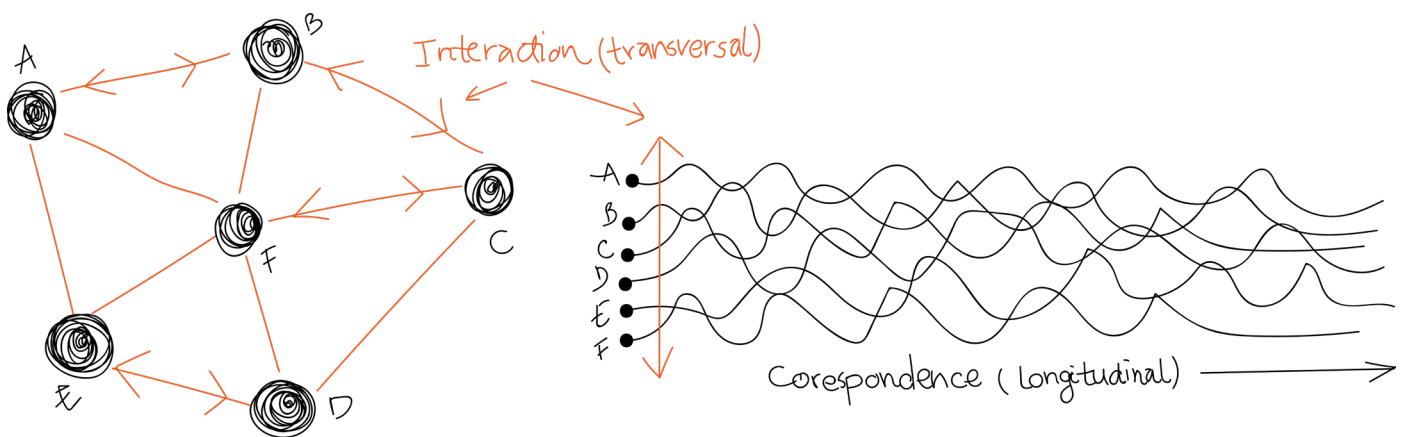


Fig. 11
General representation of Ingold’s theory of correspondence; the comparison is drawn on the basis that interaction presupposes a transversal understanding of experience, while correspondence prefers a longitudinal approach.
Source: Ingold 2015

conclusion

Taking this discussion into the realm of design, viewing the body as much a cultural phenomenon as a biological entity brings critical and pragmatic implications to humanity (Csordas and Harwood 1994: 4). Therefore, it is directly relevant to design issues, as Dreyfus proves when he draws on phenomenology to develop a critique of AI and computational models of intelligence (Dreyfus 1972). He argues that human intelligence draws on the contextuality of events, something that cannot be mimicked by giving robots stationary rigid rule sets. I find that this approach can be developed outside of human-computer interactions and into any human interaction, where contextuality is increasingly subdued to the surface of objects. A phenomenological approach can serve as a theoretical support, not only to construct mindful experiences with entities which are a product of emerging technology, but to investigate quotidian ones. Notably, Julia Valle Noronha (2019) does so in fashion. She situates the act of wearing as the main concern of her PhD. Pointing at the space between wearers and the things they wear, she uncovers its potential to sustain fruitful encounters and stronger engagements. With this master thesis, I want to bring the discussion to the everyday engagements we have with food. Via fermentation, this project communicates the transformative potential of food and hopes to offer the empirical foundation on which concepts of friction and material agency can negotiate their place in design practices.

The theoretical background outlined in this chapter is mostly used to inspire the process of building up the research rather than a system to follow. It provides me with concepts to explore and expand during the research, as well as an understanding of how to approach data collection. As understood, to be phenomenological is to undergo experience in an open, absorbed, and attentive fashion. In this work, such methodology is used to guide an investigation of food, self, and experience, with the body at the center of the analysis. Looking for correspondances, a phenomenological view over time investigates how ferments and fermentors depart from their separate places in the world and meet in the middle. When living with attention, none can impose on the other what it is that they can become. In a balance of friction and affect, they can only pay attention and respond, then pay attention again - this is the process of becoming. This is how this work also strives to act. Accordingly, the next chapter deals with presenting the design of research. It tries to build on top of the relational approach elaborated in this chapter, all while resisting to fall back into Cartesian thought models that aspire to objectify, measure, and generalize - a fairly novel way of doing research for me.

4.

research

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The last chapter outlines the underlying concepts from which this thesis departs, namely design, friction, and fermentation. As it discusses the shortcomings of HCD, it points towards friction and critical use as a new space for inquiry into design. Accordingly, it presents the intention of this thesis: to investigate critical use of food via fermentation. Adopting a relational approach to experience, the theoretical background is informed by phenomenology and correspondence. Looking for correspondances, the phenomenological approach aims to investigate how ferments and fermentors depart from their separate places in the world and meet in the middle. In order to do so, a research methodology needs to be devised - which is the aim of this chapter. Accordingly, it consists of five sections. First, I position the research as a research through design approach, exposing its aims within the field of design. Then, I present how the research is crafted, followed by a detailed methodological description. I continue with a description of the framework used to support this research, and end by discussing the approach to data analysis.

I want to ask where this term (consumption) came from, why we ever started using it, and what it says about our assumptions about property, desire, and social relations that we continue to use it. Finally, I want to suggest that maybe this is not the best way to think about such phenomena and that we might do well to come up with better ones. (Graeber 2011: 489)

research through design

Inspired by Graeber's inquiry into the concept of consumption in the left-side quote (2011), this research aims to underpin potential phenomena which can serve as a basis for an introspection on what constitutes the value we attribute to food. What do words such as convenient, cheap, nutritious, tasty say about our assumptions of what food can become. The intention is to capture the moments when, by virtue of embodied experiences, these concepts are continuously deconstructed and rebuilt as a result of active engagements with food. Therefore, the aim of this research is to bring forward an awareness of the humanity that occupies the space of fermentation - in the shape of nuanced asymmetrical gestures, emotions, thoughts, rituals.

In line with this aim of generating knowledge about a phenomena, this design practice is following a research through design approach (Zimmerman and Forlizzi 2014). Diverging from traditional approaches to design inquiries, research through design does not stop at understanding phenomena but rather aims to challenge it. It is a practice that seeks to create knowledge by inviting friction via "making new things that disrupt, complicate or transform the current state of the world" (Zimmerman and Forlizzi 2014: 169). It is for this reason that such endeavours give an instrumental role to artefacts - they are not at the center of the investigation, but a means to achieve its ends.

Practice-led research [...] does not depend upon the creation of an artefact but is nevertheless founded in practice. It can refer to a situation where a curator, seeking to understand how to develop better approaches to creating exhibitions, carries out studies into the nature of that practice and identifies the relative effectiveness of existing approaches from which new practice is developed. The outcomes may be shared in the form of principles, models, frameworks and guidelines. (Candy and Edmonds 2018: 65)

Accordingly, more than producing artefacts of my own, through this research I am more interested in producing "new understandings about practice" (Candy and Edmonds 2018: 64). To comply with this position, the research unravels as an iterative process enveloped in a main interest: the negotiation between the ferment and the fermentor as a phenomena to be explored. Inside this space, the design activity is experimental because it prioritizes critical use - the design artefact confounds the user, which comes in contrast with artefacts deployed to affirm or solve a problem for the user (Fraser 2017). This is done via involvement of designed artefacts, in this case, the produced ferments. To be clear, what is designed is not the ferment itself, but the situation of fermenting. The use of ferments disrupts the users from their habitual ways of acting. They have to deal with uncertainty and start to improvise, they tear down structures and build new ones, and their narratives shift away from assumed ones. I consider that taking this slightly experimental research through design approach does not come in spite of my background in Interaction Design, but as a result of it. Hence, this work borrows from my education as a design student, my personal interest in food, and the philosophical thoughts I explore during this thesis. This interplay of theoretical foundations epitomizes my current standing and point of view as a designer, an eater, and a human. It is at this confluence of friction, food and phenomenology that I place fermentation.

building the research

This research does not depart from an initial research question, but rather starts by defining itself within a broad field of interest. Within this field, the design process developed organically; informed by its own unfolding (see Fig. 12). By engaging in experiments early on, the subject field is framed and reframed, guiding the research towards evermore narrower questions. As the intent is to gain an understanding of the phenomena of fermentation, the research is exploratory and a qualitative approach is preferred. This imparts an attentional stance to the study and keeps the research open to subjectivity. The initial points of interest that emerge are further explored via the experiments undertaken³³. As such, through an inductive process, the focus evolves into an investigation aimed at identifying the characteristics of the fermentation space where food affords for “concrete experience and sensual perception” (Heindenreich 2009: 1154).

³³ Halfway through, the project had to account for new constraints due to the breakout of a pandemic and an nationally imposed quarantine. Therefore, the methods had to be adapted to work within this context

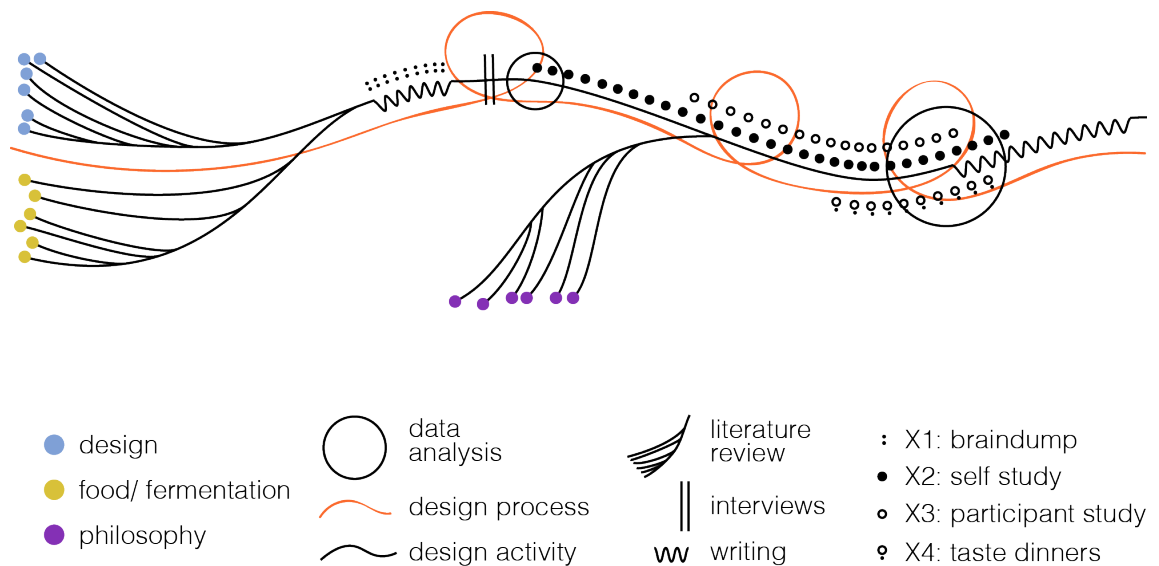
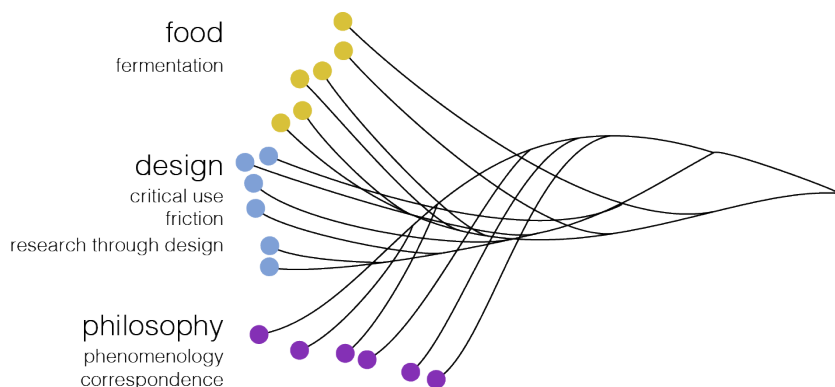


Fig. 12
An overview of the activities of this thesis and how they influenced the process. Three main iterations occurred, concurrent with: (1) X1 and the interviews; (2) the theoretical background which introduced phenomenological concepts; (3) X2, X3, X4, and the final data interpretation.

The theoretical background of this thesis emerges at the confluence of three disciplines: design, food, and philosophy (see Fig. 13). The research starts with a literature review of both design and food. Accordingly, part of the investigation is done into design approaches alternative to the mainstream HCD. The other part of the research aligns with my interest in cooking and food. Informed by the literature background, as well as the inclinations of the Interaction Design department towards user interaction, the interest zooms into the relationship between food and individuals. As the two cores of the literature move from developing in parallel to becoming congruent, the research space targets the phenomena of fermentation. At this later stage in the work, the theoretical background is supplemented with ideas of phenomenological philosophy.

Fig. 13
The theoretical background sits at the entanglement of the disciplines of food, design, and philosophy



overview of experiments

X1: Braindump. With a reframed focus on fermentation, the space of inquiry hardly narrows, but rather opens even more. At this point in time, a preparatory quasi-experiment (X1) is undertaken. The attempt is to structure the research program and align it to focus on the target phenomena of the human-food relationship. This activity helped devise the three structural pillars of this project - anesthetic design, friction, and fermentation - and how they support each other.

The research then proceeds by identifying gaps of knowledge in each of the sections. Additional literature is consulted and results in a phenomenological approach weaved with concepts of correspondence (as described in the previous chapter). At the same time, an initial dive into the topic of fermentation is done via open ended interviews. These are critical to the process of gaining theoretical knowledge and qualitative data, but also reveal a weakness in the research methodology so far: lack of empirical knowledge. Therefore, a new need emerges for the project to engage in a subjective and reflective exploration of the fermentation space by engaging in fermentation projects myself. Here, I draw inspiration from the practice of auto-ethnography: a method of inquiry, which draws on the body as a site of “scholarly awareness and corporeal literacy” (Spry 2001: 706). I intend to engage in a type of auto-ethnography to accentuate the asymmetry of embodied experience. However, by no means I suggest that this is a work of rigorous auto-ethnography, in a discussion that I make later on (p 53), in the next section discussing the research methodology.

X2. The first experiment (X2) constitutes a self study that involves applying much of the previous data into practice by starting to ferment. Rather than a stage in the research, this experience is ongoing throughout the different stages of the project. Here, not all the fermentations that are initially planned are done, as a result of the national imposed quarantine³⁴. Nonetheless, the activity is adapted and the experiment succeeded in its initial intent - to build a baggage of empirical knowledge, help understand and uncover new insights, and inform the next steps to be taken.

X3. To diversify the data, the second type of experiment is done with participants. Inspired by the method of Probes, participants are asked to undertake a fermentation project of their own and journal the process (Mattelmäki 2006). This method allows me to gain an understanding of the relationship between the participants and the ferments, when and how the ferments gain agency, and how the dynamic evolved over time. The resulting data is triangulated with the subjective data I generate to identify the most *visible*³⁵ mutual effects.

X4. The third experiment is done in the last stages of the project. An additional layer of data is obtained by having taste dinners with fermented products. If so far, the data collected focuses on the engagements, which happen in the first act of conducting fermentation, here the focus is on engagements that happen when ferments are “ready” and consumed. Along with tasty and inspiring talks, affects that can travel and translate well from making into consumption, are identified.

³⁴ For example, the experiment is made more difficult due to the sudden restricted access to equipment, resources, and knowledge

³⁵ Here I do not refer only to visual experiences, but ones embodied through any of the senses.

research methodology

The research unfolds as an iterative process. The process of theme generation and exploration happen in succession during the design activity. Therefore, the research is both a cause for and of concept development. What this means, is that the data analysis informs what experiments are taken and the results of these experiments point towards more data to be gathered and analysed, influencing the next set of experiments and so on.

literature and resource review

The desktop research has two initial focuses: getting acquainted with current discussion in design and food. Additionally, due to lack of knowledge on how to approach this data, the theoretical space slowly opens up to philosophy, thus finding support in the theoretical approach of phenomenology.

Firstly, to position my project outside human-centered design, an exploration of the discussion around alternative design proposals is necessary. The “fitting” of design theories with this thesis’ practice happens gradually and occupies a decent amount of the time spent on the compilation of this MA thesis. This knowledge is gathered through books, design publications, research articles, and documentaries (see References for the complete list of sources). The keywords for the search are: adversarial design, critical design, design fiction, design for friction, non-human design, speculative design.

The second focus is on the practice of fermentation. I seek scientific material to understand the practice myself, which I follow up with sources that can provide for a more embodied point of view. Here, from a phenomenological point of view, subjectivity is not avoided, but sought after. Therefore, most of the knowledge comes from two books by Sandor Ellis Katz: “The Art of Fermentation” (commonly referred to as “the fermentation Bible”) and “Wild Fermentation”. Additional material is comprised of video material and documentaries (including Sandor Katz’s series “People’s Republic of Fermentation”, Michael Pollan’s “Cooked” S1 Ep4 on Dirt, “Hansik of the Day” Ep7 on Kimchi, and Bon Appetit’s “It’s Alive”). Some alternative information is gathered through fermentation groups, and web publications on platforms such as Instagram, Facebook, and Reddit. This research is intended to offer an introduction to the topic and identify potential areas to be explored during the following interviews with practitioners from the field. Stemming from fermentation, a secondary topic for research is that of the human - microbe interaction. I mention it separately because it is a complex field and it requires a good amount of additional research. Here, the knowledge is obtained from research papers and web publications. The keywords used are: bacteria, gut, gut bacteria, fermentation, human, microbiota, microbiome, microbiome interaction.

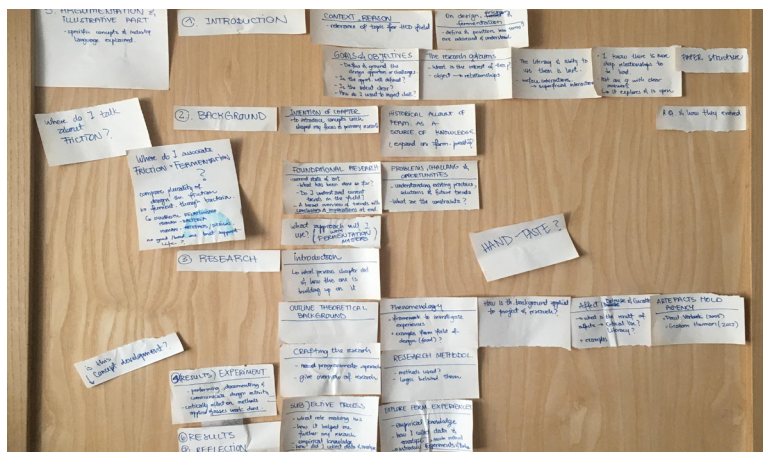
However, after this initial data is generated and analyzed, additional literature needs to be consulted about theoretical frameworks that can support the relational approach taken. Essentially, the theoretical approach of phenomenology brings on concepts of material agency, affect, being-in-the-world, and becoming. These are then interpreted from a point of view informed by Ingold’s Theory of Correspondence. The keywords used include: design psychology, relational design theory, emotional design, material agency, phenomenology, phenomenology in design, product affect.

X1: braindump

Early on during the research phase, the broad nature of the research space results in an entanglement of information and ideas. In order to structure the literature and find the relevant elements of the research, an initial experiment (X1) is conducted. This consists of two activities done with two different types of participants. The first function similarly to a braindump³⁶ method, where a friend acquainted with the project assists me in dumping all information on paper, finding connections, and lastly formulating an initial structure of the research program. This is beneficial, because it allows an outside perspective into the work, which proved helpful in discovering patterns and points of interest. The second activity involved presenting my thesis program to individuals who are non-acquainted to the project. This further aids the formulation of the research, by identifying missing links between concepts and strengthening the flow of logic. This program helps devise the three structural pillars of this project - anesthetic design, friction, and fermentation - and how they support each other, which makes up the first three chapters of this thesis.

³⁶ Initially a brainstorming technique, here braindump was used to “getting everything that’s currently clogging the neural pathways out in the open and freeing up some cognitive space for other synapses, connections, and mixtures to get through” (Rikke and Siang 2018)

Fig. 14
X1: organization of ideas, how they relate to each other, and how they construct the structure of the thesis



interviews

Most of the initial knowledge of fermentation is built through interviews. In trying to reflect the nuances of fermentation, the interview participants belong to various disciplines working at the confluence of fermentation with health, science, and cooking. Thus, a total of five interviews are conducted with participants working as a surgeon, a chef, two experienced home fermentors and an occasional home fermentor. The interview format is unstructured - while some questions are prepared before, the unstructured format leaves space to pursue unexpected topics that appear during the conversation. All the interview data is collected via phone recordings with the permission of the participants and later transcribed in full.

workshops

Not planned, but emerges out of the confinement, is the participation in online fermentation workshops held by experienced fermentors, who move their activity online and thus make it more accessible to a wider audience. This helps widen the access to knowledge as well as get a feel of the community aspect that surrounds fermentation. Accordingly, I participated in a Kimchi Zoom masterclass, held by Dutch food writer and fermentation expert Mener Wateetons, the Virtual Ferment Fest and Abundance Preservation on Instagram Live with an “all-star” fermentors line-up.

X2 & X3: probe study

Drawing on the practice of Critical Use, tangible artifacts are used to explore the patterns of use in the practice of fermentation. Seeing how the intent of the project is to investigate the kind of interactions taking place between the ferment and the fermentor, a type of probe study is chosen as a research method. The probe study is done in two rounds - a self-experiment and participant experiment. During the former, I start experimenting with a variety of fermentation projects, which is used to gather empirical knowledge and test assumptions. Therefore, it works both as a prototype, but also as research and will help delineate what will be needed from the probes in X2. Then, the emerging topics and results can be adapted to form the second experiment. By involving participants, the research is able to enrich the viewpoint on what constitutes the fermentation experience and collect information on fermenting experiences over the span of a month.



