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Living Capsules: reflections on an ongoing art-sociology collaboration

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Abstract

Living Capsules is the umbrella name we give to our art pieces that are being born out of an ongoing collaboration, between an artist and a sociologist, who share interests in the relations between senses, bodies, and technologies. This reflective paper tells the story of their co-creation. We introduce the notion of biohybrid systems as our sociotechnical inspiration. Second, we mark out the conceptual space in which we began to prototype *Living Capsules*. Third, we reflect on how and why we blend our disciplinary practices. And finally, we share and discuss some prototype pieces, sketching future directions for our continued collaboration.

1. Introduction: the of future life and the senses

The ability to manipulate life not only creates new forms of life and partial life, but also forces us to reevaluate different understandings of life and the dissolving boundaries in the life continuum
[1, p.125]

In this paper we reflect on the co-creation of *Living Capsules*. These were born from an ongoing experimentation in cross-disciplinary collaboration between an artist-researcher (Burd) and a sociologist of technology and the body (Barker). Vibrating and edible matter became important materials and concepts to work with as we blended our sensory methods and imaginations together; they are central to our reflections throughout the paper.

We first share our inspirations from the scientific literature, social imagination, and artistic expressions of biohybrid systems that combine biological and artificial components. Both vibrating and edible matter map to trajectories within these fields in interesting ways. For example, ingestible vibrating capsules have been shown to affect sensory perceptions, gut-feelings, and gut-brain interactions [2] and a range of nanorobots are being developed to work inside the body to perform medical tasks [3], potentially saving and prolonging life. Selected Cyborg and Bioart works are also highlighted in this section contributing to the contextualization of our collaborative project.

After this short review we articulate the conceptual space in which we operate (section 3). Following in the footsteps of Bioart that challenge “conventional understandings of life as clearly distinguished from non-life” [4, p.378] we outline our aim to unsettle non/living boundaries through the senses. We then reflect on the nature of, and rationale behind, our cross-disciplinary collaboration (section 4). Following this we share some prototype *Living Capsules* and discussing how our practices blended in their co-creation while sketching future directions for our ongoing art-sociology venture (sections 5 and 6).

In a period where biology and technology are increasingly being coupled in novel and intimate ways [5] we contend that it becomes especially important to engage deeply with how we sense the presence and absence of life itself. Exploring sensory futures through ethnography [see 6] and art has enabled us to create multi-sensory experiences that invites us to imagine what biohybrid futures might *feel* like. We created *Living Capsules* to critically express future body–technology–society relations. This is important because it affords our audiences to directly encounter biohybrid speculations on the future of life and the senses.

2. Our inspiration: future biohybrid systems

Biohybrid systems are where biological components are coupled to at least one artificial engineered component to form a new system where information is passed in both directions [7]. These configurations span from molecular scale to the macro-scale (such as entire organs or body parts). Cutting edge examples of biological matter being turned into biohybrid systems include brain–machine interfaces (where neurons connect with electromechanical systems establishing a bidirectional flow), and intelligent prostheses. Robots are also incorporating biological components. In the last decade these

biohybrid robots have moved out from “science fiction and into real science and engineering” [8, p.1]. Examples here include neural tissues controlling robotic movements [9] or conversely living tissue being used as actuators or sensors for robots. The prospect of assembling animal-robot hybrids has even entered the scientific imaginary [10]. Meanwhile, radically optimistic transhumanists pursue ideas of intelligent evolution and living a life without death [11] and the imaginative horizons of synthetic biology generate new risks when creating new and unknown forms of life [12].

The future possibilities of biohybrid systems therefore raise new and complex ethical, political, social issues related to the creation of hybrid non/living systems that potentially dissolve boundaries in the life continuum [13]. Art, sociology, and their collaborative intersection hold potential to engage with these complex future-facing themes critically and creatively.

