

A Nascent Robotics Culture: New Complicities for Companionship

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Abstract

Encounters with humanoid robots are new to the everyday experience of children and adults. Yet, increasingly, they are finding their place. This has occurred largely through the introduction of a class of interactive toys (including Furbies, AIBOs, and My Real Babies) that I call “relational artifacts.” Here, I report on several years of fieldwork with commercial relational artifacts (as well as with the MIT AI Laboratory’s Kismet and Cog). It suggests that even these relatively primitive robots have been accepted as companionate objects and are changing the terms by which people judge the “appropriateness” of machine relationships. In these relationships, robots serve as powerful objects of psychological projection and philosophical evocation in ways that are forging a nascent robotics culture.

Introduction

The designers of computational objects have traditionally focused on how these objects might extend and/or perfect human cognitive powers. But computational objects do not simply do things *for* us, they do things *to* us as people, to our ways of being the world, to our ways of seeing ourselves and others (Turkle 2005[1984], 1995). Increasingly, technology also puts itself into a position to do things *with* us, particularly with the introduction of “relational artifacts,” here defined as technologies that have “states of mind” and where encounters with them are enriched through understanding these inner states (Turkle 2004a, 2004b). Otherwise described as “sociable machines (Breazeal 2000, 2002, Breazeal and Scasselati 1999, 2000, Kidd 2004), the term relational artifact evokes the psychoanalytic tradition with its emphasis on the meaning of the person/machine encounter.

In the late 1970s and early 1980s, children’s style of programming reflected their personality and cognitive style. And computational objects such as Merlin, Simon, and Speak and Spell provoked questions about the quality of aliveness and about what is special about being a person. (Turkle 2005[1984])Twenty years later, children

and seniors confronting relational artifacts as simple as Furbies, AIBOs and My Real Babies (Turkle 2004a) or as complex as the robots Kismet and Cog (Turkle et. al. 2004) were similarly differentiated in their style of approach and similarly provoked to ask fundamental questions about the objects’ natures.

Children approach a Furby or a My Real Baby and explore what it means to think of these creatures as alive or “sort of alive”; elders in a nursing play with the robot Paro and grapple with how to characterize this creature that presents itself as a baby seal (Taggart, W. et al. 2005, Shibata 1999, 2005). They move from inquiries such as “Does it swim?” and “Does it eat?” to “Is it alive?” and “Can it love?”*

These similarities across the decades are not surprising. Encounters with novel computational objects present people with category-challenging experiences. The objects are liminal, betwixt-and between, provoking new thought. (Turner 1969; Bowker and Star 1999). However, there are significant differences between current responses to relational artifacts and earlier encounters with computation. Children first confronting computer toys in the late 1970s and early 1980s were compelled to classification. Faced with relational artifacts, children’s

* A note on method: the observations presented here are based on open-ended qualitative fieldwork. This is useful in the study of human/robot interaction for several reasons. Case studies and participant-observation in natural settings enable the collection of empirical data about how people think about and use technology outside the laboratory. Qualitative methods are well-positioned to bring cultural beliefs and novel questions to light. Open-ended qualitative work puts the novelty of the technology at the center of things and says, “When you are interested in something new: *observe, listen, ask.*” Additionally, qualitative approaches to human-robot interaction provide analytical tools that help us better understand both the technologies under study and the social and cultural contexts in which these technologies are deployed. Differences in individual responses to technology are a window onto personality, life history, and cognitive style. Seeing technology in social context helps us better understand social complexities.

questions about classification are enmeshed in a new desire to *nurture and be nurtured by* the artifacts rather than simply categorize them; in their dialogue with relational artifacts, children's focus shifts from cognition to affect, from game playing to fantasies of mutual connection. In the case of relational artifacts for children and the elderly, nurturance is the new "killer app." We attach to what we nurture (Turkle 2004, 2005b).

We Attach to What We Nurture

In *Computer Power and Human Reason*, Joseph Weizenbaum wrote about his experiences with his invention, ELIZA, a computer program that seemed to serve as self object as it engaged people in a dialogue similar to that of a Rogerian psychotherapist (1976). It mirrored one's thoughts; it was always supportive. To the comment: "My mother is making me angry," the program might respond, "Tell me more about your mother," or "Why do you feel so negatively about your mother." Weizenbaum was disturbed that his students, fully knowing that they were talking with a computer program, wanted to chat with it, indeed, wanted to be alone with it. Weizenbaum was my colleague at MIT at the time; we taught courses together on computers and society. And at the time that his book came out, I felt moved to reassure him. ELIZA seemed to me like a Rorschach through which people expressed themselves. They became involved with ELIZA, but the spirit was "as if." The gap between program and person was vast. People bridged it with attribution and desire. They thought: "I will talk to this program 'as if' it were a person; I will vent, I will rage, I will get things off my chest." At the time, ELIZA, seemed to me no more threatening than an interactive diary. Now, thirty years later, I ask myself if I had underestimated the quality of the connection.

