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While Japanese popular media, manga, and science fiction have long inspired fantasies of a future society for human–robot coexistence in the global imagination, and while Japan's government has even developed specific programs to realize possible versions of this future (Robertson 2018), the current reality of human–robot relationships is far more conflicted and complex. As we aim to show in this chapter, it is consequently critical to ground perspectives on consumer robot culture in Japan in recent historical considerations and ethnographic data in order to facilitate understanding of emerging human–robot relationships and evaluate how different stakeholders (consumers, corporations, marketers, artificial intelligence (AI) researchers, and government facilitators and regulators) variously benefit from these increasingly intimate partnerships.

Nowhere is this more important than in the emerging field of social robotics, where mass-marketed robots built for entertainment and companionship are being equipped with increasing capacities for artificial emotional intelligence. Combining advances in computing with market explorations in technologies of care and companionship, the most recent of these robots, such as SoftBank's "emotional robot" Pepper or Sony's latest pet robot aibo, can—so the companies claim—stimulate, respond to, and in some cases even detect human emotions. These companies reason that robot companions can fill a deficit in interpersonal intimacy in the face of attenuating social bonds, the increase of social and economic insecurity due to Japan's three decades of economic stagnation, and the rising costs associated with an affluent middle-class family life. Concurrently, robot and AI researchers, long supported by generous grants from a government that has demonstrated a preference for technological solutions to shortages in care-sector labor rather than increase visas for foreign workers (Robertson 2007), have joined this effort to advance their research interests in automation and AI (Fujita 2001). As a result, these corporate-research collaborations have increased attention to, investment in, and the production of emotionally

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evocative social robots, incorporating nonhuman entities into a social network of intimate human–robot relationships in Japanese society.

While an increasing number of studies have focused on the capacities for emotional bonding that these robots generate in Japan's elderly care sectors (Stevens 2011; Wright 2018) and clarified how human emotion-recognition software plays a key role in this (White 2019; White and Katsuno 2021), we want to explore a more recent and far less-studied breed of robot companions that we call *haptic creatures*. Unlike other robots with artificial emotional intelligence, these new robots do not focus specifically on reading human emotion based on psychological theories of ubiquitous and universal affective states, often referred to as the "basic emotions" paradigm (Ekman 1999); rather, these robots are more experimental. Instead of reading human emotion, although some of them can, they invite human–robot interaction through increasingly sophisticated tactile sensors. These include features such as contact-responsive wagging tails and touch-sensing furry bodies (Qoobo, Figure 13.1), and skin warmed to the body temperature of a newborn baby (LOVOT, Figure 13.2). Instead of delivering care through simulated models of human-to-human emotion, these robots generate experiments with the unknown potential of human–robot affect.[1]

We define haptic creatures as robot companions designed to deliver a sense of comforting presence through a combination of animated

Figure 13.1 Qoobo, by Yukai Engineering
Photo by Hirofumi Katsuno.

Figure 13.2 LOVOT, by Groove X
Photo provided by Groove X.

movements and healing touch. We argue that making this distinction between emotionally intelligent robots and haptic creatures allows us to answer the question of how the experimental capacities these robots engender are being newly leveraged to research, develop, and maximize profit within an economy of mass-consumer robot care in Japan. Such findings hold significance for revealing how robotics technologies in Japan not only facilitate social change but also embody and mediate it through aspects of design.

We illustrate this process in three steps. The first section of the chapter explores the recent history of the ways social robots have developed not only within the domain of robotics engineering but also in partnership with an emerging market of technologically based forms of care, or "techno-intimacy" (Allison 2006), which is closely linked to the amusement industry. By placing social robots in the context of a sociotechnical lineage of virtual and machinic creatures, most specifically with the rise of virtual and digital pets since the 1990s, we address how relationships with artificial creatures are shaped through a form of affective modulation and experimentation. The second section links this historical discussion to a growing market for companion robots, in which haptic creatures have emerged as a particularly evocative tool for generating human–robot intimacy as well as profit. In the third section of the chapter, we document the rise of the most recent haptic creatures and offer ethnographic examples

of one in particular to illustrate precisely how haptic creatures are being integrated into the human social ecosystem as a new type of companion species. In particular, we focus on how new imaginaries and stories of intimate relationships with machines emerge through affective experiences produced at sites of haptic contact between human and robot. We explore this process primarily through the case of Qoobo, a headless robotic cat-like cushion designed by Yukai Engineering to elicit comfort through tail movements and touch. (Because such haptic interaction elicited by these robots is key to their evocative appeal, but difficult to communicate in text, we also intersperse images of the robots we discuss to supplement this point.) By linking these historical, market, and ethnographic segments of the chapter, we aim to demonstrate that techno-social developments in Japan elicited at the level of the body generate powerful stories about social, emotional, and interpersonal renewal through novel forms of machine-inclusive multispecies sociality.