X2: Self-study. Part of the research is inspired by the methodological approach of self-ethnography. This is a necessary endeavour because I can only look at the world from the perspective of what I know. Thus, in order to begin to understand the lived experiences of my informants with fermentation, I have to undergo them myself.

First, I want to clarify in which way I work with auto-ethnography. In following a phenomenological inquiry and trying to produce an account of my own lived experience of fermentation, I take inspiration from this methodology. In anthropology, this method of inquiry requires the author to become the informant and get involved with self-observation, -reflection and writing. With this thesis, I try to situate the body in a similar fashion to that of self-ethnography; I hopelessly aspire to achieve what professor Tami Spry describes as her practice: “in seeking to dis-(re)-cover my body and voice in all parts of my life, I began writing and performing autoethnography, concentrating on the body as the site from which the story is generated, thus beginning the methodological praxis of reintegrating my body and mind into my scholarship” (Spry 2001: 708). Also, the writing is intended as a dialogue; to invite you, the reader, to reflect on your own life experience and social constructs. However, by no means I call this work an auto-ethnography. It desperately lacks the depth, rigour, and literary competence of such a “felt-text” (Spry 2001: 714). Also, another point of divergence from a true autoethnographic work is that, while this method relies on the self as the only data source (Holt 2003), this thesis draws on the experiences of others as well. Perhaps, where auto-ethnography and this research find common ground is that they both concentrate on the body as “a way to challenge monolithic views of identity” (Mascia-Lees 2011) - be that of food or the body itself.

Accordingly, in X2 the themes that emerge from the interviews are explored. The focus is on investigating what aspects of fermentation can sustain more reflective relationships and test initial hunches. The types of fermentations that take place are initially dictated by diversity (undertake fermentations belonging to all three types - lactic acid, alcoholic, acetic acid), time (from 5 days to a month), transformative potential (how unrecognizable the initial ingredient can become such as barley into soy sauce) and difficulty (how much attention and technical knowledge they demand). However, these categories need to be revised as a result of the

Fig. 15 - 18
Fermentation experiments for X2

Fig. 19
Online fermentation
session during the
quarantine session
with Anna-Maria Saar

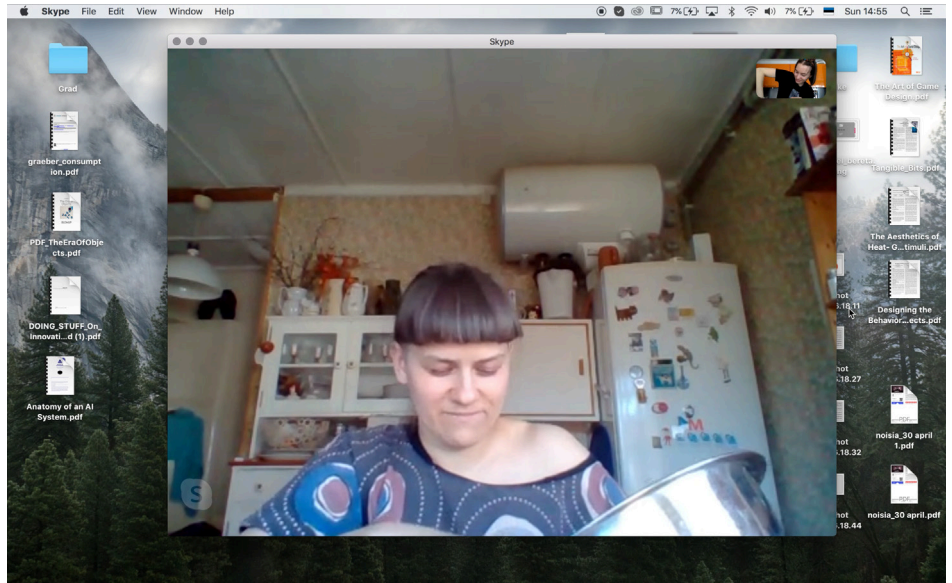


Fig. 20
Participant getting ready
to ferment. All ingredients
for sauerkraut are in the
picture (participant's picture)



quarantine. For example, the availability of certain resources is restricted, such as equipment and collaborators. Mainly due to restaurants being closed down and the fact that some international shipments are temporarily suspended. Therefore, the previous categories are mediated by availability (to see a complete list of ferments done, see Appendix 1). Where possible - for example, when no special equipment is needed - the fermentation explorations, which are planned to happen in collaboration with more experienced fermentors, are done over Skype (see Fig. 19).

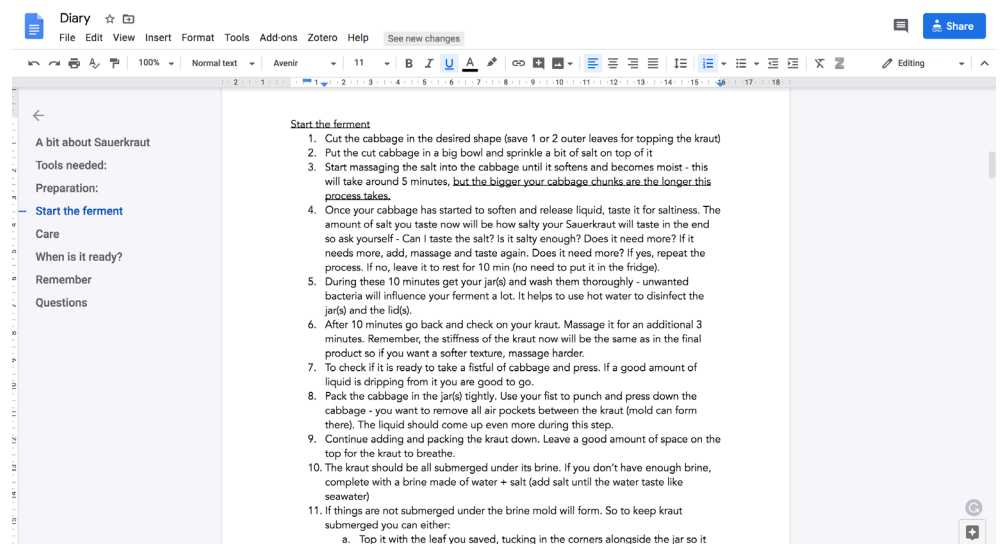
A variety of data collection methods (journaling on a physical notebook, journaling on the computer, voice notes, video recordings) are tried in order to find the less intrusive one. In the end, a combination of voice notes and journaling, both on the computer and in a physical notebook, are used. The reasoning can be found in Appendix 2.

³⁷ The time frame was left open because it is directly influenced by participant's taste, as they subjectively have to decide when the ferment is "done".

X3: probe study. Inspired by the method of Probes, participants are asked to undertake a fermentation project of their own and journal the process (Mattelmäki 2006). This method is chosen because it fits the explorative nature of the research and it aims at revealing the personal perspectives of participants (ibid). Accordingly, the making and use of the ferment is self-recorded over a period of three to four weeks³⁷. The time frame varies anywhere between one to four weeks, as readiness in ferments is subjective and is determined by personal taste. The participants do not belong to a target group, but to ensure a variety of insights, they have the following characteristics: they are not experts and they have varying degrees of self-expressed attitudes in the kitchen (from avoidant to comfortable to experimental).

For the study to be successful a few constraints must be taken into consideration. Firstly, to avoid intimidating the participants, the task's degree of difficulty must meet their abilities - in this case, a beginner level ferment will be needed, such as the lactic fermentation of vegetables. Then, to be able to make a comparison, a common starting point that allows for diverse outcomes is desirable. Such the study has participants do a Sauerkraut ferment but leaves the choice of the recipe to them - cabbage type, spices, etc. Again, not to intimidate the participants, I provide them with the basic instructions and the recipe (see Fig. 21). The activity is recorded by the participants via journaling, where a variety of media is encouraged - writing, photos, videos. To ensure that the topics of interest are documented and to reduce the difficulty of the task, I create a personal online shared document with guidelines for each participant (see Appendix 3). This decision is motivated by the fact that as the study can take a month, online documents give access to data early on and the research is not at risk to be postponed for too long. In the meanwhile, the second benefit of this approach emerged - as I write this paper in quarantine, I am glad I did not have to deal with the hassle of obtaining the physical journals.

Fig. 21
Online documents prepared to become diaries for the participants



³⁸ Here I refer to mainstream products of fermentation such as bread, wine, cheese, beer, kefir, etc.

X4: taste dinners

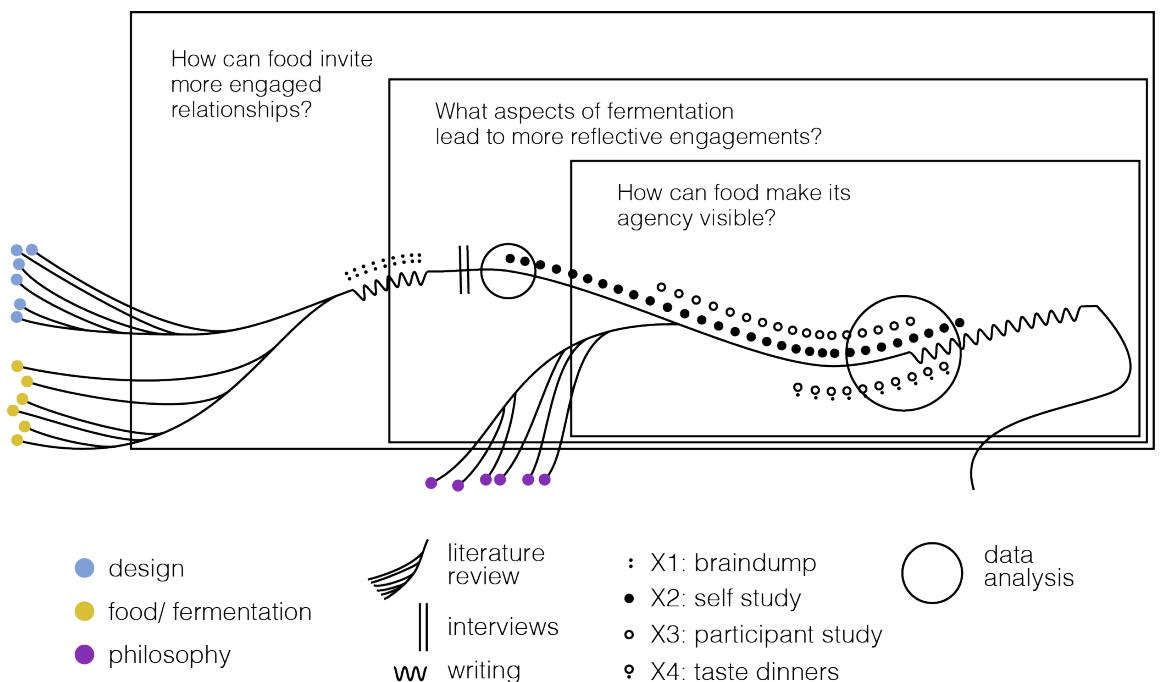
Lastly, the two taste dinners are done with a group of 5 people who are familiar with me and the project. All have little to no practice of making ferments. Their experience of eating ferments revolves around mainstream products³⁸ and the occasional sauerkraut or quick pickles. This experiment group remains constant due to the quarantine. Initially, this is seen as a good thing, as it builds confidence and allows for a trusted space for discussion. However, in practice the downside is that, due to the group's familiarity, the participants are prone to make personal comments and unintentionally intimidate each other.

During the experiment, the ferments are not used as the central focus of the dinner - rather they are used as sides and are served alongside regular dinners. This is because the aim is to investigate the relationship in the context of existing dynamics. In order not to intimidate or pressure the participants to speak a certain way, the taste dinners are only transcribed from memory after the tasting is concluded.

framework: a programmatic approach

In line with the proposed research, which aims to produce the research question as opposed to depart from it, the framework does the same, by engaging in *programmatic approaches* (Eriksen and Bang 2013). Such an approach is useful to free the research from a fixed framework and question as the starting point of the research. Rather, it encourages the research to act as a scope of investigation, where iteration and experiments are used to arrive at a research question. By virtue of this, the research question can still be explored in many ways via activities of friction and critical use. Once these experiments are carried out and completed, the framework can be designed with more clarity.

Fig. 22
The framework, as a result of the programmatic approach. The image depicts how the design activity unfolded, and how the activities done contributed to the narrowing of the field of interest. As the focus evolves, so do the research questions.



data interpretation

Informed by the theoretical background and experiments, the friction this research intends to capture is relational and dwells in movement. As Ingold puts it, it is not “<<and . . . and . . . and>> but <<with . . . with . . . with>>, not additive but contrapuntal” (2017: 14). In order to remain as true as possible to the nature of experiences, the only resolution I see is to use the collected experiences not to quantify or produce generalization, but to understand how they converse with one another. To achieve this, an appropriate model should not be transverse, as in cutting through experience, but longitudinal, as in going along with it.

For this reason, the majority of models that aim to discuss experience in the context of design, product, and material agency fall short. The research reviews the pleasure approach by Jordan (2002), the appraisal approach by Desmet (2002), a process-level approach by Norman (2004), and a revised and combined approach by Desmet (2011), which uses the previous three theories of product affect as a point of departure. As Desmet (2011) writes, “although they show some essential differences, these approaches are not mutually exclusive and share some basic assumptions and theoretical considerations”. Essentially, these models reveal the product characteristics and their potential to support material agency and affect. However, as Valle Noronha (2019) notes, when applied to a study, which is essentially interested in resulting interactions between material and human, such frameworks are not enough.

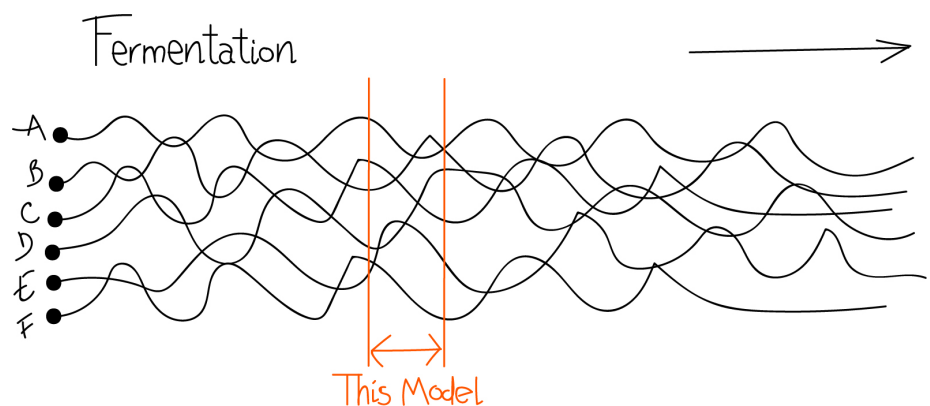
Instead, in her PhD, Valle Noronha (2019) proposes a phenomenological approach that departs from Jordan’s model and is better adapted to look at the full spectrum of material and human interaction. She does so by including two additional categories. The result is a concept structured around Perceived Characteristics, Affect, and Becoming. Perceived Characteristics are the ways in which the material comes in contact with the user. In the next grouping of Affects, she captures the resulting relationship between how material and individual “can affect each other” (Valle Noronha 2019: 146). The outcomes of these “affecting relationships” are accounted for in Becomings (ibid). Even though she applies this structure to a study in the field of fashion design and clothes, the underlying logic she is working towards - how the plasticity of embodied experience shapes relationships - are shared by and applicable to a discussion about design and food.

Following Valle Noronha’s results, such an approach is better suited to understand, rather than generalize, experience. This coincides with Ingold’s correspondence theory where data is ascribed to a longitudinal perspective of experience, which follows the relationship development between the ferment and the fermentor. However, to match it with my theoretical background, I will appropriate Valle Noronha’s (2019) approach by making several notes. First, I will not apply Jordan’s model to categorize the perceived characteristics. I consider this procedure coming in contradiction with the phenomenological effort to resist generalization. Second, I attempt to situate Ingold’s correspondence principles in Valle Noronha’s model. To do so, I proceed by showing how the first two principles of correspondence - that of habit and agency, can be joined with Valle Noronha’s perceived characteristics and affects. In Valle Noronha’s approach (2019) perceived characteristics (i.e. what ferments are) are directly influencing affect (i.e. what ferments can do). Similarly, Ingold’s (2017) habit (i.e. undergoing fermentation) is directing agencing (i.e. ever-emerging action during

fermentation). Drawing a parallel, the perceived qualities are those of an undergoing fermentation (i.e. “what ferments are” is revealed only to a fermentor undergoing fermentation) and they translate into how participants can affect each other via mutual agencing (i.e. “what ferments can do” are ever-emerging actions during fermentation). Meanwhile, the third principle of correspondence, that of attentionality, is both transverse and longitudinal across the model, the main quality by which fermentor goes along with ferment (Ingold 2017). Valle Noronha’s use of becoming remains constant.

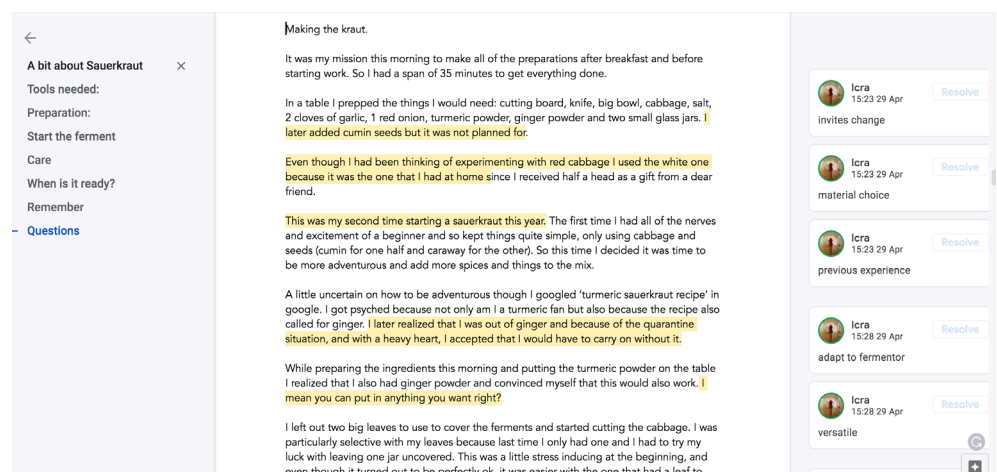
Lastly, an additional adaptation pertains to the perpetuity of correspondence. If experience happens in a “crescent” world, then this model represents just one space in time (see Fig. 23) - a snapshot of a perpetual activity of being and becoming between ferments and fermentors (Ingold 2018: 43). Because entities are in a state of perpetual renewal and emerge in the fermentation itself, a becoming is not fixed. Rather “beginnings produce endings, and are produced by them. Every end is not a terminal, but a moment along the way” (Ingold 2017: 23). Therefore, any model that this thesis produces is as prone to transformation as the entities that make it up. It is situational, but not positivist (Fraser 2017). Far from a weakness, this is seen as nodding to the underlying motif of this thesis - experience is a messy space, where friction is a natural and essential occurrence.

Fig. 23
The positioning
of Noronha’s
model within
Ingold’s theory of
correspondence



The gathered information from the research pertains to a type of qualitative data, and, for this reason, it is analyzed using a thematic coding approach. Accordingly, the aggregated material is read through multiple times, while notes are taken that summarize the emerging thoughts (see Fig. 24). From these, codes are identified (emerging from both the data and the theory). Then, these codes are further grouped into themes, in relation to the patterns that emerge. At this point, the categories are related to each other, as well as to the theoretical background and literature. Finally, an argument is constructed, and the knowledge is displayed.

Fig. 24
Online diaries with
notes from the
thematic coding
data analysis



conclusion

This work navigates possible futures for (food) design, unfolding as an experiment informed by a research through design approach. It aims to discover how to engage people in discussions of better. Furthermore, the choice for this approach exposes the aims of this work within the field of design: more than producing artefacts of its own, this research is more interested in producing “new understandings about practice” (Candy and Edmonds 2018: 64). In congruence, the methodological approach is different to a traditional design approach: there is no clear design brief, so, instead of departing from a research question, the work tries to produce its own via exploratory experiment dialectics. Encouraged by a programmatic approach, the research acts as a scope of investigation, where iteration, a type of self ethnography, and experiments are used to arrive at a research question. Borrowing from the practices of aesthetic of friction and critical use presented in the Friction chapter, the designed artefact is situational, but not positivist. The aim of the fermentation experiments, therefore, is to confound the participants, to push them outside habitual narratives of use. By virtue of this, the research question is still explored in many ways via activities of friction and critical use. In essence, this research approach furthers the ideas proposed by the theoretical background: that knowledge is found in the sensual and practical engagement with things. Accordingly, drawing on the practice of fermentation, the study, much like a ferment, emerges from a subjective negotiation: the result of embodied experience and affect.

part II:

negotiating with food

Departing from the understanding that fermentation is a way of being-in-the-world, the second part of the paper covers the tangible results of the research: the knowledge which stems from the act of doing fermentation. Informed by the ideas developed in part one, that the fermentor's being-in-the-world is through the ferment, this second part goes on to investigate what type of world ferments disclose and how. As such, interviews and experiments of exploratory nature are undertaken, and their results are presented in two chapters. I attempt to disclose the practice of fermentation as a way of being-in-the-world through food, rather than a mindless encounter with food. It is for this reason that I equate fermentation with a negotiation between the fermentor and the ferment, hence the name of this chapter and thesis.

