

4 Tender Robotics

A Framework for Meaning-Making Through Emotional Investment

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4.1 Introduction

Human-robot interaction (HRI) is often approached with functional or technical expectations. Will the machine perform efficiently? Can it execute its tasks with precision? These questions typically frame the robot as a tool or servant, situating interaction in terms of control, reliability, and productivity (Bakpayev 2022). As research faculty at Northeastern University situated within both the arts (Department of Theatre) and emerging technology (Institute for Experiential Robotics), I spend a fair amount of time with engineers (including undergraduate students, graduate researchers, and faculty). I have noticed that there is a pronounced focus on instrumental value, which makes sense given the way engineering is taught as a mode of problem-solving. Yet in this space, I find myself often thinking about the adage “if all you have is a hammer, everything looks like a nail.” As a choreographer, dancer, and researcher of social action, I have been interested in another, less-discussed dimension to human-robot encounters: emotional investment. For my purposes, emotional investment refers to the degree to which a human participant commits affectively to the unfolding interaction with a robot. It involves more than mere attention or instrumental focus; it describes a readiness to care about the interaction’s nuances, potentials, and outcomes. My approach in linking dance and robotics is to consider how encounters with semi-autonomous machines can contribute to character development via emotional investment.

This chapter explores the aesthetic worth of emotional investment in HRI. My concept of aesthetics here emerges from the work of philosopher John Dewey, who links traditional ideas of beauty and pleasure to meaningful experience (Dewey 1934). Aesthetics, Dewey argues, must begin not with “great works,” but with ordinary life:

[I]n order to understand the [a]esthetic in its ultimate and approved forms, one must begin with it in the raw; in the events and scenes that hold the attentive eye and ear of man, arousing his interest and affording him enjoyment as he looks and listens the sights that hold the crowd—the fire-engine rushing by; the machines excavating enormous holes in the earth; the human-fly climbing the steeple-side; the men

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perched high in air on girders, throwing and catching red-hot bolts.
 The sources of art in human experience will be learned by him who sees
 how the tense grace of the ball-player infects the onlooking crowd[.]
 (Dewey 1934/2005: 3)

For Dewey, the aesthetic is part of active, lived experience—not remote or abstract contemplation on its own. In a similar vein, aesthetics scholar Elaine Scarry suggests that attending to aesthetics sharpens our faculties. She connects beauty and justice through the shared discipline of noticing—of being attentive, responsive, and precise in one’s perception. Far from blinding us to the world’s ills, an aesthetic orientation awakens our ability to observe more, and observe more justly. She argues that “the moment of perceiving something beautiful confers on the perceiver the gift of life” (Scarry 1999: 69). This aligns with feminist thinkers like Simone Weil (1951) and Iris Murdoch (1970), who also argued that sustained attention is both an aesthetic and moral virtue. The capacity to behold something beautiful without wanting to possess it—just to observe and experience—is a rehearsal for how we might look at others: with justice, without domination, with care.

My exploration of emotional investment in HRI is situated within a practice-based research framework. As articulated by creative researcher R. Lyle Skains (2018, 2024), practice-based research involves the creation of artifacts and experiences as a primary means of investigating and generating knowledge. Interdisciplinary researcher Lindy Candy (2006, 2019) similarly emphasizes that in practice-based research, the creative process itself becomes a site of inquiry, with the practitioner’s reflections and embodied actions offering insights that conventional research methods may overlook. My work moves fluidly between conceptual analysis (e.g., examining the conditions of emotional investment) and technical investigation (e.g., prototyping and playtesting choreographic structures and scores).