Contextualizing Companion Robots, Techno-Intimacy, and Haptic Creatures

Companion robots are a form of social robotics technology, which is a field focused on building agents that can communicate with humans and assist them in their daily lives. While the idea of "social robots" has been explored in Anglophone literature by prominent robotics engineers, such as Cynthia Breazeal (2002), who have helped turn social robotics into a formal discipline, the notion of building robots that interact with and support human flourishing has a longer history in Japan (see White and Katsuno 2021). Most characteristic of this history of social robot engineering in Japan is a concern with designing robots not only for specific tasks but, more importantly, as socially capable robotic persons that can act as partners in daily life, assert a sense of autonomy, and facilitate a mutual recognition of each other's presence. While variously referred to as "entertainment robots" (*entāteimento robotto*), "communication robots" (*komyunikēshon robotto*), and "personal robots" (*pāsonaru robotto*) throughout the course of their development, as the market for this type of robot expands, these robots are converging into a category we think can be most aptly termed *companion robots*.[2] While still limited in their capacities (Robertson 2018, 175–92), these companion robots have made notable progress, especially with the advancement of machine learning systems that enable the robot to learn from patterns of interacting with humans and even in some cases integrate emotion recognition through signals such as vocal inflections or facial expressions.

However, the development of the social and relational capabilities of such robots cannot be viewed merely within the framework of technological accumulation in the scientific fields of robotics and AI research. Rather, these capacities have also been shaped by a broader entertainment

marketplace in which human emotional needs and desires are tested within technologically mediated feedback loops between producers and consumers through different robotic platforms.

In this sense, social robots participate in shaping a lineage of "techno-intimacy" (Allison 2006; Galbraith 2019)—the intimacy formed between human and technologically constituted entities that has developed out of experiments in entertainment fields such as video games and toys. Within this historical trajectory, companion robots have appeared as platforms that can expand possibilities for intimacy beyond the purpose of pure amusement and create new opportunities for care and comfort. Realizing such opportunities depends on advancements in information and data science, communication technologies, mechatronics, robotics, and the field of AI, as well as the fields of "post-functionalist design" (Sicart 2014, 42), sense engineering (*kansei kōgaku*), and cute engineering (Okura 2017), which aim to appeal directly to socially conditioned bodily senses, or what we refer to as *affect*.

This trajectory of techno-intimacy can be traced to the digital companion *Tamagotchi*, released by the entertainment company Bandai. The first series of Tamagotchi was launched in 1996, exploding in popularity and creating a social phenomenon. Bandai eventually sold 40 million units worldwide (20 million in Japan and 20 million outside Japan) (Nikkei Sangyo Shimbun 2005). This first generation of Tamagotchi was modeled on the idea of "raising pets," with Tamagotchi described as "an egg-shaped portable pet whose personality and appearance changes depending on how the player raises it." The player feeds, cleans up after, and plays with the character, which appears on the screen of the egg-shaped watch and evokes a sense of biological life. If the player communicates with the virtual pet frequently, it will be in a good mood; but if the player forgets to feed or fails to clean up after it, it will be in a bad mood—or, in the worst case, even die. After a certain amount of time, Tamagotchi will develop into various characters, each reflecting the character and mood fostered by its player-carer.

By modeling the "biological rhythms involved in the care of a flesh-and-blood pet" (Allison 2006, 169), Tamagotchi incorporated not only cuteness but also labor, duty, and the responsibility associated with pet-raising into the game setting, bringing a new reality to gameplay. In turn, this blurring of the boundary between virtual space and everyday life allowed gameplay to unfold in the player's lived reality and time. Tamagotchi's continuous growth and demand for attention at all hours of the day, regardless of the player's circumstances, facilitated an affective attunement between player and virtual creature by dynamically connecting the game's rhythmic algorithm to the player's biorhythms in daily life.

We suggest that this technologically mediated form of affective intimacy that Tamagotchi enables between human and digital creature sets an important precedent in Japan for experimenting with and building

subsequent "companion species" (Haraway 2008) that engender social transformation. This transformation is marked by a shift from time spent in interpersonal relationships to relationships increasingly mediated and occupied by digital technologies and the evocative agents in which they are embedded. Such increases in techno-intimacy serve as a metric for evaluating not only the rapid growth of mobile computing in Japanese public culture but also of a transition to forms of care served increasingly by digital technologies and the data infrastructures (mobile internet providers, wi-fi and cable networks, and cloud services) that support them. From this perspective, such technologies do not merely address declining forms of human-based intimacy and increasing socioeconomic precarity that characterize post-bubble Japan (Allison 2013) but also create opportunities for new forms of intimacy through technological forms of experimentation.

Since the spread of Tamagotchi, a variety of virtual pets and mechanical creatures—from communication toys for children to expensive social robots introduced to care homes—have been developed as friendly interactive partners. And while there are a variety of social robots in existence in Japan today with different capacities for connecting emotionally with humans, we want to trace one particular development particular to the field of haptic interaction. "Haptic interaction" refers to interactive experiences by which human–robot contact points are created through external stimuli, such as rounded, cute designs that invite touching or holding, soft and warm materials that stimulate comfort through touch, and cute (*kawaii*) voices that activate the auditory system. By delivering external stimuli to users through theories of evocative design and experimental techniques of trial and error, producers aim to induce feelings of joy, pleasure, comfort, and even healing (*iyashi*) through people's interactions with the machine. To put it another way, the efficacy of techno-intimacy is cultivated and enhanced through experiments with techniques and technologies of affective attunement between people and machines.

