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RETHINKING FOOD: CO-CREATING CITIZEN SCIENCE FOR SUSTAINABILITY TRANSITIONS

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ABSTRACT

Transforming human food practices to be more sustainable is not straightforward. The human food system and international sustainability advice are both global in scope. Whereas food practices are locally situated and personal. *ReThinking Food* grapples with this challenge, using co-creative citizen science and the Future 50 Foods Report. The research involves cooking with; sharing food, recipes and stories; surveys, interviews, online and in-person activities. Through these actions, participants exchange knowledges with the food, their families and each other; become agents of change in their social groups and workplaces. They enact agency, shifting scales from human to non-human; near to far; from one-to-few-to-many. Building on this insight, we propose a hybrid engagement strategy for fostering connections across scales, from the personal to the planetary. The strategy strengthens the effectiveness of bottom-up societal transformation efforts.

INTRODUCTION

The human food system is global in scope; a key driver of climate change, ecosystem collapse, species extinction and societal inequalities (Willet et al., 2019). Human food practices sit within the larger system, operating across scales—personal, political, cultural and, global. This interconnectedness makes the food system “the single strongest lever to optimize human health and environmental sustainability on Earth” (Willet et al., 2019, p.5). It also means that operationalising food system transformation is not straightforward. Food practices are situated; rooted in culture and identity. Sustainability advice is often global in scope, lacking attention to diversity of cultural norms (Bené et al., 2020). This complexity requires food system transformation to combine top-down, systemic action with bottom-up efforts and situated perspectives.

ReThinking Food investigates this challenge through bottom-up action. The project inquires how to mobilise individual and community efforts towards Environmental Citizenship: “the responsible pro-environmental behaviour of citizens who act and participate in society as agents of change...” (ENEC 2018). The objective is to transform citizen participation in the food system, and eventually the food system itself, to be more sustainable. The research uses the Future 50 Foods Report as its foundation, to focus attention on the challenge of scale. The report is developed by the World Wildlife Federation and Knorr, in consultation with world-leading food and sustainability experts (Shaver & Drewnowski, 2019). It

represents the cutting edge of global sustainable diet advice, alongside parallel efforts (Willett et al., 2019b). All fifty foods recommended in the Future 50 Foods report are deemed healthy for people and planet. However, only a portion of the foods are available in any location, and not all are sustainable where they are found. The report, thus, troubles the shift to a sustainable diet, as much as it intends to guide changes in practice. Its use contributes to knowledge-building, yet unsettles people's understanding of what constitutes sustainability in a complex global food web. It thus serves as an effective prompt for people to share ideas about how sustainability advice might be (re)framed to be effective in supporting transformative change.

In this article, we carefully unpack the *ReThinking Food* Main Course. We then bring focus to questions of empowerment, and the ways that self-directed research activity across scales might embolden citizen-scientists to step out into the world as emergent environmental citizens. To conclude we offer a hybrid strategy for troubling, enlivening and strengthening approaches to what is commonly understood as Citizen Science.

METHODOLOGY

ReThinking Food, converges co-creative citizen science (CS) and participatory research through design (pRTD, Wilde, 2020) to learn how families in Denmark might transform how they eat to be more sustainable. Over three courses, using the WWF and Knorr's 'Future 50 Foods' report as the scientific object (Shaver & Drewnowski, 2019), the study seeks to activate three research questions: 1) *How can we empower ourselves to engage with sustainability agendas and make transformational change?* 2) *How do everyday food and eating practices relate to international sustainability agendas?* and 3) *How do citizens imagine change?* The 'we' in question one, points to the active engagement of the researchers in the research, leveraging first-person perspectives through participation both as researchers standing apart from the participants, and participating alongside them, conducting Participatory Action Research (through design). This stance draws on feminist reflexivity (Rose, 1997), and allows the researchers to explore self-critique through self-construction toward lasting change.

The study unfolds over three courses that activate the above research questions through a mix of online and in-person activities. The activities are designed to connect participants in different ways with the researchers, the food, their families, and other participating families. The design is dynamic and responsive – changes were made as the research unfolded. While not unusual in design research, we position the work as CS. We do this to disrupt our understanding of the potential of CS. As Sauermann et al. (2020) explain: "Citizen Science has raised great

hopes among scientists, civil society groups, and policy makers" (p.2). However, "it is important to develop a systematic and balanced understanding of the opportunities and challenges of Citizen Science in the particular context of sustainability transitions" (p.2). We see similarities and differences in CS, with pRTD, and hypothesise that our insights as design researchers may contribute methodologically to CS in ways that advance both disciplinary agendas.

