# Chapter 9
# Problematic Milieus: Individuating Speculative Designs


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**Abstract** This chapter explores the method of speculative design. It considers the role of speculative practices as an aspect of design that allows HCI practitioners to explore problematics rather than problems. Problems need to be solved, whereas problematics are localities, situations, or experiences, where one can trace the connections between structural, political, and social forces and their implications to foster dialogue and reflection. As such, speculative design offers a theoretically rich approach through which to consider design implications of future and alternative conditions. Such work is discursively generative. To aid in deepening the philosophical aims of speculative design, I employ some of Gilbert Simondon's philosophical concepts, then examine several examples of recent speculative design.

## 9.1 What Is Speculative Design

Methods are chosen for what they produce; that is to say, methods provide certain kinds of data, or outcomes. Qualitative and quantitative methods provide us with different outcomes; they produce different forms of information. Why a method is chosen depends on the kinds of inquiry one wishes to conduct, and the information which one wishes to generate. As a method, speculative design is also overtly discursive and authorial; this positions the designer politically, beyond traditional understandings of the field. We may ask what kind of information does speculative design produce, and why would we use such a method? We may also ask, what differentiates speculative design from other design practices? This is difficult to answer, for as we shall see with our examples, the practice of speculative design is divergent.

Speculative design is related to critical design, design fiction, design as inquiry, anti-design, radical design, design futures, and other forms of design practice that critically interrogate society through the tools and materials of design, which are

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widely considered alternatives to traditional design practice (Auger 2013; Bratton 2016; Dunne and Raby 2013; Malpass 2017; Wakkary et al. 2015). As a group, we can refer to them collectively as discursive design. Speculative and critical practices are intended to provoke discussion about our world and our use of technology; they interrogate existing and new affects, means of production, affordances, scenarios of use, mechanisms of control, latent and emergent values within technology, and power asymmetries produced through certain technological forms, among other aspects of contemporary technoculture. James Auger asserts that while similar in practice, the names of discursive design signal important semantic differences to their audiences. Probes imply "investigation;" fiction lets us know that it is not real; critical signals a provocation of debate through its design, and so on (Auger 2013). Speculative, he claims, "suggests a direct correlation between 'here and now' and existence of the design concept" (Auger 2013). This distancing between the audience and the design, between the 'here and now' and somewhere else is a signal of possibility and potential. This is not to be confused with prediction, but a tracing of potential, tendencies, and energy. Speculative design begins with a "what if?" Traditional design, which also goes by other names such as normative, mainstream, or "affirmative design," is often described as design that affirms the status quo of our contemporary, capitalist, consumerist condition (Auger 2013; Dunne and Raby 2013). Speculative design (and its relatives) provoke conversation and debate about our status quo by explicitly exploring and presenting design provocations that clearly differ from our everyday. Speculative design offers new forms of the everyday, what Matt Malpass refers to as "future mundane" (Malpass 2017).

It is a well-worn truism that design is in service to a problem. Designers are trained to find and understand problems, then provide solutions for them (Koskinen et al. 2011). Design in this form hinges on the problem to which solutions are sought. "Above all, [designers] are trained to imagine problems and opportunities to see whether something is necessary or not. It is just this imaginative step that is presented in discussions on innovation in industry" (Koskinen et al. 2011). John M. Carroll provides a slightly different understanding of design. He also begins with a problem, or "current state of affairs" to be changed through design (Carroll 2000). The relationship between design and problem solving, may stem from Herbert Simon's definition of design. Simon describes design broadly as "courses of action aimed at changing existing situations into preferred ones" (Simon 1996). As with Carroll, the existing situation is the problem, and preferred situations are the results of action, that is, the implementation of designs. Design is about understanding future states as alternatives to existing states, where the solution to the problem is unknown at the outset (Carroll 2000).

Some argue that design is overrun with normative, capitalist values. "Design became fully integrated into the neoliberal model of capitalism that emerged during the 1980s, and all other possibilities for design were soon viewed as economically unviable and therefore irrelevant" (Dunne and Raby 2013). Implicit to this argument is an escalation, or acceleration, of capitalism during the late twentieth century, that according to Dunne and Raby has subsumed mainstream design practice. Speculative design, and its surrounding practices, are seen as attempts to stem the

tide of market-driven logics about what design is and what it can do. This argument is not just a pushback on design practices, and their neoliberal entwining, but perhaps on mainstream life in general. Dunne and Raby write, "it strives to keep alive other possibilities by providing a counterpoint to the world around us and encouraging us to see that everyday life could be different" (Dunne and Raby 2013, 45). Auger also argues that speculative practices allow us to delineate trajectories of existing technologies, and see where they might lead, providing "a system for analyzing, critiquing and rethinking contemporary technology" (Auger 2013). Speculative design provokes our thinking of what is and what could be, and tends to leave us with unsettling prospects. "Practitioners of speculative design engage in design as a sort of provocation, one that asks uncomfortable questions about the long-term implications of technology" (Lukens and DiSalvo 2012). This is not just a response to design's complicity in capitalism, in my opinion (though this is a critical point), but instead a rich theoretical shift from the problem to the problematic.