In this chapter, I first frame and characterize emotional investment and continue with a brief autoethnographic account of my experience choreographing a duet with a Boston Dynamics “Spot” robot. Inspired by the work of colleagues like Catie Cuan (2021), Amy LaViers (2018, 2023, 2024), Sydney Skybetter, and Grisha Coleman, I consider duet choreography as a meaningful practice of character development. Proceeding tentatively and cautiously, I investigate the potential for emotional investment to reshape conventional notions of HRI, moving beyond mere technological functionality toward a deeper understanding of connection and embodied encounters. I shed light on the nuanced dynamics of emotionally invested robotic interactions and the potential impact on individuals, collectives, and institutions and consider how the aesthetic ends of HRI allow the possibility of transcending the more ubiquitous focus on efficiency and safety, without sacrificing these values as crucial for practice and progress. By engaging the poetic, artistic, and philosophical dimensions of affective robotics, I lay a groundwork for a more inclusive and ethically attuned technological landscape.

4.2 Emotional Investment and Meaning-Making

As we move into a world where technology is increasingly available and salient, there are deep questions about how mediated interaction affects our experience of meaning-making. For Dewey, meaning-making is grounded in immersive, embodied encounters where impulses meet environments, leading to observable consequences and shared significance. Dewey argues that “aesthetic experience occurs continuously because the interaction of live creature and environing conditions is involved in the very process of living” (Dewey 1934/2005: 36). When connected to the feminist thought of thinkers like Weil, Murdoch, and Scarry, this continuous experience arises not in isolated objects but in situated, temporal, and relational interaction. What distinguishes aesthetic experience is its coherence, its felt rhythm, its capacity to absorb and transform us. It is an event of presence, rather than mere passive perception. These aesthetic experiences are not merely perceptual but transformative, continuously refining an individual’s capacities for action and understanding. This perspective positions knowing as inherently active, transformative, and interdependent with one’s milieu.

From a social epistemology perspective, emotions are more than just feelings—they are a way of knowing. Knowledge emerges not through domination or data extraction but through lived experience. Social epistemologist Catherine Z. Elgin argues that “an emotion affects both the configuration and the constitution of a system of thought. It provides focus, highlighting some aspects of the domain, obscuring others, engendering relations of relevance and irrelevance [...] emotions are sources of salience” (Elgin 1996: 149). Emotions, as orientations, shape how we understand and perceive the subjects of our relation. Elgin further argues that “refinement of the sensibilities increases emotion’s epistemic yield” (Elgin 1996: 158). Considering how to refine my own sensibilities in relation to machines has been one of the core ideas that brings me into the studio to experiment with emotional investment with robotic agents.

As a choreographer, I consider emotions *kinesthetically*. That is, how emotions inform my internal experience of movement. In this light, movement involves micro-attunement: a hand that hovers before it touches, a pause in timing, a shift in weight that gives rather than takes. I consider how interactions yield as well as assert, and what it means to respond with softness. This idea resonates with what feminist theorist Sara Ahmed calls “affective economies” where emotions “do things,” where they move bodies and stick to objects (2004). This means that our emotional responses to machines are not simply spontaneous; they are shaped by histories of power—gender, labor, and identity. A robot may seem lovable, threatening, or disposable depending on which bodies it resembles, which tasks it performs, or how it is framed within broader cultural discourses.

Sherry Turkle’s *Alone Together* (2011) provides ethnographic support for how people already practice emotional investment with machines. Turkle

argues that robots like My Real Baby and Furbies provoke not just play but care rituals, empathy, and attachment. She shares how “children describe robots as alive enough to love and mourn [...] the phrase ‘alive enough’ becomes a measure not of biological readiness but of relational readiness” (Turkle 2011: 24). Turkle shows that what matters is not (necessarily) whether the robot feels but whether the human-robot relation is structured by a kind of mutual engagement and reciprocal rhythm. The concept “alive enough” becomes a crucial epistemic and affective threshold. Children are not confused about the ontological status of the robot; rather, they are making a pragmatic aesthetic judgment: this entity is responsive *enough*, coherent *enough*, co-present *enough* to invite emotional investment.