A newer technology has created computational creatures that evoke a sense of mutual relating. The people who meet relational artifacts feel a desire to nurture them. And with nurturance comes the fantasy of reciprocation. They wanted the creatures to care about them in return. Very little about these relationships seemed to be experienced "as if." The experience of "as if" had morphed into one of treating robots "as though." The story of computers and their evocation of life had come to a new place.

Children have always anthropomorphized the dolls in their nurseries. It is important to note a difference in what can occur with relational artifacts. In the past, the power of objects to "play house" or "play cowboys" with a child has been tied to the ways in which they enabled the child to project meanings onto them. They were stable "transitional objects." (Winnicott 1971) The doll or the teddy bear presented an unchanging and passive presence. But today's relational artifacts take a decidedly more active stance. With them, children's expectations that their dolls want to

be hugged, dressed, or lulled to sleep don't only come from the child's projection of fantasy or desire onto inert playthings, but from such things as the digital dolls' crying inconsolably or even saying: "Hug me!" or "It's time for me to get dressed for school!" *In the move from traditional transitional objects to contemporary relational artifacts, the psychology of projection gives way to a relational psychology, a psychology of engagement. Yet, old habits of projection remain: robotic creatures become enhanced in their capacities to enact scenarios in which robots are Rorschachs, projective screens for individual concerns.*

From the perspective of several decades of observing people relating to computational creatures, I see an evolution of sensibilities.

- Through the 1980s, people became deeply involved with computational objects – even the early computer toys became objects for profound projection and engagement. Yet, when faced with the issue of the objects' affective possibilities, a modal response might be summed up as "Simulated thinking may be thinking; simulated feeling is never feeling. Simulated love is never love.
- Through the 1990s, the development of a "culture of simulation" brought the notion of simulation (largely through participation in intensive game spaces) into the everyday. The range and possibilities of simulation became known to large numbers of people, particularly young people.
- By the late 1990s, the image of the robot was changing in the culture. A robotics presence was developing into a robotics culture increasingly shaped by the possibility if not the reality of robots in the form of relational artifacts. Alongside a tool model, people are learning about a notion of cyber-companionship. Acceptance of this notion requires a revisiting of old notions of simulation to make way for a kind of companionship that feels appropriate to a robot/person relationship.

The Evolution of Sensibilities: Two Moments

A first moment: I take my fourteen-year-old daughter to the Darwin exhibit at the American Museum of Natural History. The exhibit documents Darwin's life and thought, and with a somewhat defensive tone (in light of current challenges to evolution by proponents of intelligent design), presents the theory of evolution as the central truth that underpins contemporary biology. The Darwin exhibit wants to convince and it wants to please. At the entrance to the exhibit is a turtle from the Galapagos Islands, a seminal object in the development of evolutionary theory. The turtle rests in its cage, utterly still. "They could have used a robot," comments my daughter. She considers it a shame to bring the turtle all this way and put it in a cage for a

performance that draws so little on the turtle's "aliveness." I am startled by her comments, both solicitous of the imprisoned turtle because it is alive and unconcerned about its authenticity. The museum has been advertising these turtles as wonders, curiosities, marvels -- among the plastic models of life at the museum, here is the life that Darwin saw. I begin to talk with others at the exhibit, parents and children. It is Thanksgiving weekend. The line is long, the crowd frozen in place. My question, "Do you care that the turtle is alive?" is welcome diversion. A ten-year-old girl would prefer a robot turtle because aliveness comes with aesthetic inconvenience: "its water looks dirty. Gross." More usually, votes for the robots echo my daughter's sentiment that in this setting, aliveness doesn't seem worth the trouble. A twelve-year-old girl opines: "For what the turtles do, you didn't have to have the live ones." Her father looks at her, uncomprehending: "But the point is that they are real, that's the whole point."

The Darwin exhibit gives authenticity major play: on display are the actual magnifying glass that Darwin used, the actual notebooks in which he recorded his observations, indeed, the very notebook in which he wrote the famous sentences that first described his theory of evolution *But in the children's reactions to the inert but alive Galapagos turtle, the idea of the "original" is in crisis.* I recall my daughter's reaction when she was seven to a boat ride in the postcard blue Mediterranean. Already an expert in the world of simulated fish tanks, she saw a creature in the water, pointed to it excitedly and said: "Look mommy, a jellyfish! It looks so realistic!" When I told this story to a friend who was a research scientist at the Walt Disney Company, he was not surprised. When Animal Kingdom opened in Orlando, populated by "real," that is, biological animals, its first visitors complained that these animals were not as "realistic" as the animatronic creatures in Disneyworld, just across the road. The robotic crocodiles slapped their tails, rolled their eyes, in sum, displayed "essence of crocodile" behavior. The biological crocodiles, like the Galapagos turtle, pretty much kept to themselves. What is the gold standard here?