CS has as its aim to "include citizens in research to create a common language between the citizens and the scientists" (Haklay, 2013). At its foundation, CS is inclusive – it involves activities in which different publics can participate; it contributes to science and scientists, as well as to publics; and it involves reciprocity: dissemination of scientific information to publics, on the one hand, and a reciprocal listening to citizens' opinions and needs, on the other (Golombic et al., 2017). In CS, the use of the word citizen is not linked to state. Rather, it is linked to science and society. We use it to denote citizenship: Environmental Citizenship, as defined above.

Haklay describes four approaches or levels to CS, ranging through: *Crowdsourcing*, where citizens act as sensors; *Distributed Intelligence*, where citizens interpret data; *Participatory Science*, where they participate in problem definition and data collection; and *Extreme Citizen Science*, where they additionally participate in analysis (Haklay, 2013). Our research troubles this model by moving away from a tradition of citizens as sensors, to engender a form of extreme, co-creative citizen science; extreme in the sense that it involves citizens in problem definition, data collection and analysis, community evaluation and peer-review (Liboiron, Zahara and Schoot, 2018), and is guided by the methods and philosophies of pRTD.

pRTD is a stance that foregrounds embodied, situated experience throughout research. *ReThinking Food* takes this stance to shift what is understood as CS to a more personal scale, to trouble assumptions and practices around CS and resituate it within politically more inclusive – co-creative – traditions. This impulse aligns with current moves in CS, to trouble the ways it is practiced (Sauermann, et al., 2020). It enables us to bring problems to the scale of the body, and embodied engagement with the world, to reflect on, in, and through action. Through these means, pRTD affords new perspectives on what might be required for people to feel empowered in the face of planetary scale challenges, and enact Environmental Citizenship (EC).

Positioning pRTD research as CS afforded a number of advantages: it helped to make the work seem impactful to our participants, due to an assumed commitment to reciprocity on their part. It offered differing frameworks for understanding the outcomes (Sauermann, 2020) that we may not have considered if we had remained strictly



Figure 1: Onboarding activities, a) receiving the Future 50 Foods kits, b) covid-safe Foods kit delivery, c) unboxing the foods

within the theoretical and methodological traditions of participatory design research. It afforded a partnership with Denmark's national broadcaster that brought in journalists to expand our understanding of how to frame our outreach efforts and enabled us to engage 500,000 people in the second part of the project – the Free-Range course. It also provided some challenges. As design researchers, we brought assumptions to the work about co-creation, not necessarily visible to the participants. The idea of co-creating the study they were involved in upset some participants' notions of hierarchy in science and led to expressions of frustration and anger. Nonetheless, we remained committed to engaging our citizen-scientists through participation and co-creation, and to shaping the study together.

RETHINKING FOOD

The Main Course of *ReThinking Food* ran Oct-Dec 2020 and involved 35 families with children, living in Kolding municipality. The Free-Range course ran Nov to December 2020, and involved ~500,000 people from across Denmark, with no demographic restriction. As detailed below, Main Course participants had food delivered to them; the Free-Range participants did not. If they were to eat the Future 50 Foods, Free-Range participants had to find and purchase them, thus make a conscious act. The third course, Dessert is planned for late 2021. It consists of community peer-review and analysis conducted through communal, online exchange. The purpose of Dessert is to discover the temporal impact and thus scalability of this research; whether and in what ways participants' short involvement in the study may have contributed towards long-term changes in their food practices. We focus here on the Main Course.

MAIN COURSE

Over 11 weeks, we conducted online and in-person activities to connect 35 families with the researchers, the food, their own families and other participants. This included: onboarding activities (week 1), community-building on a closed Facebook group (week 1-11), an online cooking session (week 3), a Sunday Market

(week 4), and a series of Sustainability Breakfasts (week 7-11). In week 5, the Danish national broadcaster hosted a ten-day special theme on the future of food, featuring participants from the Main Course, who spoke about their experiences in the research to that point.