Engaging with the future forms of biohybrid *life* and *senses* is reflected in the Cyborg Art movement, “where artists extend their senses beyond their physical boundaries by applying technology into their bodies” [14, np]. Two acclaimed examples are Moon Ribas, whose seismic sensory allowed her to feel moonquakes, and Neil Harbisson whose antenna implant enables him to perceive (in)visible colors via audible vibrations. Our *Living Capsules* share features with these examples by experimenting, placing, and/or imagining technologies inside bodies (however through edible matter rather than implants) in ways that use vibration as a medium that directly interacts with human senses.

Our *Living Capsules* are also closely situated against Bioart that “challenge the traditional division between life and non-life” [15, p.384] by making ‘semi-living’ structures and new biohybrid systems. Amor Muñoz’s piece ‘Chimera, Expanded Bodies’ (2022) [16], for example, explores the boundaries between non/living, as well as the relationship between the body and machines. It features bioautomatas, artificial entities containing living matter, forming a hybrid textile-tactile nervous system that can be activated by the public. These generate performative gestures where audience interactions create a sound installation through vibration. The relationship between biology, technology, and sound (vibration) is also on display in Serge Vuille’s collaborative piece, ‘Living Instruments’ (2016-2020) [17]. Here instruments employ living bacteria and organisms in a unique manner, to create an otherworldly musical experience. We likewise use biological living materials in some of our pieces to create and experiment with vibration as medium to unsettle non/living boundaries (elaborated on later).

These selected Bioart examples provide powerful counter images, sounds, and narratives to the idea of non/living matter as distinct entities, while simultaneously disrupting the perception of life as controllable [18]. Notably, Bioart that engages with themes of non/living is being created and shared in leading artistic laboratories such as SymbioticA [19]. Although art coming from hubs inspired our collaborative process it is beyond the reach of this short paper to unpack individual works further.

In this section we introduce the concept of biohybridity as a potential disruptor to traditional divisions between non/living and as our social, technological, and artistic inspirations. We approach the relatively open, ambiguous, and shifting terrains that biohybrid systems inhabit as a creative space for our cross-disciplinary explorations, experimentations, and co-creations. Against this backdrop we now refine our shared interests that have guided the co-creation of *Living Capsules* and anchored our cross-disciplinary collaboration.

3. Unsettling non/Living Boundaries: vibrating and edible matter

“Life” is a force qualitatively different from the merely mechanical operations of matter: life “is not the result of metabolism but its cause”
[20, p.48]

‘to animate’ is to impart life, vitality and motion
[21, p.4]

From our joint engagement in the areas highlighted above we marked out and clarified a conceptual space in which we operate. In essence, we explore and unsettle perceived non/living boundaries through the senses. From our engagement in the technological, sociological, and artistic fields outlined above, we understand boundaries within these emergent biology-technology assemblages as multidimensional and fluid – broadly aligning with a vital materialist perspective [e.g., 22]. We also argue that trajectory of biohybrid systems has the potential to obscure the shape, location, status, and sociological consequence of such boundaries even further.

Defining life remains a thorny philosophical and biological question with ethical/political implications. For this work we deliberately avoid providing neat biological definitions of ‘life’. Instead, in our

ongoing collaboration we experiment with a wide range of sensory dynamics (e.g., movements, sounds, temperatures, smells, and tastes) to unsettle the audiences' sense of non/living boundaries. The pieces and reflections in this paper have a refined focus on how vibrating and edible matter may be incorporated into imagined future biohybrid robots to disrupt and dissolve perceived boundaries.

Our interest in these matters were, in part, driven by the realization that during digestion the boundaries between "carrot and eater vanish altogether" [23, p.49], and that once digested, food becomes new human tissue. Consequently, inside the body became a target area for our work as a site where the boundaries between non/living things, their autonomy and distinctiveness, are already obscured. Symbiosis and constant exchange are cornerstones of life, especially in our holobiont bodies; where for example bacterial/viral strands of DNA are present and active, where parasites affect bodily processes and behaviors [24], and where gut bacteria have co-evolved with their human hosts to benefit both [25]. Acutely aware of the diverse ecosystem of non/living matter within a body our artworks aimed to insert future imagined biohybrid technologies into this assemblage.