I have written that now, in our culture of simulation, the notion of authenticity is for us what sex was to the Victorians -- "threat and obsession, taboo and fascination" (Turkle, 2005[1984]). I have lived with this idea for many years, yet at the museum, I find the children's position strangely unsettling. For them, in this context, aliveness seems to have no intrinsic value. Rather, it is useful only if needed for a specific purpose. "If you put in a robot instead of the live turtle, do you think people should be told that the turtle is not alive?" I ask. Not really, say several of the children. Data on "aliveness" can be shared on a "need to know" basis, for a purpose. But what *are* the purposes of living things? When do we need to know if something is alive?

A second moment: an older woman, 72, in a nursing home outside of Boston is sad. Her son has broken off his relationship with her. Her nursing home is part of a study I am conducting on robotics for the elderly. I am recording her reactions as she sits with the robot Paro, a seal-like creature, advertised as the first "therapeutic robot" for its ostensibly positive effects on the ill, the elderly, and the emotionally troubled. Paro is able to make eye contact through sensing the direction of a human voice, is sensitive to touch, and has "states of mind" that are affected by how it is treated -- for example, it can sense if it is being stroked gently or with some aggressivity. In this session with Paro, the woman, depressed because of her son's abandonment, comes to believe that the robot is depressed as well. She turns to Paro, strokes him and says: "Yes, you're sad, aren't you. It's tough out there. Yes, it's hard." And then she pets the robot once again, attempting to provide it with comfort. And in so doing, she tries to comfort herself.

Psychoanalytically trained, I believe that this kind of moment, if it happens between people, has profound therapeutic potential. What are we to make of this transaction as it unfolds between a depressed woman and a robot? When I talk to others about the old woman's encounter with Paro, their first associations are usually to their pets and the solace they provide. The comparison sharpens the questions about Paro and the quality of the relationships people have with it. I do not know if the projection of understanding onto pets is "authentic." That is, I do not know whether a pet could feel or smell or intuit some understanding of what it might mean to be with an old woman whose son has chosen not to see her anymore. What I do know is that Paro has understood nothing. Like other "relational artifacts" its ability to inspire relationship is not based on its intelligence or consciousness, but on the capacity to push certain "Darwinian" buttons in people (making eye contact, for example) that cause people to respond *as though* they were in relationship. For me, relational artifacts are the new uncanny in our computer culture, as Freud (1960) put it, "the long familiar taking a form that is strangely unfamiliar."

Confrontation with the uncanny provokes new reflection. Do plans to provide relational robots to children and the elderly make us less likely to look for other solutions for their care? If our experience with relational artifacts is based on a fundamentally deceitful interchange (artifacts' ability to persuade us that they know and care about our existence) can it be good for us? Or might it be good for us in the "feel good" sense, but bad for us in our lives as moral beings? The answers to such questions are not dependent on what computers can do today or what they are likely to be able to do in the future. These questions ask what *we* will be like, what kind of people are *we* becoming as we develop increasingly intimate relationships with machines.

Rorschach and Evocation

We can get some first answers by looking at the relationship of people – here I describe fieldwork with children and seniors – with these new intimate machines. In these relationship it is clear that the distinction between people using robots for projection of self (as Rorschach) and using robots as philosophically evocative objects, is only heuristic. They work together: children and seniors develop philosophical positions that are inseparable from their emotional needs. Affect and cognition work together in the subjective response to relational technologies. This is dramatized by a series of case studies, first of children, then of seniors, in which the “Rorschach effect” and the “evocative object effect” are entwined.*

Case Studies of Children

I begin with a child Orelia, ten, whose response to the robot AIBO serves as commentary on her relationship to her mother, a self-absorbed woman who during her several sessions with her daughter and the robot does not touch, speak, or make eye contact with her daughter. One might say that Orelia’s mother acts robotically and the daughter’s response is to emphasize the importance and irreducibility of the human heart. In a life characterized by maternal chill, Orelia stressed warmth and intuition as ultimate human values.

Orelia: keeping a robot in its place I met Orelia at a private Boston-area middle school where we were holding group sessions of fifth graders with a range of robotic toys. Orelia received an AIBO to take home; she kept a robot “diary.” We met several times with Orelia and her parents in their Charlestown home. (Turkle 2004a)

Orelia is bright and articulate and tells us that her favorite hobby is reading. She makes determined distinctions between robots and biological beings. “AIBO is not alive like a real pet; it does not breathe.” There is no question in her mind that she would choose a real dog over an AIBO. She believes that AIBO can love but only because “it is programmed to.” She continues: “If [robots] love, then it’s artificial love. [And] if it’s an artificial love, then there really isn’t anything true... I’m sure it would be programmed to [show that it likes you], you know, the

* My case studies of robots and seniors with AIBO and My Real Baby are drawn from work conducted through weekly visits to schools and nursing homes from 2001 to 2003, studies that encompassed several hundred participants. In my discussion of Paro, I am reporting on studies of the same two nursing homes during the spring of 2005, a study that took place during twelve site visits and recruited 23 participants, ranging in age from 60-104, six males, and seventeen females. Researchers on these projects include Olivia Dasté, for the first phase of work, and for the second phase, Cory Kidd and Will Taggart.

computer inside of it telling it to show artificial love, but it doesn’t love you.”