We can think of the problematic as the shifting connections between constituting relations that form a particular context; this might be a new form of technology, the impact of climate change, the implications of an aging population, or other emergent, complex shifts in life. Here, problematic means "ways of establishing new connections between bodies, institutions, and ideas" (Mitchell 2010). Speculative design explores potential outcomes, implications, and scenarios caught up within (typically) technical networks that may imbricate potential users and populations. It often uses contemporary science and technologies as a jumping off point in a consideration of what is possible (Malpass 2017; Auger 2013). These connections are not stable, but in constant shift. Speculative design is a method of envisioning problematic contexts. It offers a means of raising complex issues through design artifacts and scenarios of use and production. Designs resulting from speculation comment on socio-technical practices and infrastructures that are not yet of this world, but could be. More importantly, the problematics of speculative designs shed light on specific aspects of society and technology through a designed artifact in situ. This offers a framing not just of the artifact, but of its situated environment, and the values behind the creation and use of such a product.

One of the main differences in the shift of emphasis from problem to problematic is a de-emphasis on the solution. Problematics are a knotted, complex emergent set of relations; they do not lend themselves to solving, for they often elicit multiple problems at various scales. Solution is not the point. Speculative design is a discursive practice; it raises issues of concern, issues worth thinking about. In raising such issues, speculative design helps us think differently about our contemporary condition. "Since facts seem to end debates, and design seems to open them up, our greatest chance for critical intervention arise in our engagement of shared concerns—even if that means we cannot solve a problem" (Galloway, quoted in Malpass 2017, 131). It is a means of exploring not the just future, but also the present, and perhaps how we got here.

There are a number of approaches to raising concern through design, but speculative designers often use satire, irony, and humor to inflect their designs. At its best, these approaches help increase audience engagement, but may also lend themselves

to scorn or shame. Satire in speculative design is one of the means of offering a new means of perception of the problematic context "through methods of exaggeration or understatement" (Malpass 2017, 114). Humorous exaggeration helps emphasize Auger's point on the distance between "here and now," and Dunne and Raby's emphasis on imagining the everyday differently. Speculative design often places the designed artifact within a context, or environment to highlight underlying values embedded in technology. This may not be fully narrative as one finds in similar approaches, such as design fiction. Speculative design explores the context, not necessarily creating full diegetic detail.

Thus, speculative design provokes discussion about the intersection of technology and society. Rather than point out specific problems, speculative design focuses on the problematic—the material and social relations that give rise to new designs. Often, but not always, it is future-oriented, considering emergent conditions and technologies. However, designers may also choose to question latent values and logics in existing practices and infrastructures. The provocations of speculative design foster a more sophisticated understanding of the stakes of particular technical objects, raising critical awareness of affordances—what material capacities new technologies have and create—and values that form problematics. Speculative design is a rich, diverse, theoretical tool for exploring the environments of how things come to be in the world. Or, at the very least, how things come to be designed in the world. In this way, we can consider speculative design as a means of material speculation. It is an exploration of future potentials through our present conditions. Gilbert Simondon, a philosopher of technology and individuation, or how things come to be, provides a number of philosophical concepts that can help deepen our appreciation and understanding for this form of discursive design.

Simondon, writing in the mid-twentieth century, helps understand how environments and individual entities are related. He extends this thinking to technology and invention, which he describes as "a case of the future conditioning the present" (Simondon 2017, 60). Such an understanding of technical activity can also be applied to speculative design. His philosophy can help highlight the theoretical strengths of speculative design, that is the relations between technology and culture that are constantly evolving. Here I wish to briefly explore his concepts and their relation to speculative design, to which I will then return my attention.

## 9.2 Technical Individuation and Futural Functions

Much of Gilbert Simondon's writing has yet to be published in English. Yet, his influence can be felt in the works of contemporary theory and philosophy (such as Gilles Deleuze, Bernard Stiegler, Brian Massumi, Erin Manning, to name a few). I want to frame the following brief explanation of some of Simondon's concepts through one of his primary concerns, the separation of culture and technology. In the opening prospectus of one of his major works, *On the Mode of Existence of Technical Objects*, Gilbert Simondon identifies a "gap" between culture and

technology, one which he sees critical to reduce. Culture lacks an understanding of how technologies function, he argues, with a focus only on the use of technologies. The emphasis of use over function, that is, how technologies physically interact with the world around them, is one of his ongoing lamentations. In a posthumously published essay he refers to the need to develop a "technical mentality" (Simondon 2009). Arne de Boever claims that this can this notion "can arguably be used to sum up the contributions of Simondon's entire oeuvre" (de Vries et al. 2014, n.p.). There is an ethical component to his emphasis on technical mentality, for not understanding the ways in which technology changes the world is dangerous. Technology is a both a mediation between humans and the natural world, as well as an organizing force of humanity itself (Simondon 2017). I see this aligned with speculative design practices.

Simondon offers us a philosophy attuned to processes. He eschews a consideration of the individual (person, object, or thing) in favor of underlying processes which produce such an individual, which he calls *individuation*. He stresses that we must understand the world through individuation, rather than by studying specific individuals to understand retroactively how they came to be. This, he argues, is too late and misses the mark. For Simondon, individuation is ongoing; we are in a constant state of becoming, as individuals, cultures, societies, as are our surrounding technologies, organisms, the planet, and the universe. Creating new technologies is an important way of thinking, but also an important catalyst to real change in the world. Brian Massumi, writing about Simondon, says, "There is an individuation of thought, he said, by the same token by which there is an individuation of matter, on the physical plane and from there on to the plane of life, and following—or prolonging—the same constitutive principles. He recognized technological innovation as a key theater of thought materializing in matter becoming, in ways imbricated with life transformations" (Massumi 2009, 37). Transformation is key to Simondon's philosophy.