In hindsight, the phenomenological approach confirms itself throughout the research: I can only understand the experiences of the informants by relating them to my own. Accordingly, the interviews done in the beginning of the research are constantly revisited and re-evaluated subsequent to the experiments, using my own animated fermentation experience as a point for meditation and reflection. It is for this reason that the following chapters do not cast results as fixed occurrences bordered by methodology, but rather as a space, which opens itself up to include networked agents. What it tries to describe are not linear results enclosed in a rigid methodology, but the story of how transformation takes place. In doing so, I structure the discussion around two main findings from the study: correspondence and *the space in between*. Respectively, the first section deals with the notion of correspondence: how fermentation is understood to be an exchange of movements, energy, and emotions. This concerns the interviews and how they inform a relational approach to constructs of time, taste, and newness. The second part zooms into their corresponding roles to find *the space in between*, the way they make an impression on each other. Here, the design activity attempts to investigate how the aforementioned constructs converse and influence each other, with the results organized under perceived characteristics, affect, and becomings. These findings are then followed by a discussion of the results and implications of the corresponding roles and the space in between. Herein, I propose that they can bring about change in the way the fermentor perceive themselves, the ferment, and the surrounding. I then offer a conclusion, wrapping the findings of the paper up in a discourse on the role of design in creating more engaged relationships between people and food.

5.

corresponding roles

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The interview results are discussed first, however they inform the research in an iterative fashion. Initially, they help shape a clear idea of what this work is trying to accomplish. The following section discusses the initial findings from the interview, how they support the phenomenological approach, and guide the research towards the embodied experience of the fermentor: How does intimate correspondence manifest itself in fermentation? In short, it describes how I formed my understanding of how the ferment and the fermentor relate to each other: through a process, where the mindful body is given enough time, materiality, openness, and uncertainty to undergo a process of deconstruction and construction of self, food, and the surrounding environment. Later on, as I start my own fermentations, the experiences from the interviews gain more nuances and bear more resemblance to the fermentors themselves.

aim of the interviews

This thesis departs from fermentation as a way to investigate friction in action. As the research moves out of the initial literature review, a growing interest in the complex sociality of the practice of fermentation emerges. As such, it makes for quite a big space to work in - from the invisible life of bacteria and the human microbiome, to the more visible act of food preparation and preservation. This initial broad starting point is reflected in the professional backgrounds of the interview participants. On one hand, the discussions with the doctor are focused more on the health, the microbial world, the human microbiome, and the role bacteria play in shaping humanity. On the other, the chef provides insights into the visible action of these bacteria - taste and cooking. Home fermenters oscillate somewhere in between the two. Therefore, the interviews are used to aid the plurality and pragmatism of the literature data. They range in length from one to two hours and amount to just under eight hours. They are transcribed in full and analyzed via open coding. Although the interview insights contribute to a variety of questions and ideas, the thesis results follow only the material that is relevant to the final outcome.

informant	field of work	experience	particularities	location
Maria Jäärts	UX researcher	occasional fermenter	tea fermentation	Tallinn, Estonia
Liis Tuulberg	founder of Metsik Toit, gives workshops on fermentation	forager, experienced home fermentor, Nordic Food Lab	wild fermentation, Lacto-fermentation, Kombucha	Tallinn, Estonia
Silver Saa	head chef, ORE	experienced fermentor	fungi fermentation, Kombucha	Tallinn, Estonia
Anna-Maria Saar	part-time baker	experienced home fermentor	Lacto- fermentation	Tallinn, Estonia
Paula Ivan	surgeon	no fermentation experience	bacteria, microbiome	Bucharest, Romania

Fig. 25
Table with interview participants

data set

Below is an overview of the data set generated from the open-ended interviews, organized by data type, collection method, participant details, and the length of the interview.

Fig. 26
Table with the interviews data set

data type	collection method	participants	length
open ended interview, face to face	self recorded audio, transcribed in full	Maria Jäärts, occasional fermenter	32 min
		Liis Tuulberg, experienced home fermenter	1:55 h
		Silver Saa, experienced fermenter, head chef ORE restaurant	1:50 h
open ended interview, Skype	recorded video, transcribed in full	Anna-Maria Saar, experienced home fermenter, part-time baker	1:45 h
open ended interview, Whatsapp	not recorded, made notes	Paula Ivan, surgeon	31 min

Fig. 27
Notes taken on the transcribed interviews, as the first step of the thematic coding data analysis

- Preparation during the initial stage (flavor, cutting, washing, etc)?
- A: In the initial stage i placed a cutting board on the table and chose a large jagged knife as i found it most suitable and easy to use to cut the cabbage. I then started taking off some layers of the cabbage at they had a bit of bruises and black spots. I also saved a nice looking leaf to put on top of the jar later. I didn't rinse the cabbage as i had removed a lot of the leaves that were at the outside. Next, i cut it in half vertically and then sliced each half on the vertical, thus forming long strips. I placed the cut cabbage in a big bowl, added salt and started massaging it. While massaging it i realised that the strips were too big so i started shredding it more by hand while massaging it for a out 15 mins, as it took longer for it to soften. After i let it sit for 10 mins during which i prepared a jar. I found one big enough to fit the cabbage and leave enough space as well as an opening that allowed me to put my hand through it. After the 10 mins passed i touched the cabbage and felt it was not soft enough so i added a bit more salt and massaged it for an extra 10 mins. After that i squeezed the cabbage and enough water was coming out. I put in the first layer of cabbage and i pressed it down firmly with my hand and i repeated that making sure it was pressed tightly.
- Why did I choose this type of cabbage?
- A: I chose a medium sized white cabbage because it was the only one available at my local grocery store.
- Why these spices? How did I cut the cabbage?
- A: For spices i added some pepper and dried dill. The cabbage was enough to fill up a half of the jar. I added a bit more salt water so all the cabbage was submerged and i also put on top the leaf that i saved at the beginning to help keep everything under the brine.
- Where did you place it? Why?
- A: I closed the lid lightly and stored it in the pantry as there is no direct sunlight and the temperature is never below 20 degrees.
- How do you feel?
- A: Before starting out I was a bit scared of the whole process, thinking it was gonna be too much to do and I was thinking I didn't have any knowledge about it, but after reading about it and actually starting it i felt much more confident about it.

The screenshot shows a chat log with five messages from a user named 'Icra' on April 29th. The messages are:

- 15:03 29 Apr: Initial shaping
- 15:04 29 Apr: Invites change
- 15:06 29 Apr: engagement with material
- 15:06 29 Apr: engagement with surrounding
- 15:04 29 Apr: Adapt to ferment

 Each message entry includes a profile picture, the name 'Icra', the timestamp, the message text, a 'Resolve' button, and a three-dot menu icon.

fermentation shots

As stated above, the interview participants were chosen based on the variety of interests stemming from the literature review. As it usually goes with research, more potential informants are contacted without success, so by no means am I considering the sample of five interviews done exhaustive. However, they are immensely helpful and insightful. The variation within the field of work and experience provides a good base for comparison, accentuating the versatility and applicability of fermentation (Fig. 25). In order to convey an initial idea of the participants and how they relate to fermentation, instead of their physical pictures, I attach their “fermentation shots”.

These shots are essentially word infographics, which represent the word frequency generated from the interview transcripts (Fig. 28). The central part of each infographic is occupied by a word cloud generated from the text of the interviews (using ATLAS.ti), with each represented word's size proportional to the frequency in which it is used in the interview. I use this to offer an overview of the focuses of specific informants. By comparison, it outlines the differences or similarities of various practitioners and the reasons for which they turn to fermentation to achieve their goals.

Additionally, the purpose of the word infographics is to highlight the animated space of fermentation, evident in the amount of verbs present.

This dish and approach showed me that a carrot is worth the same as a truffle, the price is only dictated by supply and demand. (Silver Saa, chef at ORE restaurant)

³⁹ This claim was stated by Silver Saa during his interview. According to him, most cooking schools teach french cuisine and the ideas of one frenchman - Auguste Escoffier. In accordance to his claim, reminisces of Escoffier can still be seen in the strict hierarchical organization of kitchens (from the bottom up: commis chefs, chefs de parties, sous chef, chef de cuisine) along with all the grammar and idioms devised back in 19th century that we still use to construct the image of the restaurant (menu, entree, plat, dessert, aperitif, digestif, bistro, etc.) (Steavenson 2019). To top it all, in 1900 the first Michelin Guide was published, which would go on until now to celebrate the classic french restaurant (ibid). Still today, alternative gastronomy seems to be the exception, not the rule. However, while slowly, the situation is changing and restaurants are made famous by pushing for alternative cuisines: such as El Bulli (Spain) with molecular gastronomy or Noma (Denmark) with nordic cuisine, especially fermentation. Even the Michelin Guide is responding to the critiques of being dogmatic and in 2020 it diversified it's guide to support sustainable practices such as the zero-waste approach (Michelin Guide 2020)

results & findings

The quote on the left side embodies the initial hunch and the central idea that influenced the direction of the project: that value made visible through critical use can question current pragmatism of consumption. It suggests a way to challenge the worth of objects that propose deductive use and obstruct their users by domesticating experience (Flusser 1999). An inductive approach is recognized in fermentation, as one essential characteristic was shared by all interview participants: an always evolving definition of food, evident in the way they talked about food and about the ability that fermentation enables to expand and transform ingredients. The space of fermentation animates the participants, includes individuation and helps construct the self. It is all done rather intuitively by the mindful body, while cultural, social, and political constructs are put to a test.

It is really a wide spectrum - here is fresh and here is rotten and ferments happen in between. It is interesting how at some point it is still acceptable for us [...] When do we consider something edible? When do we consider something food? It is often very social, cultural, political. It is very subjective also - it is definitely related to cultural stereotypes and the way we see ourselves and how we identify ourselves. (Liis)

I started off reading a lot of books and it ended up killing my style, my personality. You learn from mentors, you take a recipe from there. At one point a couple of years ago, I was like "But what am I about? How do these chefs know how to create these recipes?" [...] You look for your own narrative, start testing out. Getting over the fear of failure - fermenting has helped with that. You need to learn more and understand more, it gives you more confidence, more knowledge, and new unique points. (Silver)

While it can be argued that in the case of a chef, such a fluid self could be attributed to the nature of the profession, it should be noted that modern European cuisine is still under the influence of classic French cuisine³⁹, which can at times be rigid, traditional in its use of ingredients and celebration of technique. In ORE restaurant, however, fermentation is a means to question and break these rigid lines - improvisation is celebrated. Here, the personal is entangled with the professional. Silver's fermentations finds place in a consumer culture and are utilized as means to achieve uniqueness while practicing in the food industry, to order to answer the industry's demand for "new" things:

Cause everybody has beets, everybody has carrots, everybody has already the same meat and fish. Like what are you doing different with it? Are you poaching or frying? These are techniques, yes, but where do you get these unique tastes from? So that's where fermentation and preserving really come in for us. It's new for me as well, but it really ends up giving you something really funky at the end, like very unique. And then you know this is my differentiation point - like, nobody has this, this is new! (Silver)

It was surprising to notice that in the case of Silver Saa as well as David Zilber (the head of fermentation at Noma), while they both manage successful restaurants, the ingredients that they consider the most exciting, are not the expensive seafood or rare truffles. It is the ferments. And that it is because of their critical use, their capacity to deviate from the norm. They are the ones that make a dish novel and extraordinary and thus fulfill

the customer's demand for new. I find it ironic that, in essence, this human desire for newness is achieved by the oldest of practices.

He put a spoon in, took out a very murky kind of cloudy looking liquid, and it wasn't just salty gooseberry juice: it was completely transformed. It was lacto-fermented gooseberry juice. René tasted it and his world completely changed. It was full of umami, it was full of depth, it was full of lactic acid playing alongside the phenolic acids that came from the berries as well. And it was an "aha" moment, to say the least [...] And it was like, "Oh, we made a sauerkraut of berries? Well, what else can we make a sauerkraut from?" And fifteen years later, we have a world-famous fermentation lab in the restaurant. (Zilber 2019)

Perhaps, my informants ability to renew their experiences via food lies in the fact that, along with a more fluid self, they also talked about food with a certain freshness - like they were constantly rediscovering it. The food that they talked about was not the food I knew. I knew barley to be bread or beer, but Silver knew it as soy sauce or chocolate. I knew birch leaves to be just that - birch leaves- but Liis knew them as a potential fermented Burmese food salad. I knew fireweed as a weed, but to Maria it was tea. I knew plums as a sweet autumn treat, but Anna-Maria knew them as her friend's spicy-savory winter delicacies. There were really no boundaries imposed by taste, nor appearance, nor even initial inedibility. They saw ingredients as temporary forms on their way to becoming something else (this would later be identified in the theory of phenomenology and correspondence). This is due to the fact that to ferment requires some knowledge on the properties of ingredients, such as high concentration of natural sugars or proteins, existence of naturally occurring lactic acid bacteria, interesting texture, etc. This way the fermentor becomes familiar with what food can do and become. Therefore, freed from their surface, food ingredients are seen as resources or possibilities. Rather than being final, forms are temporary and awaiting transformation. Truly, a lot of it made me think of alchemy.

If we use wine that comes from Italy, it doesn't tell a lot about us, so why do we need to use wine? It just starts to break it down, you need acidity and maybe added notes of grape, to add some funk to the sauce, a bit of sweetness – that's very cool. When you get down to this "you need acidity in the sauce" acidity can come from anywhere. You can use vinegar instead of wine, just a little bit, added later. (Silver)

And it turned out that some turned inedible and some were rather good, and some needed to involve another process - the taste was there, but the texture not. (Liis)

Here I am also reminded of David Zilber, and how he uses fermentation to mess with form: "If you can't eat this, can you manipulate it? Can you turn it into something else? Can you make a stock from it? All of these little, tiny experiments and concoctions would end up being novel new ingredients" (Zilber 2019)

This critical attitude puts everything under a question mark and breaks with the need for pre-determined ways of acting in favor of self-expression. I call this deconstruct to construct. Learned ways of being are challenged. Once there are no forms to aspire to, fermentors become attentional rather than intentional and fermentation becomes much like a "playground". Experience

is thus made visible through food and new narratives of use are constructed through negotiation. Engaging in critical use, informants can fulfill their various human interests. As a result, what initially doesn't tell a lot about us, transforms and becomes the story of us.

Silver's interest is to create, thus fermentation gives him the ability to stay creative and confident in the kitchen:

But when it's playtime again [...] you have these cool ingredients to play with and you start testing and roasting it, or reducing it, or cooking it, brazing it, whatever, add it to somewhere. Gives you so much freedom and funk to it. Cause cooking is like playing music – you just add different notes and stuff like that. (Silver)

Maria's fermentations stem from an interest in the medicinal properties of plants:

So for me, it has a lot to do with medicinal properties because this is something I am also into. A thing you can turn to make yourself healthy. And also a place to get vitamins in the winter. (Maria)

My favourite is Liis, who recently became a mother. She is caring for her family and the bread she bakes forms after them:

Right now we bought this little, little bread dish - that you can put bread in and put in the oven. First, we had two big ones and now we bought a new little one, so now every time we make buckwheat bread, then this little one is for Uku - so he has his own little cute bread coming out and he really likes it. So that is maybe a new thing that now it is three breads - one for me, one for Jaak, and one for Uku. (Liis)

Still, far being recruited to live inside human societies, ferments also retain a story of their own. Here, the most wonderful thing happens: over time the inanimate it becomes a she/he. It is common place that the bacteria or yeast colonies that are used in making kombucha tea and sourdough bread, who require a certain level of care, are given names. These names are sometimes given after the person from which the culture was sourced, or place of provenance, or totally random. The relationships get so animated from the care the ferments demand that, very often, the ferment and the fermentor find themselves in the roles of parent and child.

With Kombucha I have forgotten my sweet mushrooms. Became a bad mom [...] But then a few weeks or months passed and he runs out of the liquid that he is in, he eats it - or she - and then at some point, the mold takes over because just another life form starts forming. (Liis)

I've had my sourdough starter for 4 years now, it was started from apples. You grow into it, it becomes a part of you, it is like my baby. It came from my summer cottage, from the apple trees. (Silver)

(about sourdough mother) you have to feed it every day, it's like taking care of somebody dear. (Anna-Maria)

These roles are allowed to develop because, being a playground, there are little rules, so to be attentive is encouraged. Ferments are sometimes described as "tests" or "experiments" and fermenting is "playtime", "trial and error" or "a learning process". In such a space, failure is to be expected, something all informants agreed to be an essential part of learning. What supports attention is the fact that fermentation is open ended.

This is a game changer for us. And that really excites me, it gives me goosebumps every time we do it. The funny thing is that when we do stuff we don't know what we are doing it for. So something weird is going on cause we really don't know what we are making it for, just making it. (Silver)

Fermenting vegetables is an endless world - you can always add spices, ginger, garlic. Giving a specific recipe - you don't have to do that. You don't have to measure or have a scale. Instead, use your body, your taste, your senses. (Liis)

Time and openness invites uncertainty and to stabilize the relationship one turns his attention inward. For this reason, in fermentation, the most important tool one has to navigate the space between fresh and rotten is the mindful body. Being such a bodily practice, fermentors learn by doing because they think through making (this is in accordance with Ingold's theory 2012). And in this process they learn to trust their senses. Perhaps a juxtaposition is pertinent here, and I urge you to consider that now it is a common practice to determine edibility based on one rather abstract construct - the expiry date. If that doesn't sound problematic, it should, seeing how incorrect assessment of food edibility by virtue of expiry labels, accounts for a substantial margin of unnecessary food waste (Neff et al 2019). Quite literally, in these cases, people are food illiterate. In contrast, during fermentation, as time passes and relationship evolves, one learns to pay attention to the mindful body. As a result, senses gain more acuteness and flexibility and affect the embodied experience in a number of ways. This is also known as acquired taste.

But I think that if you are really into fermenting and experimenting then your palate will also develop. That's why it is difficult to say when a ferment is ready. When somebody tells you that it takes this much time to make a fermented product I would be skeptical about this opinion because it is always a matter of taste - which makes it interesting and exciting. (Liis)

And you always have your eyes, nose, hands, even ears to figure out if things are edible or not. I acquired this sense when things are off. I always get this puking reaction, immediately I feel something in my throat. (Silver)

Apart from being more present when dealing with food, my informants were also actively participating in their environment. On one hand, fermentation drives sociality. There are numerous communities of fermentos who function on a principle of sharing information. It is a very friendly space which makes for a social practice. Also because it is so open-ended and complex, it is a process that overarches many disciplines: chemists, physicists, biologists, cooks, artists all find their place within fermentation. I would go as far as to say that it is socially contagious: one of the participants continued to ferment long after the experiment was over. Two friends took up fermentation just because I talked about it. Talking about my personal experiments with two of my interview informants resulted in them undertaking the same fermentations themselves. Simply put, the action of fermentation builds relationships also with other humans.

And just learning and sharing amongst our team in the kitchen just makes it such a beautiful process. Brings people together. So that's what I really love about it cause everybody learns and "Oh, you have to taste this" and "Oh, this is really good, like wow - what is it?" and then "Yeah, I put this and this" (Silver)

Again, I refer to the words of David Zilber (2019), who describes fermentation as culture:

It is culture (...) Food is culture, but fermentation is culture on a deeper level. And I love the idea that somehow, someway, these synonyms overlap—that “culture” and “culture” mean two different things to a biologist and an anthropologist, but in fermentation, they overlap completely.

On the other hand, through fermentation informants also accumulate knowledge about the material world, rendering it more visible. This works two ways, as understanding the process behind fermentation gives more value to both food and the bigger system it is related to. First, food becomes valuable not only for what it is, but for how it got to be so.

So they served it cut in a cube, with some rosehip dust on top and the texture was like a smooth chocolate ganache – but it is not chocolate, it’s toasted barley with Aspergillus mold on it. (Silver)

Second, to ferment, one needs to manipulate environmental factors such as temperature, light, or humidity as well as exposure to other bacteria. By doing so, one gets more intimate with the processes that make us and the world around us. When I talk of visibility, I don’t refer to visual perception only, but to all sensorial experiences once surfaces are broken. Thus, the kitchen is not just a room in the house but can be seen as the quality of its constituent parts, such as, the temperature, humidity, weight of the jars, materials, or amount of light. Borrowing Silver’s expression, what becomes visible is “the space in between”. Soon enough, the world reveals itself as a meshwork (Ingold 2015).

Wild fermentation takes advantage of what is already out there. You know on the surface of food in summer. That isn’t just dirt, it’s alive! That is healthy bacteria for you (Anna-Maria)

I remember when I was in culinary school, we didn’t really learn about it as well. You didn’t really understand how yoghurt was made. Like you didn’t know there is yogurt cultures stuff like that. Cause we didn’t have a fermentation class so that’s how we talked about it. Yogurt was yogurt. Kefir was kefir. Sour cream was sour cream – didn’t really understand why it was sour. (Silver)

That is an interesting dichotomy: some say that you have to eat specific supplements and then you are good and I would like to believe that you can eat and make your own ferments and still be ok with that [...] My knowledge is very superficial, but what is happening in your body, in your microbiome, is that you have thousands of different bacteria colonies. And you also have the bad ones. But if you keep your health good, it is balanced. So you have to have those bad ones a bit (Liis)

Where do the bacteria that are inside the carrot come from? From the soil. But the soil is so loaded with pesticides, that bacteria die. And if there are no bacteria in the soil, there is no us. (Liis)

In concluding this section I refer to an equally important insight from the interviews - my reaction to it. The lasting impression is one of balance: old and familiar, yet new and unique. Seems like all the informants are searching for newness not outside of their existing relationships, but inside of them. Experiencing new food did come by way of employing a bunch of static objects for their predetermined purposes, but by way of pursuing

a fluid one into what it could do and become. For this reason, they were able to get more intimate with ingredients and their relationships with food grew stronger. Suddenly, the valuable becomes the used. This is also what Silver means when comparing cooking food from the outside via techniques such as boiling or frying with cooking food from the inside via fermentation. This is not change, but transformation. Just as Ingold suggested that the essence of sociality lies not in interaction but in correspondence. This ability to actively participate in the transformation and manufacturing of new from old is what inspired the next set of experiments.