Orelia is sure that she could never love an AIBO. “They [robots] won’t love you back if you love them. In order to love an AIBO, Orelia says it would need “a brain and a heart.” Orelia feels that it is not worth investing in something that does not have the capacity to love back, a construction that is perhaps as much about the robot as about her relationship with her mother.

Orelia’s brother Jake, nine, the baby of the family, is more favored in his mother’s eyes. Unlike his sister, Jake assumes that AIBO has feelings. Orelia speaks to the researchers *about* AIBO; Jake addresses AIBO directly. He wants to stay on AIBO’s good side, asking, “Will he get mad if you pick him up?” When Jake’s style of addressing AIBO reveals that Jake finds the robot’s affective states genuine, Orelia corrects her brother sharply: “It [AIBO] would just be mad at you because it’s programmed to know ‘if I don’t get the ball, I’ll be mad.’” The fact that AIBO is programmed to show emotions, make these artificial and not to be trusted.

Orelia expands on real versus programmed emotion:

A dog, it would actually feel sorry for you. It would have sympathy, but AIBO, it’s artificial. I read a book called *The Wrinkle in Time*, where everyone was programmed by this thing called “It.” And all the people were completely on routine. They just did the same thing over and over. I think it’d be the same thing with the [artificial] dog. The dog wouldn’t be able to do anything else.

For Orelia, only living beings have real thoughts and emotions:

With a real dog if you become great friends with it, it really loves you, you know, it truly . . . has a brain, and you know somewhere in the dog’s brain, it loves you, and this one [AIBO], it’s just somewhere on a computer disk... If a real dog dies, you know, they have memories, a real dog would have memories of times, and stuff that you did with him or her, but this one [AIBO] doesn’t have a brain, so it can’t.

Orelia wants the kind of love that only a living creature can provide. She fears the ability of any creature to behave ‘as if’ it could love. She denies a chilly emotional reality by attributing qualities of intuition, transparency, and connectedness to all people and animals. A philosophical position about robots is linked to an experience of the machine-like equalities of which people are capable, a good example of the interdependence of philosophical position and psychological motivation.

Melanie: yearning to nurture a robotic companion The quality of a child's relationship with a parent does not determine a *particular* relationship to robotic companions. Rather, feelings about robots can represent different strategies for dealing with one's parents, and perhaps for working through difficulties with them. This is illustrated by the contrast between Orelia and ten-year-old Melanie. Melanie, like Orelia, had sessions with AIBO and My Real Baby at school and was given both to play with at home. In Melanie's case, feelings that she did not have enough of her parent's attention led her to want to nurture a robotic creature. Melanie was able to feel more loved by loving another; the My Real Baby and AIBO were "creature enough" for this purpose.

Melanie is soft-spoken, intelligent, and well mannered. Both of her parents have busy professional lives; Melanie is largely taken care of by nannies and baby-sitters. With sadness, she says that what she misses most is spending time with her father. She speaks of him throughout her interviews and play sessions. Nurturing the robots enables her to work through feelings that her parents, and her father in particular, are not providing her with the attention she desires.

Melanie believes that AIBO and My Real Baby are sentient and have emotions. She thinks that when we brought the robotic dog and doll to her school "they were probably confused about who their mommies and daddies were because they were being handled by so many different people." She thinks that AIBO probably does not know that he is at her particular school because the school is strange to him, but "almost certainly does know that he is outside of MIT and visiting another school." She sees her role with the robots as straightforward; it is maternal.

One of Melanie's third-grade classmates is aggressive with My Real Baby and treats the doll like an object to explore (poking the doll's eyes, pinching its skin to test its "rubberness," and putting her fingers roughly inside its mouth). Observing this behavior, Melanie comes over to rescue the doll. She takes it in her arms and proceeds to play with it as though it were a baby, holding it close, whispering to it, caressing its face. Speaking of the My Real Baby doll that she is about to take home, Melanie says, "I think that if I'm the first one to interact with her then maybe if she goes home with another person [another study participant] she'll cry a lot . . . because she doesn't know, doesn't think that this person is its Mama." For Melanie, My Real Baby's aliveness is dependent on its animation and relational properties. Its lack of biology is not in play. Melanie understands that My Real Baby is a machine. This is clear in her description of its possible "death."

Hum, if his batteries run out, maybe [it could die]. I think it's electric. So, if it falls and breaks, then it would die, but if people could repair it, then I'm not really sure. [I]f it falls and like totally shatters I don't

think they could fix it, then it would die, but if it falls and one of its ear falls off, they would probably fix that.