Simondon argues that the world operates through *metastable* conditions. Metastability is a physics term that describes a precariously stable state where slight disturbances create new states of existence. Water cooled to a temperature below freezing, yet still in liquid form, is metastable. The slightest disturbance, such as a speck of dust, sets off a chain reaction of rapidly forming ice crystals (Combes 2013). Crystallization is Simondon's paradigmatic example of metastability and resulting individuation. Individuation, he argues, begins with difference, or disparity (Simondon 1992). Individuations are resolutions of these tensions and potential energies (disparities) already existing within systems, be they social, physical, technical, and so on. Simondon refers to the process of transformation of liquid to crystal as *transduction*. Transduction can be considered a restructuring of energy (or information) from one form or another, and a process that works across all domains (physical, mental, social, technological). Transductive processes undergird individuation in Simondon's philosophy (Simondon 1992).

He describes transduction as a process "in which an activity gradually sets itself in motion, propagating within a given area, through a structuration of the different zones of the area over which it operates" (Simondon 1992). This restructuring

produces new, or different, results. Transductive results do not "pre-exist" in the systems from which they emerge (Simondon 1992).

Specificity of relations is key to Simondon's philosophy. While he claims a certain universality within his concepts of individuation and transduction, he stresses the importance of understanding the actual relations of any individuation. This is clear from his description of crystallization: "It is the organization of energy in a metastable system that leads to crystallization and subtends it, but the form of the crystals expresses certain molecular or atomic characteristics of the constituent chemical types" (Simondon 1992, 303). In other words, individuals do not just appear in the world, they are results of specific environments, or milieus (Simondon 1992). He claims that individuals and their milieus are linked together as dyads; they are co-emergent in the world. Environments change as new individuals emerge in them, and individuals change with their environments. This recursive relationship of co-emergence is governed by transductive processes, that is resolutions of tension that bring into the world new states of being. Simondon identifies technology as a form of mediation between humans and the world; it is a constant disturbance, bringing about new tensions and potentials in the world. As these tensions resolve, new individuals emerge into the world, forming new relations, possibilities, and new tensions. Here, we can see a connection to speculative design as well. Speculative design imagines not just new technical objects, but the underlying conditions of its invention, and the new tensions and potentials these objects produce in their environments.

Technologies that exist within specific milieus are 'technical individuals', according to Simondon, and they are not just tools, such as a hammer or a needle, but technologies dependent on a specific environment to function. He argues that they only come to be through the act of invention, which is a specific human endeavor. Invention is a highly creative act for Simondon, for it requires an understanding not just of the technical components of the individual, but an understanding of conditions and factors of its milieu, and how they will affect one another.

> Only a thought that is capable of foresight and creative imagination can accomplish such a reverse conditioning in time: the elements that will materially constitute the technical object and which are separate from each other, without an associated milieu prior to the constitution of the technical object, must be organized in relation to teach other according to the circular causality that will exist once the object will have been constituted; thus what is at stake here is a conditioning of the present by the future, by that which is not yet. Such a futural function is only rarely the work of chance; it requires putting into play a capacity to organize the elements according to certain requirements which act as an ensemble, as a directive value, and play the role of symbols representing the future ensemble that does not yet exist (Simondon 2017, 60).

It is easy to read this quote and apply it to all forms of design. Design is a creative, imaginative field that anticipates its use and context; design seeks to make products that fit its environment. However, I believe that speculative design takes one important step further, and it hinges upon Simondon's primary concern of the gap between technology and culture, that is technical mentality. Speculative design uses the tools of design to make clearer the connections between the technical

objects and the societal context, or milieu, to which it belongs. It focuses on the potential transductive qualities of design to create new milieus. The "futural" functions of speculative design are not only attuned to the technical, but also to social milieus—the collective of society. Speculative design builds on the operations of technologies, their use and modes of production to also consider futural and alternative milieus of specific concern. In other words, speculative design is concerned with the intersections of technology and culture and especially attuned to critical awareness of the resulting tensions and potential effects of new technical objects. Speculative design is indicative of a transductive form of thinking, it is the creative attempt to understand affects and effects of new technological milieus. "In the area of knowledge, [transduction] maps out the actual course that invention follows, which is neither inductive nor deductive but rather transductive, meaning that it corresponds to a discovery of the dimensions according to which a problematic can be defined" (Simondon 1992, 313).

In sum, Simondon's philosophy provides an undergirding to speculative design. He helps us recognize the tranformative potential of technologies within specific contexts, the problematic. The knowledge speculative design produces, comes through the design artifacts and the means by which they interrogate their problematic. The reticularity of the technical object and its milieu as presented by speculative designers is the critique; it is this relationship that raises critical insight. At this point, examples may be particularly useful.

## 9.3 Examples

Speculative design is a divergent practice. The following examples were chosen in part to highlight the different approaches in form and area of interest. The designers below use videos, scenarios, and prototypes of varying fidelity to consider new technologies, alternate means of production, and showcase different scenarios of use and impacts upon society. Some contexts are far-fetched, or near term, others are only theoretical in their proposal and minimize scenarios of use. From a Simondonian perspective, these are not general worries, but specific problematics. They explore not just a technical individual, but its associated milieu and imaginatively engage with transductive potentials to spur discourse among society. They help the audience understand potential technical functions, functions that may only be possible within certain milieus.