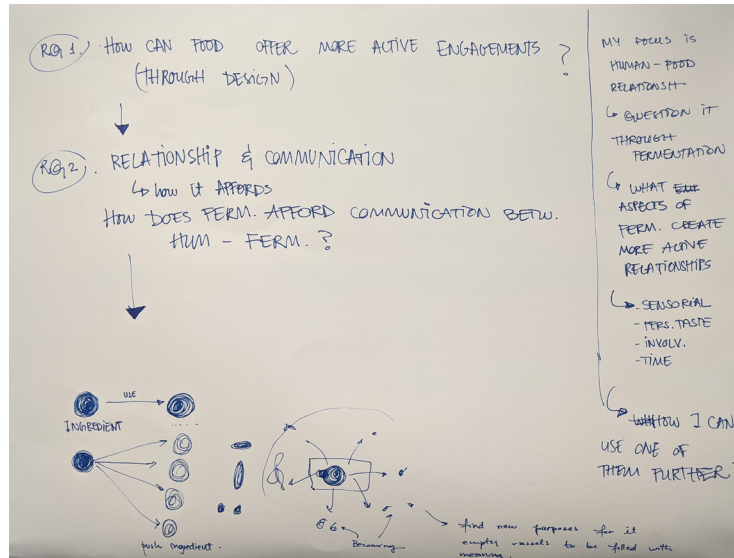


Fig. 29
Notes from the design process, capturing the moment when, as a result of the interviews and theoretical background, the focus shifts on a relational approach. The questions read: from asking “How can food offer more active engagements through design?” into “How does fermentation afford communication between human and ferment?”

conclusion

This chapter describes what the practice of fermentation means for fermentors and how it points towards initial ideas of what it can provide. The results above inspire the question from which a set of experiments departs - how can I establish a completely different relationship with food in the way I start perceiving it? This exploration starts from the concepts that emerge from the interviews - that time, open-endedness, uncertainty, and sensorial embodiment are potential spaces for friction in design. During fermentation, they are used to create something new and unique through the critical use of something old. The next chapter deals with how these identified variables are making experience visible and how they support negotiations between the fermenter and the fermentor. Due to the iterative nature of the research, previously presented ideas are revisited and re-evaluated. As my understanding and intentions evolves, so does the data interpretation.

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This was my second time starting a sauerkraut this year. The first time I had all of the nerves and excitement of a beginner and so kept things quite simple, only using cabbage and seeds (cumin for one half and caraway for the other). So this time I decided it was time to be more adventurous and add more spices and things to the mix.

A little uncertain on how to be adventurous though I googled 'turmeric sauerkraut recipe' in google. I got psyched because not only am I a turmeric fan but also because the recipe also called for ginger. I later realized that I was out of ginger and because of the quarantine situation, and with a heavy heart, I accepted that I would have to carry on without it.

While preparing the ingredients this morning and putting the turmeric powder on the table I realized that I also had ginger powder and convinced myself that this would also work. I mean you can put in anything you want right?

[...]

I cut the cabbage in medium sized pieces. I was very conscious of the size at the beginning, sometimes even cutting some pieces in half, but after awhile the rhythm of cutting made me forget that I even wanted a particular size. I remember thinking that the cabbage was not very fresh and I wondered if it would be better to have used a different one. On the other hand turning it into a ferment also seemed like a good idea at this point.

I eyeballed the salt. Just throwing stuff in there by gut feeling made me feel super empowered all along. As I started to massage it was amazing once again how much liquid starts to come out (although maybe not as much as the first time I did. Maybe the freshness of the vegetable does matter). As I massaged the question of the size of the pieces now seemed totally irrelevant. I also noticed that the lack of freshness that bothered me at the beginning seemed to be gone. I tried the cabbage. It was super nice. Way nicer already than the plain raw taste I had. This was the first of many times throughout where I tasted from my hands and then continued using them without washing them. (I know there was a recommendation on sterility but in the back of my mind I am convinced that my mouth and hand bacteria cannot damage the kraut)

After several minutes, when I could already feel my hands soaked I stopped massaging it. Time to add more stuff. (should I leave it to rest or something for some time? I have no idea but I just want to add everything else now). I diced the onion and threw it in. Grated the cloves of garlic and threw them in. And as I threw stuff in, I began to feel very excited and empowered. I kind of wanted somebody to ask in and ask me what I was doing, so I could get a chance to brag about my future ferment. Did not happen though. I completely forgot about whatever recipe I was following and kept throwing stuff in in the amounts that felt right. As I put the turmeric I realized that it was very nice that each time I added something I could really smell each ingredient. Then went the ginger. And after I thought - oh I could also add cumin seeds - and sprinkled them with a grin.

*Then I massaged for another while. It was cool to see the color it took. For some reason the colors and smells became very vibrant. I was happy.
(extract from participant's diary, X3.1)*



Fig. 30
Myself and sauerkraut ferment (white cabbage, lemon, mustard seeds; ready after 25 days)

Fermentation is situated in making, thus the relationship between the fermentor and the ferment can be seen as an intersubjective communication and a reciprocal giving and receiving of forces and sensations. As a result, meaningful connections may be established between, which are anything but static because nor is the fermentor or the ferment. This negotiation comes to life in the above quotation. Departing from their separate places - from individual and food - they meet in the middle, and take the role of the fermentor and the ferment. Within these roles they correspond with added time and practice: the fermentor becomes more confident and creative, the ferment becomes less rigid and intentional, the relationship is more animated from within: the color, the taste, the sensations of the hand, the available ingredients, the cravings. They can only *become* in the presence of the other.

The aim of this design project lives in a space where it is not interested in the literal designing of new food. Rather it is using design thinking and design techniques to reconsider the act of making and eating food. Accordingly, what became clear after the interviews is that fermentors don't try to cast projections that match the world around, but they are interested in working from within. Joining with ingredients, the fermentor awaits how a ferment reacts before responding. In short, it is not about working deductively with food as a static and predefined ingredient, but inductively, from the inside, ensuing and forming meaning along the way. The protruding flavours, the unfamiliar smells, the way texture loosens during lactic acid fermentation of vegetables are material qualities of food that demand engagement. It seems like what fermentors are working towards is almost always a surprise - something unique. Time and openness is expected to bring newness, but it is not decided beforehand in what way. During fermentation, form is negotiated, not cast. Therefore, the "fun" lies in discovering what that transformation brought along. This is the space in between that this thesis aims to study.

Therefore, any knowledge that I have produced so far is one *of* fermentation. While helpful to the endeavour so far, it is not enough for me to understand the essence of the experience in question. If I now know fermentation to be an open form, what comes next is to find out its implications. For this reason, in this chapter, the experiments are used to move in a space where knowledge is gained *with* fermentation. Accordingly, the focus shifts to embodied experience and to the experiments that follow the intention to get closer to the agents present during fermentation. The aim is to understand how the agents converse and evolve over time. I am interested not only in the beginning and becoming, i.e. how food ingredients are perceived and what they end up becoming, but the space in between: using them. I expect that the implications of such dynamics is that food opens up to be known more intimately, revealing its hidden interiority (Ingold 2013). The work presented intends to highlight the relevance of the intimate encounters and correspondences between mindful bodies and food, experienced through the critical use of fermentation. In doing so, I hope to put forward the idea that friction is an invitation to enter into more thoughtful relationships.



Fig. 31 - 36
X2 ferment experiments. Top: hot onions. Middle row, left to right:
grapefruit+ fennel+ daikon radish; red cabbage+ cinnamon+ ginger+
orange; sourdough mother; grapefruit+ fennel+ daikon radish+ thyme.
Bottom: grapefruit (only juice) + fennel+ daikon radish

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Fig 37 - 44
X2 ferment experiments. Top: kombucha. Middle row, left to right: garlic+ honey; 2 months old white cabbage kraut; white cabbage+ lemon+ fennel; fresh kraut; black bread mother. Bottom: white cabbage+ turmeric+ ginger; ginger bug.



Fig. 45 - 56
X2 ferment experiments.
Top: ramson+ fish sauce+ chili+ ginger; simple ramson.
Second row, left to right: cucumber+ ramson; cucumbers+ garlic; cucumbers+ daikon+ leek; cucumbers+ chili+ garlic+ ginger.
Third row: cucumbers+ chili; curry cauliflower+ carrots; local kimchi; brine from fermented sirracha sauce.
Bottom: carrots+ lemon; carrots+ garlic; carrots+ lemon+ thyme.



aim of the experiments

The designed experiments are picking off from where the interviews left off: the animated space that undergoing fermentation brings about. As understood from interviews, the fermentation is made up of animated verbs, not static nouns. As they become the fermentor and the ferment, both practitioner and food are fluid, so what interests me is how they negotiate their roles, how they turn into actions that evolve over time. This is what inspired the direction of the experiments and a reframed research question: How can food reveal its material agency? At the same time, this exploration implies additional questions: How can time, openness, uncertainty, and sensorial explorations constitute a space for design? What narratives of use do they open up? What type of knowledge of food is implied by our engagements with it? And, in general, how would all of this creation of knowledge feed back into the world? As this focus solidifies, it becomes clear that to go further with this inquiry, a more “inside” view of the process is needed.

This happens by engaging the design activity in three interconnected experiments: (X2) a self-study of me undergoing fermentation through ethnography, (X3) a participant study undergoing fermentation via probes, and (X4) a participant study undergoing fermentation via taste dinners (for a more detailed description of the experiments refer to Chapter 4). Through X2, I make myself familiar with the space and gain empirical knowledge. Only then can I understand the vocabulary, dynamics, and agents that animate this space. This works in two ways, as undergoing fermentation only works by mutual engagement: as the fermentation space opens up to me, I also open myself up to it. Therefore, the fermentation that I begin to know is as much a tale of a common practice, as well as a tale of me. Similarly, the self that I construct is by way of fermentation. For this reason, using myself as an informant comes as an advantage because only after going through the process of fermentation myself I can fully understand the experience of my informants.

Fig. 57
X2. Fruits and
vegetables
awaiting their
transformation





Fig 58 - 59
X2 fermentation diary. It includes “recipies” and notes on the process, as the materiality of the ferment changes. Notably, the earlier ferments notes have extensive notes on when is expected to be ready. These notations appear more rare in the later ferments, as I became more confident and more reliant on my own senses to deduce the readiness of a ferment.

The reevaluated insights are then revised through X3, which further explores the potential of time, uncertainty, and senses as spaces for design. Accordingly, X3 is complementary to X2, and it investigates how participants respond to frictions brought into their quotidian food activities. This is done by involving participants in designed situations - in this case making and caring for a sauerkraut. In order to investigate the quality of engagement, it is important that the participants are not experienced fermentors. Then, X4 expands the territory of X3: instead of following the making of a ferment, it focuses on its subsequent activities - tasting, cooking and sharing it with others. To help triangulate the data, both X2 and X3 were followed up with two respective group discussions. Rather than producing knowledge individually from one another, the experiments functioned as a whole, conversing with and triangulating each other. For this reason, the results discussed stem from the combined data set of the experiments.

participant X3	age	field of work	experience	location
P3.1	26	interaction designer	fermented once before	Tallinn, Estonia
P3.2	25	product designer	never fermented before	Tallinn, Estonia
P3.3	24	accountant	never fermented before	Bucharest, Romania

Fig. 60
Table with X3 participants

participant X4	age	field of work	experience	location
P4.1	25	product designer	never fermented before	Tallin, Estonia
P4.2	28	lawyer	never fermented before	Tallin, Estonia
P4.3	30	IT engineer	never fermented before	Tallin, Estonia
P4.4	51	insurance broker	occasional fermenter	Tallin, Estonia
P4.5	51	experienced executive	never fermented before	Tallin, Estonia

Fig. 61
Table with X4 participants



Fig. 62
Participant 3.1 with her ferment (sauerkraut of white cabbage, cumin, caraway, salt; ready at 16 days old)

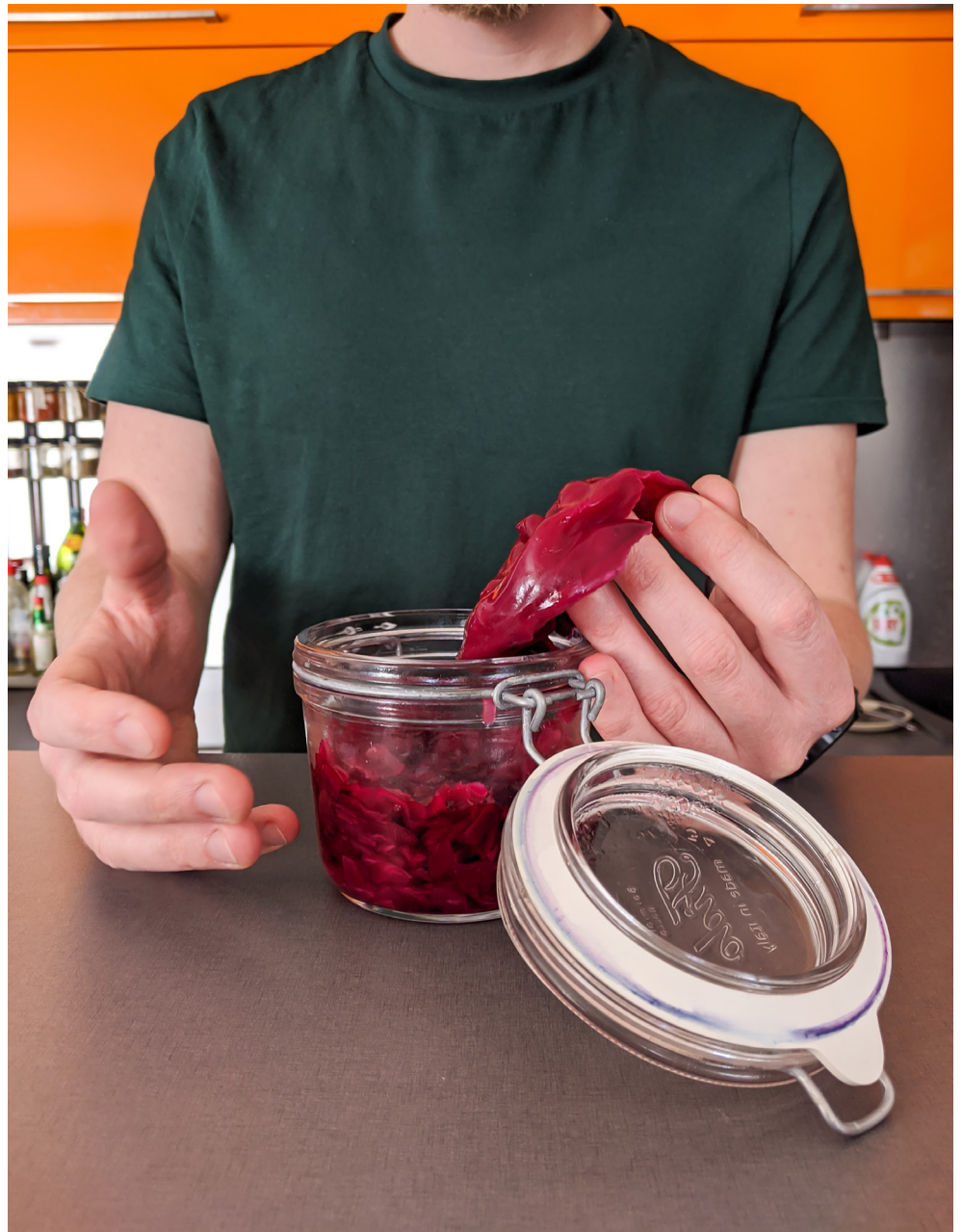


Fig. 63
Participant 3.2 with his ferment (sauerkraut of red cabbage, salt; ready at 6 days old)



Fig. 64
Participant 3.3 with her ferment (sauerkraut of white cabbage, dill, garlic, mustard seeds, salt; ready at 9 days old)

data set

Below is an overview of the data set generated from the experiments, organized by data type, collection method, participant details, and the amount of gathered information. This aggregated data, together with previous insights from the interviews, inform the data interpretation discussed in this chapter. Similar to the analysis of data emerging from the interviews, the aggregated data from the experiments is analyzed using a thematic coding approach.

data type	collection method	participants	amount
X2 diary (online)	self recorded, handwritten	1 (designer)	12 pages
	self recorded, audio recording	1 (designer)	33 minutes
X2 recipe diary (physical)	self recorded, handwritten	1 (designer)	31 pages
visual data	self recorded	1 (designer)	100+ pictures, 9 videos
X3 experiments diary (online)	self recorded, handwritten	3	19 pages, 3 pictures
X3 group discussion (Skype)	no recording, notes taken	3	45 min
X4 tasting + discussion	no recording, later transcription from memory	5	30 min - 1 h

Fig. 65
Table the data set
from the experiments

The screenshot displays a digital workspace for thematic coding. The main text area contains a document titled "Making the kraut." with several paragraphs of text. The left sidebar contains a list of notes and questions related to the text, such as "A bit about Sauerkraut", "Tools needed:", "Preparation:", "Start the ferment", "Care", "When is it ready?", "Remember", and "Questions". The right sidebar contains a list of identified codes, such as "invites change", "material choice", "previous experience", "adapt to fermentor", and "versatile", each with a "Resolve" button.

Fig. 66
The thematic coding data analysis process. The material is read through multiple times, while notes are taken that summarize the emerging thoughts (left). From these, codes are identified and are further grouped into themes, in relation to the patterns that emerge

results & findings

Pursuing the idea that the fermentor and the ferment get along, not in the absence, but in the balance of friction in their affects, the experiments seek to understand how individuals relate to friction brought to their food through fermentation. The results seek to explain how the interplay of forces animating *the space in between* guide towards more active engagements. To do so, I use a revised model which investigates experience, proposed by Valle Noronha (2019). To see how the model is appropriated for the purpose of this thesis, see Chapter 4, section 4.5 on Data Interpretation. Accordingly, the findings are divided in three categories, which follow the development of the relationship between the ferment and the fermentor: (1) Perceived Characteristics, (2) Affects, and (3) Becomings. These findings are deduced from the data set presented above, as well as the revised initial interviews with fermentation practitioners.

This section proceeds by presenting the first category, that of Perceived Characteristics, which describes what ferments *are*, as revealed to the fermentor undergoing fermentation. As explained in Chapter 4.5, this grouping is concerned with how the agents, the fermentor and the ferment, participating in fermentation are perceived. This first grouping is followed into the second one, that of Affects: what ferments are turns into what they can *do*. Thus, the aim of Affects is to explain how, once involved in the act, the agents are able to affect each other. The results of these actions and their affects are grouped as Becomings. Nonetheless, these groupings are not exclusive, so their contents are not static, but rather oftentimes overlapping

perceived characteristics: what is friction identified as?

The ferments made by the study participants can be considered designed interruptions - unusual, but recognizable forms. Their use is instrumental to design the setting for a certain type of engagement with food, one that includes unfamiliarity, openness and liveliness. Unlike traditional use of prototypes, the ferments are not there to propose a solution, rather they purposely interrupt, provoke, and create friction. These aspects bring a certain experimental quality to the ferments, which is sustained by the fact that the makers of the ferment are the participants themselves. Because the maker and the consumer of the ferment are the same person, the perceived qualities of the ferment are intertwined with those of the fermentor. For this reason, the perceived characteristics, while mainly attributed to an agent cannot be viewed as separated from the other but in relation to it. For example, in the way I have come to understand fermentation, the choice of which materials to work with is indeed a characteristic of my taste (the fermentor) but one that conforms to the chosen food (the ferment). My taste preference exists insofar as a variety of possible tastes exists. When reading this model, one should have this interdependence in mind. The first diagram shows how the agents undergoing fermentation are perceived (see Fig. 67). The understanding of microbial action during fermentation is included under the alive property of the ferment. The environment in which the fermentation occurs is included under the material engagement of fermentor. The second diagram proposes that these characteristics should not be seen as exclusive, but correlated (see Fig. 68). Perceived Characteristics thus work as if they belong to a network rather than a list (Valle Noronha 2019).