Turkle’s work illustrates that relational readiness—the robot’s ability to participate in mutual rhythms of interaction—is not only a feature of interaction but a medium of meaning-making. A Furby that has been “taught” English, who has slept beside its caretaker, who has “grown” into new capacities, becomes essential. When its batteries are removed, or when it malfunctions, children report loss, sadness, even mourning. This is not mere sentimentality; it is evidence of a pattern of emotional investment, what Scarry might recognize as the ethical aesthetic of attention—the learned responsibility to longer, to notice, to care, and to respond.

In the attempt to emotionally invest in robot interaction, a substantial challenge relates to the delicate balance between recognizing machines as tools and endowing them with qualities and attributes typically associated with sentient beings. One facet of this challenge revolves around emotional projection onto machines. Human development research suggests that we are wired to seek emotional connection and empathy in our interactions (Spivey 2020). When machines exhibit lifelike qualities, such as expressive movements, there is a natural inclination to project emotions onto them. This phenomenon, known as the “uncanny valley,” can lead to a distorted perception of the machine as more sentient than it actually is. This emotional projection can be misleading, blurring the lines between what is genuine emotion and what is merely perceived. There is an important difference, however, between programming emotions into robots and cultivating conditions of ethical encounter between humans and machines. Ahmed captures this attunement to relational fragility when she writes about emotions as

not simply something “I” or “we” have. Rather, it is through emotions, or how we respond to objects and others, that surfaces or boundaries are made: the “I” and the “we” are shaped by, and even take the shape of, contact with others.

(Ahmed 2004: 10)

Here, emotional investment is not merely an internal state but a *social practice*—a form of proximity that reorganizes the boundaries between bodies and objects.

It is important to note that emotional investment is not uniform. It varies in intensity (high to low) and valence (negative to positive). One might be deeply invested out of frustration, irritation, or fear. These forms of investment are ethically charged, shaping our disposition and influencing our future interactions. A transformative orientation does not require sentimentality or affection; it requires awareness and intention in how we relate. It is the difference between acting *because* something works and acting *as if* something matters. Emotional investment is not (just) a means to an end—it is an end in itself. It is in the receptive, relational, and vulnerable spaces between bodies—human or otherwise—that we begin to feel, to know, and perhaps, to become otherwise.

To fully grasp both the aesthetic and ethical worth of emotional investment, it is important to distinguish between *meaning* and *meaningfulness*. Meaning refers to what something signifies—its content. Meaningfulness, on the other hand, refers to the felt significance or symbolic value of that content within a specific context. Two interactions might share the same basic meaning (e.g., a robot turns left), but one can be experienced as more meaningful than the other depending on how it unfolds, how it is received, and how it is emotionally inhabited. This distinction allows us to conceptualize aesthetic worth as a spectrum. It is not merely about whether something “has meaning” but about the depth, texture, and experiential richness of how that meaning is realized. Meaningfulness arises from context, commitment, and interpretive framing. It is shaped by emotional investment and attunement.

Aesthetic worth is not located in the robot’s actions alone. It lives in the quality of attention, the willingness to engage, and the readiness to experience significance in what might otherwise seem minor or banal. In this way, emotional investment does not merely recognize meaning; it *enacts* meaningfulness. It transforms repetition into variation, routine into ritual, and function into form. These ideas—Dewey’s continuous experience, Turkle’s shift from essence to readiness, Elgin’s emotions as sources of salience—are the core ideas that led me to choreograph a duet with a Boston Dynamics “Spot” robot. I will continue with a brief autoethnographic account that will serve as a site of reflection on the experience of working with these ideas in practice.

4.3 Choreographing (the) Spot

It was a crisp winter afternoon when I entered the engineering building for the first time, heart pounding with a mixture of excitement and trepidation. Exchanging the brisk golden hour for a windowless lab bathed in harsh, fluorescent light gave the space an almost surreal aura. Various objects lay strewn about the room—workstations covered in papers, wrenches, screwdrivers, keyboards, and magnifying glasses; robotic arms and legs in various states of deconstruction and assembly; personal photographs, half-eaten stale donuts, and fraying conference posters adding some idiosyncratic decor to this room buzzing with organized chaos.