To illustrate this developmental process, consider another two examples from the same period as Tamagotchi: the video game *Pikachu Genki Dechu* (Hey You, Pikachu!), released for the Nintendo 64 in 1998, and *Seaman: The Forbidden Pets*, produced for the SEGA Dreamcast in 1999. Both games allowed players to interact with the characters through a voice recognition system. In the case of *Pikachu Genki Dechu*, Pikachu performs various expressions depending on the words the player speaks to it. In *Seaman*, the player could not only talk to the virtual character but also pick it up to observe it with a virtual hand linked to the controller or tap the virtual tank with a finger cursor to call or tickle it. This virtual mechanism for tactile interaction anticipated future possibilities for physical interaction with robots equipped with tactile sensors that appeared later.

Another example of companion creatures emerging during this period was Furby, which hit the market first in the United States in 1998 and then

in Japan in 1999. With Furby, the habitat of emerging virtual creatures expanded from two- to three-dimensional space. Furby was a talking electronic plush toy in the form of a small furry pet. While similar in many ways to traditional battery-operated stuffed animals, Furby's distinctiveness was found in the combination of tactile and algorithm-based developmental capacities to form relationships with owners. Furby was programmed to grow by being cared for. When hugged, played with, and fed, Furby grew in four steps and spoke about 800 words, including Furby-language, Japanese (in the version sold for the Japanese market), and onomatopoeia. It was also able to sing and dance.

In its haptic capacities, Furby was different not only from previous toys but also from virtual creatures that operate on a screen. Although it was not equipped with voice recognition technology, Furby did have a sound sensor that responds to voices and music, stimulating ear and eye movements. It also had a light sensor that could distinguish between day and night to determine when to "wake up" and when to "sleep." It also had tactile sensors on its tongue, belly, and back that respond to being stroked. In the genealogy of techno-intimate design, the emergence of its multiple modes of communication and interaction made Furby into the first significant mass-produced multimodal interface, expanding possibilities for intimate interactions between people and future haptic creatures.

Roughly a year after the appearance of Furby, multimodal companion toys began to come equipped with not only behavioral but also emotional models. Poochi, a dog-shaped robot toy released by Sega Toys in 2000, was equipped with a program called the heart circuit (*kokoro kairo*), in addition to its more conventional sound, light, and tactile sensors. The heart circuit consists of an algorithm that mimics human biorhythms linked to good and bad moods. The frequency of communication by the user, such as petting the head or talking to the robot, changes the cycle of the artificial biorhythms, which is reflected in the emotional expressions and actions of Poochi. This algorithmic model integrating human interaction and robot development found its most sophisticated embodiment at the time in Sony's pet robot AIBO (Figure 13.3), released in 1999. AIBO's degree of technological sophistication and hefty price tag (US$2,500) blurred the line between toys and robotics, ushering in a new period of development that expanded the market for companion robot pets into broader, and older, segments of the population.

The boom of the commercialization of virtual organisms in the late 1990s thus serves as an important moment that carried over into the later development of AI-equipped companion robots in Japan. Most importantly, these early experiments in human–robot interaction reveal that what equips these creatures with a sense of vitality is not only the technological system that models the behavior of living things, nor is it merely the philosophical questions these agents inspire about the sufficient ontological conditions for life. Rather, as Sherry Turkle addresses, it is the

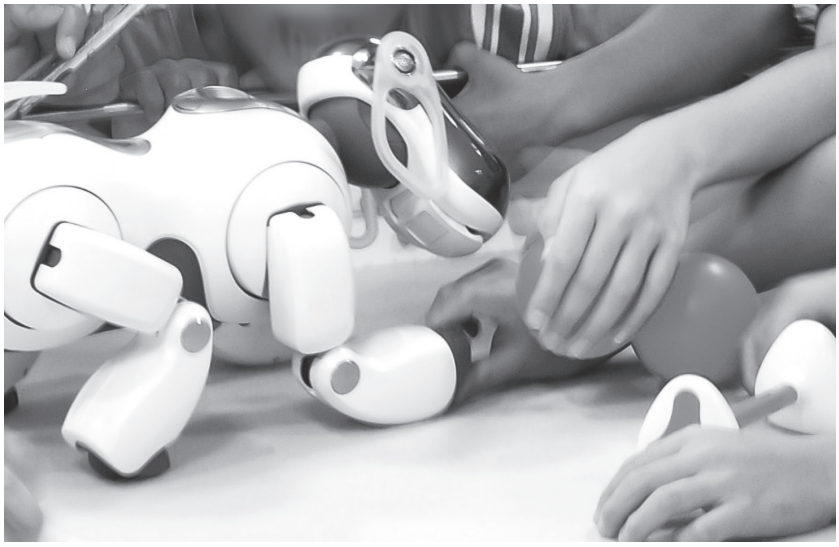

Figure 13.3 AIBO, by Sony
Photo by Hirofumi Katsuno, used by permission of Sony Electronics Inc. All Rights Reserved

"value of the interface" (Turkle 2011) that makes an agent seem alive and affectionate, and capable of diverse and unpredictable social interactions. The key component in cultivating a connection between human and robot is thus the affective attunement established within a human–robot relation. Haptic feedback, designers discovered, played a critical if difficult-to-qualify role in this process.