Vibration became a key sensory dynamic through which we sought to activate material and affective assemblages and generating lively forces. Here we came to encounter vibration as an animate force that ripples out, creates chains of motion, is never static, evades location and ignores boundaries for example by passing through ears, bones, flesh, and environment. We were drawn to vibrating matter as it connects with the idea of life as animate, or as having the ability to move [26]. *Lively* animation refers to instances where movement has been taken as a sign of life as analysed in film studies as well as science and technology studies [27]. We sought to create lively animations through vibrations, to permeate or scramble our senses of the boundaries between fictional biohybrid robots and the audiences' bodies. Edible and vibrating matter provided us with opportunities to simultaneously interact with the body's internal and surface (skin/mouth) sensory receptors.

The *Living Capsules* reflected on later are product of our experiments with vibrating and edible matter. They exist in within speculative scenarios where bodies and technologies become further integrated with each other; in futures where the boundaries between non/living have dissolved further and are sensed differently by human bodies. We now turn to describe how we have been working together across disciplines.

4. Cross-Disciplinary Sensory Experiments

With this conceptual space guiding our collaboration, we have been exploring ideas and materials by co-creating prototype for art pieces. Through these activities we have taken forward a sensory approach [e.g., 28] where ‘the body’ (our bodies and the bodies of our collaborators and audiences) occupies a central focal point in our joint venture.

In attending to the body and senses our approach has been influenced by a methodological book on *experimental collaboration* (as a distinct mode of creative para-site ethnographic enquiry beyond observation) [29] and what Sarah Pink coins in the afterword, *blended practice* (“ways of working that surpass the disciplinary conventions of practice and theory” [p.202]).

Influenced by ethnographic practices (e.g., immersion, developing/sharing fieldnotes) when making art our collaboration can be located within intersecting methodological trends where: ethnographers are increasingly engaging with art and collaborating with artists [30]; and where artists bring ethnographic approaches further into their practice [31] or producing works in response to ethnographic research. Our collaborative methodology evolved over 12 months in two broad phases.

Phase 1: We built the foundations for our cross-disciplinary sensory experiments and formed some shared visions for our collaborative project. Between January and August 2022, we worked together remotely sharing: (1) readings and our reflections/questions on these readings; (2) artistic work that intersect with the broader themes that interested us; and (3) our observations and imaginations of biohybrid systems in society. These activities led to the establishment of the conceptual space that we now operate (see section 3).

We also decided to co-write a symbolic code of collaboration, where we wrote, “We recognized that the end products of our collaboration do not have to be entirely clear to us now”. In the face of this uncertainty our collaboration recognizes that valuable knowledge and creative expressions are “not merely produced through the coming together of *disciplines* but of *people*” [32, p.11]. This underpins the rationale for investing time (9 months) and effort to establish personal (not just disciplinary) understanding of each other and the motivations we bring to this joint project.

Phase 2: In this phase work took place in the same physical spaces between September and December 2022. This allowed us to directly engage with materials that we identified and sourced together. Every week was an exploration of the senses and an experimentation in prototyping as we worked with new ideas, materials, and inspirations from art and society. For us prototyping includes multiple activities and stages where we set out to realize our imagination and engage with these materializations through our bodies and senses. Specifically, our prototypes consisted of drawings, 3D models (virtual and physical), composed sounds and sensory experiences.