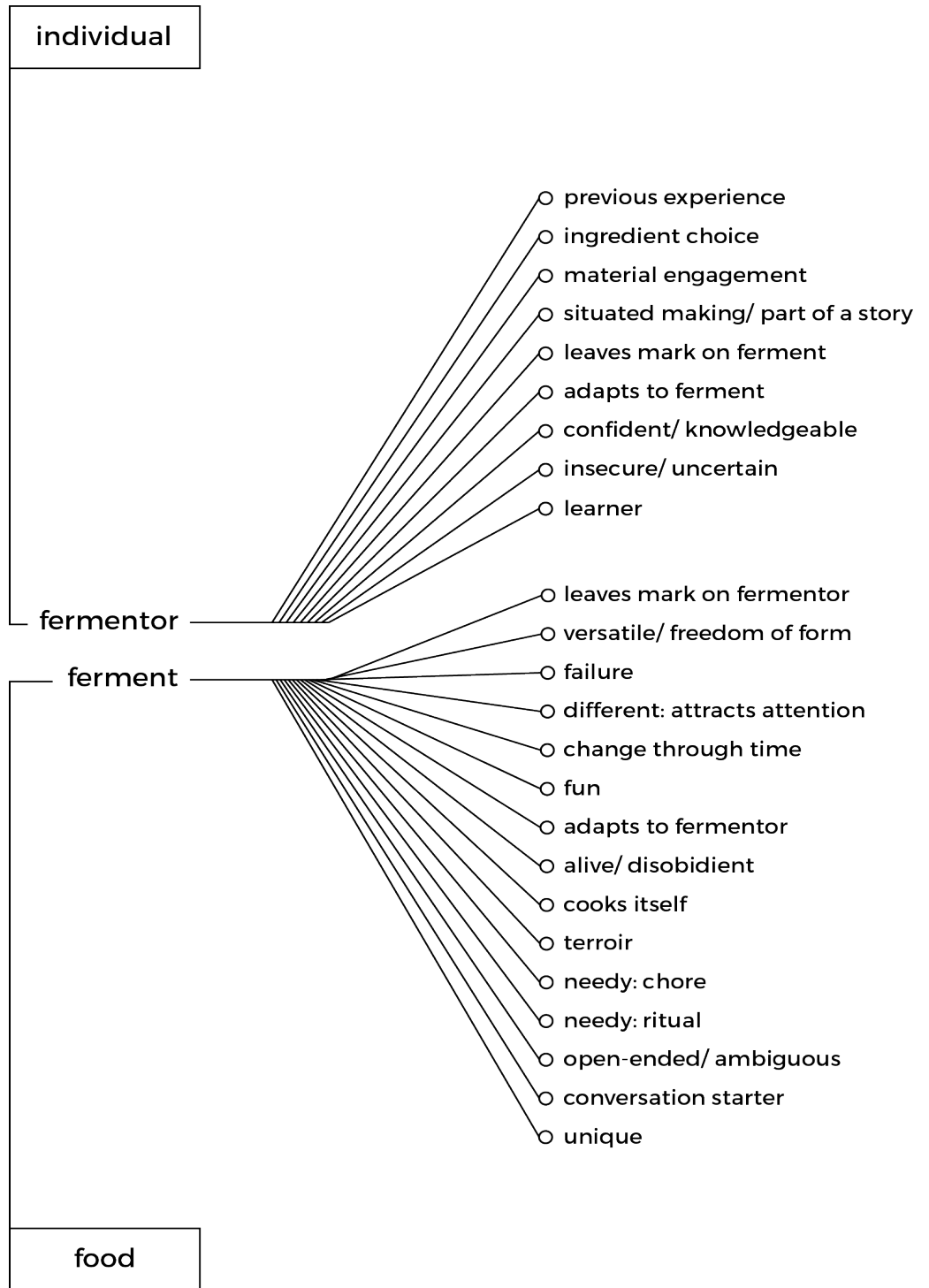


Fig. 67
Perceived Characteristics, visualisation adapted from Julia Valle Noronha (2019). This category depicts what ferments *are*, as revealed to the fermentor undergoing fermentation. This grouping is concerned with how the agents, the fermentor and the ferment, participating in fermentation are perceived

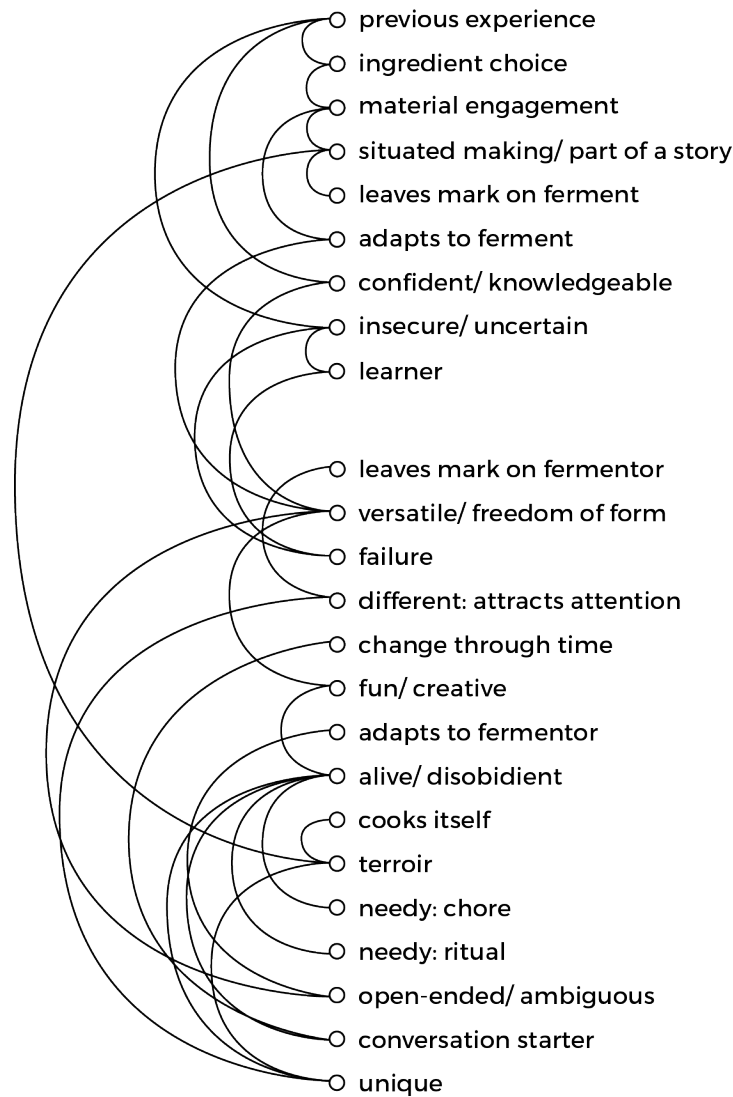


Fig. 68
Visualisation adapted from Julia
Valle Noronha (2019), depicting
how the perceived
characteristics converse and
influence each other

One of the perceived qualities that participants mention most often is the material engagement, which includes both the materiality of the ingredient and the environment. At all stages of the practice, the ingredient “wants” to be sensed in some way and to involve the fermentor: there is not one sense to rule them all, but they are all equally needed and practiced. Sometimes the starting of a ferment involves especially vision, touch, and taste. As the fermentation continues, the process can rely more on smell, hearing, and vision. In the experiment, the Sauerkraut has participants massaging the cut cabbage which allows the participants to feel the material as it softens and transforms under their hands. It encourages them to use their body in unfamiliar ways (to them), in order to be in direct contact with the food.

After washing it I stared at the lines within the cabbage for a bit. They look very pretty and remind me of something like a brain, very delicate and complex [...] Also tastes nice crunchy and fresh at the moment. Funny how much the flavor differs from a sauerkraut [...] Massaging it sounds a bit inappropriate, but that's what I have to do to get those juices flowing [...] This felt quite weird. After a while, massaging it was a lot more sticky and gooey and the cabbage has lost its white contour lines in favour of a very rich dark purple hue. Very pretty. Added more salt because I couldn't taste much of it yet. Leaving it for another 10 min now to sit and juice it up. (P3.2)

Being a preservation method, fermentation encourages material engagement with the environment as well. Later, in *Affects*, I show how these engagements involve environmental conditions such as temperature, humidity, absence of oxygen, etc. During the interviews, the practice is uniformly associated with seasonality. This is related to when produce grows or ripens, thus enabling the fermentor to sense a direct connection between food and (passing of) time. Additionally, seasons (such as warm summer days) dictate how “active” the ferment is, how much time it takes for it to get ready. This is closely related to another perceived quality, that of a situated practice. The making belongs to a story and is deeply contextual, contributing to the development of a networked relationship between ferment, fermentor, and environment.

It is also about seasonality. Because some stuff you only do in the summer, and some stuff you only do in the winter. So for me, fermentation has a special time in the year and also a special place. The tea thing, I only do it in the countryside, I don't do it in the city. I gather the plants there, I do it there. It goes with that place. (Maria)

These types of stories remain embedded in the ferment, which can be perceived because the fermentor leaves marks on the ferment. Sometimes, these marks are equated with the *hands* and *body* of the fermentor, as there is a unique colony of bacteria that we all carry on and in our bodies. This supports the idea of affected hand taste (authorship) and contributed to stronger engagements.

The bread thing is cool, when you make your own starter - everybody has a different starter. I made mine from apples from my country side [...] Then a friend of mine just started his with water in his apartment - the apartment was in Kopli - he had a smell of cinnamon. It was just “wow, where did the cinnamon smell come from?”. But no taste of cinnamon when he baked the sourdough. But the starter, he still has it, there is some kind of culture or yeast in there that produces this cinnamon smell lactic fermentation - so it's a very personal touch. (Silver)

On the other hand, the ferment also leaves marks on the fermentor. Due to the physicality and material engagement of massaging the cabbage, the ferment leaves a trace of its presence: the body gets tired, the hands ache and itch from the salt, they even take on the color of the ferment.

Put the leaves. Pressed further down. Closen and into the cupboard. I forgot to put a date on them or mark them in any way. But they marked me. My nails are yellow. I feel accomplished and proud. (P3.1)

My hands are tired and my fingers purple. But they don't look like regular stains - like when I drop food on my shirt. This feels different, deeper, more meaningful. I am not ashamed of it, but proud. If I think about it, when food leaves a stain is because I didn't treat it with enough care. This is the opposite - it is the most careful stain ever. (Personal notes)

However, one does not have to be the maker of the ferment to “read” these stories. Most of the time, the perceived taste, smell and look of the ferments trigger imagination and memory, enough for people to relate and build their own.

I must say that pickles are still my favourite - probably to do with familiarity. Pickles usually remind me of winter times and Christmas, which makes them a nice cosy bite to eat. The weird thing was that the pickles with leek had a distinctly summery taste - almost like BBQ. That was very nice, and it was nice to taste how different one ingredient can taste - even after just a few days of fermentation. (P4.3)

Open-ness is another important characteristic, which leads to stronger engagements. It is mostly perceived concerning the way in which the ferment can be constructed and used, and is greatly influenced by previous experience, material engagement and situated making - with more maturity and involvement comes more perceived open-ness.

The first time I had all of the nerves and excitement of a beginner and so kept things quite simple, only using cabbage and seeds (cumin for one half and caraway for the other). So this time I decided it was time to be more adventurous and add more spices and things to the mix. (P3.1)

This pushes participants into unscripted situations, which stimulates them to notice details, improvise, and proceed in the act of *making with attention*, and not intention. With this attentionality comes perceived versatility, freeing the ferment from its current form, which greatly influences the nature of the acts undertaken by fermentors. During the experiments, as participants are doing fermentation, they become the act, not the intention. Accordingly, their use of ferments is more likely to disobey common patterns of use.

While preparing the ingredients this morning and putting the turmeric powder on the table I realized that I also had ginger powder and convinced myself that this would also work. I mean you can put in anything you want right? (P3.2)

I placed the cut cabbage in a big bowl, added salt and started massaging it. While massaging it I realised that I didn't like the size and feel of the strips - they were too big so I started shredding it more by hand while massaging it for about 15 mins. (P3.3)

Perceived liveliness is a tricky concept because ferments are in fact live microorganisms at work. So before anything, ferments are perceived as alive because they are so. Similarly sits the fact that they are also seen as transforming themselves - microorganisms inside the ferment are indeed transforming the structure of the food. That being said, both perceptions of liveliness and self-governance are mostly made obvious by the instable form - the ferment is animated and constantly evolving, bubbling on its own. The fact that the ferments are alive, supports a more intimate knowledge of the food, while their ability to "cook" themselves contributes to making the process visible.

It's funny how they (Sauerkrauts) are a bit different since they came exactly from the same mixture. Like having two children, twins, with different personalities. (P3.1)

I didn't have to add anything but the salt, the rest it did by itself. Which is weird, it made me realize that it is a thing of its own that can change flavour by itself. I thought that to get that flavour you need a lot of spices. (P3.2 group discussion)

⁴⁰To release built-up CO₂ in the fermentation jar, burping is the act of loosening or slightly releasing the lid every few days. Similar to opening a carbohydrate drink, the act sounds like a burp

In their liveliness, ferments also appear needy. Through their way of being, they demand the attention and involvement of the fermentor, while giving a sense of responsibility in turn. These perceived dynamics create space for the fermentors to observe, and reveal opportunities for the fermentor to respond in correspondence with the ferment.

After one day the brine rose to the top of the jar so I opened the cap to let some bubbles out. From the 2nd to 4th day there was a lot of bubbling but the brine didn't rise anymore, still I would open the lid a bit and stir the jar for the bubbles to rise to the top. (P3.3)

No bubbles or sounds. But they were a bit dry so they definitely needed to be pushed down a bit (P3.1)

This is also supported by the vocabulary of fermentation with words such as “massaging”, “burping”⁴⁰ and “feeding”. approachable, all participants described a growing feeling of learning and During the experiments, this neediness put in the dimension of time is perceived as either a positive or a negative responsibility. When positive, they are seen as moments that can benefit one’s experience, and are integrated in daily life, in the form of rituals. When the need to take care of fermentation is perceived as a burden, it becomes a chore. Most interestingly though, being perceived as either one is not definitive - rather, it alternates even in the span of a day, based on emotional and contextual factors. For example, Liis mentioned in her interview, that there is definitely a mood for ferments, which is sometimes not compatible with the busy life of a recent mom. Similarly, in my experience, as I was undertaking a lot of fermentation experiments all at once, I found myself caring for fifteen ferments in a span of days, which promptly turned my new-found ritual into a chore. Noticeably, in such cases, the previously discussed open-endedness helps stabilize the relationship, as the ferment is adapted to the fermentor.

The fact that fermentation is perceived as different attracts a lot of initial negative expectations - before fermenting, all participants describe the process as intimidating. However, experiencing the fermentation contrasts with their expectations. Retrospectively, the activity attracts positive attention, and supports its propagation. Discovering an approachable practice, the initial intimidation is overcome, and all participants report a strong feeling of learning and confidence.

Burping was not as gross as I thought it might be. I was worried some disgusting smells would erupt as I do it, but it wasn't bad in the end. Overall the process was simpler and easier than I thought. I always thought pickling or fermenting is a big hassle, but it turns out babushka didn't have it as tough as I thought. (P3.2)

affects: what dynamics are born out of friction?

Departing from what ferments mean, this section aims to exemplify what ferments can do via Affects (Valle Noronha 2019). Moving closer towards the interest of this thesis, friction is suspected to help human gestures move in rhythm with the natural world. To illustrate this, Fig. 69 depicts the dynamics that animate the space of fermentation, drawn from the aggregated interviews and experiments data. This model is chosen due to its ability to follow how participants correspond over time. Accordingly, the discussion above already dealt with the departure of individuals and food as separate entities, and their coming together as agents of fermentor and ferment. Consequently, this section deals with how they affect each other, a point of interest in understanding what friction entails. The results of these mutual affects are then concluded in the next section of Becomings.

⁴¹What I mean is that I'm not copying the way she situates the terms (not in a line, but in an arc) just because it looks good, but because they should be spaced out; affects and agencies are ever emergent in action, and not given at the same time

Here, it is important to mention that, rather than following Valle Noronha's model due to aesthetic reasons⁴¹, the concepts are intentionally offset to emphasize the idea that they don't appear all at once, but emerge within action. Through the study, I understand the concept of agency as an occurrence that does not precedes action, but rather is "ever forming with action itself" (Ingold 2017: 17). As I was working with the ferment, its material agency revealed and disappeared gradually.

Then, I make an additional observation. When talking about visibility of material agency, a thing to be taken into consideration is that perception is altered through the act of recording. In the group discussion following X3, this visibility was debated. What I mean is, that, generally, experience happens fast and is perceived as an entanglement. However, during the act of reproducing the occurrence via written text, due to the linearity of this medium, the experience cannot be captured in its entangled form, and thus it has to be recreated from its constituent parts. To do so, the participants, and me included, pull apart the entangled entities and, in trying to explain them, the essence of the phenomena becomes what it is retrospectively thought to be, rather than what it really is in the moment. While this doesn't negate the visible agency of food during fermentation, it does propose that the action of journaling contributes to the vivid encounters with it.

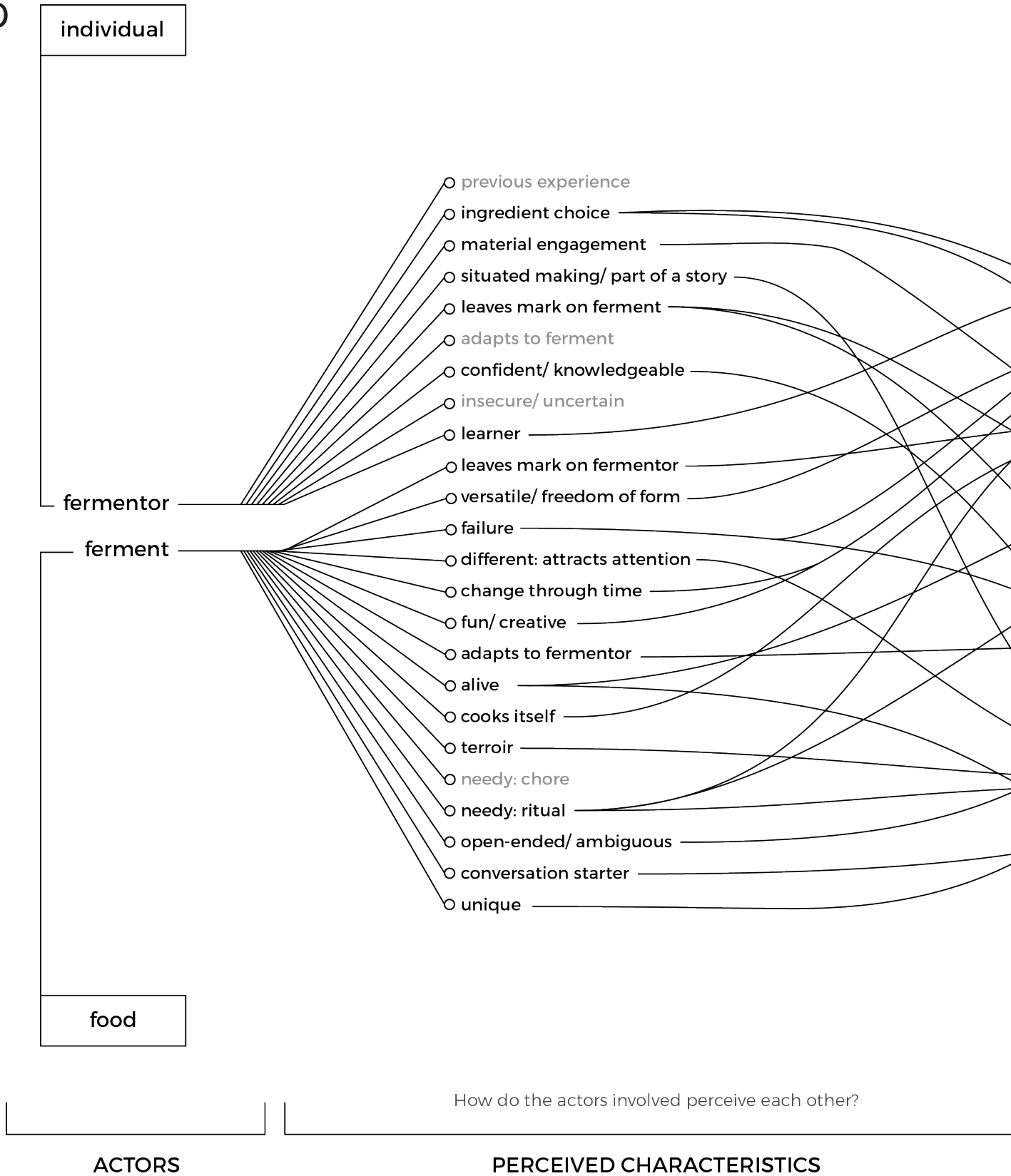
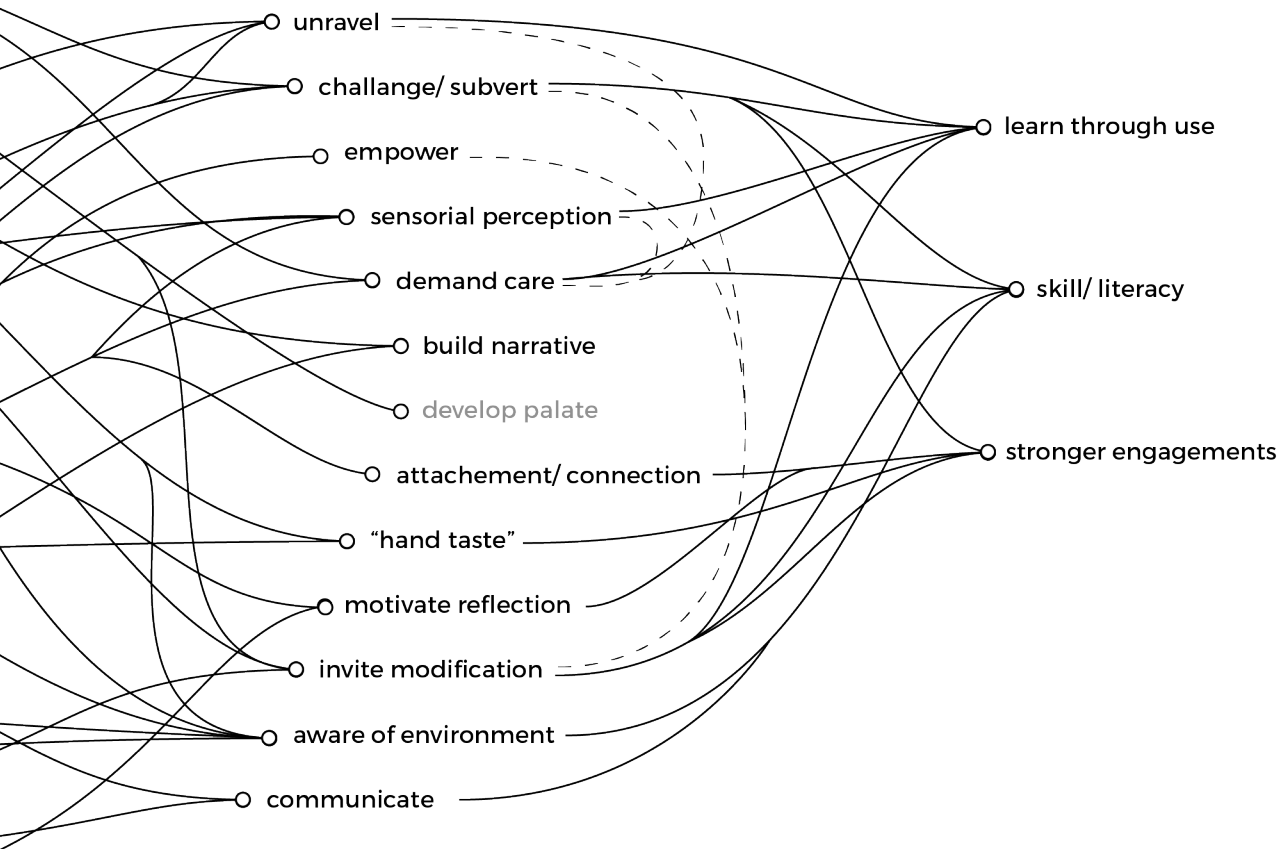


Fig. 69
Perceived Characteristics, Affects, and Becoming visualisation adapted from Julia Valle Noronha (2019).
The model depicting how fermentor and ferment become together. It starts with Perceived Characteristics, which describes what ferments are, as revealed to the fermentor undergoing fermentation. This first grouping is followed into Affects: what ferments *are* turns into what they can *do*. This grouping explains how, once involved in the act, the agents are able to affect each other. The results of these actions and their affects are grouped as Becomings. Notably, these groupings are not exclusive, so their contents are not static, but rather oftentimes overlapping



Through which actions are they able to affect each other?