Melanie combines a mechanical view of My Real Baby with confidence that it deserves to have her motherly love. At home, Melanie has AIBO and My Real Baby sleep near her bed and believes they will be happiest on a silk pillow. She names My Real Baby after her three-year old cousin Sophie. "I named her like my cousin . . . because she [My Real Baby] was sort of demanding and said most of the things that Sophie does." She analogizes the AIBO to her dog, Nelly. When AIBO malfunctions, Melanie does not experience it as broken, but as behaving in ways that remind her of Nelly. In the following exchange that takes place at MIT, AIBO makes a loud, mechanical, wheezing sound and its walking becomes increasingly wobbly. Finally AIBO falls several times and then finally is still. Melanie gently picks up the limp AIBO and holds it close, petting it softly. At home, she and a friend treat it like a sick animal that needs to be rescued. They give it "veterinary care."

In thinking about relational artifacts such as Furbys, AIBOs, My Real Babies, and Paros, the question is posed: how these objects differ from "traditional" (non-computational) toys, teddy bears, and Raggedy-Ann dolls. Melanie, unbidden, speaks directly to this issue. With other dolls, she feels that she is "pretending." With My Real Baby, she feels that she is really the dolls's mother: "[I feel] like I'm her real mom. I bet if I really tried, she could learn another word. Maybe Da-da. Hopefully if I said it a lot, she would pick up. It's sort of like a real baby, where you wouldn't want to set a bad example."

For Melanie, not only does My Real Baby have feelings, Melanie sees it as capable of complex, mixed emotions. "It's got similar to human feelings, because she can really tell the differences between things, and she's happy a lot. She gets happy, and she gets sad, and mad, and excited. I think right now she's excited and happy at the same time."

Our relationship, it grows bigger. Maybe when I first started playing with her she didn't really know me so she wasn't making as much of these noises, but now that she's played with me a lot more she really knows me and is a lot more outgoing. Same with AIBO.

When her several weeks with AIBO and My Real Baby come to an end, Melanie is sad to return them. Before leaving them with us, she opens the box in which they are housed and gives them an emotional good bye. She hugs each one separately, tells them that she will miss them very much but that she knows we [the researchers] will take good care of them. Melanie is concerned that the toys will forget her, especially if they spend a lot of time with other families.

Melanie's relationship with the AIBO and My Real Baby illustrates their projective qualities: she nurtures them because getting enough nurturance is an issue for her. But in providing nurturance to the robots, Melanie provided it to herself as well (and in a way that felt more authentic than developing a relationship with a "traditional" doll). In another case, a seriously ill child was able to use relational robots to speak more easily in his own voice.

Jimmy: from Rorschach to relationship Jimmy, small, pale, and thin, is just completing first grade. He has a congenital illness that causes him to spend much time in hospitals. During our sessions with AIBO and My Real Baby he sometimes runs out of energy to continue talking. Jimmy comes to our study with a long history of playing computer games. His favorite is Roller Coaster Tycoon. Many children play the game to create the wildest roller coasters possible; Jimmy plays the game to maximize the maintenance and staffing of his coasters so that the game gives him awards for the safest park. Jimmy's favorite toys are Beanie Babies. Jimmy participates in our study with his twelve-year-old brother, Tristan.

Jimmy approaches AIBO and My Real Baby as objects with consciousness and feelings. When AIBO slams into the red siding that defines his game space, Jimmy interprets his actions as "scratching a door, wanting to go in. . . . I think it's probably doing that because it wants to go through the door... Because he hasn't been in there yet." Jimmy thinks that AIBO has similar feelings toward him as his biological dog, Sam. He says that AIBO would miss him when he goes to school and would want to jump in to the car with him. In contrast, Jimmy does not believe that his Beanie Babies, the stuffed animal toys, have feelings or 'aliveness,' or miss him when he is at school. Jimmy tells us that other relational artifacts like Furbies 'really do' learn and are the same 'kind of alive' as AIBO.

During several sessions with AIBO, Jimmy talks about AIBO as a super dog that show up his own dog as a limited creature. Jimmy says: "AIBO is probably as smart as Sam and at least he isn't as scared as my dog [is]." When we ask Jimmy if there are things that his dog can do that AIBO can't do, Jimmy answers not in terms of his dog's strengths but in terms of his deficiencies: "There are some things that *Sam can't do and AIBO can*. Sam can't fetch a ball. AIBO can. And Sam definitely can't kick a ball." On several other occasions, when AIBO completed a trick, Jimmy commented "My dog couldn't do that!" AIBO is the "better" dog. AIBO is immortal, invincible. AIBO cannot get sick or die. In sum, AIBO represents what Jimmy wants to be.

During Jimmy's play sessions at MIT, he forms a strong bond with AIBO. Jimmy tells us that he would probably miss AIBO as much as Sam if either of them died. As we talk about the possibility of AIBO dying, Jimmy explains

that he believes AIBO could die if he ran out of power. Jimmy wants to protect AIBO by taking him home.

If you turn him off he dies, well, he falls asleep or something... He'll probably be in my room most of the time. And I'm probably going to keep him downstairs so he doesn't fall down the stairs. Because he probably, in a sense he would die if he fell down the stairs. Because he could break. And. Well, he could break and he also could...probably or if he broke he'd probably. . . he'd die like.