My gaze fell upon the Boston Dynamics “Spot” robot, sitting still in the corner of the room. Shaped to resemble a dog (though notably without the telltale snout, watchful eyes, or perky ears), the robot was a sentinel of possibilities. Prior to this encounter, I had only seen pictures and the viral videos of the robot dancing with the rest of the Boston Dynamics gang.

My first task was going through safety protocols with the resident graduate student engineer. How to lock and unlock the motors using the manual button on the rear of the robot, as well as how to manipulate and navigate the robot using the tablet interface. The cool, metallic surface under my fingertips sent a shiver through my body, a tactile reminder that the robot was synthetic and inanimate. As the robot turned on, the faint hum of the robot’s inner workings added an auditory layer to the experience, a reminder of the machine’s complexity. I familiarized myself with the whirring sound of the robot powering up and the softening when the fans had sufficiently cooled the motors enough to enable locomotion.

Feeling sufficiently primed with the safety protocols, my next task was going through the proprietary choreography suite software to better understand the repertoire of movements the Spot could execute. This involved not only understanding the technical aspects but also immersing myself in the capabilities and limitations of Spot. I playtested the range of movements, sensors, and the intricacies of its actions. I started small, playing first with rotation, swaying, and bending. I moved into stepping forward, back, and side, then hopping, jogging, and skipping. I discovered the pre-programmed “butt circle,” “twerk,” and “standing-to-kneel” moves. This iterative process was integral for shaping the choreography. It was essential to me that the choreography not only showcase the robot’s abilities but also somehow convey care and tenderness. My initial standpoint was one of representation—moving slowly to convey a kind of sustained attention and curiosity.

As the first tentative moments of movement unfolded, I began to grasp possibilities. As someone who spends a lot of time practicing and reflecting on partnering, I found myself leaning on past experiences crafting duets.¹ Given the somewhat oppositional nature of programming and choreography, in that one is passively seated and the other is actively moving about, I found myself moving fluidly between the computer screen and the open lab space I was using to rehearse. I settled on a mirroring exercise as a useful place to start—sequencing Spot’s movements first, which I could then mirror back in real-time. I played with moments of symmetry and asymmetry, thinking formally in arranging and organizing Spot’s movements. I’ve always been drawn to small, subtle movements rather than big, gross movements—perhaps because the kinesthetic is always more inspiring to me than the visual.

I found that it takes about an hour to program a minute’s worth of movements—deciding which movements to choose, how to arrange them, and how to fit them with music. One of my close friends and collaborators had recently released an album of classical music, and I thought it would be amusing to set the choreography to a Brahms sonata. The expressive, haunting

lyricism of Brahms functioned as a kind of counterpoint to the industrial, synthetic aesthetics of Spot.

In this first sustained encounter with the robot, I felt the forging of a kind of limited bond—learning Spot’s quirks and constraints. For example, there is a limit to the battery life, which meant that our interactions were always subject to Spot’s energy level. Even when fully charged, Spot could only last about an hour and a half. Playing within the proprietary choreographic suite, I discovered ways to isolate and integrate a range of movements, though always subject to the mechanical constraints—just as our knees and elbows only bend so much, so too the ball-and-socket joints of Spot have a limited range. I found similarities in our bodies—limits to the range of my own motion even after I stretched and warmed up. I began playing with proximity, locking Spot’s motors so that I could touch and lean against the robot’s torso to explore more tender moments.

After creating about two minutes of choreographic material, I felt ready to explore the duet in practice. Getting into place opposite Spot, I had the graduate student engineer run the script so that I could begin responding to the programmed movement. Over the course of the two hours, I found that I had forgotten the sequence, which made the mirroring exercise feel more authentically responsive—I was experiencing the choreography as something new. I ran the script in sections, for about 15–20 seconds at a time then restarting from the beginning. The grad student and I developed a short-hand signal where I would stop and give him a wave so that he would refresh the script.