RECRUITMENT AND ON-BOARDING

We recruited participants through public and closed local Facebook groups, and distributed flyers in local cafes, at the university, a local design school, a business park, the city library, outside of supermarkets and at secondhand stores, where shoppers may be aware of sustainability issues. We sought households with children, living in Kolding municipality. This demographic allows us to study local responses to international sustainability advice, and the impact children may have on choices and actions when preparing food. Of the 35 families recruited, 90% were middle class, ethnic Danes; 10% came from other origins – the norm in Denmark in 2020. To initiate recruitment, we asked interested parties to fill out a brief online survey with demographic information, eating and cooking habits, and allergy information. Once we had recruited 35 families, we hand-delivered food boxes to their homes (Figures 1), including 39 locally-purchased foods from the Future 50 Foods list, characterized as being beneficial for both humans and the environment (Shaver, D., & Drownowski, A., 2019), a research consent form, and a pictorial survey. The survey asked, for each food on the list, if the families had a) heard of it, b) tasted it, c) had it in their home. We requested families complete the survey before unpacking their boxes, and create an 'unboxing' video (Figure 1c), and upload them both to the project's closed Facebook group (described below). Participation in these activities was optional. All activities throughout the study were optional, though we stressed the importance of research

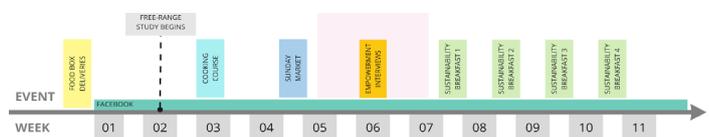


Figure 2: project timeline.

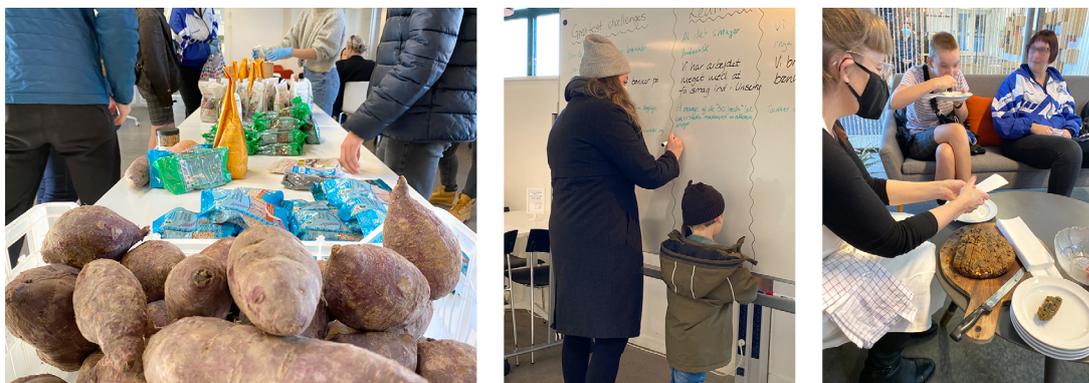


Figure 3: Sunday Market: a) foraging at the food stall, b) leaving feedback on the community whiteboard, c) fresh coffee and cake.

consent in enabling us to ethically conduct and report the research. The food delivery process served as a first point of in-person contact between the families and the researchers. It enabled participating families to ask questions and express their interest; some invited the researchers into their homes, others enjoyed a quick exchange on the doorstep, some requested drop-off without exchange as they were unable to be home on the delivery days (Figure 1). This process, and the literal food handover, allowed the researchers to perform their role as researchers and the families to assume their roles as research participants within the study. Once this task was complete, participating families were free to explore the Future 50 foods in any way they wished.

FACEBOOK

A closed Facebook group is the main communication platform for the study. It serves as a virtual research commons for the families, where they exchange knowledge, experiment, and share situated research findings with each other and the researchers. Active families post questions, share recipes, comment, offer advice, and share photos of their cooking practices. Others lurk (as evidenced by acknowledgements of researcher posts). The researchers play a number of roles in the Facebook group. They post formal notifications of activities (the cooking session, the Sunday Market and Sustainability Breakfasts). They respond to questions raised to them directly (leaving time for the families to find answers for themselves). They occasionally provide first-person perspectives through comments, and one researcher participated in the study with her family. This researcher declared their dual role when she introduced herself in the Facebook group. Otherwise, she participated in the same way as the other families. Her reflection is provided below.