Perceived results of action?

AFFECTS

BECOMINGS

Compared to common practices around food, fermentation brings friction in the way of its tangible embeddedness in context. The form is never final but rather temporary and always changing in relation to the environment and the fermentor. When joining with these movements, participants deviate from the norm. This bionomy confounds because participants have to deal with uncertainty of form and create new structures for themselves in order to navigate the unfamiliar space. As a result, it gets harder to sustain usual relationships with learned constructs that dictate what is tasty, valuable, convenient, and abundant. A somewhat humorous example comes right to mind: my partner's reaction to witnessing the lengthy process of baking sourdough, which can easily take 26 hours in total:

I now see that the price of sourdough is not as expensive as I thought. I don't know how it's not sold for 20 euros!

Not surprisingly, as these frictions are perceived, they elicited emotional reactions. Similar to the agential properties of both the ferment and the fermentor, emotions emerge from within action. An essential dynamic is the oscillation between contrasting emotions: confidence and uncertainty, excitement and disappointment, worry and surprise, proudness and fear. These occurrences are critical for coregraphing the balance between human gestures and the material world. Too little or too much of everything - confidence, care, worry - can lead to unbalance. Similarly, without revealing too much or too less of itself, the practice doesn't bore or overwhelm, thus maintaining curiosity and propagating critical use.

It's a very interesting process that I have to say I underestimated after gaining a bit too much confidence. In the early stage of preparation, I thought it was gonna be easy just following the steps, but it is not quite like that. It's not easy to get it right when it comes to taste or texture if you don't pay attention to it. Although there are not that many steps, messing one up can lead to a very different result. But like with many others, I do believe practice makes perfect and this is definitely a trial and error kinda process. (P3.3)

Noticeably, the perceived characteristics are not only adjectives (versatile, open-ended, needy) but also verbs (leaves marks, changes, attracts). Fermented food is an active participant in the relationship. Once these properties are traced into affects, it reveals an embodied practice which influences the fermentor's way of being-in-the-world. Based on the type of dynamics that emerge as the ferment and the fermentor act and react to each other, there are some patterns in the way they affect each other. Accordingly, the nature of the situations that harness friction to animate the object are: (1) unravel, (2) subvert, (3) care, (4) communicate, (5) immateriality. While on paper, these groupings help deliver the data in a more structured way, in reality they are volatile and overlap. More often than not, they have more perceived properties in common, and what makes a ferment unravel, also subverts, communicates and is immaterial. For this reason, quotes and examples might be repeated.

unravel

If one makes sauerkraut, the following transformation happens: slowly the texture of the cabbage softens, its taste and smell gradually intensify and the colour changes steadily, in response to variables such time, touch, or temperature. Being an embodied experience, any modification that it invites leaves traces, incites reflection, and brings about even more modifications. Through these actions and reactions, the sauerkraut unravels itself to the participants. Instead of remaining an enclosed object (sauerkraut) it opens up and makes itself known through its constituent parts: cabbage, salt, massaging hands, fatigue, brine, time, space, temperature, spices, season, taste, color, smell, bubbles, sourness. Through such interplay, hidden interiorities become visible and traceable (Ingold 2013). Instead of seeing them in their current form, ferments are seen as their potential to transform. These unravelings can occur in the food itself, the environment, or the self.

Through embodiment, the ferments are also being experienced from the perspective of different senses. As the form of food becomes less recognizable, so do the existing patterns of use. New definitions are constructed. Whereas participants use only their sense of sight to determine edibility in the supermarket, during the taste dinners they smell the ferment first. This is very important because it motivates them to imagine: they can't visually see what it is inside, and, by smelling it before eating, they construct a sense of what it is inside and how it tastes like. Ultimately, this helps create stronger bonds and further the knowledge on what food can do.

The way food responds, its agency, can only become visible through action and, therefore, value is ever emergent and comes through critical use. This is a characteristic of the "space in between", which emerged from the previously discussed corresponding roles - food gains value as it unravels to make its process visible and knowable.

There is this one grain Aspergillus Luchuensis – this is a type of Aspergillus Niger mold that creates citrus tastes. It is weird! You put it on cooked, boiled barley and then you incubate it for 48 h and then you get something that smells like grapefruit and tastes like lemon. But it's a grain! With mold! (...) In its essence is mind-boggling cause it was a grain! And then a type of fungi on it. When you eat the grain it doesn't taste like anything, just starchy and doesn't have anything good about it. But after this process it becomes something totally new and valuable. (Silver)

I was surprised how much flavour one ingredient has in itself. I didn't think that there was any space in between cucumber and pickle. I really thought it goes from fresh to sour. But there is a whole spectrum between fresh and sour, where you can play with intensity. (P3.2 group discussion)

Food byproducts, too, became valuable. After culturing butter during an online workshop, Sean Doherty, a long time fermentor, talks of the potentiality of the buttermilk byproduct - not what it is but what it could be. Similarly, I have used leftover brines for enriching all kinds of sauces, soups, dressings, or to kickstart other lactic fermentations.

Don't think about this liquid that is left as buttermilk, but as a brine or a medium. (Sean Doherty 2020)



Fig. 70
The literal space in between. Fermented wild garlic (ramson), two days apart. Color changes, but texture remains the same, retaining its “crunch”.

Through material engagement and situated making, the environment also unravels - it is not a given, but consists of parts that can be known and manipulated. The fermentor that emerges from these engagements is not the same as the one who entered them - there is a growing sense of confidence and empowerment, as the fermentor learns to move in rhythm with the natural world.

So if you know these like hacks and you know you have this temperature in the room then you can predict how long it will take, you don't need to touch it every day, or open the jar, or taste it. (P3.3 discussion)

I can already see a bit of growth in the volume (sourdough starter). Wondering if I haven't caught other bacteria from my kitchen [...] but I know there are ways to “respond” to this, like cutting back on the hydration of the starter. This gave me confidence that I am not completely hopeless, there is a place for me and my interventions once I understand the process. In the face of this obstacle, I even felt excited because getting over it meant that I was able to work with food in a way that I have never before. It is the promise of knowledge, adaptability, and confidence. (Personal diary)

And in the summertime, when fruits hit, we do it. In the winter we don't do much fermentation. We try to utilize what we made before. (Silver)

However, not only engagements which are perceived as successes hold the potential to unravel. Failures are equally important in their ability to disclose the inner workings of materials. Far from discouraging, they are seen as an essential part of learning. This steps into the territory of the next dynamic, that of Subversion, and together they suggest that the quality of fermentation lies in exploration and experimentation.

At the end I was a bit disappointed that it didn't come out as I expected but this failure is making me want to try again and make it better because I know where I messed up. (P3.3)

One was slimy and "overdone", the other was just extra slimy and the third can be added to something but maybe not worthy to eat alone. We had quite a strong discussion with my mother and grandmother after that. They turned to me with the question "did you forget to put the garlic," [...] As they said the garlic should keep them crunchy. (Anna-Maria)

If one follows these new forms of the unraveling food, new and unique uses can be negotiated.

So we forgot ours (morell miso) out for a bit too long and it ended up tasting like mushrooms and a bit toast coffee. So like, tried to put it in a sauce – it was too bitter, too overpowering. But then whipped it up with some double cream and some sugar, like made a mousse out of it. And it tasted like chocolate – with coffee notes in there. (Silver)

I never heard of pickled cucumbers with lemon but it works so well. It is like the lemon amplifies the salt and keeps the taste very fresh. Now I wonder how other things would taste with lemon. (P4.4)

subvert

As soon as ferments become known for what they can do, when put to these uses they subvert. Especially because ferments change over time, the fermentors have to deal with unusual questions and uncertain situations, which challenge their belief systems. However, ferments don't propose a solution themselves, instead they give the space for the participants to construct their own. The fermentor has to turn his/her attention inwards, in order to find ways to improvise and create new systems. Current narratives are deconstructed, and new ones are constructed - new ideas about food, environment, and self. The motivation for these circumstances to happen is attributed to the (1) changing form, (2) the space in between, (3) the aesthetics, and (4) determining doneness. As with everything so far, as I open up each of these concepts, one should keep in mind that they are interconnected.

The changing form refers to the transformation (or lack of it) of the taste, texture, smell, or look of the ferment. Most of respondents admit to not even knowing that there is a space in between the beginning (cabbage) and the end product (sauerkraut). Because of this, the perceived value of food is dissociated from its potential and the worth of cabbage is subdued to its surface. However, as the changing form of the ferment is witnessed, participants become aware of these incongruities, and enhance their understanding of both the process behind fermentation and the value of food in itself.

⁴² Here I refer to common vegetables and fruit, and not aged produce such as wine, cheese, vinegars, etc.

I was surprised how much flavour one ingredient has in itself. I didn't think that there was any space in between cucumber and pickle. I really thought it goes from fresh to sour. (P3.2)

Not only the presence, but also the absence of change in the form is able to pose questions to values and artifacts of the consumer economy. The quotation below exemplifies how depreciation of some food with time⁴², an idea embedded in consumer culture is challenged through fermentation and preservation.

I really did not expect the onions to be so crunchy. When you said that they were fermented for four weeks I expected them to be soggy and not very nice. Because four weeks is a long time for something to ferment but they still taste so fresh. (P4.3)

As the form starts changing, it dwells in **the space in between**. Here, the form becomes unclear and it frees the ferment from pre-established uses. In the face of uncertainty the relationship is stabilized via modifications and improvisations. For example, if the taste is nice, but the texture is not, this subverts the current shape and invites interventions aimed at conserving the taste but modifying the texture: one could try to dry, mash, chop, infuse, or pulverize. Undertaking these modifications is regarded as empowering and it grants the ferments the hand-taste, a kind of authorship evident in the way ferments bear the taste (and ideas) of the one who made it. This chapter opens up with a quote from P3.1 that embodies the dwelling in this *space in between*: what started as an intention, to ferment, soon becomes the action - fermenting. By doing the act, she forgets whatever recipe she is following, and fermentation becomes through her movements.

I immediately could tell which was my sauerkraut [...] Not at all like regular sauerkraut, which is good because I was hoping that it wouldn't be like the traditional one. It still has some slight notes of red cabbage flavour, which I like a lot. Slight sour flavour and nothing too crazy. Mild compared to the others I've had to try recently, and I prefer that. (P3.2)

However, the ferment does not remain immobile in the face of these interventions and it is, in fact, described as stubborn, surprising, or temporary. The perception of liveness renders the ferments a certain stubbornness, which suggests that, even in the hands of human intention, they retain some will of their own. For this reason, the ways in which the ferment transforms still retains a feeling of surprise. As discussed above, under the previous grouping, surprise (both positive or negative) initiates curiosity - how and why did transformation happen this way? Additionally, due to their transitory form, ferments support an awareness of the environmental forces they abide to. During the study, this interplay of forces disrupts the ideal of homogeneity.

No ferment is ever the same, they always vary, because it depends on the time of the year, bacteria in the earth, in your hands, what the product was before, how fresh, etc. (Liis)

It's funny how they (Sauerkrauts) are a bit different since they came exactly from the same mixture. Like having two children, twins, with different personalities. (P3.1)

The aesthetics refer to the image constructed around fermentation - that it is a dangerous practice only tamed by skilful grandmothers wielding ancient tools. Indeed, the practice itself is old, and there are a lot of specific fermentation tools that accomplish both functional (manipulate temperature, humidity, light) and aesthetic purposes. However, more often than not, fermentation is approachable and tools can be substituted pretty easily with stuff that one has lying around the house. Similar to making adaptations to the ferment itself, this initiates a lot of creativity, improvisation, and ownership. Generally, this leads to a deeper understanding of the process behind fermentation. The quotation below describes how I moved from the perceived challenge of not having the right equipment, to the promise of an embodied experience; from a process that follows the norm, to a process that is my own.

I had to google what substitutions I can make [...] It reminded me of Silver and the way he tries to understand the process behind in order to make a process his own. This way I realized I can use my Romanian clay dish - which made me super excited because that pot carries a lot of identity and meaning within. I could have not thought of a better recipient to carry and bake my bread - screw dutch ovens. This allowed me to imbed the process and the bread with a little bit of me, my home, my mom and my grandma who gifted me the dish. Now I see how these minor modifications gave it the meaning that made this my bread. (Personal Diary)

Moreover, participants' own initial skepticism of their ability to ferment is challenged, substituting it with a feeling of learning, confidence, and pride.

I haven't tried it before today. I was a little bit scared to do it, because it was made by me after all. But it actually tastes pretty legit, which surprised me. The smell has been quite strong and I was waiting to taste something off about it. But no, it's really pleasant. Quite inviting actually. (P3.2)

Determining doneness is regarded as an important moment because it brings into discussion what the meaning of doneness is for each participant. It is also one of the most difficult obstacles voiced by participants. Taste is an elusive component. The open-ness of the practice makes the participants turn inwards for responses, using taste and texture to survey and construct their own definitions of what a done ferment is. Here, the experience of fermenting becomes clearly embodied, as it involves many layers of our being and, thus, it is a trigger for emotion and reflection. Constant exposure to the plurality of taste and texture invites individuation and becomes a portal for self discovery and actualization.

I wanted to make something fresh-ish and something that wouldn't resemble the traditional Estonian Christmas sauerkraut, which is always made from regular cabbage and has that brown color and mushy, heavy texture [...] So yes, the taste that I'm after is pretty basic, fresh kind of red cabbage sauerkraut. (P3.2)

I noticed I'm usually going for that extra mile, keeping the ferment out longer, part curiosity and part desire for it to bring a bit more funkiness. Anyways, sour is good, so sourer is better. I am curious where my limits are. (Personal diary)

⁴³ liveliness refers to how active a ferment (bubbling, smell, coloration), how much time it takes for it to get ready (higher temperature accelerates the process)

⁴⁴ due to the shortness of the experiment, participants didn't have time to develop a pronounced trust, however, as discussed under Subvert they did report that their initial skepticism of their own ability to make a "good" ferment was challenged. Therefore, this insight comes mainly from the interviews and my own fermentation experience

care

The ingredient choice, the environment, the fermentation technique, dictate liveliness⁴³ and how much care the ferment demands. The caring activity during X3 mostly consists of making sure the ferment is submerged under the brine, burped or fed. Through these engagements, the food reveals its material agency. Though not always viewed as a positive engagement, the care creates space for fermentors to take action and responsibility. This suggests that the interplay demands a habitual engagement, if it is to be successful. Stemming from these circumstances, a point often mentioned by the participant is that caring for ferments comes in contrast with the way most food is designed to interact with: time saving, passive, and efficient.

*It is dangerous and volatile if you don't burp it
(P3.2 group discussion)*

communicate

When dealing with a literally living entity, the ability to communicate is described in two ways: to communicate *with* the ferment and to communicate *through* the ferment. While the first is focused on the relationship between the ferment and the fermentor, the second one extends to include the development of relationships between fermentor and others.

Firstly, the materiality of the ferment aids the communication between participants and their experiments. It is mostly through care and unraveling that the ferment makes its current status known. As material changes occur, the ferment shows that it is on its way to become something else. This communication includes all senses⁴⁴ and it influences the embodied experience - in the interviews Silver mentioned that his smell became so acute, that any off smells make him gag. The ability to participate and navigate the space of fermentation is closely related to paying attention to action and reaction. With time, fermentors learn to engage and trust their senses. This is again the attentionality at work (Ingold 2017), contributing to a deeper understanding of the process and stronger engagements.

*As I opened the first jar I saw that it was very dry and a weird smell came out. I panicked. Felt it was over. Surely there must be mould by now. But then I took a closer look and smell again and it didn't actually smell that bad. I pushed down and as the liquid started to come up again I saw bubbles coming up. This was recomforting.
(P3.1)*

It did not smell so nice when I took it out. Not the champagne smell, but a rotten sour one. There was also a bit of slime on top, the watery substance. I guess this happens when it is hungry. I am in so much wonder at these details, these ways of communicating. They are so strange yet so natural. (Personal diary)

There is also a second type of communication - with others. In some cases fermentation can attract negative attention and emotions - think about the infamous smells associated with some ferments. While I was doing experiments of my own, my partner would constantly raise the issue of the very present smell. However, the majority of the time the communication is positive and aimed at sharing emotions and information, enforced by the existence of numerous communities of fermentors. Moreover, it also attracts positive attention and curiosity from non-practicing people whom fermentors came in contact with. From quarantine, one participant writes of her desire to use fermentation as an excuse to start a conversation.

And as I threw stuff in I began to feel very excited and empowered. I kind of wanted somebody to ask in and ask me what I was doing so I could get a chance to brag about my future ferment. Did not happen though. (P3.1)

Be it in a community, family, or restaurant setting, communication is a big part of the experience of fermentation.

I think at some point I became known by my family and friends as the one who ferments and does interesting stuff and when they visit me I give them something to taste and they ask if I have something (Liis)

And just learning and sharing amongst our team in the kitchen just makes it such a beautiful process. Brings people together. So that's what I really love about it cause everybody learns (Silver)

immateriality

Being the product of negotiation, a ferment's material form is contingent on context. Much of this interplay happens not only in the material world, but also somewhere outside.

I can taste with my mind, I don't need to cook. Cooking is not a physical act, it is much more than that - cooking is visualizing, cooking is designing, cooking is making. (Personal diary)

This gives a certain elusiveness to the experience of fermenting. Teachings that echo among practitioners speak of the fact that ferments are never the same, and neither is taste. This liberation from anesthetic homogeneity (for example uniformity of taste or appearance) leaves space for fermentors to intervene in form making and contribute with meaning of their own. In the absence of habitual ways of being, practitioners can choose more appropriate ones. Through improvisation, they join with the movement of materials (Ingold 2012), and synchronize their human gestures with the world around. This brings both the ferment and fermentor closer to each other.

First, we had two big ones and now we bought a new little one, so now every time we make buckwheat bread then this little one is for Uku - so he has his own little cute bread coming out and he really likes it (Liis)

Isn't that a human thing to do? To care for another life? Even though this life sits in a yellow liquid at the bottom of a weirdly large jar in a dark corner of my sauna? [...] Come to think of it, I don't think we ever got so happy over something so vague and seemingly simple or irrelevant - some yeast at the surface of some liquid. But this was more than some yeast and some liquid, it is a promise of a SCOBY, and later kombucha, and the taste, the morning drinks, the refreshing afternoons sipping it on the balcony, the act of sharing it with friends. (Personal diary)

With the next jar I started I was more confident in deciding for myself if it needed more salt, or more massaging, or when to stop burping it. (P3.1 discussion)

Still, far from being recruited for and living inside human societies, ferments also retain a story of their own. They elude; so, in an attempt to stabilize the relationship with living things, fermentors assume ferments have a bionomy of their own. While coping with their indeterminacy, this unfolds in a number of ways: sometimes ferments are given names, or take on human relationships of parent and child (as discussed in the Interview results). Also, ferments are rarely considered finite, suggested by the fact that they are improvised "tests", "trials", "concoctions", or "experiments". What is important here is that entities are not subdued to generalization or reduced to a surface.