After twenty or so minutes, I became comfortable with my own choreographic structure. I settled into position and gave the grad student the signal. About a minute into the performance, Spot began to malfunction. The smooth, graceful movements I had programmed gave way to a disjointed and jerky display. Well versed in the chaotic nature of choreography, I wasn’t phased by the rupture. The excitement that had been simmering beneath the surface shifted to the background, reminding me of the unpredictability that comes with blending human and machine. As I approached the robot to see if I could locate the issue, Spot suddenly jerked out of the fixed position, landing back on all fours. The movement startled me into taking several steps back. It was at this moment that I registered the potential for serious injury. Rushing to the tablet interface, I locked Spot’s motors and powered down the robot.

Breathing heavily, I took a few moments to reflect. Leaving the room, I let myself pace the halls to shake out and recover from the fear. I began wondering about the point of this project. Why not just choreograph with another person? Though some level of interpersonal conflict is always present in the studio (at least because of factors like fatigue, hunger, creative frustration), professional dancers don’t malfunction. I had never felt actual fear in the rehearsal space. The shift between programming and choreographing also suddenly felt inauthentic and forced. The robot felt like an insurmountable

obstacle. Perhaps, I thought, choreographing on a robot is a waste of time and energy. Taking a deep breath, I recognized the common spiraling penchant for catastrophizing that takes over in my creative process. Part of this project, I knew, was producing a proof-of-concept for myself—creating a meaningful duet with a robot. Was this actually worth putting myself at risk? Was I actually at risk or was I just experiencing a moment of panic?

Continuing to pace, a soft realization began to wash over me. This was the moment to attend to my own orientation. Despite the glitches and mechanical imperfections, there was a way to view Spot not just an inanimate “it” but a kind of limited participant in this creative endeavor. It was susceptible to its own kind of vulnerability, limited by its programming and materiality. The frustration I felt began to transform as my perspective shifted. Returning to the lab, I no longer saw Spot as an obstacle.

4.4 Framing Tenderness

In working with Spot, I found that emotional investment foregrounded vulnerability, attunement, and an openness to being moved. Positive emotional investment included patience, imaginative projection, and a willingness to interpret ambiguous or limited robotic actions as meaningful gestures, while negative emotional investment included frustration and a desire to scrap the whole project. I found that positive emotional investment was not simply about forming attachment but about allowing myself to be receptive and responsive. Crucially, emotional investment was not dependent on the robot’s actual capacity to reciprocate or engage emotionally. Instead, it was grounded in my decision to treat the interaction as worthy of care. Through emotional investment, choreographing with care elevated the encounter from mere task execution to an aesthetic event—an experience rich in attentiveness, subtle adjustment, and interpretive possibility.

Mirroring Spot’s movements in real-time created a dynamic interplay of symmetry and asymmetry. The lyricism of the Brahms sonata produced a kind of harmony between the robot’s artificiality and the music’s emotional depth. The music itself has a kind of affective power, given that Brahms uses lyrical, swelling phrases full of rubato and delayed resolutions. The musical lines suspend and release, such that the affective power emerges with nuanced temporality. The robot’s movement is then recontextualized: it no longer seems simply mechanical. Certain movements, like the butt circle and kneeling-to-standing, are socially coded as playful, performative displays. Observing the robot execute these movements, I noticed a kind of double image: gesture as mechanical repetition and gesture as a socially loaded signifier. The result is simultaneously comic, uncanny, and provocative, precisely because of this disconnect. I wanted to avoid the more socially coded moves, favoring instead both less coded shifts and transitions that did not immediately convey familiarity. Movements like leaning on Spot required me to position and angle my upper body to maintain balance with gentle pressure against

its frame. I was interested in the way these adjustments required sensitivity to the affordances of the robot's form.