COOKING WITH, FORAGING, COLLABORATIVE REFLECTING

Three activities were held outside of Facebook: an online cooking session (week 3), a Sunday market (week 4), and sustainability breakfasts (week 7-11). The online cooking session was hosted by an internationally acclaimed local chef, who prepared a three-course menu based on the Future 50 Foods. His remit was to guide

participants in preparing great tasting, nutritious and sustainable food for the whole family, for minimal effort and cost, highlighting the Future 50 Foods. Ten families participated. Recipes were shared in advance to facilitate preparation. Over the course of an evening, from their kitchens, the families conversed, cooked, and ate together with the chef and the researchers. Overall, we noticed distinct forms of engagement. There were those who prepped everything in advance, drank wine and enjoyed themselves; those who cooked whatever they had time for and were relaxed and had fun; and there was one family who had nothing prepped, had not checked in their cupboards to see if they had suitable ingredients, and frantically tried to follow the chef and confirm suitable replacement ingredients as they scrambled to keep up. Throughout, everybody laughed, even the very stressed family. One family who did not come said they felt that cooking a three-course meal on a Tuesday evening was “too heavy” (F04). However, as the chef explains, the idea behind cooking three courses is to diversify taste exposure for children, use leftovers more creatively, and in the end save money and time.

The week 4 Sunday Market was modelled after a public food market and included a food stall, a whiteboard that served as a community noticeboard for suggestions and comments, and seating areas where families could sample freshly baked cake made with sustainable ingredients (Figure 3). The market gave participants an opportunity to talk to the researchers in-person, forage for foods and continue their research. Market attendees could give feedback to the researchers over coffee and cake, or by adding their reflections to the whiteboard. To conform to Covid-19 safety protocols, participants booked an appointment time for their visit to the Market. This restriction limited participant-participant interactions but provided space for enhanced researcher-participant interactions as the individual appointments allowed more time for one-on-one conversation. All families who attended said they appreciated the possibility to come out and meet us in person.

The final act of co-reflection was four Sustainability Breakfasts, held Saturday mornings, Nov 28-Dec 19 (week 7-11 of the study). Themes included: *ReThinking Food Research*; *Tips & Tricks*; *Sustainable Christmas*; and *Sustainable New Year*. Researchers and participants

gathered over Zoom, shared coffee, breakfast, and conversation from the comfort of their homes, reflected and shared ideas and impressions on that week's theme. The Breakfasts were open to Main Course and Free-Range participants. They enabled families to connect with the researchers, across courses, to discuss concerns, share advice and food practices across three distinct scales: i) familial: cooking within the family and exchanging experiences with other families; ii) national: exchanging experiences with participants from diverse locations across Denmark; and iii) global: sharing experiences of traveling and living abroad, and with family and friends abroad.

In addition to the weekly theme, participants brought up topics that surfaced within the closed Facebook group. Conversation often would lead back to best practices for including children in the cooking process at home, and sharing personal backgrounds and relationships with food, whether sustainable or not. They expressed a desire for more scaffolding in their adoption of the foods. For example, they liked being able to explore freely for the first couple of weeks, but then would have appreciated recipes. Those who joined the *Cooking with* session were longing for more recipes from the chef, which unfortunately never arrived. They all loved the food that he introduced them to and mung beans, in particular, became a new staple in their cupboards. "I never knew mung beans could be delicious!" exclaimed one of our participants, laughing. She now makes mung-bean risotto regularly, and always has them in her cupboard. Others in the breakfasts agreed. The Breakfasts were not well attended but were appreciated by those who came. They enjoyed the opportunity to connect with the researchers through casual means and explicitly connect us to their discussions on Facebook. This was the last formal activity for the Main Course, though it is not the end of the study. As we write this, we are preparing Dessert in the form of community peer-review and analysis of our findings.

UNDERSTANDING EMPOWERMENT THROUGH SCALING

Environmental Citizenship (EC) is defined as "responsible pro-environmental behaviour of citizens who act and participate in society as agents of change..." (ENEC 2018). For citizens to act as agents of change, they must be well informed and empowered to take action appropriate to the seriousness of the environmental problems affecting our world (Hodson, 2003, OECD, 2012; WEF 2021, in Reis, 2020). To gain a sense of whether, and if so, in what ways, participants might be feeling empowered towards EC, in week 6, we conducted 7 semi-structured, conversational interviews with participants who responded to an open email. By then, they had been experimenting with ingredients, engaging with other families via the Facebook group,

and may have participated in the cooking course. Interviews were held online, one-on-one, to encourage participants to share personal impressions without influence from the opinions of others. The goals were to i) identify how they define empowerment, ii) how empowered they feel in the project, and iii) whether they believe it is possible to make societal scale changes from personal scale action.