### *9.3.1 The Red String of Fate*

Sputniko! is an artist/designer who speculates about possible technological outcomes, prototyping provocative works and then disseminating her work through pop music videos. Her work, *Red String of Fate – Tamaki's Crush* (2016) examines

biotechnology through an East Asian myth of the same name. The work consists of both a music video and a bioengineered "oxytocin-induced red silk" (Sputniko!). In the myth, a red string from the gods ties destined lovers together. Her music video tells the story of a young female scientist in love with another male scientist, incidentally played by Sputniko!, problematizing heterosexual norms while also emphasizing other stereotypes. The young woman, Tamaki, genetically engineers her own red silk by "inserting genes that produce oxytocin, a social-bonding 'love' hormone, and the genes of a red-glowing coral into silkworm eggs" [ibid]. The highly stylized video offers rich layers of social commentary, including gender roles, Japanese popular culture, the ethics and science of biotechnology. This is a deft example of the problematic: technology, culture, and societal norms are woven around the myth and potential of biotechnical engineering. Though the emphasis may be on the technical possibility of biotechnology, it is important to note that it is the surrounding relations that provides a rich problematic to her work. The social tropes of nerdy girl falling in love with a dream man (portrayed by a woman) is both commentary on heterosexual norms, as well as the role of pop culture in amplifying and/or subverting those norms, and the cultural baggage attached to engineering biology. Such baggage colors our perception of the ethics of tinkering with nature.

One of the most important aspects of this project is that the red silk featured in the story is actually created, or prototyped, in a collaboration with scientists from the National Institute of Agricultural Sciences (NIAS) in Japan. Thus, Sputniko! actualizes the central premise of her story by genetically engineering red silk embedded with oxytocin. This makes her scenario all the more plausible, pushing the speculative nature of her project past the realm of potentiality and into the universe of actualities. This string exists. Here, practices of inventing new biotechnical forms intertwine with existing sociopolitical milieus, from cultural myths to nonbinary understanding of binary and cultural tropes of "nerds."

In the music video, we see the story of Tamaki who engineers her own red string of fate to tie her to Sachihiko, her crush. The video offers subtitles that help tell the story. Tamaki asks, "Who decides what is forbidden?" She asks if she can create her own string of fate. In the video, Tamaki explains her approach, injecting red fluorescent protein and oxytocin into silk. The video concludes with success and failure. Tamaki's red string of fate works too well, turning all passers-by into red-glowing eyed zombies chasing her chasing Sachihiko. Though satirical and absurd, the music video quickly brings forth the hope and peril of genetic engineering, while making the technology more understandable to a lay audience. Through absurdity Sputniko! explores the side-effects and unintended consequences of biotechnology, while all the while grounded through the engineering of novel materials. Sputniko!'s work uniquely speculates and produces the very matter which sparks dark speculations about our future.

Dark though it may be, the work is also buoyed through an upbeat J-pop soundtrack and stylized music video, plunging the video into the everyday. Like many of her projects, the video is highly aestheticized across multiple layers through high-level production values. It is subtle in its nature, while simultaneously being over the top and ridiculous. It is an exemplar of the use of satire and absurdism to

question everyday practices of science. As mentioned, satire, irony, and absurdism are common strategies of critical and speculative design (Malpass 2017). Here, they provide an entry into the critique of emergent scientific practices.

Sputniko!'s work humanizes potentially mad science by placing it within very human relationships of unrequited love, which is a well-known trope of popular culture. Sputniko! depicts a confluence of relations between individual bodies, institutions, and technologies to explore the problematic of engineering new biological materials, through popular culture - pop music, video culture, nerdy stereotypes, and zombies. We, the audience, are asked to consider what the side effects of this work are, while also bringing forth a bioengineered red fluorescing string imbued with oxytocin. To invoke Simondon, the scenario deftly illustrates the potential for a milieu to shift rapidly due to technical individuation. One can draw an easy parallel between the hordes of love-struck zombies, with the hype, and fear, of genetic modification. Our milieu is already transformed by the technology. The project nicely brings forth the fictitious with the actual, acutely provoking the audience to consider the possibilities of a bioengineered world. *The Red String of Fate* deftly explores technical invention in a cultural context, bringing forth technical knowledge and ethical questions related to it. The whole scenario is structured through a stylized approach that is unique to speculative design, but redolent of Simondon's philosophical project.

### *9.3.2 Happy Life*

In *Happy Life* (2010) designers James Auger and Jimmy Loizeau (Auger and Loizeau N.D.), in collaboration with scientists Reyer Zwiggelaar and Bashar Al-Rjoub, explore the implication of real-time emotional monitoring of family members. Building off of existing research, the project imagines real-time profiling techniques in the context of the family home. Computer scientists Zwiggelaar and Al-Rjoub are currently investigating thermal cameras as a means to detect emotional fluctuations of humans for security monitoring at border crossings, airports, secure entries, etc. Auger imagines this kind of "non-invasive" observation in a new site: the family home (Auger and Loizeau).

The project builds on the increasing efforts of technological surveillance meant to deter or dissuade terrorist attacks, imagining it as a domestic object that reveals the emotional health of family members. The prototype consists of round dials, lit by colored LEDs (one for each family member), that provide a relative readout based on thermal imaging. In addition to the physical prototype, Auger and Loizeau create storyboard vignettes to contextualize the moments when family members may encounter emotional shifts of their loved ones. Parents leaving on trips; the reminder of the untimely death of a child or loved one; a normal night of domestic life of children and parents.