Jimmy's concerns about his vulnerable health are expressed with AIBO in several ways. Sometimes he thinks the dog is vulnerable, but Jimmy thinks he could protect him. Sometimes he thinks the dog is invulnerable, a super-hero dog in relation to his frail biological counterpart. He tests AIBO's strength in order to feel reassured.

Jimmy "knows" that AIBO does not have a real brain and a heart, but sees AIBO as a mechanical kind of alive, where it can function as if it had a heart and a brain. For Jimmy, AIBO is "alive in a way," because he can "move around" and "[H]e's also got feelings. He shows . . . he's got three eyes on him, mad, happy, and sad. And well, that's how he's alive." As evidence of AIBO's emotions, Jimmy points to the robot's lights: "When he's mad, when they're red. [And when they are green] he's happy."

Jimmy has moments of intense physical vulnerability, sometimes during our sessions. His description of how AIBO can strengthen himself is poignant. "Well, when he's charging that means, well he's kind of sleepy when he's charging but when he's awake he remembers things more. And probably he remembered my hand because I kept on poking in front of his face so he can see it. And he's probably looking for me."

AIBO recharging reassures Jimmy by providing him with a model of an object that can resist death. If AIBO can be alive through wires and a battery then this leaves hope that people can be "recharged" and "rewired" as well. His own emotional connection to life through technology motivates a philosophical position that robots are "sort of alive."

At home, Jimmy likes to play a game in which his Bio Bugs attack his AIBO. He relishes these contests in which he identifies with AIBO. AIBO lives through technology and Jimmy sees AIBO's survival as his own. AIBO symbolizes Jimmy's hopes to someday be a form of life that defies death. The Bio Bugs are the perfect embodiment of threat to the body, symbolizing the many threats that Jimmy has to fight off.

Jimmy seems concerned that his brother, Tristan, barely played with AIBO during the time they had the robot at

home. Jimmy brings this up to us in a shaky voice. Jimmy explains that his brother didn't play with AIBO because "he didn't want to get addicted to him so he would be sad when we had to give him back." Jimmy emphasizes that he did not share this fear. Tristan is distant from Jimmy. Jimmy is concerned that his brother's holding back from him is because Tristan fears that he might die. Here, AIBO becomes the "stand in" for the self.

When he has to return his AIBO, Jimmy says that rAIBO he will miss the robot "a little bit" but that it is AIBO that will probably miss him more.

Researcher: Do you think that you'll miss AIBO?

Jimmy: A little bit. He'll probably miss me.

Seniors: robots as a prism for the past

In bringing My Real Babies into nursing homes, it was not unusual for seniors to use the doll to re-enact scenes from their children's youth or important moments in their relationships with spouses. Indeed, seniors were more comfortable playing out family scenes with robotic dolls than with traditional ones. Seniors felt social "permission" to be with the robots, presented as a highly valued and "grownup" activity. Additionally, the robots provided the elders something to talk about, a seed for a sense of community.

As in the case of children, projection and evocation were entwined in the many ways seniors related to the robots. Some seniors, such as Jonathan, wanted the objects to be transparent as a clockwork might be and became anxious when their efforts to investigate the robots' a'innardsa' were frustrated. Others were content to interact with the robot as it presented itself, with no window onto how it 'worked' in any mechanical sense. They took the relational artifact 'at interface value' (Turkle 1995). In each case, emotional issues were closely entwined with emergent philosophies of technology.

Jonathan: exploring a relational creature, engineer-style Jonathan, 74, has movements that are slow and precise; he is well spoken, curious, and intelligent. He tells us that throughout his life he has been ridiculed for his obsessive ways. Jonathan's movements He tends to be reclusive and has few friends at the nursing home. Never married, with no children, he has always been a solitary man. For most of his life, Jonathan worked as an accountant, but was happiest when he worked as a computer programmer. Now, Jonathan approaches AIBO and My Real Baby with a desire to analyze them in an analytical, engineer's style.

From his first interaction with the My Real Baby at a group activity to his last interview after having kept the robot for four months in his room, Jonathan remained fascinated

with how it functioned. He handles My Real Baby with detachment in his methodical explorations.

When Jonathan meets My Real Baby the robot is cooing and giggling. Jonathan looks it over carefully, bounces it up and down, pokes and squeezes it, and moves its limbs. With each move, he focuses on the doll's reactions. Jonathan tries to understand what the doll says and where its voice comes from. Like Orelia, Jonathan talks to the researchers about the robot, but does not speak to the robot itself. When he discovers that My Real Baby's voice comes from its stomach, he puts his ear next to the stomach and says: "I think that this doll is a very remarkable toy. I have never seen anything like this before. But I'd like to know, how in the entire universe is it possible to construct a doll that talks like this?"

Despite his technical orientation to the robot, Jonathan says that he would be more comfortable speaking to a computer or robot about his problems than to a person.