Empowerment is discussed in the literature in different ways, depending on context (Bailey, 1992, p.74). The OECD (2018) and Kim and Roth (2016), describe being empowered as having a sense of agency: an innate sense of responsibility, a capacity to act, and a willingness to participate in the world. In the context of CS, Peterson, (2014) explains that empowerment is a "strengths-based, non-expert driven approach that emphasizes the ability of people [...] to actively engage in solutions to the problems confronting them." Page (1999, p.2) describes this process as "a multi-dimensional social process" that helps participants gain control over their lives at a range of scales that cross individual, group, and community dimensions (ibid.). At all of these scales, the objective of empowerment is to bring forward change through an interconnected process between the individual and the community (ibid.). As Dominitz et al. (2018:1) explain, empowerment involves "increasing independence, establishing a sense of fairness, and enabling conscious decision-making while creating benefits for other stakeholders".

To begin each interview, we asked the interviewee(s) to define empowerment. Their definitions diverged from the literature, in that they all considered that having a sense of freedom, or self-determination in the project was critical to their feeling empowered. This sense of freedom led to enhanced involvement, and a feeling that their actions "have some realness in it" (F04). Participation in project activities was voluntary. While this may be standard for ethically conducted research, our participants imagined that, by signing up, they would have to do everything. They reported that being able to determine for themselves the level, quality, and kinds of engagement they had in the project gave them a real sense of freedom. Whether this led to increased involvement is unclear. However, all interviewees suggested that from their perspective, it did.

Empowerment is commonly understood as the ability to effectuate changes that have societal impact. For the families in our study, small changes, such as decisions around what to cook that day, made them feel that they were making a difference to society. Moreover, the more important the area of action was to them, the higher the potential they felt for long-term change. Throughout the interviews, participants describe having a sense of agency – an innate sense of responsibility, a capacity to act, and a willingness to participate in the world (Kim & Roth, 2016; OECD, 2018), as a direct

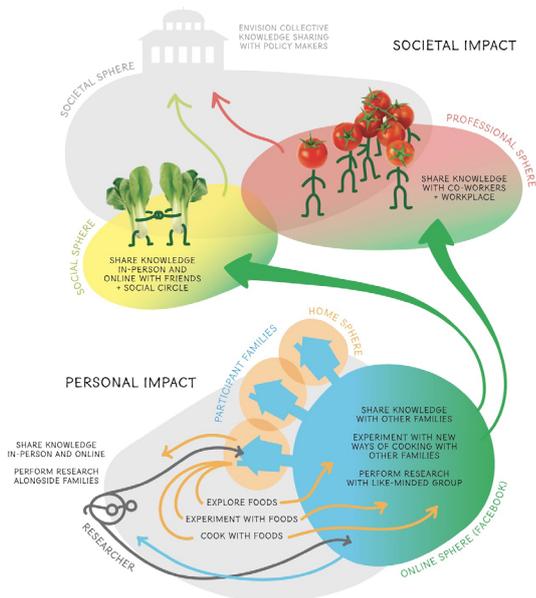


Figure 4: a hybrid strategy for bottom-up societal transition. By shifting scales between home and online, participants can try out emerging knowledge, and be emboldened to scale out to social, professional, and societal spheres of action.

result of the freedom they felt to move between scales of concern. They clearly valued the feeling of control the study gave them over their own lives and food choices, over society and the ways food is understood and consumed.

HYBRID STRATEGIES FOR ENGAGEMENT ACROSS SCALES

The *ReThinking Food* Main Course research was designed to encourage participants to shift their scales of engagement between a number of spheres: the intimate realm of home and family; and the less intimate in-person and online spheres, where they engaged one-to-one and one-to-some, with the researchers; and one-to-some and one-to-many, with the other participating families. They moved between these scales, freely, trying out emerging knowledge. The scale shifts seemed to embolden them to scale out further, to social, professional and societal spheres (Figure 4). One participant discussed seeing opportunities for their work canteen to become more sustainable, and making suggestions to the cafeteria managers about simple, yet effective changes they could make to offer more sustainable meals. They noted that they felt empowered to act in this way because of the strength they gained from their role in this research. We hypothesise that it is the underlying structure of nested, overlapping and interconnected spheres of action, each operating at different relational scales, that engenders this empowerment. Through different spheres (Figure 4), researchers and participants co-create activities. These actions enable them to move across scales. Throughout, families shape their engagement according to personal

needs and preferences (Sauermaun et. al, 2020), and in the process become empowered. We contend the blended, responsive design strategy affords this outcome. It gives participants a sense of agency and emboldens them to shift scales of action. It fosters Environmental Citizenship by beginning at the scale of the body and extending out into the world. We consider, next, other forms of scaling that undergird this model.