A thermal camera is used in conjunction with algorithms to manipulate the dials on the display, which visualizes physiological changes that suggest emotional shifts.

"We built a visual display linked to the thermal image camera. The system employs facial recognition software to differentiate between family members. Each personal dial has two pointers; one showing the current state taken from the most recent thermal image capture and one showing the predicted state where the system would expect the dial to be based on the processing of accumulated statistical data" [ibid]. Auger states it would have been more accessible to a lay audience had the project used dials to indicate happy and sad, but also factually incorrect. This is true both for the technology and human emotion, as we are more complexly emotional than simply happy or sad. This complexity is highlighted though the vignette depicting the passing of the family member, where the algorithm predicts a surge in family sadness near the anniversary of the death. In the caption, the narrator describes this prediction as "strangely comforting" (Auger and Loizeau). Here, the project sits neatly within the problematic, illustrating the complexity of the proposed design. They write, "The Happy Life proposal was designed to sit somewhere between the dystopian worlds of Ballard and Bradbury and the utopian corporate smart home, acknowledging the complexity of domestic human interactions whilst employing near-future informatics technology" (Auger-Loizeau).

Much like Sputniko!, Auger and Loizeau are working with the threads of possibility. The prototype helps think through the speculative nature of the project. Noting that 'happy' and 'sad' while easy, are not accurate means of conveying emotional valence, they are forced to come up with a realistic design that conveys the complexity of human emotion and the technology at hand. This is not simply fantasizing about technology, but following the problematic of emergent science and placing it within a domesticated situation.

Shifting surveillance milieus from security contexts (airports, borders, etc.) to pervasive surveillance contexts of quotidian intimacy immediately brings the ethics of surveilling technologies into sharp relief. It also follows a Simondonian interest in function over use; the technology affords monitoring regardless of its use-case. At once the project is uncomfortable, yet the domestic scenarios - especially that of a lost child or family member (the scenario is cleverly ambiguous) - are also touching. It brings together the thick problematic of technological monitoring in an unsettling way. It also raises the specter of profiling and prediction. What does it mean if the system knows what your emotions will be? What if we cannot hide our emotions when the flushing of skin and other embodied tics tip off an omnipresent thermal system?

As a design object, *Happy Life* exudes contemporary technological aesthetics. A sleek, silver and glass panel with four dials each lit by its own colored light channel the aesthetics of contemporary smartphones and Stanley Kubrick's *2001 a Space Odyssey.* A glowing orb of light assigned to each person slickly displays the emotional trajectory. This appealing, yet somewhat cold presentation, emphasizes the discomfort of being under surveillance in the home. Auger and Loizeau help us understand the milieu as problematic. Family affect is not a problem to be solved, but speculating about these technologies in the home raise important ethical questions, not simply through their presence, but by tracing out their *functions.* Simondon's emphasis on function over use and the ways in which milieus are

affected by new individuations are helpful for recognizing the rich problematic these designers provide us. It also helps us understand why this is an exemplary form of speculative design.

### *9.3.3 Uninvited Guests*

Design studio Superflux imagines the intersection of aging populations, healthcare, and smart objects in their project, *Uninvited Guests*. Their work culminates in a short film in which 70-year old Thomas is surrounded by smart objects (bed, fork, cane, medicine bottles, etc.) that track his activities for his concerned, but absent, children. His smart fork informs him that he has exceeded his recommended daily fat and salt intake during his breakfast. The bed tells him it is time for bed, and reminds him to return to bed as rises to read in the middle of the night. The smart cane encourages him to walk, interfering with reading and watching television. The smart objects also share the data with his children, who send texts encouraging Thomas to go for walks and to get to bed early. The video sets us up to sympathize with him, superimposing texts from children and devices on the video. Anyone with a smartphone can understand this scenario.

These interruptions clearly detract from the way that Thomas wants to live, and he finds clever hacks to keep the nagging, both from the objects and his children, at bay. He eats his fried dinner with a regular fork, pausing to dig around fresh vegetables with his smart fork, and receives accolades. He sends his smart cane off with a neighboring teen for quick jaunt down the street in exchange for a can of Red Stripe beer. Thomas diligently prepares for bed at 22:00 h by piling his stack of books on the bed so that he may return to reading in front of the television.

Superflux set out to research the emergent relationships between humans and autonomous smart objects, the impact upon human agency, and the resultant shifts of rhythms and daily rituals (Superflux). They write, “Situated behind this, is the bigger, more political issue around the future of healthcare and the growing argument to replace human care givers with robots and connected, networked, smart devices. Whilst there are undeniable benefits to monitoring and tracking the elderly in their homes, we wanted to pause and reflect on some of the more complex human behaviours we are likely to encounter along the way. What are the messy, whimsical, unintended human behaviours that might collide with the one-size-fits-all ‘care’ that many smart devices are designed to deliver”(Superflux, n.p.)?

The scenario is almost too real for it to feel speculative, yet this most dystopian future is not quite here. Superflux does an excellent job of raising the friction between the immanent internet-of-things and the reality of how we wish to live. From a Simondonian perspective, their work shows how the milieu and individual transform in response to new individuals. The impact of seemingly helpful devices spark a cascade of comedic work arounds to maintain something of ‘normal’ existence. The project captures what Malpass describes as the “future mundane” eloquently (Malpass 2017, 101).