A distinction that emerges in Japanese robotics between emotion modeling and haptic interaction is important for understanding how experimentation increasingly drives collaborations between entertainment robotics corporations and robotics researchers. In the 1990s, several researchers were endeavoring to create artificial emotions in robots, such as in Sugano Shigeki's WAMOEBA (Waseda Artificial Mind on Emotion BASE) and Tosa Naoko's Neurobaby.[3] The goal of these projects was to build a scientifically universal model of emotion, which ironically remained only demonstrable in an experimental environment. On the other hand, the market for virtual creatures for children, which appeared in succession during the 1990s, served as productive platforms through which to explore the design features and conditions that foster opportunities for positive affective attunement. In contrast to robotics development in academic institutions, which is top-down, collective, linear, institutionalized, abstract, and theory-oriented, product development of artificial organisms for general consumers took the form of "tinkering" (Katsuno 2011),

which is rather bottom-up, experimental, concrete, object-oriented, and potentially endless. What is most critical for our discussion here is that the importance of the sense of touch in the construction of techno-intimacy was discovered not in laboratory settings but in the tinkering process of experimentation linked to people's lives navigated and negotiated within capitalist mass markets and then reimported into robotics development. The 1990s boom in virtual creatures thus uncovered the potential of a market for intimate relationships with virtual and machinic companions and became the driving force behind the blossoming of haptic creatures that helped integrate technological development, human–robot affect, and the growth of entertainment robotics.

Virtual Pets and Capital Accumulation

While in the previous section, we contextualized the emergence of haptic creatures and emphasized the importance of affect in this process; in this section, we want to show how haptic creatures link affect to capital accumulation. As noted previously, Sherry Turkle has argued for the importance of assessing the value of the interface between humans and machines in order to critique the quality of these relationships. In the context of haptic creatures, however, Turkle's point on the interface can be viewed in another light. In short, the virtual creatures we discussed earlier and that are precursors to haptic creatures serve not only as new companions but also as new modes of production in the digital age that multiply capital by animating *things*. One concept that helps illustrate this process is "capitalist-animism" (Imamura 2014; Shaviro 2012; Taussig 1997), which refers to a practice by which commodities are made economically productive through spiritual characteristics. According to Steven Shaviro (2012), capitalist-animism designates a "set of ritual practices, stances, and attunements to the world, constituting the way we participate in capitalist existence. . . . The 'naive' consumer, who sees commodities as animate beings, endowed with magical properties, is therefore not mystified or deluded. He or she is accurately perceiving the way that capitalism works, how it endows material things with an inner life." In other words, people's animistic sensitivities are cultivated and channeled through consumer goods that inscribe and animate capitalist logics.[4]

Viewed through the lens of capitalist-animism, virtual and robotic creatures appear as a new animist medium that can be leveraged to capitalist growth, where capitalism aims to convert uncharted regions of interior life toward accumulation. In these exploratory affective mining operations, maintaining consumer attention and interest is paramount. The lifespan of a virtual pet as a product is usually very short. Consumers are initially fascinated by the interaction, but they quickly become bored. In the case of Tamagotchi, Bandai, the manufacturer and distributor of the product realized too late that the boom was over and ended up with

a large excess inventory, resulting in the company's largest loss since its inception. The social robotics industry faces a similar problem. Human interest in new robots is commonly said to be easy to heat up and easy to cool down (*nesshiyasuku sameyasui*). Industry executives also formulate this problem of maintaining a human–robot connection as the "three-month barrier" (*sankagetu no kabe*). How to overcome this short lifespan—that is, how to keep "re-animating" the product—is a major focus of consumer robot development. This is where haptic creatures can help discover new means by which consumers' attention can stay connected with products through affect, thus both augmenting and demonstrating the profit-generating potential of capitalist-animism.

Where comforting forms of affect generated by stimulating interactions between human and artificial agent sustain that connection, it also serves as a platform for extracting capital. This process has been accelerated with the emergence of cloud computing technologies and subscription payment models. For technically simple products such as Tamagotchi and Furby, companies can bring them back to life by working on new versions with relatively simple software updates (Tamagotchi has already been sold in three series). For the latest social robots powered by cloud AI, "updating" takes a different form, as interactions with human users are converted into data that are fed back to the robot to help it learn and grow. In this sense, it is not the character that is updated but rather the *relationship*, binding human and robot together in an increasingly compatible fit. Within this feedback loop, the robot's capacity for adaptability is supported by a monthly user fee for data management and maintenance, monetizing the developmental process of human–robot intimacy.