The carrot is not sweet anymore, now it has a zing - a nice sour taste that I can't define, so I just want to taste it more. But at some point I have to give up, because all that I come up with falls short and reduces the taste that I feel. I think it may lie in a nice space of undefinable, which makes it more exciting because it kind of lives outside of my imagination, of what I know and can define. It is its own thing. (Personal diary)

Additionally to the above mentioned forces, most of the time, the house or kitchen is also subjected to change. The use of the quotidian kitchen space is questioned, as ferments need recipients, recipients need an appropriate setting and care, notes appear on the ferments and the walls, smells grow stronger, and sounds of bubbling can be heard.

becomings

The friction brought about by unraveling, subversion, care, communication, and immateriality is necessary because it can be used as a reference point and synchronize human gestures with the natural world. Within this new found rhythm, I propose that three ways of being emerge: learning through making, stronger engagements, and skill.

learning through making

As ferments are never really finite, their making is ongoing. As fermenters join with their movement, they negotiate, and become together - both bend and adapt to the other. A commonality from the interviews and experiments is the development of knowledge, mainly through involvement of sensory perception. This knowledge about the world comes from use, as ferments mediate the human thought. Additionally, the fact that fermentation practices are informed by corporeal employment, shows the importance of the body in acquiring knowledge. While participants are given instructions on how to start and care for a ferment, how they perceive concepts such as dry or bubbly is subjective. Also, because the agency only reveals itself to the one undergoing the fermentation, only in the act of making, do participants really get to think and sense. What materials can do when worked with, their properties, are not objectively defined but practically experienced. This is discussed at length in the Affects, as participants discover the transformative potential of food ingredients, or the environment around them. Actually, any objective definition gets shattered by concrete experience because knowing happens inside of being (Ingold 2012). Ironically, one participant “disobeys” the directions provided and decides for herself what is the best way to undergo fermentation, informed on her own experience.

This was the first of many times throughout where I tasted from my hands and then continued using them without washing them. (I know there was a recommendation on sterility but in the back of my mind I am convinced that my mouth and hand bacteria cannot damage the kraut) (P3.1)

The proposition that making is the departure for thinking is not a new idea (Ingold 2013; Noronha 2019), but it is not the usual way in which HCD approaches experience. (see Chapter 2 for my objection to HCD). The study revealed that fermentors engage with fermentations for the messy process, as much as for the unique results. In fact, it is the way to attain unique results. Fermentors don't thrive only in secure and comfortable settings. When met with unfamiliar and uncertain smell or taste, participants try to balance relationships by searching for connections and adaptations. Considering all that I have learned from fermentation, I would even dare to say that creativity does not lie in innovation, but adaptation. My own experience, supported by the interviews, suggests that, with time, the intention evolves, and becomes to ferment for the sake of *doing* fermentation. Put it another way, making is not the cause of thinking, but its effect (Ingold 2013). This allows fermentors to pay attention, thus knowledge comes from the inside, becoming a part of who fermentors are and how they relate to the world. Therefore, the results of the act of making are more apt at embodying a meaning or a story. The way ferments look, taste, smell, feel, sound are embodiments of a relationship. Most importantly, they are not homogenous or better - they disobey norms, they disappear and reappear, transforming the entity and its identity.

engaged relationships

Being a sensorial practice, via fermentation, participants encounter food through embodied experiences: their massaging hands meet the stubborn texture and get tired; their nose catches a sniff of what smells like childhood; their taste shocks and challenges ideas of flavour. Many of these ways of acting are more intimate or wierd than participants are used to, which encourages them to react in unusual ways, via adaptation and improvisation. Even if identities and roles are fluid and mutually informing, they are still dependent on the participating agents. As they leave marks on eachother, the fermenter and fermentor find more points of being aware of their mutual affects: while the strong and unfamiliar smell upsets, the hands stained yellow bring happiness and pride. Based on these intimate encounters they (re)connect, not only with food, but with themselves and their surroundings, gaining a sense of place. Experience is the entity of food, not the object: taste unravels as an enmeshing of the passage of time, the season, and the hand of the fermentor. These relationships are closer to the flows of the natural world - ephemeral, interconnected materials and movements.

You know, the sentiment that you can return to nature and find other ways of knowing the world [...] Fermentation today is having this renaissance. It's not undergoing a trend: it's undergoing an understanding [...] I'm excited for what's to come, because you see the fervor, and you see people's enthusiasm; you see people connect to food that they made. To ferment something is to invest not only in a project, but in your own future. (Zilber 2020)

Learning about the process and experiencing the agents that are involved in fermentation motivates participants to reattribute value to food ingredients. Fermentors develop stronger relationships in the way they perceive food. The main difference being that the way they perceive food is not through its surface, but through its unraveling "hidden interiorities" (Anusas and Ingold 2013). Far from being anesthetic, these engagements are sensual, and they reveal the food's agency to the mindful body.

What is interesting though, is that the different narratives of use come from the same ingredient. The way in which food becomes new is by being subjected to reinterpretation. When this occurs, food is not changed by outside forces, but transformed from within through engagement - it is a manifestation of the mutual becoming between the ferment and the fermentor. Instead of stagnating, through fermentation, the form and meaning of food are being constantly negotiated, to relate to the fermentor and the material world. With the help of some knowledge, freely given to me through a mindful body, I am able to reap the benefits of simple ingredients. There is as much ferment as fermentor affecting a becoming, and the value lies in their ability to become together.

skill

Articulated through the previous two concepts, the ferment and fermentor become through skill. Acquiring skill is constructed via two important concepts: visible agency and attentionality (Ingold 2017). This responds to the inquiry into the need for friction in design posed by this thesis: skill is the ability to lose control, not to gain it. I shall elaborate on that. During fermentation, as knowledge is subjectively constructed through deeper engagements, food opens up to experience, and is revealed as an agent capable of affecting. Such an animated view supports the perception of visible agency (traces of this agency are previously identified throughout the research as ferments are described as alive, stubborn, or communicative). Once agency is distributed between agents, the interplay becomes one of negotiation: the fermentors do not impose form on the ferments, but bend the grain to their purpose, through variables such as temperature, humidity, and much more. This brings us to the second important circumstance, that of attentionality. In order to react, fermenters need to pay attention to the ferment - Is it dry? Is it bubbling? Is it submerged? Is it mouldy? Does it smell bad? Does it look hazy? Does it taste salty? Therefore, the “mastery” of fermentation does not come from controlling the process, but rather learning to respond and go along with it. Only by joining with the ferment, do the participants understand food for what it does and for what happens when you work with it (Ingold 2012). In the wake of such force, common concepts of value, edibility, taste, and convenience reveal their superficiality. Here, I bring back the quote that inspired this approach in the first place.

Anyhow, this dish and approach showed me that a carrot is worth the same as a truffle, the price is only dictated by supply and demand. (Silver)

The master does not really exist in fermentation - the space is run by amateurs or enthusiasts. This brings about an important characteristic of skillful fermentors: continuous improvisation. Understanding food as the sum of relational properties, fermentors agree that food is indeterminable. Therefore, the only way to move forward comes through feeling and joining with the movement of food - improvisation. The continuity of the act comes from the fact that, to improvise is to think through making (Ingold 2017), suggesting that nothing is ever finished.

I don't think you can master it, cause there are so many variables to work with, so each time something is different, each time something turns out different. So I just think you have to have massive amounts of respect and attention when you are doing it and then you get great results... and it's something you can't really take for granted, cause it's so complex and beautiful when you get it right. It gives you these new sensations and tastes that you have never seen before. I'm an enthusiast, so I'm still learning. (Silver)

Lastly, as a food enthusiast myself, I equate the becoming through skill with literacy - the ability to “read” the material environment, to look at food and see beyond its surface, rendering its agency visible. Consequently, I can notice a shift in the way I approach and work with food: less intentional and more attentional, leaving enough space for food to “act” and “guide” - I smell, touch, taste, look, hear more. I engage with more ingredients than before, sometimes with “weeds”, because I understand that form is not fixed, which later translates into a combination of different textures, colors, and tastes on my plate. Perhaps, the simplest way to put it is like so: I have become more “food” literate, I think and eat differently.



Fig. 71
The many faces of
spring radish dwelling
in the space in
between

conclusion

This chapter follows up on the proposed correspondence between ferment and fermentor. Hence, it zooms into their corresponding roles, following their coming together as agents of fermentation. Here, the design activity proposes that the agents of fermentation converse and influence each other, accentuated by materiality, time, and openness. As a result of the experiments, it becomes clear that the fermentor's knowledge of ferment stems from their engagement - the critical use. This confirms the philosophical thoughts of Merleau-Ponty's phenomenology and Ingold's act of correspondence that inspired this work; together they propose that knowledge comes from sensual experience of things responding to each other over time. Thus, the fermentors themselves are more aware of both the ability of food to transform, as well their own ability to transform with it. This reveals both agents' material agency and answers the last question that preoccupied the research: how can food reveal its material agency? The answer is found in the space in between. This is a space that opens up when the fermentor-ferment engagements are put into the dimension of time, materiality, openness and it is organized under perceived characteristics, affect, and becomings.

Notably, a characteristic of the space in between is that it includes a wide spectrum of emotions; here, both confidence and uncertainty have their place in constructing a stronger engagement with food. As such, some patterns form in the interplay between fermenter and fermentor: the relationship unravels (the food, the self, the environment becomes known as their constituent parts); it subverts existing beliefs, attitudes and behaviors; it supports communication between fermenter and fermentor, as well as between fermentor and others; it demands care; and, lastly, it proposes that the relationship is not only material, but also immaterial (fermentation includes thoughts, feelings, memories, desires). By virtue of these experiences, the fermentor becomes with the ferment: these becomings are highlighted through the concepts of learning through use (food is known not as the given form, but the possibility), gaining skill (how to work with possibilities), and developing stronger engagements.

7.

discussion

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I propose that the ferments are designed artefacts not because they themselves are designed, but the situation they bring is. The purpose of this study is to bring disruption. As such, ferments are deployed in order to understand in what way the agency of food is made tangible in the relationship between the fermentor and the ferment. This study is looking for evidence of negotiations, and discusses what it means to distribute the agency of making between humans and food, informed by a theoretical background that urges for the consideration of such agencies (Flusser 1999; Anusas and Ingold 2013; Ingold 2017). Knowledge is produced in an exploratory fashion and is intended to disclose the transformative potential of food: What happens if we retract our grip and let objects be themselves in their animate, mutable ways? If we let food be food, what can it become once it lives outside of objects recruited for human societies? What can we become with it?

Pertaining to this discussion, *the space in between* is important because it brings forward the experience of subjective embodiment. Via fermentation, the participants physically engage with new forms in new ways. There are materials, tools, routines, and the tangible transformation of the ferment perceived through one's senses that affect the embodied experience. This is visible in the way the fermentor maneuvers his or her body around the material space. During the study, both the participants and myself move our bodies in a way that reflects our experience inside the space of fermentation: stiff and interrupted when uncertain, casual and fluid when confident, exploratory when playful. The opposite applies, as the space bears the mark of the fermentor: one participant "disobeyed" the guidelines and pursued to practice fermentation in her own way. It is important to underline that the mutual affects that space and body have on each other strongly affects participants' way of being-in-the-world. Perhaps, to understand how fermentor's being-in-the-world is affected, one can think of the concept of tradition and culture, which are, in their essence, practices shaped by people over time. These imprints stay on the participants, and continue to influence their ways of being and doing; Silver's developed sense of smell instantly triggers the gag reflex around bad odours.

As the fermentor dwells in the physical space in between, an immaterial one also opens up- a place full of memories and expectations, old and new things, the familiar and the unfamiliar. Supported by the phenomenological view, I described at length how fermentation, and cooking in general, exists as an act inseparable from thought. As a result, Chapter 6 describes how participants gained a new way of knowing the world - the ability to loosen their grip in order to re-evaluate their understandings of food, self, and environment. It is a space, where the mindful body is encouraged to wonder, break, and discover. Given the choice to make a sauerkraut, participants projected the form in different ways, based on their desires and whims - two want it to taste fresh and simple, one is looking for funk. However, when actually *doing* the ferment, the material and immaterial confound - they have to deal with unusual questions: How does fresh taste like? Because using the cabbage leaves room for possibilities, they have to construct their own concepts of a fresh/simple/funky sauerkraut. Like so, they engage in modification and intervene in form making: add more salt, break texture up, give additional flavour with spices, ferment for a short or a long time. Being constructed through making, the knowledge participants gain of the world is asymmetric and mediated by the material entities themselves. Both the fermentor and the ferment are liberated from

presupposed forms - their understanding of each other transforms inasmuch as it is an understanding *through* each other. They observe how social projections of food don't match personal ones. As a result, such concepts are deconstructed as participants realize that they are artefacts of their thoughts (or consumer culture), and not of the ingredients themselves. The experiments are essential in capturing these initial impressions as they emerge from participants *becoming with* their ferments, hinting at the potential that food holds for embodiment. Further, the fact in the span of one short experiment participants become aware of the agentic properties of ferments speaks of the dense webbing between humans and food. However, the experiments do prove too short to capture the extent of what can happen when joining the movements of the two, which is more evident in the discussions with long time fermentors. Their experiences with food are lived outside of the guise of *objects* (Anusas and Ingold 2013), where boundaries between materials are blurred. Here, form is fluid, while embodiments are wild and powerful. While dwelling in fermentation, fermentors become the space in between.

A great interest for this thesis is how improvisation is critical to knowledge. The open-endedness of the practice and the sensual stimulation allots the material and immaterial territory the feeling of a playground. It is not just any space, but one where participants are encouraged to play with concepts of self, doneness, tastiness, time, form, etc. As discussed, previous experience plays a big role, as the perceived freedom to explore comes with practice. Furthermore, sometimes the practice overwhelms, and there is no desire to intervene or modify. However, positive and negative experiences alike are valuable. Both are equally encouraging for the participants to know ingredients through their mindful bodies, disrupting the commercially mediated nature of experiencing food (e.g. price, aesthetics, nutrition). As a result of the study, fermentation brings into attention the cultural conditioning of participants and is seen as a way to discover new ways of being-in-the-world. For example, abundance, celebrated by consumer culture, can exist in one ingredient. In the hands of the one who is capable of improvising, any food ingredient is abundant, bursting with possibilities of taste and experience. Therefore, one's ability to act in the world is framed not by the ability to consume, but to correspond.

Dealing with a live being is emphasized by the act of caring for a ferment. This creates an interplay of forces, which contributes to the development of an understanding of the *textility* of food (Anusas and Ingold 2013). Given that there are not many cases in which food demands such prolonged care (at least not for the participants), fermentation is especially apt at revealing the agents at work and the way they influence each other. The process of caring is a necessity, rather than a pleasure, and only in one case was the caring described as a chore throughout the experiment. However, pleasurable or not, it did help to make visible the agents, the energy, and the time that goes into transforming food via fermentation, as stated by the participants themselves. As a result, participants are better equipped to navigate and negotiate. Similarly, I could notice how my idea of beauty changed, revealing an ever evolving aesthetic question⁴⁵ - the mushroom growing on top of my kombucha is not gross, but beautiful and warm. This points towards friction as a space for generating knowledge and strengthening relationships.

⁴⁵ In general, aesthetics is a branch of philosophy which, in very general terms, examines what makes something beautiful, sublime, disgusting, entertaining, pretentious, harmonious, boring, humorous or tragic. Amongst the many questions Aesthetics ask, one is "Why do we find certain things beautiful?"

As they find new points for correspondence, participants' gestures synchronize with the natural world. In a supermarket, foods are devoid of seasonality, undoing the knots between food and the mesh of the natural world. In contrast, fermentation binds these connections back together: food finds ties to place and time. Ferments can remind us of the place, where food is made or inherited from (in the case of SCOBY and sourdough mothers). Time can be accounted for through seasonality, the intensity of taste (an older sauerkraut is more sour), or sometimes a visual (bubbling or haziness). All participants were surprised by the fact that sauerkraut fermentation happens so fast, suggesting that the perception can be shaped through closer engagements. In fact, time is at the "centerpoint of this proposed shift in thinking" (Auger 2018). Working with a material has a time-centric condition - the pace. There is a reason why fermentation is described as a waiting game. Experience is slowed down by friction, and thus reveals the bigger picture at work. To take the time to care for a ferment, to develop stronger engagements, is important insofar as the ferment changes and it reveals its agentic properties. Again, this contributes to maintaining a balance between the material world and human gestures.

This section reviews the ideas that emerge from a phenomenological view at fermentation. Some, which belong to theoretical background, are confirmed through the work (thinking through making, friction, embodied knowledge, material agency), while others emerge from it: *the space inbetween*. This space is to be found in the experience of thinking through making, in which deeper understanding of food is supported via its visible agency (Ingold 2012; 2017). Under such circumstances, embodied experience is capable of subverting the current surfaces, which are attributed to food. Essentially, what the interpretation of data proposes, is that the quality of our being-in-the-world is the results of mutual relationships between the mindful body and the objects that surround it. Therefore, a closer look at the agency of food reveals something about our own agency as well. Moreover, it situates the sensorial body in the middle of this exploration: the fermentor who is capable of loosening his/hers autonomous grip on experience gains back himself/herself and the world through self-consciousness.

8.

conclusion

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and non objects 118

end note 120

By researching fermentation through design, this study discloses the transformative promise of food. It exposes the flaw of viewing food as an object of consumer culture, devoid of life of its own and subdued to human will. Via fermentation, this research reveals the entanglement of agencies at play present in the making of a simple sauerkraut, while proposing that our being-in-the-world is a collective one, through others. Through the interviews and experiments undertaken, I seek to understand how the ferment and the fermentor engage in a creative and relational practice. Adopting a phenomenological approach, the study offers an empirical foundation on which concepts of friction and material agency can negotiate their place in design practices. Inspired by a methodological approach of self-ethnography, I disclose that, indeed, it is a different I that arrives, than the one that departed. The locus of my experience of self and food becomes my mindful body doing fermentation. My body is feeling, smelling, tasting, hearing, and seeing inasmuch as there is something to touch, smell, taste, hear, and see. Therefore, it captures a duality: the importance of the mindful body in requiring knowledge and “performing” food. I then discuss how both humans and food gain their agency through corresponding movements. As action leads to reaction, agentic food can revive agentic humans. Therefore, this work stands against the properties of anesthetic design, and explores what friction can do for the relationship between the ferment and the fermentor. Still, it is not the intent of this project to offer a straightforward answer, so it intentionally leaves loose ends, absences if you will, where others can join from.

The data interpretation articulates the transformative potential of food through the concepts of *corresponding roles* and *the space in between*. Within these concepts, the data points towards aspects like time, materiality, openness, and uncertainty as enabling the fermentor and the ferment to involve in an active relationship. When the mindful body is operating within these categories, it is given enough stimulus to undergo a process of deconstruction and construction of self, food, and the surrounding environment.

I address *the corresponding roles* of fermentation, showing that they are dynamic and intersubjective interactions. Due to the openness of form, roles can be fluid, transforming the mindful body and its identity. The interdependence between food, self, and time, animates the human experience: uncertain and interrupted movements are alternated by confident and playful ones. Improvisation is encouraged. Assumed positions are constantly being disobeyed, i.e. sometimes the ritual of caring for a ferment turns into a chore. As a result, it becomes harder to exhaust the use of an ingredient. Fermentors depart from the understanding that ferments are never homogenous, revealing the food’s material agency, so they are rarely submitted to fixed categories. In response, fermentors join with their own agency, taking advantage of the incongruities, and constructing food to *become* the story of themselves - i.e. deform to adapt to a new family member, motivate creativity, heal oneself, and much more.

In *the space in between*, both fermenter and fermentor constitute their agencies via negotiation - i.e. to manipulate taste via modifications, to feed the ferment when it is dry, to understand where the flavour comes from, etc. Due to the perceived corporeality, openness and liveliness of the form, fermentation is a performative embodied practice and space. It exists both in the material encounter with food, via sensorial experience, such

as taste, as well as in the immaterial, via emotions, memories, thoughts. As experience is ever emergent, I propose that fermentation is a liminal space - what I call *the space in between*. Due to its ambiguity, the ferment is seen as experimental, which encourages fermentors to improvise and, in return, reveals the food's potential to undergo extreme transformation. For example, I refer back to Chef Silver Saa's experiment: the transition of morels and koji to miso to being a dessert replicating chocolate mousse. Because it requires care, fermentors have the time to observe and learn the processes behind, better understanding what encounters affect food. Following the further given example, a Maillard reaction and some added cream "turns" morel-miso into chocolate-like food. The fact that sometimes the ferment ends up taking surprising forms incites curiosity, which further motivates fermentors to deepen their knowledge of what the ferment can do.

The success of time, openness, and materiality as dimensions in design corresponds to their ability to affect the fermentor and the ferment. Time is at the center of this proposed experience because, in the space in between, entities are always unfolding in some way. There is an absence of concretization, where at least one dimension is always allowed to undergo tangible transformation - i.e. taste can get stronger, smells more intense, color is lost or intensified, it attracts more or less attention. In this way, put into the dimension of time, food does not only depreciate, but can introduce novelty or surprise. To navigate this novel territory, one has to rely on his/her own mindful body - the ferment engages all of the fermentor's senses. Different from the one proposed by human-centered design, the fermentor's body is involved with and affected by the world around. It is not a body that is defined before action, but emerges from it; a body articulated through its engagements with the material world. Notably, such a body can return to the food it owns and renew himself/herself by finding new ways of relating to it. In the food industry, implications can be far reaching: a denial of the consumerism's ideal of abundance of objects, and a return to local agriculture, wild foraging, and, in general, food literacy.