Perhaps differently than other speculative works, the devices featured in the short video are bright neon green 3D printed objects. They are less functional than other prototypes, but their quotidian nature and the notifications we see—and hear, as each notification is accompanied by a chime or a chirp meant to be innocuous or charming, but ultimately fiendishly annoying—provides a well understood scenario of use. Superflux claims that the simple nature of the objects allow us to project any smart object upon them, they are "symbolic 'ghosts of the future' where with time, their physical presence fades into the fabric of our environment, and all that is left is their invisible halo constantly monitoring, logging, tracking and processing ambient feedback" (Superflux, n.p.). Superflux raises important questions of an emergent world mediated by smart objects, and like Auger and Loizeau injects our intimate home life with a dystopic sense of surveillance.

### *9.3.4 Crafted Logic*

Irene Posch and Ebru Kurbak explore alternative histories of computing in their project, *Crafted Logic*. Posch and Kurbak handcraft logic gates into textiles, via crocheting and needlepoint. They pose the questions, "What if digital electronics emerged from textile handcrafts? How would technology be different if craftspeople were the catalyst to the electronics industry, via textiles manufacturing?" (Posch and Kurbak 2016: 3882). These questions are posed materially, through the construction of working crafted objects. Here, speculation, the questions of how things might be different, are not focused on the future but on the past, in the present.

The work of *Crafted Logic* hinges on a functional prototype. Posch and Kurbak use conductive thread to create functional logic gates, "the building blocks of digital electronics" in textiles (Posch and Kurbak 2016). Their interactive work questions the underlying aesthetics and processes of contemporary consumer electronics. Further, there is an implicit feminist critique in utilizing crafts traditionally associated with women (needlework), that questions the male dominated tech industry. This is a call to rethink not just how technology is made, but the implicit values tied into contemporary technologies, and who is involved in the construction of a technical culture. What are the implications of a craft-centric approach, rather than a code-centric approach to technology?

Craft is time consuming, bespoke, and requires specific skillsets call into question mass produced gadgets. Craft occupies a specific space that constitutes a set of cultural associations with it that we do not associate with contemporary technology. One's iPhone is not considered a crafted object, though it is a designed object. The connections and distinctions between needlepoint and an iPhone are the context of this work. *Crafted Logic* poses a logic that is alternative to today's mass-produced objects speculating how technology could be different.

In one example of *Crafted Logic,* three red hexagonal shapes are crocheted together in a symmetrical layout, with two hexagons placed on the lower right and left of a central hexagon. The outer hexagons are lower than the central hexagon, creating an alternating pattern of low, high, low. The crocheted strip is mounted on a whiteboard with three switches at the bottom of the board. At the center of each hexagon is a small, round magnet with silver conductive thread crocheted above and below it. A silver 'wing' moves between an up and down (1 or 0) position, connecting to the upper or lower silver patches. Switches at the bottom of the board send electricity through the conductive thread to move the wings between the respective positions of 0 or 1. The crocheted work offer two inputs, A (left hexagon) and B (central hexagon), and the third switch on the right is an output (right hexagon). Switching between "1" and "0" in different configurations of the A and B switches provide different outputs of "1" or "0." As such, Posch and Kurbak offer a crafted computer switch, basic though it may be. Its aesthetics of soft thread, patterned and textured through crocheting challenge the aesthetics of contemporary technologies. The work asks us to reconsider the design of our technologically-dependent world.

The bespoke quality of *Crafted Logic* questions not just the aesthetics of technology, and of mass produced items, but also the underlying logic and practices by which technology is created, reproduced, and disseminated in the world. Replacing the sleek, smooth designs of contemporary electronics are interactive, relay doilies. Computer fundamentals are depicted in a craft associated with matronly grandmothers, rather than an army of male coders armed with laptops covered in stickers from the most recent hackathon. This shows alternate paths of what is possible, highlighting different trajectories of creative computation. It also subtly raises critical awareness of our existing milieu.

As mentioned, the work highlights craftwork generally associated with women. At a time of considerable critique of the technology industry's general lack of diversity, this implicit critique is poignant and needed. How would HCI and the technology be different if our designers were more diverse? How can such projects help us remember the vital role women have played in the history of computing? Could craft draw more women into design and engineering roles? How does the notion of craft change our relationship to computing? *Crafted Logic* provides a lens through which to consider our current socio-technical milieu, offering an alternate approach as both example and critique.

One of the great strengths of this speculative project is its lack of answers. *Crafted Logic* provokes a great number of questions through its physical presence. It poses a deeply entwined problematic, pulling together questions of aesthetics and production through an implicit feminist lens, but does not provide a simple answer or way out. If speculative design is meant to provoke thought, *Crafted Logic* succeeds by bringing forth a rich problematic of our contemporary, technical condition.