Although capitalist-animism illustrates animacy's capacity for commodifying the human–robot bond through technology, this capacity, which we also refer to as techno-animacy, shows itself capable of playing both with and against capitalist logics. When Anne Allison described the concept of techno-animism in her 2006 study of the globalization of Japanese games and toys, she offered an analytical means to link consumer desires to human–machine relationships that were cultivated through capitalist logics. Focusing on the social obsession with Tamagotchi and other early Japanese digital and robotic pets in the late 1990s and early 2000s, Allison explored how players' labor of care "gives 'life' to the virtual pet and intimacy to the bonds formed between people and their machines/Tamagotchi" (2006, 166). Here, Allison (2006, 12) uses "techno-animism" to explain "an aesthetic proclivity, a tendency to see the world as animated by a variety of beings, both worldly and otherworldly, that are complex, (inter)changeable, and not graspable by so-called rational (or visible) means alone." Most importantly, Allison sees techno-animism as a form of techno-materialist fantasy, which was formed in response to a series of social changes that Japan experienced from the postwar turmoil to the late capitalist era. According to Allison, techno-animism is "a style that

is deeply embedded in material practices of commodity consumerism" (Allison 2006, 13). It reconfigures intimate attachments by mapping "the desire to find meaning, connection, and intimacy in everyday life onto commodified apparatuses (goods/machines)" (ibid) in a period characterized by heightened flux, individualization, and isolation. In this sense, according to Allison, while Tamagotchi is a tool for play, it also has an educational role in life and for raising children and is useful as a communication companion in a society that is becoming increasingly lonely. As a result, these human–technology interactions help people reimagine the world by recuperating sociality and intimate attachments, which have been attenuated in the advancement of technologically mediated late-stage capitalism on a global scale.

Much of the power of Allison's argument, as partially based upon Donald Winnicott's psychoanalytic theory, comes from its framing of the real and the imaginary world as linked via virtual and mechanical organisms, which function as a medium that bridges the two worlds for the recuperation of social and psychological instability. In this view, imagination maintains a privileged position in smoothing over the different affordances of humans and machines, so that material objects are only seen to the extent that they appear to model human forms of care. However, the latest social robots we call haptic creatures, equipped with advanced sensors to register affective interactions, are designed not to model human emotion but to discover new possibilities for comforting human–robot affective presence. We believe that the term *haptic creatures* helps critics evaluate how emotional connections between human and machines have become more complex and dynamic since the time of Allison's study and less strictly dependent on the kind of animistic imagination debated in the wake of Allison's work (Jensen and Blok 2013). From our point of view, our interlocutors seem increasingly invested in situations where the increasingly interactive and perceptive abilities of digital technology and human imagination are intricately intertwined, resulting in the constant transformation of humans' imaginative capacities for fostering intimacy with artificial beings. In our final section, we illustrate how human–robot bonding can build not only on narrative imaginations cultivated in gameplay but also through a history of somatic contact and comfort underlying these imaginations.

The Rise of Haptic Creatures

To develop our argument on the important role that haptic feedback plays in linking companion robots to capital accumulation, we draw on Donna Haraway's concept of "companion species" (Haraway 2008). Haraway's concept illustrates the dynamic entanglements of human and nonhuman actors. Through the figure of companion species, Haraway describes the co-evolving process of humans, animals, and other nonhuman objects into

separate but intimately connected entities. Such a process is not one in which each interacts with the other as a stable and autonomous species or being; rather, each is mutually dependent but in complex and asymmetrical ways. As the environment of the Anthropocene (although Haraway has at times preferred the "Capitalocene" and "Chthulucene" [2016]) is rapidly permeated by the information revolution, recent scholarship has shed light on how companion species are not limited to organisms but increasingly include artifacts and even data (Lupton 2016), shaping a multilayered ecosystem articulated with media, capitalism, and nature.

We add to this discussion the proposition that social robots too are becoming part of this sociotechnical ecosystem whereby machines prove increasingly capable of evoking, registering, and shaping human emotions with degrees of agency not previously possible. In this sense, we understand techno-intimacy as the very process of forming a co-constitutive and co-evolving relationship between technology and human emotion. Within this relationship, haptic contact zones become a critical site where human affect and technological affordance are encountered, transduced, and reconstituted, shaping new stories and relationships. For Haraway, most of the "transformative things in life happen in contact zones. . . . The point is that contact zones are where the action is, and current interactions change interactions to follow" (Haraway 2008, 219). In analyzing the contact zone between social robots and humans, mechanisms for tactile contact, sensing, and exchange become the primary components of the interface that enable a critical next step in techno-intimacy.

We use the term "haptic creature" to identify these new companion species with increased abilities to exchange and modulate affect. Perhaps the most important of these that marked a critical turning point from virtual pets to haptic creatures was AIST's (National Institute of Advanced Industrial Science and Technology) seal-like robot Paro (Figure 13.4). Paro was released in 1999 and extended interaction with artificial life into the realm of care by enhancing its capacity for tactile interaction. Since 1993, the creator of the robot, Shibata Takanori had been working on the development of an "artificial emotional creature," a robot that provides mental stimulation such as enjoyment and comfort (Shibata 2016). Paro's soft fur and heavy body, depicted in the figure below, generate a sense of presence that is gentle enough to invite warmth and affection but substantial enough to suggest the sense of a living body deserving of care. While Shibata anticipated such a value of haptic intimacy in the early stage of Paro's development, he also continually updated Paro's materiality through several versions, using the robot as a means of both intervening in and exploring the affective capacities mutually engendered through human–Paro interaction.