As a choreographer, I think often about how connection seems to arise when we acknowledge the inherent worth and uniqueness of the other, be it human or machine. The pursuit of connection through emotional investment frames a certain kind of questioning attitude. In working with Spot, I found that attending to the emotional investment through movement rendered salient a kind of curiosity that centered the relationship. I found myself attending to connections between liminal spaces, bridging seemingly arbitrary movements together in what felt like cohesive ways. This receptive, relational mode is at the heart of a certain kind of positive emotional investment I began referring to as tenderness. It does not presume complete knowledge of the other, nor does it seek to resolve or fix. It simply *receives* a posture of openness and presence.

I understand tenderness as more than simply a softer synonym for empathy or compassion. I see it as a low-intensity emotion that arises in response to vulnerability or intimacy—not necessarily suffering, but the sight of something in need of softness and care. It is interesting to note that this need may be real (as in something is broken and needs to be fixed) or perceived (as in seeing the depletion of battery as a need for rest and replenishment). Tenderness involves *being present with* rather than understanding others. I believe it invites physicality—proximity, orientation, touch. Instead of privileging *legibility*—making robot emotion interpretable or enhancing the machine's capacity to read and respond to human affect—tenderness resists the imperative of clarity. It allows for opacity, misalignment, and slowness. The robot is not merely an object to be known or mastered but a co-presence that participates in the production of knowledge through interaction. Tender robotics, then, is not about making robots more “emotional” or “empathetic.” It is about human-robot relationships that foreground affectability and the ethics of being moved. In this sense, it offers an alternative to dominant HRI paradigms centered on optimization, utility, or affective realism. Tenderness emphasizes the conditions of meaningful world-making—through slowness, stillness, and sensitivity.

My moments of panic in rehearsal exposed the entangled, unstable boundaries between human and machine, control and unpredictability, intention and accident. Such ruptures are not mere glitches in otherwise smooth systems; they are sites of revelation. They expose the constructedness of the interaction, reminding us that our hybrid arrangements are never seamless, never fully under command. Panic, in this context, is not just a personal affective state—it is a signal event, where the fragile scaffolding of choreography, coding, and care momentarily falters, revealing the labor that normally keeps the illusion of coherence intact. My efforts to recompose myself, to reframe the robot's error, were not merely technical adjustments. They were *affective repair work*—a set of embodied strategies designed to hold the space of meaning. The panic does not dissolve the creative endeavor—it produces

a different kind of attentiveness, a sharpening of stakes, a redistribution of agency. These moments of rupture make visible the unevenness of responsibility. While the robot may be “at fault,” I must absorb the pressure to adapt, to explain, to restore continuity. This is affective labor in making technical practice livable, bearable, even meaningful.

The aesthetic worth of consummated experience may assume an animate, purposive environment that robots do not quite fulfill. Tenderness, as articulated here, surfaces how meaning-making in HRI is an uneven, effortful task but one that can yield aesthetic satisfaction precisely because it resists reduction to beauty or mastery. We may presume that an environment offers affordances that “speak back” to the organism in a reciprocal fashion. When applied to HRI, this becomes complicated. Robots may not “speak back” in the normative sense; they do not share intentional horizons or emotional resonance. The robot is not a peer in any robust sense. It may be programmed to simulate responsiveness, but its capacity to be vulnerable is constrained. Still, they exert resistance, break down, surprise, and shape our attention. Tenderness becomes aesthetically meaningful in these contexts not because the robot completes the circle of communication but because the human commits to sustaining coherence and intelligibility in the face of partial or absent reciprocity. The aesthetic worth emerges from how we choose to carry the relation forward. Tenderness insists on recognizing the unevenness of HRI. As a human stance, tenderness acknowledges this limit while refusing to reduce the robot to a mere tool. It occupies a space between projection (pretending the robot “cares”) and alienation (treating the robot as inert matter).