### *9.3.5 Parasitic Products*

Studio PSK, led by Patrick Stevenson-Keating, imagines an "alternative route for product design, where competition, and product interdependence shape the design of the objects in our environment" (StuidoPSK). This statement is understated in its profound reimagining of technical innovation and invention, creating an "alternate paradigm" to both contemporary and historical practices. Three "specimen" prototypes (A, B, and C) modeled on parasitic organisms offer new perspectives on product design. Patrick Stevenson-Keating, head of the studio, says that he was inspired to work with radios, because as a new technology it too was somewhat parasitic. The parasitic radios are traced back to the early twentieth century products. Designers seeking to find the right form factor placed radios in armchairs, side tables, and cabinets. StudioPSK writes, "As more objects become connected to the internet, and one another, it is plausible to imagine devices which pervert and exploit systems and objects to their own advantage. Parasitism has been a practice exhibited for millions of years. What effect would parasitic devices have on a product ecology" (StudioPSK)? StudioPSK worked with parasitologists and entomologists to understand parasitic behavior and organisms more thoroughly, deciding on their three model organisms, hookworms, Knopper gall wasps, and Ichneumon wasps.

*Specimen A* is modeled on hookworms. It is a radio that plugs into a landline telephone, thereby engaging the landline and powering *Specimen A*. When powered, this parasitic radio emits a signal that blocks Wi-Fi within a ten-meter radius (http://www.studiopsk.com/parasiticproducts.html). The activity is correlated to the hookworm's ability to produce chemicals that mask its presence from its host.

*Specimen B* is modeled on The Knopper Gall Wasp, whose parasitic actions are of a chemical nature. "By injecting a cocktail of chemicals and genetic information into a budding acorn, it causes a change at the genetic level in the plant, causing it to grow into a hard, horned structure providing food and safety for the wasp larvae" (StudioPSK). *Specimen B* is made to push into a cardboard carton of juice or milk; "the radio pierces two metal electrodes into a carton of milk or juice, and injects a small amount of salt" (StudioPSK). When zinc and copper are introduced to an acidic solution they produce electricity, the salt helps speed the chemical reaction of juice or milk, allowing the metal electrodes to eventually produce energy, which charges a battery. StudioPSK does not state whether this radio receives, transmits, or both. The charging battery seems to be the main goal.

*Specimen C* is modeled on Ichneumon Wasps, which StudioPSK claims are so prevalent they can be found "parasitising [sic] other parasites" (StudioPSK). Fittingly, this parasitic radio is made to feed off the battery of an iPhone, which often feeds off of a laptop, distributes code and software through other devices and the internet, and "it has changed the behaviour [sic] of its users" (StudioPSK).

The three prototypes are nondescript. Each are black, and fairly small—just a few inches long. The shapes are simple, a cylinder, a rectangle, and a slightly tapered cylindrical shape with a flat cutout just the right size to slide an iPhone into it on one side. Each prototype has a metal antenna topped with round, black ball on top pro-

truding from one end. The shared visual forms signal a shared belonging, but also seem easy to overlook, just as might be expected from a successful parasite.

Along with the three parasitic prototypes, the studio created an alternate timeline of production and a video explaining each of the products. The timeline depicts the parasites as direct descendants from radio cabinets and "'easy chair' radio" (StudioPSK). This is a line that parallels the history of radio production, highlighting it as an imagined alternative, quietly evolving, hidden in plain sight. The video features a parasitologist and an entomologist with whom Stevenson-Keating worked with to better understand parasite behavior when researching the project.

Here we find an elegant interpretation of milieus and technological development, mimicking biological relationships. It sparks immediate insight into our own fetishized relationship with technology, but also follows a Simondonian attention to function over use. The human user here is absent, these are purely functional technologies. By this I mean there is no imagined use, other than to suck power from another existing technology. The speculation of these technologies is one about production, the underlying motivation and rationale of creating such a product. Much like *Crafted Logic*, *Parasitic Products* question the underlying epistemologies of how things are made, and why. They also cast a wider eye to technology and the world, drawing upon evolutionary strands from insects to consider technological affordances. This broader milieu of the natural world and the technical world decenters humanity by eschewing use scenarios, but it also clearly critiques consumerism and capitalist modes of production. There is a subtle jab to our current relationships to technology; radios, telephones, and mobile phones modulate and mediate our human relationships, both intimate and at large scales. *Parasitic Products* provides an orthogonal view of a contemporary problematic, our own parasitic relationships to communicative technologies, radio, phones, and the internet.

## 9.4 Prototyping Problematic Provocations

Speculative design allows designers the opportunity to use their skills and tools to explore a problematic, or a dense set of contextual relations and their potential results. The results are designed objects, scenarios, and provocations that help us realize the affects and effects of these relations. While mainstream design often seeks to understand and solve problems in the present or near future, speculative design reframes our understanding through the problematic. It encourages a deeper consideration of how individuals and milieus (subjects, objects, and their environments) come to be. Importantly, this is speculation through design, and thus all speculative design can be assumed to comment on design's implicit and explicit role in producing new technical objects, users, and milieus. It is a value-laden activity that speculative design critically examines. Auger-Loizeau, Superflux and Sputniko! explore the potential impacts of new technologies. These designers take different approaches, one heavily mediated through satire and genre-specific approaches (the

music video, and video prototype), another explores the unsettling invasion of privacy in an intimate family setting. These works emphasize the complexity of the issue at the heart of the problematic, in these cases bioengineering, "smart" devices, and surveillance technologies. This complexity requires consideration of prevailing attitudes, scenarios of use, emergent technologies and trends, and the social and cultural structures that enable, or not, such technology. These works do not settle our understanding of the technology, but just the opposite. They unsettle our understanding of the technology and their imbricating milieus in which they emerge.