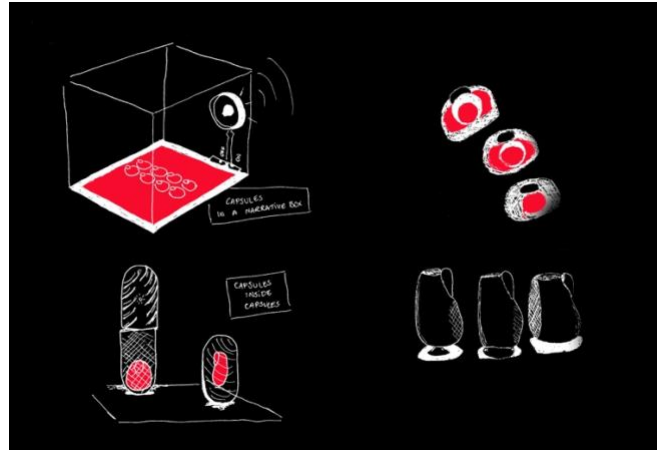


Figure 1. Sketches of some prototypical designs

Prototyping allowed us to interact with our ideas in a material way – to taste, touch, and feel our creations through every stage of their development. Through creating and refining our artworks we have been able to reflect on our sensory experiences by writing sensory fieldnotes and through conversations. On occasions we invited colleagues, friends, and audiences to engage with our *Living Capsules* as they were born to gain a sense of their experiences. Making, sensing, writing, sharing, reflecting, and discussing our creations became an iterative process with its own catalytic inertia. We now share and discuss some prototype pieces that emerged from this collaborative way of working.

5. Prototyping Living Capsules

We started our prototyping in dialogue with Burd’s recent series, *Automaton* [32]. One might say the form has a ‘head’ and a ‘body’ (see Figs 1, 2, 3 & 4). In an unconstrained way, the head may identify a space where the electronic components of her automata are located and made visible. The body is the

larger area where audiences are invited to interact emotionally and physically. This distinctive shape invites bodily projections and engagements because of its abstract quality. For example, audiences have remarked that it reminds them of an egg, organ, molecule, cell, finger, and tongue. Audiences have also shown curiosity in the form that can also resemble a robot. Impressions of the form can change drastically with respect to altering its size, color, texture, and surroundings. Reflecting on its affordances we felt that the abstract shape lends itself to exploring the conceptual space that we had marked out.

The term ‘capsule’ appeared in our early discussions. The term was first used as we discussed various ways in which future biohybrid systems could interact with, or become part of, our bodies. This term sparked an exchange that led to the overarching idea of creating *Living Capsules*,

“I like your idea of creating Living Machines as 'capsules' many reasons. They are potentially mobile and multiple. They can be buried and found (e.g., time capsules that preserves and connects us to past life and cultures). They can be exploratory looking for new life (e.g., space capsules). And drugs can be administered in pill capsules. As the shell breaks down, it, and its contents, become part of the body. Indeed, we have shared many examples already of ‘pill-sized’ robots being designed to perform medical procedures and preserve life” (Written correspondence, Barker responding to Burd, 27/05/22).

This excerpt is a concrete illustration of how our cross-disciplinary dialogue unfolded. It also captures a significant moment from which the first prototype (Fig. 2) can be traced. Through a stream of correspondence, we continued to share examples, definitions, as our artistic-sociological imaginations of capsules as biohybrid systems entwined. In these exchanges we played with ideas of novel body-capsule relations. These exchanges led to intentions to create a collection of *Living Capsules* that share a family resemblance. As such they share a recognizable form but also have their own distinctive personalities and sensory qualities.

This introduction reflects the origins and the longer-term vision for these works-in-progress. We now share some selected prototype *Living Capsules*, illustrating how we blended our practices in their co-creation, and articulating how we imagine them unsettling perceived boundaries between non/living.

5.1. Small Capsules



Figure 2. The first prototype *Living Capsules* 2022. Six 3D printed sculptures in plastic and wooden casting.

Inspired by ‘pill-sized’ robots and ‘nanobots’ our first attempt to materialize a *Living Capsule* was reduce Burd’s *Automaton* form to a size where people may perceive them as edible. The way material boundaries dissolve and combine during digestion motivated us to explore inside the body. Moreover, the inside of the body is usually unseen; it is where organs and systems actively produce sensory experiences. We became interested in activating these internal sensations through vibrating and edible matter.