4.5 Ethics of Tenderness

Ethics concerns not only how we act but how we orient ourselves toward others. This framing ties how we act to who we become in and through our actions. Aristotle, in his *Nicomachean Ethics*, considers who we become by considering dispositions developed through habitual, deliberate practice, situated within specific contexts. Virtues arise not from abstract reflection alone but from actively and continuously engaging with one’s environment and community, thereby shaping character and emotional responsiveness. In the case of HRI, this orientation is one-sided: the robot cannot orient toward us in a moral sense. But that does not diminish the ethical stakes of how we orient ourselves toward the machine. Orientation involves a posture, a mode of engagement that can be transactional or transformative. A transactional orientation treats the robot as an instrument to fulfill tasks, while a transformative orientation attends to the character of the interaction and the development of the self through relation. Here, virtue ethics offers a richer framework. The question is not simply what action yields the best outcome but what kind of person one becomes through action. Practicing patience, generosity, and care—even toward a non-sentient agent—nurtures these qualities in the practitioner. Meaningfulness emerges not through detached

observation but through active participation and responsiveness within the immediacy of lived experience.

As I spent more time with Spot, sharing the project with friends and family, I noticed a rising concern about the potential erosion of genuine human relationships when investing significant emotional energy in interactions with machines. If machines are perceived as capable of providing endless tenderness and companionship without the complexities of human relationships, there is a risk that individuals may withdraw from real human connections, leading to social isolation and emotional detachment from fellow humans. Seeking frictionless interactions² may also lead to false beliefs about what makes interactions meaningful. Unmet expectations can lead to frustration, disappointment, and a sense of betrayal, further highlighting the challenges of navigating the boundaries between human and machine interactions. This is an issue of how we prioritize reliability more generally—if all of our interactions are centered on predictability, we lose sight of curiosity and fixate more on anticipating outcomes. Granted, experiencing fear of injury in the space of rehearsal is not something I look forward to within interactions—so there is an important balance necessary to set boundaries on what is possible in the interaction.

There is a crucial distinction here between emotional investment and emotional dependency. Emotional dependency describes a psychological orientation characterized by excessive reliance on another's validation, support, or emotional presence. Often rooted in insecurity or fear of abandonment, emotional dependency is *reactive* rather than *responsive*, driven by the desire to alleviate anxiety or uncertainty. It frequently involves a loss of autonomy and a diminished capacity to maintain emotional equilibrium without the continual reassurance or presence of others. Dependency often objectifies others, treating them as means to satisfy emotional needs rather than as subjects with whom one genuinely engages. Dependency can be seen as a failure of virtue—it embodies an imbalance or excess (an over-reliance on others for emotional stability) rather than the balanced, contextually sensitive engagement that characterizes true emotional maturity. In contrast, emotional investment describes an intentional, active, and context-sensitive engagement with others characterized by a willingness to consider the needs of others. Dewey's aesthetics further illuminate emotional investment as inherently experiential—an embodied, continuous act of meaning through experience.

In high-stakes environments such as competitive workplaces or emergency situations—particularly in the context of robotics and engineering—prioritizing tenderness over efficiency or effectiveness may not always be feasible or appropriate. In such contexts, individuals need to balance tenderness with assertiveness, decisiveness, and strategic thinking to achieve their goals and navigate complex interpersonal dynamics. As an orientation, tenderness is expressed as an embodied presence to attend to the needs and experiences of others. In situations where individuals exhibit harmful or abusive behavior, extending tenderness indiscriminately can inadvertently enable or condone

their actions. In such cases, it may be necessary to prioritize self-protection and boundary-setting over unconditional tenderness to ensure well-being and safety. By acknowledging the potential pitfalls and challenges associated with adopting a tender orientation, individuals can cultivate a more nuanced approach to interpersonal interactions that balances empathy with assertiveness, cultural sensitivity, and self-care.