SCALING OUT FROM THE INDIVIDUAL

The Main Course begins with a food delivery and unfolds over a range of actions. Along the way, the researchers engage in research alongside the participating families, modelling the research process, engaging in embodied ways. We (the researchers) share knowledge (*“The Future 50 Foods report was intended to...”*) and our own embodied, situated research (*“I find when I cook with sprouted kidney beans that...”*). Through each knowledge exchange, we (re-)frame the research as a co-creative process. From the very beginning – the delivery of the foods to their door – families responded with enthusiasm, took ownership, and proceeded to explore on their own. “Thanks for the box! It's almost like Christmas Eve – filled with exciting things” (F08).

After initiating the research at the scale of the individual, we offered families the option to connect at the scale of the group, to see if they would common their challenges and develop a sense of community. This group was the closed Facebook group. As they shared with the Facebook group, we notice their engagement with the research begin to shift, moving back and forth between the home sphere and the group sphere (Figure 4). This movement across scales enlivened families’ personal, situated food practices and encouraged continued engagement within the online community. Their activities in one sphere informed and strengthened their activities in the other. In interviews, families explained the role that the Facebook group played in creating a feeling of community: “Facebook allows us to feel connection with the other participants” (F01) because in the group the families felt they could “have their meaning heard” (F07), an experience they define as empowering.

While the closed Facebook group enabled families to scale their research engagement, it was not a tool that all families chose to use. 33 of the 35 Main Course families joined the closed Facebook group and not all families who joined were active. Barriers to participation arose due to distrust of the Facebook platform and, in general, being “not very active on social media” (F02). Such families were unable to fully engage with the researchers and other participants because of discomfort with the platform. Their engagement with the research was thus challenged. We appreciate privacy concerns around social media, however, did not expect them to be

A first-person researcher-participant account:

- Motivated to make long-lasting changes to her family's diet for personal health and environmental health reasons
- Enjoyed receiving the future 50 food box from other researchers and experimenting with new foods in her home kitchen
- Liked the support and community of the Facebook group as a resource, but did not actively participate in the group due to data privacy concerns
- Reported that lack of time, dietary issues and lack of local accessibility to future 50 foods were obstacles to change within her family food practices
- De-motivated through encountering these obstacles but determined to keep trying to enact change on a personal, familial scale.

Table 1: First-person account of researcher-participant

a high barrier to participation in Denmark, which is noted for high social media participation (Tankovska, 2020). The use of a pre-existing social media platform to support group communication and exchange was attractive to us given the low-to-no setup costs and the built-in infrastructure that corporate social media platforms offer. However, participants' discomfort, biases related to social media, personal privacy, and other anxieties about online presence were obstacles to participation for some. These barriers to engagement attached require further consideration of net positive and negative effects on participation within the context of co-creative, CS and other methodologies. Table 1, above, provides a brief journey through the research, from the first-person perspective of the researcher who joined the study with her family. We see her move through motivation, enjoyment, then hesitation, as she encounters resistance to the Facebook group. We see her challenges, which translate into de-motivation and then determination to find a solution to low accessibility in the stores, and her acceptance that personal and societal changes come in different forms and tempo.

SHIFTING SCALES THROUGH ONLINE ENGAGEMENT TOWARDS AGENCY

During our research, Covid-19 restrictions were implemented in Denmark. The highly personal, situated nature of food practices and the reciprocal, participatory nature of the study's methodology necessitated interconnection and communication between families and researchers. The online group enabled us to connect families, researchers, and experts despite the restrictions. Shifting research activities online had a twofold effect. It created a shared community space that helped to support the co-creative research process; and

engendered feelings of agency in families by affording connection across scales of intimacy.

The closed Facebook group afforded flexible avenues for engagement with research. It was always accessible, and thus allowed families to engage with research activities at their own pace. Group invitations to activities from researchers could be accepted, ignored or declined without judgement or repercussions. Families were free to RSVP to events in advance, join in at the last minute, or not at all if their schedules did not allow for it. On a day-to-day basis, families using the Facebook group were able to move between roles of active problem solver, researcher, and spectator (Reis, 2020) as they wished, while simultaneously conducting their individual research in the home. This flexibility and freedom to self-determine their level(s) of involvement across scales engendered feelings of agency in participants. Families expressed feeling "free to experiment" (F02) and "hav[ing] the power to choose" (F05). This sense of agency, in combination with feelings of empowerment, arose from belonging to a larger community with shared interests. It led families to begin sharing knowledge on a societal scale with friends, social circles, and co-workers (Figure 4). "We feel like we're doing something good together" (F06).