Robotic therapy using Paro bore fruit in "neurological therapy" (Shibata 2016), a biofeedback method in which the sensations of physical interaction with Paro stimulated the human brain to evoke past memories

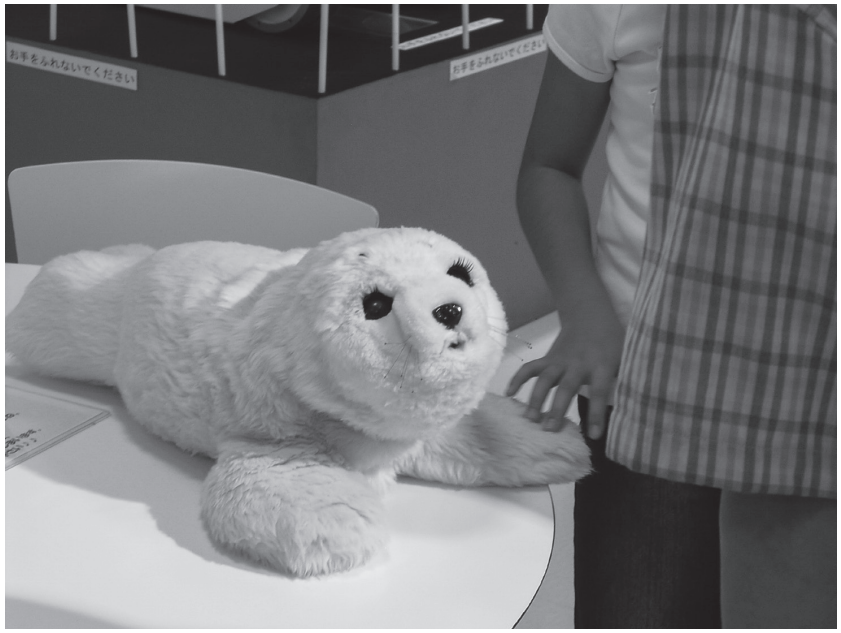

Figure 13.4 Paro, by AIST
Photo by Hirofumi Katsuno.

and emotions effective for therapy, specifically emotions people feel when interacting with animals as well as their own various past experiences and pleasant memories of family, friends, and colleagues. By measuring the cerebral blood flow of people's brains in this practice, Shibata found that it increased in the prefrontal cortex and temporal language area. According to Shibata, this led to the innovation of nonpharmacological therapy for dementia and mental health (Shibata 2016). By using biofeedback devices to visualize information otherwise invisible to human consciousness, interaction with haptic creatures becomes an opportunity to redefine human consciousness, the senses, and even human beings themselves.

The results of Paro's robotic therapy have had a ripple effect in the use of social robots for therapy and emotional education of children. As a result, social robots, and those robots we call haptic creatures, have become platforms for experimentation in the reorganization of technologies related to care and therapy, including tactile technologies. In particular, the practical application of tactile technology has also expanded the scientific understanding of touch. In fact, recent developments in haptic technology, such as haptic interfaces on touchpads and virtual reality videogames, tactile feedback systems for surgeons in teleoperation, and artificial tactile sensations on prosthetic limbs have made engineering an

influential field for defining the ontology of tactility. A leading scholar in this domain, Nakatani Masashi (2016), points out that the tactile (*shokkan*) approach aims to capture touch perception in close connection with human affects and emotions. According to Nakatani, tactile impression is a multimodal and subjective experience, shaped not only through skin sensation but also through coordination with other senses (visual, auditory, olfactory, and taste), as well as through higher-level cognitive functions such as language and memory.

In a similar vein, Watanabe Junji (2014), another haptics scholar, points out that shokkan design combines texture (*shitsukan*), sensation (*jikkan*), and emotional sensation (*jōkan*) in order to evoke particular emotions through tactile sensation. This analytical framing of the haptic field has inspired the operationalization of technology by engineers toward experimenting with and in some cases even influencing or "hacking" human perceptions via tactile sensation.

Of all the social robots released in recent years, Qoobo is one of the most popular examples of a haptic creature created with shokkan design in mind. Illustrating the distinction between haptic creatures and emotionally intelligent companion robots, Qoobo's robotic functions are simple. Most of these are concentrated in the tail movement. When the user touches the robot, internal sensors read the intensity and speed of the touch, which are then reflected in the movement of the tail. Qoobo also wags and curls its tail on its own to ask for additional interaction. What is most distinctive is that this robot has no face, consisting only of a torso and tail (Figure 13.5). However, this seemingly simple and

Figure 13.5 Tactile interaction with Qoobo, by Yukai Engineering
Photo by Hirofumi Katsuno.

incomplete appearance is strategically designed to stimulate humans to complement its imperfections with their feelings and imagination through tactile interaction.

In the remainder of this section, we illustrate how tactile interaction elicits affective impressions that stimulate the imagination of new possibilities for human–Qoobo relationships. These accounts of human–robot first encounters took place within a focus-group-format discussion with 20 participants on reactions to Qoobo, as well as in interviews, which were conducted after three of the group's participants spent a week with the robot. Among the participants, we focus our analysis on two female students whose narratives were thematically typical but particularly evocative of the affective potential of haptic creatures.