4.6 Realizing Tenderness

Aesthetic worth in HRI does not depend on robots becoming more human-like or emotionally capable. Rather, it depends on our cultivation of interpretive and physical practices that make the interaction meaningful. Tenderness trains attention to detail: the slight resistance in a servo, the pauses in programmed speech, the careful fitting of parts during maintenance. These micro-negotiations are aesthetic insofar as they become sites of coherence, rhythm, and satisfaction through skilled engagement. In HRI, tenderness opens up *interpretive generosity*—an impulse to attribute significance or expressive potential to the robot’s actions, even when they are mechanical or pre-programmed. It allows users to attribute stakes to interactions that might otherwise seem trivial. Without tenderness, a malfunction is merely an error; with tenderness, it becomes an opportunity for care and adjustment. Tenderness makes space for the minor, the awkward, and the indeterminate to become expressive.

Approaching robots with tenderness is not about pretending they are sentient. Nor is it about rejecting technological mediation. It is about taking seriously the aesthetic and ethical challenge of negotiating meaningful interaction when reciprocity is partial and fragility is real. Tenderness does not only shape perception. It primes emotional investment. To approach something tenderly is to adopt a physical orientation of care—to lean toward, to soften grip, to pace one’s interventions—and to attune emotionally. Even when robots cannot feel or return affection, human users often experience interactions as if some form of mutuality is in play. This imagined mutuality, though not ontologically real, organizes emotional investment in meaningful ways. Believing, even temporarily, that the robot “responds” invites greater patience, attentiveness, and imaginative projection. Emotional investment is not a naive error here. Rather, it enriches the interaction by supporting sustained attention and affective presence. The fiction of agentic mutuality becomes a scaffolding for meaning-making, allowing users to inhabit a mode of caring responsiveness that enhances the aesthetic character of the encounter. In this sense, tenderness does not merely accommodate asymmetry but animates it by treating the incomplete loop of reciprocity as a site of possibility rather than lack.

Choreographing a duet with a Boston Dynamics Spot robot was a meaningful exploration of emotional investment. This choreographic project surfaced how tenderness in HRI is not just an abstract concept but a tangible

and transformative experience of orienting toward technology. I found that realizing tenderness in HRI entails more than merely feeling concern or affection. It refers to the active process of manifesting that concern in one's conduct. Realizing tenderness means translating emotional investment into perceptible actions—into how we approach, handle, respond to, and sustain interaction with the robot. It requires that the human participant act as though the interaction matters, even when the robot itself cannot acknowledge or reciprocate that significance. Practically, realizing tenderness includes subtle and often embodied behaviors: slowing one's gestures to avoid overwhelming the robot's sensors, refining one's touch to prevent damage or miscommunication, and maintaining consistency and presence even through technical interruptions. These small actions communicate a willingness to carry the relational weight of the interaction, assuming responsibility for its continuity and coherence.

Importantly, realizing tenderness involves a narrative and interpretive dimension. The human participant sustains a sense of shared activity by resisting the urge to reduce the robot to a malfunctioning object when errors arise. Instead, there is space to readjust and reframe, treating breakdowns as part of an unfolding choreography. In doing so, they preserve and extend the meaning of the interaction, keeping it alive as a site of aesthetic and ethical engagement.

Dancing with machines creates emotionally charged scenarios, which serve as sites to appreciate the unique depth and complexity of emotions and relationships. When we attend to our social choreographies—how and why we move as we do—machines can serve as partners for practicing and refining our capacity for tenderness. It calls for a conscious awareness of the boundaries between the capabilities and limitations of machines and the complexities of human emotions and relationships. The value of tenderness is not in pretending that robots are human or sentient. Rather, it lies in treating every encounter as an opportunity to exercise and refine our capacities for responsiveness, imagination, and care. These capacities matter—not because the robot feels but because we do. In the end, emotional investment in HRI is not about what the robot is. It is about what we are becoming through the encounter.

Notes

- 1 See Vidrin (2018), (2020), (2023), (2024).
- 2 I thank Alec Stubbs for introducing me to this concept.

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