According to ENEC(2018) and Hadjichambis et al., (2020) Environmental Citizenship is:

"the responsible pro-environmental behaviour of citizens who act and participate in society as agents of change in the private and public sphere, on a local, national and global scale, through individual and collective actions, in the direction of solving contemporary environmental problems, preventing the creation of new environmental problems, achieving sustainability as well as developing a healthy relationship with nature. "Environmental Citizenship" includes the exercise of environmental rights and duties, as well as the identification of the underlying structural causes of environmental degradation and environmental problems, the development of the willingness and the competences for critical and active engagement and civic participation to address those structural causes, acting individually and collectively within democratic means, and taking into account inter- and intra-generational justice (ENEC 2018).

Throughout this definition, we see the importance of scaling, as they "act and participate in society as agents of change in the private to the public sphere, on a local, national, and global scale, through individual and collective actions..." (ibid.). In *ReThinking Food*, we see these ways of being emerging as a direct result of what is afforded by the closed Facebook group, as this group performs the role of being a safe space to test out emerging knowledges and develop a sense of agency – an innate sense of responsibility, a capacity to act, and a willingness to participate in the world (OECD, 2018;

Kim & Roth, 2016). By volunteering to participate in the study at the outset, our participating families confirmed their sense of responsibility and willingness to act. By practicing their emerging knowledges in the Facebook group, as they enacted the dual role of citizen scientist researcher, they developed their capacity to act at other scales, and then they acted.

This finding is exciting for us as researchers, but we must also practice caution and note the flip sides of the strengths in our study design. For example, maximizing for participant self-direction and freedom of choice across scale had beneficial effects but also left some families who expected more structure feeling lost. F03 commented that they “don’t know where to begin” and that it was “hard to keep up momentum, we need more guidance.” This family simultaneously expressed a positive view of the structure, stating they could “get answers to questions in the Facebook group” (F03). Through being able to both seek and receive guidance within the group they experienced social empowerment. Nonetheless, they had a hard time recognising their co-creative exchanges with other participants as the performance of research. This conflicting experience highlights a tension point between participants’ perceptions of CS and the enactment of extreme, co-creative CS through the lens of pRTD. Notions of hierarchy in science led some participants to view their role in the research process as existing within the bounds of Haklay’s (2013) levels of CS, wherein participants play a relatively passive role as sensors in the research process. Coming from this point of view, expressions of frustration like the above example were understandable when families were confronted with expectations of performing research within active, co-creative frameworks.

ENVIRONMENTAL CITIZENSHIP: FROM THE BODY TO THE WORLD

The scaffolding of Environmental Citizenship in this research begins with an embodied exchange (from researcher to participant, handing over a box of food); then scales inward, to the ultimate particulars of peeling vegetables, sprouting legumes, and acts of handling the live materiality of the food. From this scale, participants then engage as a family with the question of what to eat. Children play an important role in the process, as F03 noted, sometimes they just wanted to make a simple family fall-back meal, but the children would not let them – they wanted some of the research food, and the parents, despite being tired, complied. Children will live with the futures we are making day by day. Their insistence can help us to make better (if not always easier) choices, as they help us to see beyond the timescales of our own bodies to imagine the lives of future bodies. Many of the discussions on Facebook came back to children. We have many photographs of

children cooking and experimenting; the scale of their commitment was larger than we anticipated.

From the scale of the family, the research then scales out to the online sphere, to be enacted vigorously in the Facebook group, where participants find acceptance and form community. From here, they continue to scale outwards, acting within larger social, professional, and societal spheres. One family reported positively that they “accidentally posted on their own Facebook wall and got a lot of comments from friends there” (F06). Others proactively posted in their social networks, and we received a number of requests from friends of participating families who wanted to join the study.