Posch and Kurbak, and StudioPSK offer us a different approach, but one that is no less unsettling. By rethinking digital computation and contemporary manufacturing processes through analog craft, or parasitic insects, they unsettle our expectations and assumptions of what already exists. Their work offers an opportunity to reconsider what we take for granted in technology. What logics shape our current condition, and what does thinking about different forms of production afford us? How do the notions of craft and parasitism help us evaluate our technically mediated world? These examples offer an existing problematic - contemporary techno-culture and design practice - for us to contemplate.

One thing that binds these disparate examples together is a focus on the prototype. Prototyping is an essential design skill, and through these projects we see various prototyping forms (lab work, scenarios, functional prototyping, etc.) that flesh out the projects in meaningful ways. They help us, the audience, gain a better sense of the project, and the problematic as envisioned by the designer. The social and technical systems are bound together through the prototype in all its unsettling ways. Speculative design helps us think through the potential of design to change and shape our world and to help the audience feel, to some level, the implications of the problem at hand. From a Simondonian perspective, these designs explore not just the technical object, but the associated milieu of the project. For Simondon, milieus and individuals are bound together, just as the proposed designs, and their underlying contexts. One of the strengths of speculative design is to help the audience understand the reverberations of technologies within their milieus; it offers a deeper understanding of how designed objects change the world.

Prototyping is a form of thinking through making. Speculative design and its surrounding practices do not differ from the mainstream design here—all designers prototype in one form or another—but they emphasize critique. Critique through prototyping is a specific form of thinking, predicated on materials and affordances. Designs "give material expression to the insights generated" (Dunne and Raby 2013). Again, this echoes Massumi's comment that Simondon, "recognized technological innovation as a key theater of thought materializing in matter becoming" (Massumi 2009). Prototyping is a critical step of such technological innovation. However, it is more than that. Prototyping reveals the individual-milieu dyad that forms the problematic.

"Importantly, we stress that this type of critical inquiry occurs through the conceptualizing and crafting of design artifacts to generate theoretical articulations and intellectual argumentation" (Wakkary et al. 2015). Prototyping is theorizing. As designers entwine their area of concern, their problematic, and their material design

ideas, this prompts new experiences and insights. Transduction, is a form of structuring thought and material; within speculative design there is a restructuring of socio-political order through a design object, or at least a proposal of such restructuring. This is critical, for speculative design challenges our everyday through its alternatives, both emergent futures (surveillance, biotechnology) and existing values that shape and temper technical culture (craft, parasitism).

Prototyping becomes a way of highlighting certain potential outcomes. Thus, rather than offering a solution, speculative design may instead highlight "unintended consequences" of the speculative prototype (Lukens and DiSalvo 2012, 26). Speculative design draws out the connective strands that form a problematic—the bodies, technologies, and social forces that produce a set of contingent issues—and provides a focal point of this problematic through the design artifact, or prototype. Working in this way strengthens not just our design savvy, but our understanding of technology. Lukens and DiSalvo argue that this kind of thinking enhances our ability to consider ethical, environmental, and social implications of technology, what they call "technical fluency." (Lukens and DiSalvo 2012). This clearly aligns with Simondon's technical mentality, and adds a specificity to his arguably murky goal of reducing the gap between technology and culture.

## 9.5 Conclusion

Speculative design is a discursive practice; it aims to raise complex issues of technical society for discussion and debate. It uses design language and process, such as prototyping and scenarios, to explore problematics of particular concern. Problematics bring together the constituting milieu, the bodies, institutions, social practices, etc., in ways that help elucidate what connects them. Speculative design takes a critical stance also found in other approaches, though it does so by providing problematics focused on the intersection of technology and the everyday; speculative design imagines possible milieus that may comprise our future mundane existence. The examples here offer two broad approaches, consideration of future technologies, and a consideration of the inherent logic and values of design and technical culture. In either approach, the problematic is not solved, but presented as an unsettling form; we are meant to be provoked to consideration. Considerations both of how we currently live, and how we will live in the future.

Gilbert Simondon can help us think perhaps more philosophically about this practice, with his emphasis on both the specificity of milieu and individual—the crystallization of specific technical forms in specific contexts. Use is not the most critical aspect of the speculative designs above, but affordances of control, the unintended consequences, and the values taken for granted within our world. How technology interacts with its milieu is a deeply specific problematic. The prototypes of speculative design offer moments of transductive thinking and insight, the technical objects impact their environment in specific ways, through specific operations.

The examples in this chapter show divergent approaches to speculating through design, and the (overly) brief introduction of Simondon's philosophy is but one lens

to think of this practice. In reality, speculative design must be a voracious practice, considering many different emergent and latent problematics in our world. It should also be an open practice, incorporating other speculative approaches, such as speculative philosophy, speculative fiction, and speculative art. There is a need for more speculative design. Benjamin Bratton points out that technology advances at a rate that exceeds our existing logics. Speculation is needed "…to search the space of actual possibility (even and especially beyond what any of us would conceive otherwise" (Bratton 2016). Thus, speculative design requires a more experimental and expressive approach to technology than designers may be accustomed to doing. Speculative design must come before affirmative or normative design, for we must expand our understanding of the possible, the problematics, before questions can be formed and subsequently solved. As Bonnie Nardi writes, "A challenge is to adjust design practice so that it more expansively encounters the future, lifting its gaze from the designed object to the complex realities of the world in which the object will be used" (Nardi 2015, 30).

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