Drawing on ethnographic sensitivities and methods we lived with these early prototypes for over a month interacting with them. We kept these prototypes on our desks, carried them with us, and showed them to friends as we continued to progress our collaboration in different directions. We recorded and shared our sensory engagement with these capsules and our changing relationship with them overtime. Barker, for example, had them unpacked and sprawled across his kitchen table one day. He noted how they look like dismembered fingernails, or some sort of acrylic prosthetic, or tactile sensor. Closely inspecting them he became drawn to the tiny lines left from the 3D printing process: could these be fingerprints? Each capsule had almost identical ridges and this contrasts with those found on us; even identical twins bear different marks because how they interact with their mother in the womb shapes their formation. We jointly explored ideas that these ethnographic fieldnotes raised to contemplate notions of reproduction for biohybrid systems as they sit between biological and mechanical, mutation and copy, evolution and design. Indeed, this led to the crystallization of our desire to play with the notion of family resemblance as another route to unsettle our audiences’ senses of (non)living. Over time these Small Capsules developed into a different piece altogether, *Dream Capsules*.

5.2. *Dream Capsules*



Figure 3 “*Dream Capsules*” 2022. Digital fabricated capsules, 2 channel sound system, 1’15” audio. Dancer/performer Luiza Kessler. Photography ©Ram Shergill.

Dream Capsules are sound objects that entice audiences to dream together. A looping poem is projected through a dismantled sound system, left exposed and dangling. A hybrid-robotic voice, produced through a vocoder, delivers the poem between snoring noises.

The capsules are inside a ‘narrative box’ and deliberately staged as red medical capsules and as therefore edible matter. The small acrylic box is not merely a display unit to stop the audience touching or eating the plastic capsules. Rather it was our attempt tap into the notion of time capsules where artifacts (in this instance the *Dream Capsules*) appear preserved in time and discovered in an undetermined future. In this way we sought to present them as rare relics that should not be touched even as they entice you to join with them.

Almost as visual narrative, there are six capsules and two empty spaces. So, whilst the audience are left unsure of how old they are, how long they have been waiting, and how long they will continue to exist there neither dead nor alive – they also may infer that two of them have escaped or have been consumed by someone becoming part of their subconscious.

In this prototype we seek to unsettle boundaries between non/living by inviting our bodies to engage with liminal states of dreaming. Dreaming, including transitory moments of falling asleep and awakening, can provide moments where our bodies are more susceptible to irrational encounters and

imaginations. As such, sensory experiences of dreaming do not always mimic those we usually encounter in daily life; our consciousness can hover between reality and fantasy. Through this prototype, therefore, we seek to exploit dreams as bodily experiences that can straddle thresholds between daily-life, escaping-life, and doing more-than-living. *Dream Capsules* call to the listener, the vibrations of the audio piece running through them, as they plead to enter the listeners inner worlds in permanent symbiosis.

In terms of our collaborative methodology of prototyping we note here that the narrative (poem) was the last aspect of the piece to be developed. It only appeared after the materials were assembled and staged. This illustrates a process where ideas and materialization propel each other in unexpected directions. From our cross-disciplinary perspectives we discussed the narrative box, what we wanted it to say, and why. These materials and conversations gave rise to a creative moment where lyrics appeared in a liminal dream-state.

5.3. *Biohybrid Buzz*



Figure 4. “BioHybrid Buzz” 2022. Group tasting electric daisy cocktails from 3D printed capsules. Models: [REDACTED], [REDACTED], Luiza Kessler, and Daen Palma Huse. Photography ©Ram Shergill

Biohybrid Buzz is a sound-taste-tactile immersion piece that should be shown in a low light room, with a 4.2 surround sound system and a projector to play a video that frames and guides audiences through the experience. A video of the performance can be viewed [34].