Because if the thing is very highly private and very personal it might be embarrassing to talk about it to another person, and I might be afraid of being ridiculed for it... And it wouldn't criticize me... Or let's say that if I wanted to blow off steam, it would be better to do it to a computer than to do it to a living person who has nothing to do with the thing that's bothering me. [I could] express with the computer emotions that I feel I could not express with another person, to a person.

Nevertheless, Jonathan, cannot imagine that his bond with My Real Baby could be similar to those he experiences with live animals, for example the cats he took care of before coming to the nursing home:

Some of the things I used to enjoy with the cat are things I could never have with a robot animal. Like the cat showing affection, jumping up on my lap, letting me pet her and listening to her purr, a robot animal couldn't do that and I enjoyed it very much.

Jonathan makes a distinction between the affection that can be offered by something alive and an object that acts as if it were alive.

Andy: animation in the service of working through Andy, 76, at the same nursing home as Jonathan, is recovering from a serious depression. At the end of each of our visits to the nursing home, he makes us promise to come back to see him as soon as we can. Andy feels abandoned by family and friends. He wants more people to talk with. He participates in a day-program outside the home, but nevertheless, often feels bored and lonely. Andy loves animals and has decorated his room with scores of

cat pictures; he tells us that some of his happiest moments are being outside in the nursing home's garden speaking to birds, squirrels, and neighborhood cats. He believes they communicate with him and considers them his friends. Andy treats robotic dolls and pets as sentient; they become stand-ins for the people he would like to have in his life. Like Jonathan, we gave Andy a My Real Baby to keep in his room for four months. He never tired of its company.

The person Andy misses most is his ex-wife Rose. Andy reads us songs he has written for her and letters she has sent him. My Real Baby helps him work on unresolved issues in his relationship with Rose. Over time, the robot comes to represent her.

Andy: Rose, that was my ex-wife's name.
Researcher: Did you pretend that it was Rose when you talked to her?
Andy: Yeah. I didn't say anything bad to her, but some things that I would want to say to her, it helped me to think about her and the time that I didn't have my wife, how we broke up, think about that, how I miss seeing her... the doll, there's something about her, I can't really say what it is, but looking at her reminds me of a human being. She looks just like her, Rose, my ex-wife, and her daughter . . . something in her face is the same, looking at her makes me feel more calm, I can just think about her and everything else in my life.

Andy speaks at length about his difficulty getting over his divorce, his feelings of guilt that his relationship with Rose did not work out, and his hope that he and his ex-wife might someday be together again. Andy explains how having the doll enables him to try out different scenarios that might lead to a reconciliation with Rose. The doll's presence enables him to express his attachment and vent his feelings of regret and frustration.

Researcher: How does it make you feel to talk to the doll?
Andy: Good. It lets me take everything inside me out, you know, that's how I feel talking to her, getting it all out of me and feel not depressed . . . when I wake up in the morning I see her over there, it makes me feel so nice, like somebody is watching over you.
Andy: It will really help me [to keep the doll] because I am all alone, there's no one around, so I can play with her, we can talk. It will help me get ready to be on my own.
Researcher: How?
Andy: By talking to her, saying some of the things that I might say when I did go out, because right now, you know I don't talk to anybody right now, and I can talk much more right now with her than, I don't talk to anybody

right now.

Andy holds the doll close to his chest, rubs its back in a circular motion, and says lovingly, "I love you. Do you love me?" He makes funny faces at the doll, as if to prevent her from falling asleep or just to amuse her. When the doll laughs with perfect timing as if responding to his grimaces, Andy laughs back, joining her. My Real Baby is nothing if not an "intimate machine."

Intimate Machines: A Robot Kind of Love

The projective material of the children and seniors is closely tied to their beliefs about the nature of the relational artifacts in their care. We already know that the "intimate machines" of the computer culture have shifted how children talk about what is and is not alive (Turkle 2005[1984]). For example, children use different categories to talk about the aliveness of "traditional" objects than they do when confronted with computational games and toys. A traditional wind-up toy was considered "not alive" when children realized that it did not move of its own accord. Here, the criterion for aliveness was in the domain of physics: autonomous motion. Faced with computational media, children's way of talking about aliveness became psychological. Children classified computational objects as alive (from the late 1970s and the days of the electronic toys Merlin, Simon, and Speak and Spell) if they could *think* on their own. Faced with a computer toy that could play tic-tac-toe, what counted to a child was not the object's physical but psychological autonomy.

Children of the early 1980s came to define what made people special in opposition to computers, which they saw as our "nearest neighbors." Computers, the children reasoned, are rational machines; people are special because they are emotional. Children's use of the category "emotional machines" to describe what makes people special was a fragile, unstable definition of human uniqueness. In 1984, when I completed my study of a first generation of children who grew up with electronic toys and games, I thought that other formulations would arise from generations of children who might, for example, take the intelligence of artifacts for granted, understand how it was created, and be less inclined to give it philosophical importance. But as if on cue, robotic creatures that presented themselves as having both feelings and needs entered mainstream American culture. By the mid-1990s, as emotional machines, people were not alone.