In all, we found that performing research within the context of an online social network prompted “independent forms of communication/intervention” (Reis, 2020) both within the group and outside of it. Participating in the online group helped families build confidence in their own situated practices and acted as a conduit for enactment of EC between the private and the public spheres, the body, and the world. Curiously, despite there being no direct contact with policymakers, our participants expressed a belief that the small changes they were making could impact government, and that the bottom-up approach, scaling out from the personal to the societal, would ultimately incentivise policymakers to put the topic of a more sustainable diet on their agendas. For the families who were interviewed, the option of scaling up their contribution motivated them to change their behaviour on the individual level. They also appreciated the scaling out of the research that took place in the Free-Range study. They found themselves represented in national media. Some were interviewed over breakfast by the DR regional radio crew, others conducted online Q&As for a national audience, and had their stories shared in the newspaper and online. Whether or not they appeared personally in these media events, they felt they were at the forefront of a national discussion on societal transition; that their actions were helping society to understand how we can make change. They were emboldened by the combination of online and offline activities, and by the support provided in the online communities. These communities provided access to knowledge, and the courage to scale out experiments to social, professional, and societal spheres. Participants in the study became community catalysts; developed EC leadership capacities; and brought sustainable eating agendas to the table both in and beyond the home. They nurtured long lasting change around themselves as they experimented with transforming their personal practices.

CONCLUSION

ReThinking Food affords the development of Environmental Citizenship through engagement with international sustainability agendas across a range of

scales. It does this by working with a hybrid structure that affords scale-shifting from the home sphere through the online sphere, into social, professional, and societal spheres. At each of these scales, interaction and commoning emerge through the performance of one-to-one, one-to-some, and one-to-many interactions, infinitely nesting scales to empower citizens to enlarge the spheres within which they “act and participate in society as agents of change.” (ENEC, 2018). The online sphere is critically important within this landscape of action. The closed Facebook group provides a safe space of community-building within which participants test and share emerging knowledge; rehearse change.

Over the course of our study, activities spanning multiple levels of engagement fostered connections across scale, expanding from the person through the personal to the societal. The research thereby, methodologically troubled the tendency to keep CS at what Haklay (2013) describes as level 1: Citizens as Sensors (Sauer mann, et al., 2020). By exploring the concept of empowerment through embodied engagement with the research object – food and sustainability in the family and in society – becoming an agent of change in society could begin at home. This rescaling of planetary issues to the family home was important. It enabled our participants to make small moves and, after testing their emerging knowledge in the Facebook group, become emboldened to act. The Facebook group as safe space for rehearsing EC, was critical to this process.

In terms of motivation, the main reasons for joining the study were to eat more sustainably, eat less meat and have more energy. The main challenges were finding recipes, shifting practices in the kitchen to accommodate unfamiliar and time-consuming processes, such as soaking beans and legumes, and finding the ingredients at local supermarkets. The main reasons for reverting to habitual cooking and eating were time, motivation, and digestion issues, resulting from the increase in pulses in the diet. Critical to our hybrid strategy, we found that participants seemed to not only face similar challenges, but to find support, tips and advice through the Facebook group. They exchanged hopes, fears, questions, and concerns within this safe space. These exchanges helped in the collaborative formulation of knowledges as people considered how to move forward.

The participants in the Main Course were mostly middle-class Danish families who shared economic and lifestyle commonalities; they also all lived in the same municipality. The strategy presented here reflects the experiences of this specific group, and our methods would necessarily require change when applied in other, situated circumstances. Conducting this study with older or younger people, for example, may significantly impact the online component of the research. Working with people living on a lower income might require

more active support from researchers in procuring foods over the course of the study. We do not consider these to be weaknesses, merely limitations to acknowledge.

In this article, we offer a live account from research, and a hybrid strategy of engagement that begins at the body and expands across scale. As our researcher-participant’s bulleted account demonstrates (Table 1), the path through the research was not necessarily easy. She highlights her embodied engagement with the Future 50 Foods in the home sphere, and access to a community of like-minded individuals in the online sphere, as important points of engagement that enriched her situated practices, and helped her family engage with what it means to be sustainable in the home. Like some of our other participants, she expressed concerns about the privacy issues connected to companies such as Facebook. We take these concerns seriously. We can clearly see from our families that the perceived safe space provided by the closed group was critical to them developing their capacities in EC. This brings up a dilemma for us that will need further research. It seems clear from this study that hybrid strategies, combining online and scales of in-person engagement, are effective in accelerating the transition to Environmental Citizenship. This strategy is therefore a powerful strategy to support the radical societal changes we must make. However, we hope that we might find new platforms for conducting this work and will expand our search for alternatives moving forward.

ReThinking Food reinterpreted Citizen Science, through the lens of participatory research through design. The research foregrounds co-creation, and uses experimental, embodied and food design methods to enliven the inquiry. Through this process, we discovered that engaging citizen-scientists across scales strengthens the effectiveness of bottom-up societal transformation efforts, beginning with the personal and extending across familial, societal, and planetary scales.

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