Though our ongoing attempts to source living materials possessed of sensory properties that relate to our conceptual map we became interested in a Brazilian flower, Jambu. In English speaking countries these flowers are also known as Electric Daisies or Buzz Buttons because they vibrate the mouth. We first tried this plant extracted in Cachaça, a popular drink in Brazil known for its ‘tremor’ affect.

Excited with how it vibrated our mouths we sought to give it new life as a *Living Capsule*. We have been experimenting with the raw flower, Cachaça, and flavored gels containing extractions. Through these sensory experiments Electric Daisies became a base material to create fictional biohybrid robots that we call *Biohybrid Buzz*. We emphasize the alias Electric Daisies when introducing the capsule to audiences because it leans into the notion of biohybrid systems that are composed of at least one engineered component (i.e., electrical circuit) and one biological (i.e., daisies). We played with multi-sensorial manifestations of vibration with a view to create a *lively* animation for the audience to experience as the capsule is consumed, enters the body, with sound vibrations travelling around and through it.

In this piece, we worked together to create a multi-sensory experience by blending fieldnotes with sound composition. Barker’s sensory fieldnotes contained temporal and rhythmic markers, along with descriptors and a mouth map that traced how his sensory experiences moved and morphed. Burd then interpreted this and composed sonic vibrations in synchronisation with the fieldnotes. The result was that this prototype combined low frequencies with the Jambu to vibrate mouth, skin, and deep tissue receptors simultaneously, presenting a complete and lively sensorial landscape. In developing this piece, we worked closely with a sound artist, Nikolas Gomes, to sonify data extracted from the Jambu; turning its biological matter into vibration. Nikolas Gomes and Joana Burd created an open-source data sonification application (NGFDS) that enables data to be transformed into sound using a simple and intuitive interface [35].

6. Cross-Disciplinary Learnings and Future Directions

In this paper we have positioned our *Living Capsules* somewhere on the edge of *life* as we know it. We have also described and illustrated the evolution of our cross-disciplinary collaboration. Ethnographic experimentations with the senses together has brought art to sociology, and vice versa.

Prototyping enabled our practices to blend *through* materials, to engage with vibrating and edible matter in tangible (rather than purely abstract) ways. We shared and applied our usual methods to explore the material world. With our sociological hands, we traced cultural history of objects and wrote fieldnotes that interweaved the social with sensory. With our artistic hands, like scavengers [36], we dismantled and cataloged the objects we worked with. Insights produced through this were then translated into joint expressions using techniques such as coding, sculpturing, and composing. One concrete example of this is when sensory fieldnotes of tasting the Electric Daisies became the score for sound composition.

Blending practices has been valuable to stretch our disciplinary methods leading to new innovative approaches. For Barker, the act of co-creating art as an observant participant (who is especially orientated to the body) became a powerful way of doing ‘sensory futures ethnography’. For Burd, becoming an apprentice ethnographer encouraged expanded sensory engagements and documentation practices. During the process Burd reflected on arriving at a different awareness of her own practice when thinking through concepts with a sociologist. Her imaginative horizon shifted from haptics to the full body and its many relations with technology and society.

This paper reports on *Living Capsules* as an ongoing art-sociology collaborative project. There are sensory dynamics that we mapped out and have yet experiment with. These include temperature, smell, familiarity, and autonomy. We intend to develop pieces that directly engage these areas and exhibit all our creations together as a collection. Our idea is to curate a house of *Living Capsules* (a dwelling where they come together). Such an output, alongside a series of exhibitions of our more developed prototypes (i.e., Biohybrid Buzz), will contribute to both our fields by expressing new imaginaries of future worlds populated with biohybrid systems.

Exploring sensory futures through blending ethnography and art has enabled us to create multi-sensory experiences that invites us to imagine what biohybrid futures might *feel* like. We created *Living Capsules* to critically express future body–technology–society relations. This has afforded our audiences to directly encounter biohybrid speculations on the future of life and the senses.

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