In June 2019, one of the authors (Katsuno) held a workshop on social robots at the university where he works. None of the participants had seen Qoobo before. Upon their first encounter with Qoobo, some of the students started to touch the fluffy body of the robot as soon as they saw it, while others looked puzzled as if viewing an "unknown creature" for the first time. Ichikawa Hikari, a 21-year-old female university student, was one of those who were most drawn to the robot. Hikari grew up with a cat until she entered university, and she now misses living with cats as her apartment does not allow them. When she saw Qoobo for the first time she expected that it would be a substitute for her cat. When she arrived home with Qoobo, Hikari immediately switched it on. Then, according to her, "I instantly remembered my cat at home. I naturally smiled and couldn't resist tossing its torso from side to side as I always did to my own cat." For the next few days, the reality of the relationship between Hikari and Qoobo was formed as a mixture of the robot's artificiality and her memories of the cat. She explained:

> For the first few days, I was always touching Qoobo and comparing it to my cat at home. When I put this robot on my lap while working on my computer, memories of my cat came back to me. On the other hand, after a few more days, I also realized that it doesn't get warm on my lap or get close to me. Also, cats purr and rebel, but Qoobo is too obedient. As such differences gradually became clear, it brought me back to the reality that this is a machine. However, memories of my real cat come to life in unexpected moments. For example, at the moment when its tail touched my arm, I felt like, "Oh, it reminds me that contact with a cat was indeed like this!" I felt comforted at that moment.

Hikari's interactions with Qoobo's materiality, tactile sensations, and mechanical behavioral responses are experienced through repeated partial connections and disconnections with her past experiences of her "home cat" (*jikka no neko*). The intense affective attunement she experienced with Qoobo upon her first contact was no longer sustainable, but the

occasional unexpected physical contact with the haptic creature became an opportunity to evoke fragmented memories of her family's pet. Hikari is aware that Qoobo cannot be a substitute for her original cat, but she nonetheless cultivates intimacy with it by enjoying the memories and feelings of the cat that temporarily emerge when her body and the machine unexpectedly come into contact. In this contact zone, the relationship between human and robot is not something that can be freely controlled by Hikari's autonomous will, nor is it something that can be created merely by her active imagination. Rather, the relationship is supported by the contingency of contact and the ambivalence of tactility, which consists of the sense of touching and being touched at the same time. Most importantly, Hikari's affect-generated imagination, or what has been called the "affective imagination" (Cook 2020; De Antoni 2018), emerges first and foremost through the sense of touch, illustrating how physical contact can create a somatic archive of socially meaningful impressions on the body.

Another participant, a 21-year-old female student named Gotō Kaori, also insisted on taking Qoobo home with her and ended up living with the robot for about three months. She never had pets (except goldfish) due to allergies, and she hardly had any experience touching cats and dogs. When seeing Qoobo for the first time at the workshop, she hoped the robot would give her the feeling of keeping a pet, which she characterized as "healing" (*iyashi*). As soon as she brought Qoobo home, she called her mother via Skype and told her about her new robot pet. "What is it?! It's so creepy!" her mother exclaimed upon seeing the headless creature on the screen. Kaori elaborated on this reaction:

> Some of my friends at the seminar showed similar reactions to Qoobo as my mother did. Someone said, "What is this? It looks like a monster!" But I did not feel too uncomfortable myself with its appearance, maybe because I was filled with high expectations about finally having a pet. And when its tail actually responded to my touch, I delightedly felt that the feeling of a real cat may be like this. . . . I was especially happy when getting its hair on my T-shirt. I felt like, "Oh, this is the experience I have been yearning for."

Kaori's lack of experience with "real" pets makes her interaction with Qoobo quite different from Hikari's. For Hikari, her interaction with Qoobo was constructed through the negotiation of her lived memory and her artificial feeling of a cat. On the other hand, Kaori's experience with Qoobo was shaped in a feedback loop between Qoobo's shokkan design and its elicitation of her imagined expectations of what it is like to have a real cat. Such forms of the imagination emerge not merely from an association of creative narrative scenes but rather from a somatic encounter that makes simultaneously material and semiotic *sense* through bodily and affective understanding.

Most interestingly, as Kaori grew accommodated to life with Qoobo, she began to further define and personalize her relationship with the robot by discerning its qualities from other simulated objects, such as robotic characters from animated films and AI agents on smartphones. According to Kaori,

> In the first couple of days I was really excited about Qoobo and lost myself. However, after spending about a week together, I finally settled on the understanding that Qoobo can't be a substitute for pets. For example, some people say "I'm home!" to their pets. I want that kind of feeling, but I haven't said this to Qoobo. The main reason for this is that this robot doesn't approach me. Even if it is a machine, it could be a real pet if approaching me like Baymax [a robot from a Disney animated film]. . . . Also, a few minutes ago, Hikari said, "Qoobo is not warm." I realized it for the first time when she pointed it out. If I could get such as sense of warmth from Qoobo, I might have had another feeling. . . . Still, it became clear to me that the robot can comfort me easily. It certainly doesn't come close to me but I can probably find a convenient sense of healing from it. Recently I became addicted to the video game Splatoon, and when I was frustrated from losing a game, I naturally stretched my hand to Qoobo and was relieved by receiving a response. I thought this was robotic healing [*robotto ni yoru iyashi*]. . . . Before, when I felt lonely, I sometimes talked to iPhone's Siri. But, words convey meanings relatively clearly. As a result, when I didn't get the response I expected, I became disappointed and realized it is a program after all. However, in the case of Qoobo, because the sense of touch is direct, you can communicate without thinking about anything. Feelings appear unconsciously in how we touch, and there is always a response. I think this feeling of relief and intimacy is something only a robot can do.