With relational artifacts, the focus of discussion about whether computational artifacts might be alive moved from the psychology of projection to the psychology of engagement, from Rorschach to relationship, from creature

competency to creature connection. Children and seniors already talk about an “animal kind of alive” and a “Furby kind of alive.” The question ahead is whether they will also come to talk about a “people kind of love” and a “robot kind of love.”

What is a robot kind of love?

In the early 1980s, I met a thirteen-year-old, Deborah, who responded to the experience of computer programming by speaking about the pleasures of putting “a piece of your mind into the computer’s mind and coming to see yourself differently.” Twenty years later, eleven-year-old Fara reacts to a play session with Cog, a humanoid robot at MIT that can meet her eyes, follow her position, and imitate her movements, by saying that she could never get tired of the robot because “it’s not like a toy because can’t teach a toy; it’s like something that’s part of you, you know, something you love, kind of like another person, like a baby.”

In the 1980s, debates in artificial intelligence centered on the question of whether machines could “really” be intelligent. These debates were about the objects themselves, what they could and could not do. Our new debates about relational and sociable machines – debates that will have an increasingly high profile in mainstream culture – are not about the machines’ capabilities but about our vulnerabilities. In my view, decisions about the role of robots in the lives of children and seniors cannot turn simply on whether children and the elderly “like” the robots. What does this deployment of “nurturing technology” at the two most dependent moments of the life cycle say about us? What will it do to us? What kinds of relationships are appropriate to have with machines? And what is a relationship?

My work in robotics laboratories has offered some images of how future relationships with machines may look, appropriate or not. For example, Cynthia Breazeal was leader on the design team for Kismet, the robotic head that was designed to interact with humans “sociably,” much as a two-year-old child would. Breazeal was its chief programmer, tutor, and companion. Kismet needed Breazeal to become as “intelligent” as it did and then Kismet became a creature Breazeal and others could interact with. Breazeal experienced what might be called a maternal connection to Kismet; she certainly describes a sense of connection with it as more than “mere” machine. When she graduated from MIT and left the AI Laboratory where she had done her doctoral research, the tradition of academic property rights demanded that Kismet be left behind in the laboratory that had paid for its development. What she left behind was the robot “head” and its attendant software. Breazeal described a sharp sense of loss. Building a new Kismet would not be the same.

In the summer of 2001, I studied children interacting with robots, including Kismet, at the MIT AI Laboratory

(Turkle et. al. 2006). It was the last time that Breazeal would have access to Kismet. It is not surprising that separation from Kismet was not easy for Breazeal, but more striking, it was hard for the rest of us to imagine Kismet without her. One ten-year-old who overheard a conversation among graduate students about how Kismet would be staying in the A.I. lab objected: “But Cynthia is Kismet’s mother.”

It would be facile to analogize Breazeal’s situation to that of Monica, the mother in Spielberg’s *A.I.*, a film in which an adopted robot provokes feelings of love in his human caretaker, but Breazeal is, in fact, one of the first people to have one of the signal experiences in that story, separation from a robot to which one has formed an attachment based on nurturance. At issue here is not Kismet’s achieved level of intelligence, but Breazeal’s experience as a “caregiver.” My fieldwork with relational artifacts suggests that being asked to nurture a machine that presents itself as a young creature of any kind, constructs us as dedicated cyber-caretakers. Nurturing a machine that presents itself as dependent creates significant attachments. We might assume that giving a sociable, “affective” machine to our children or to our aging parents will change the way we see the lifecycle and our roles and responsibilities in it.

Sorting out our relationships with robots bring us back to the kinds of challenges that Darwin posed to his generation: the question of human uniqueness. How will interacting with relational artifacts affect people’s way of thinking about what, if anything, makes people special? The sight of children and the elderly exchanging tendernesses with robotic pets brings science fiction into everyday life and techno-philosophy down to earth. The question here is not whether children will love their robotic pets more than their real life pets or even their parents, but rather, what will loving come to mean?

One woman’s comment on AIBO, Sony’s household entertainment robot startles in what it might augur for the future of person-machine relationships: “[AIBO] is better than a real dog ... It won’t do dangerous things, and it won’t betray you ... Also, it won’t die suddenly and make you feel very sad.” Mortality has traditionally defined the human condition; a shared sense of mortality has been the basis for feeling a commonality with other human beings, a sense of going through the same life cycle, a sense of the preciousness of time and life, of its fragility. Loss (of parents, of friends, of family) is part of the way we understand how human beings grow and develop and bring the qualities of other people within themselves (Freud 1989).

Relationships with computational creatures may be deeply compelling, perhaps educational, but they do not put us in touch with the complexity, contradiction, and limitations of the human life cycle. They do not teach us what we need to know about empathy, ambivalence, and life lived in shades

of gray. To say all of this about our love of our robots does not diminish their interest or importance. It only puts them in their place.

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