This thesis also brings into attention the role of embodied experience in constructing knowledge and intimate connections with food. When the fermentor is placed in between the constructing worlds, embodiment brings about positive and negative experiences alike - when fermenting, my body knows excitement, curiosity, proudness, but also tiredness, loathe, and disappointment. Similarly, the mindful body constructs an image of the ferment through the perspective of different senses. This balance between disorientation and new found meaning creates dynamics that come closer to the complexities of (human) nature, provoking personal truths. As such, this research points towards the moment of contact, when body and food are sensorially affecting each other, as being central to our experience of living consciously. It proposes that material engagement is central to our construction of relationships. With added time, worlds in between can lead to learning and transformation because it is then that both the ferment and the fermentor reveal themselves. This brings a whole new set of responsibilities for designers to consider the full spectrum of human emotions (Dunne and Raby 2013) - how can food, and designed artefacts in general, engage with the complexities of (human) nature?

Notably, some of the ideas presented in this study correspond with those of Valle Noronha (2019). What is interesting is that a phenomenological inquiry into the slightly different fields of food and fashion design reveals common points of discussion. I consider that far from subverting the

findings, this strengthens the potential that dimensions such as time, materiality, care, openness, and liveliness hold for design. By proposing them as points that need further inquiry, new questions emerge. These are apt proposals for both the separate fields of food and fashion, but also for the field of design in general. Essentially, both Valle Noronha's work and this study suggest that our ways of being-in-the-world are shaped by the engagements with the materials around us. At the time that I am writing this conclusion, I become aware of more practitioners working towards similar outcomes. For example, this discussion can find commonalities with the ideas of practitioners such as Audrey Lingstuy (2020). Practically, her proposal for design for absences shares commonalities with the ideas discussed here: that material agency emerges in the absence of concretization. Furthermore, Audrey's principles of designing for disobedience, bionomy, and randomness, do not sit so far away from the characteristics that make up the space in between.

design for friction mindful bodies non-objects

By investigating the idea of friction in alignment with material agency, this work attunes to discussions on the philosophy of communication and artistic production (Flusser 1999; Anusas and Ingold 2013; Colomina and Wingley 2016). Casting a phenomenological eye on design, the work reveals an idiosyncrasy in the attempt to design rigid experiences for knowable finite humans. Of this flawed activity, Colomina and Wingley write: "It is precisely the lack of a clear line between human and world that provokes or energizes design as the attempt to draw such a line, our forever incomplete attempt to fashion a self-image and the forever unsatisfying attempt to come to terms with what we see in this continually reconstructed mirror." (2016: 25). As an alternative, perhaps one should think of the human and the material world as entities, not already created, but on their way to become so. This ability to live in a world not yet created is what the space in between proposed by this thesis is about. Such spaces are created through time, materiality, care, openness, and liveliness. Accordingly, the work of this thesis argues for the role improvisation has while living in such a space; it endows participants with the ability to take food and make it their own. Far from being new, this idea corresponds with the human predisposition to play, which is intrinsic to the (human) nature; as the Berlin critic Adolf Behne argued in 1926, "it is play that generates form in the first place. Function itself is unable to arouse human interest in any way" (Colomina Wingley cit Adolf Behne 2016: 83).

So how can people start perceiving food differently? Considerations of (1) materiality over (2) time matter because small disruptions brought by senses greatly affect the way participants experience food - during the study, smell, touch (hand), and hearing were especially important, perhaps due to the fact that they are not so often involved in habitual encounters with food. Interesting circumstances are created not only when smell evokes memories, but also when smell contrasts with taste, such as it smells bad, but tastes good. Similarly, touching their food with their hands, as opposed to mediated by tools, creates a more attentional

encounter, as fermenters explore the many ways of “seeing” food, via temperature, texture, or the stains that food leaves on the fermenter's body. These situations propose more ways for fermentors to experience food, and therefore helps with developing an understanding of the process, as well as observing their own involvement with it. (3) Caring for a ferment supports the visibility of transformation from state to another, which creates space for fermentors to intervene in form making. Additionally, it exposes the ties between food and the material world, especially the effect of seasonality and location, as a ferment's taste can be traced back to ripeness, temperature, and much more. (4) Openness is related to the experimental nature of a ferment, the fact that the participants have to decide themselves how to make a ferment and when it is ready. (5) Liveliness is regarded as the ability of the ferment to act on its own, which, in fermentation is attributed to the activity of microorganisms. Subsequently, the above mentioned concepts also deny the idea of homogeneity, as technique and material itself are never ending. Far from wreaking havoc, (6) non-homogeneity encourages communication between the ferment, the fermentor, and others. That is due to the fact that the incongruities between knowledge, taste, or technique motivate sharing of information and food. Ultimately, we can find opportunities for deeper engagement with food through the way we start perceiving it.

Essentially, what this thesis proposes is a reorientation of the ambitions of design, “reimagining form so that it resists the conventional objectification of the material world” (Anusas and Ingold 2013). Taking a step into that non-conventional direction, this work plays with the idea that through friction of ever emerging agencies, the human attunes to and joins with the movement of the material world. In joining, they meet in *the space in between*: a space animated by food and humans carrying on and responding to one another. In such a space, entities are allowed to do what they can do, not only what the perceiver thinks they can do. Dwelling here, we can regain our footing by adjusting our bodies to the irregularities of the world, such as one does when fermenting - action and reaction. In fact, it is this irregularity that prompts wandering in the first place, nudging the mindful body outside of intentionality and into attentionality (Ingold 2017; 2018). In the words of Silver Saa, “it gives a new language that you learn, a lot of knowledge, which you can get really creative with”. Time, materiality, open-endedness, liveliness, improvisation, care can all be used to create irregularities in the habitual narratives of use. Furthermore, by exposing our bodies to the irregularities of spaces in between, we can begin to adjust ourselves to being reflexive towards our activity in the world; participatory and knowledgeable of our involvement; and active in improvising along the continual becoming of life (Anusas and Ingold 2013). And by we, I imply designers, and people alike.

end note

Food itself carries the traces of people, so the way we ascribe value corresponds with how much use we find in it. By portraying it as a discrete, finished entity, we cast ourselves in the same light - food and people alike stop being agential. For this reason alone, this thesis urges to look at food as *textilic* (Anusas and Ingold 2013: 1); part of a material world animated by *energetic lines*, and at “design as a practice of enriching the weaves that bind people and their environments” (ibid)). In an attempt to do so, I propose to create what Henry Dreyfuss (1995) warned against - points of friction. In my point of view, the challenge is not about sparing the human from friction. Perhaps a more urgent question is: how to attune our designed efforts to produce non-objects that perpetually alternate between our imagination and perception (Ingold 2018)? Taking inspiration from the preservation property of fermentation, how can time be used not to depreciate, but give food a life of its own? What stories of us can emerge from the material engagement with food? Can food suggest how it is grown? Can we feel how far it traveled? How much transformation does it undergo? Can we hear the stories of the ones who formed its shape? Can we discover new textures if we use our body differently when eating? Or can we discover new bodies by eating familiar things in new ways?

Finally, I have gotten this far, not with the intention to affirm, but provoke. If anything, as it comes to an end, this thesis doesn't leave you with an answer, but it invites you to propagate a discussion:

What might we learn about food and ourselves if we allow ourselves to *become* together?

glossary of key terms

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term	meaning	reference
affect	the ability of the participants engaged in fermentation to affect each other; it does not exclusively refer to emotional responses, but rather the ability to affect in a general sense.	Deleuze and Guattari 1987
(material) agency	the understanding that material culture is co-constitutive of human action, thought and understanding	Ingold 2017
becoming	the outcome of the human-ferment correspondence	Deleuze and Guattari 1987
being-in-the-world	used to describe an entity who is not distinguished from the world, but is inseparable from it; for example, the craftsman, who knows his craft by engaging in his craft, rather than explaining it	Heidegger 1962
correspondence	the act by which which beings or things literally answer to one another over time	Ingold 2017
embodied experience	the way the subjective body perceives and responds to ferments	Deleuze and Guattari 1987
embodied knowledge	a type of knowledge, where the body knows how to act; general example is cutting vegetables	Merleau-Ponty 2012
lived experience	the understanding and representation of the experience of those who lived it; it is an interpretive process, situated in the body of the individual, when knowledge is accessed through experience.	Merleau-Ponty 2012
mindful body	the body is not detached from the mind, but the body is mindful, a joint vehicle for understanding and gaining knowledge	Merleau-Ponty 2012
non-object	emerging entity, temporary, on its way of becoming something else	Anusas and Ingold 2013; Ingold 2018
object	entity or thing enclosed in a surface; it is a finished form, a complete artefact	Anusas and Ingold 2013; Ingold 2018
surface	surfaces have anesthetic properties, removing bodily and psychological sensation	Anusas and Ingold 2013

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appendices

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Appendix 1: table of ferments done

ferment	ingredients	type	start date	end date
carrot	carrot sticks, thyme, 2% salt, water	Lactic acid fermentation	25/02	2/03
	carrot rounds, garlic, 2% salt, water	Lactic acid fermentation	25/03	2/03
honey garlic	½ cup honey, 5 garlic cloves	Lactic acid fermentation	28/02	ongoing
kraut	300g white cabbage, garlic, 1 tsp cumin, 2% salt, own brine	Lactic acid fermentation	14/03	12/04
hot sauce	500g hot peppers, 1 cardamom pod, 1 garlic clove, 2 black peppercorn, 3% salt, water	Lactic acid fermentation	14/03	8/04
hot onions	600g chopped red onions, ½ tbsp black peppercorns, ½ tbsp chili flakes, 3% salt, own brine	Lactic acid fermentation	15/03	30/04
lemon dill kraut	200g thinly cut white cabbage, 1 lemon slice, fennel greens, 2,5% salt, own brine	Lactic acid fermentation	15/03	9/04
turmeric kraut	200g coarsely cut white cabbage, 1 tbsp ginger, 2 peppercorns, 1 garlic clove, ½ tsp turmeric, 2% salt, own brine	Lactic acid fermentation	15/03	ongoing
orange cinnamon kraut	200g thinly cut red cabbage, 1 tsp ginger, orange zest, ½ garlic clove, 1 tsp cinnamon, 2% salt, own brine	Lactic acid fermentation	15/03	13/03
fennel kraut	200g coarsely cut white cabbage, ¼ sliced fennel, 2,5% salt, own brine	Lactic acid fermentation	15/03	molded
ginger bug	400g ginger, 250g brown sugar, 12 cups water	Lactic acid fermentation	15/03	ongoing
radish	150g spring radish, fennel greens, 2% salt, own brine	Lactic acid fermentation	15/03	19/03
daikon grapefruit	½ daikon, ½ grapefruit pulp, 1 tbsp ginger, 1 tsp rosemary, 2,5% salt, own brine	Lactic acid fermentation	15/03	29/03 slimy
	½ daikon, ½ grapefruit pulp, 1 tbsp ginger, 2% salt, own brine	Lactic acid fermentation	15/03	29/03 slimy
carrot 3 ways	shredded carrot, 1 lemon slice, ½ tsp thyme, 2% salt, own brine	Lactic acid fermentation	21/03	25/03
	carrot rounds, 1 lemon slice, ½ tsp thyme, 2% salt, water	Lactic acid fermentation	21/03	30/03
	carrot sticks, 1 lemon slice, ½ tsp thyme, 2% salt, water	Lactic acid fermentation	21/03	30/03
curry cauliflower	300g cauliflower, 1 tsp curry, 1 tbsp mustard seeds, 1 tbsp cumin seeds, 1 tsp coriander seeds, 1 tsp chili flakes, 5 curry leaves, salt, water	Lactic acid fermentation	28/03	10/04
cucumber	cucumber sticks, 1 lemon slice, salt, water	Lactic acid fermentation	21/03	30/03
	Cucumber, 1 garlic clove, parsley, dill, salt, water	Lactic acid fermentation	21/03	2/04
plums	80g plums; chopped: 1 chili, 1 garlic clove, 1 tsp ginger, 2 cardamom, 2 cloves	Lactic acid fermentation	29/03	14/04 rotten
cucumber	sliced cucumber, sliced daikon, 1/3 sliced leek, 1 garlic clove, 5 ramson leaves, salt, water	Lactic acid fermentation	29/03	14/04 too sour
	sliced cucumber, sliced daikon; chopped: 1 chili, 1 tbsp ginger, 2 garlic cloves, ramson	Lactic acid fermentation	29/03	12/04
	cucumber sticks, 1 chili, 2 garlic cloves, dill	Lactic acid fermentation	29/03	12/04

"kimchi"	½ finely shredded white cabbage, 10% carrot shredded, 10% daikon shredded, 10% spring onion chopped, 2 garlic cloves, 1% ginger, 5% chili pepper, 1% sugar, 1 tsp fish sauce, 3% salt, own brine	Lactic acid fermentation	01/04	20/04
cucumber	cucumber, 1 tbsp mustard seeds, 1 tsp cumin, 1 bay leaf, 1 garlic, water	Lactic acid fermentation	14/04	23/04
	cucumber, 50% ramson, 1 tbsp mustard seeds, water	Lactic acid fermentation	14/04	23/04
ramson	ramson, 2% salt, own brine	Lactic acid fermentation	14/04	25/04
	shredded ramson, 1 chili, 1 garlic, 1 tbsp ginger, 2% salt, own brine	Lactic acid fermentation	14/04	25/04
curry cauliflower 2.0	300g cauliflower, 2 garlic cloves, 30% carrot, 1 tsp curry, 1 tbsp mustard seeds, 1 tbsp cumin seeds, 1 tsp coriander seeds, 1 tbsp chili flakes, 5 curry leaves, salt, water	Lactic acid fermentation	14/04	25/04
cauliflower	300g cauliflower, 20% ramson, 1 tbsp mustard seeds, water	Lactic acid fermentation	14/04	25/04
sourdough mother	from scratch 1:1, flour:water	Lactic acid fermentation Alcoholic fermentation	10/04	alive and well
black bread mother	received starter Rye flour, water	Lactic acid fermentation Alcoholic fermentation	2/04	alive and well
kombucha	from scratch Store bought kombucha, tea, sugar	Alcoholic fermentation	30/03	ongoing
radish 4 ways	spring radish slices, 2% salt, own brine	Lactic acid fermentation	30/04	5/05
	spring radish wedges, 1% turmeric, 1% sumac, 2% salt, water	Lactic acid fermentation	30/04	5/05
	spring radish matchsticks, 30% beetroot matchsticks, 2% salt, water	Lactic acid fermentation	30/04	5/05
	spring radish cubed, 5% turmeric, 2% salt, water	Lactic acid fermentation	30/04	5/05

Appendix 2: research methodology reasoning for data collection method X2

A variety of data collection methods (journaling on a physical notebook, journaling on the computer, voice notes, video recordings) are tried in order to find the less intrusive one. In the end, a combination of voice notes and journaling, both on the computer and in a physical notebook, are used. The reasoning is as follows:

1. Voice notes are mostly used when cooking or tasting the ferment. Firstly, during this process, the hands are usually occupied or dirty, so setting the phone on the table to record before, frees them. When dealing with a ferment is also important to minimize the number of things touched. Finally, it feels more natural to voice my thoughts as the experience unfolds than to write about it after.

2. The majority of the impressions about the fermentation process is recorded via a digital diary. This is due to the numerous fermentation projects, which are undertaken. A physical journal would restrict the data collection to a form that focuses on journaling the experience as it unfolds by time, but without a categorization by type of ferment. However, in digital format, each ferment can be given a different section and journal the experience as it unfolds by time respective to a certain ferment. Alternatively, the experience with the general practice can be accounted for, by comparing all the entries based on the date. This way, it is easier to record both the relationship to each ferment and the process itself.

3. Physical notebook journaling is done via recipes. This is due to my habit of collecting recipes in a recipe book. This only accounts for occasional notes and adjustments based on taste and are mostly instrumental.

Appendix 3: diary spreads X3

Name:
Start date:
End date:

During the period of a month, you will be preparing a ferment - Sauerkraut. Every time you interact with it, you will write down the experience using the material provided. Instructions for the method and some suggestions on how to record your experience are provided next. However, you can come up with other ways as well - photographs, drawings, collages, or any type of annotation are most welcome!

A bit about Sauerkraut

Sauerkraut is a Lacto fermentation because it involves submerging vegetables (in this case cabbage) in a brine solution— salt and water. The purpose of the brine is to create a salty environment that only allows certain bacteria to thrive - in this case, Lactobacillus, a bacteria which converts sugars naturally present in fruit or vegetables into lactic acid and CO₂. Lactic acid is a natural preservative that helps fight harmful bacteria and preserves not only the flavor and texture of food but also its nutrients. CO₂ is what makes the brine bubbly (think of beer!). Lastly, the bacteria also pre-digest the nutrients found in food, making them digestible and accessible for us.

Tools needed:

- Cabbage head (red, green, or a mix)
- Ground Salt
- Knife & cutting board
- Big bowl
- 1 big jar or 2 medium with a large mouth (your fist fits through it)
- Spices - the choice is up to you

Preparation:

Sauerkraut is one of the easiest ferments - the basis of this ferment is made using cabbage and salt, to which spices can be added to develop a specific flavor. You can tweak the original recipe and choose what spices to add - it is your food!

First, you should think of the final taste and texture you want. For the taste, you can go online to get inspiration for what spices to use. For the texture think of the shape you can cut the cabbage in - do you want thin strips of cabbage or bigger chunks? Longer strips or shorter?

Sauerkraut is traditionally submerged in its own brine - no water added. So you should choose a critical amount (at least half of a medium cabbage head) to work so there is enough liquid coming out of the cabbage.

Once you have decided on the flavor and texture you are ready to go. Read all the steps first and then start.

Start the ferment

1. Cut the cabbage in the desired shape (save 1 or 2 outer leaves for topping the kraut)
2. Put the cut cabbage in a big bowl and sprinkle a bit of salt on top of it
3. Start massaging the salt into the cabbage until it softens and becomes moist - this will take around 5 minutes, but the bigger your cabbage chunks are the longer this process takes.
4. Once your cabbage has started to soften and release liquid, taste it for saltiness. The amount of salt you taste now will be how salty your Sauerkraut will taste in the end so ask yourself - Can I taste the salt? Is it salty enough? Does it need more? If it needs more, add, massage and taste again. Does it need more? If yes, repeat the process. If no, leave it to rest for 10 min (no need to put it in the fridge).
5. During these 10 minutes get your jar(s) and wash them thoroughly - unwanted bacteria will influence your ferment a lot. It helps to use hot water to disinfect the jar(s) and the lid(s).
6. After 10 minutes go back and check on your kraut. Massage it for an additional 3 minutes. Remember, the stiffness of the kraut now will be the same as in the final product so if you want a softer texture, massage harder.
7. To check if it is ready to take a fistful of cabbage and press. If a good amount of liquid is dripping from it you are good to go.
8. Pack the cabbage in the jar(s) tightly. Use your fist to punch and press down the cabbage - you want to remove all air pockets between the kraut (mold can form there). The liquid should come up even more during this step.
9. Continue adding and packing the kraut down. Leave a good amount of space on the top for the kraut to breathe.
10. The kraut should be all submerged under its brine. If you don't have enough brine, complete with a brine made of water + salt (add salt until the water taste like seawater)
11. If things are not submerged under the brine mold will form. So to keep kraut submerged you can either:
 - a. Top it with the leaf you saved, tucking in the corners alongside the jar so it stays put (the leaf should also be under the brine - you might need to check and push it back down daily).
 - b. Top it with a zip lock bag/plastic bag filled with water
 - c. Don't cover it but stir it daily so mold doesn't form on the surface.
12. You can cover the jar in two ways:
 - a. Loosely put the cap on so the ferment can release the CO2 by itself
 - b. If you choose to close the lid tightly, remember to "burp" (open the lid) of the ferment at least twice a day as buildup gas can make the jar explode.

Care

1. Keep it out of direct sunlight and at a temperature above 20 degrees.
2. Put the jar somewhere where you won't forget about it.
3. There should be active bubbling in the first 3-4 days, afterward less action.
4. The ferment will get hazy - that is a sign of bacteria busy at work

5. If unattended for 2+ days, some Kahm yeast can form on the top of the liquid - this is normal and not dangerous, simply scoop the yeast out. The same goes for white mold. Colorful mold is dangerous and the kraut should not be consumed.

When is it ready?

1. Kraut can be "done" anywhere between 5 days and 5 weeks. Start tasting it around day 5. Does it taste done to you? Could it go more? If you want a more intense taste then keep fermenting.
2. When you want to stop the fermentation, move the jar in the fridge.
3. To compare taste you can remove a small part of the kraut and put it in the refrigerator and leave some out to ferment more.

Remember

When you are fermenting you are manipulating an environment to create a delicate balance of bacteria. But bacteria are everywhere, so anything you introduce in the jar will introduce new bacteria into your ferment. So it is recommended to clean hands and utensils before touching your kraut with them - don't put the fork back in the jar if you licked it already.

Questions

For the initial stage

- Preparation during the initial stage (flavor, cutting, washing, etc.)? Why did I choose this type of cabbage? Why these spices? How did I cut the cabbage?
- Where did you place it? Why?
- How do you feel?
- What do you think about the ferment?

During care

- Preparation during care (washing, burping, etc.)?
- When & where (date & place)?
- How long did the process take?
- Was this amount of time longer/ shorter than before?
- Describe the ferment when you check it (talk of appearance, sound, texture, etc)
- If you are tasting it, describe the taste. What do you like and what don't you like?
- Do you speak to others about it?
- How do you feel?
- What do you think about the ferment?

When ready

- Why is it ready?
- How do you feel?
- What do you think about the ferment?

Any other information would also be most welcome! You can write stories that come to mind, tell about your day, including photographs or make videos and voice notes(send them to me by WhatsApp). You can also write about your experiences, how you use the ferments and how they make you feel.