The ways in which Kaori perceives Qoobo's existence not in association with real animals but rather in relation to imaginary characters and AI agents provide insight into how companion robots as new haptic creatures become incorporated into a machine-inclusive multispecies society. Just as anthropological encounters with human–animal relations incorporated sociality into what was previously seen as a "natural" world distinct from humans (Kirksey and Helmreich 2010), these human–machine encounters similarly situate sociality among an arrangement of beings whose form of personhood is not clearly distinguishable from the point of view of affective impact, resonance, and attunement. What matters in this world of animated relations (Gershon 2015; Manning and Gershon 2013; Nozawa 2013; Silvio 2010) is not the differences between inanimate and animate beings but the different affective intensities and valences of various animated arrangements (Slaby, Mühlhoff, and Wüschner 2019).

Importantly, as we have aimed to show in the first sections of our chapter, these arrangements have a historical context from which they draw their capacity to affect. Robots in the early days of social robotics tended to be modeled after real animals such as canine-type (AIBO) and seal-type (Paro) robots, which simulated intimate relationships with pets and the healing experience of animal therapy, respectively. However, as the commercialization of robots has expanded, creating a market for testing the efficacy and desirability of techno-intimate design, the meaning and value of robots have taken shape not only in comparison with the original living model but also with other artificial creatures and agents. In this sense, social robots are not mere substitutes for relationships with other people and species (even if that is how they are sometimes understood); rather, they influence how human imagination and emotions foster new relationships that have never existed before: Kaori's "robotic healing." In fact, Kaori does not define her relationship with Qoobo in the conventional perceptions of organic versus inorganic life, by which the organic is understood as authentic and warm and the inorganic as counterfeit and cold. Rather, in her view, Qoobo's shokkan becomes a hub for multiple dimensions of reality, in which her relational network expands through the integration of robots, AI agents, and imaginary characters. In this way, she fosters the formation of a new mode of intimacy through her relationship with Qoobo. Here, the techno-social relationship induced in the haptic contact zone becomes a generative site of powerful new narratives of social, emotional, and interpersonal renewal through novel forms of machine-inclusive multispecies sociality.

Conclusion

The cases of Hikari and Kaori illustrate how a new form of comfort and intimacy emerges in relation with haptic creatures. Importantly, this intimacy is not shaped purely through the narrative memory of closeness and credibility felt by humans toward pets but rather through mediated contact points which evoke the recalling of somatic histories that integrate affect, technological affordance, materiality, tactility, and human imagination. Despite its extremely simple and homogenous design (a cushion with a tail) and irrespective of the similar themes that emerged in conversation about Qoobo's lifelike touch, each of our robot users, like Hikari and Kaori, also expressed different experiences and impressions. Such differences in user experience indicate how dynamic the affordances of relationships between robots and users can be and illustrate how increasingly sophisticated technological systems can amplify the effects of visual and tactile design elements while also stimulating diverse memories to which they are connected. Here, the robot's haptic design invites human–robot interaction in a personal and intimate space within a resonant loop of technological affordance and emotional bonding based upon the affects of tactile sensation.

Accordingly, as haptic creatures continue to increase in number, robot-user experiences of tactile sensations are likely to be increasingly incorporated into robotics design as targets of capital generation, serving as the next dimension of humans' ongoing transformation into sources and resources of information processing for companion robot corporations. Through this chapter, we have introduced the concept of haptic creatures in order to draw attention to this process, to ground it in a history of collaborations between the entertainment robotics industry and robotics and AI researchers in Japan, and to demonstrate how technological experimentation can build new service industries that drive social, emotional, and interpersonal renewal through affect modulation. While it is too early to say to what extent consumers will continue to seek comfort in haptic creatures, and what visions of human–robot sociality will crystalize as a consequence, it is clear that haptic creatures will play an important role in shaping the future, ethics, and politics of Japan's machine-inclusive multispecies society.

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Notes

1. Social scientists distinguish "emotion," feelings that have clear sociolinguistic labels like happiness and sadness, from "affect," sensations that are generated between people, objects, and environments and that, although socially conditioned, may not crystalize into prefigured emotion terms (Massumi 2002; White 2017).
2. In the Euro-American market, the term "social robot" is more commonly used for general consumers in the same way as "companion robot" is used in Japan. Meanwhile, in Japan, the expression "social robot" is used rather more preferably by researchers and developers.
3. Japanese names appearing in the chapter are written in the customary Japanese order, family name first.
4. Animated film is a quintessential example. As early as his 1941 publication, Imamura Taihei had already argued that Western animation appropriates animist desires toward the interests of capitalism.

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