

# Sex With Robots and Human-Machine Sexualities: Encounters Between Human-Machine Communication and Sexuality Studies

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## Abstract

Sex robots are a controversial topic. Understood as artificial-intelligence enhanced humanoid robots designed for use in partnered and solo sex, sex robots offer ample opportunities for theorizing from a Human-Machine Communication (HMC) perspective. This comparative literature review conjoins the seemingly disconnected literatures of HMC and sexuality studies (SeS) to explore questions surrounding intimacy, love, desire, sex, and sexuality among humans and machines. In particular, I argue for understanding human-machine sexualities as communicative sexuotechnical-assemblages, extending previous efforts in both HMC and SeS for more-than-human, ecological, and more fluid approaches to humans and machines, as well as to sex and sexuality. This essay continues and expands the critical turn in HMC by engaging in an interdisciplinary exercise with theoretical, design, and use/effect implications in the context of sex robots.

**Keywords:** human-machine communication, sexuality studies, sex robot, assemblage, more-than-human

*Contemporary academic discourse needs to move away from the idea of sexuality as a subject position, nicely and relatively stably wrapped under the epidermal cover of an individual human body, and develop instead a vocabulary about affective intensity, flux, and the sensual assembling of human and nonhuman elements into a pleasure machine.*—Lambevski, 2004, p. 305

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For an introductory price of less than \$10,000, interested customers may purchase “affordable” sex robots from Abyss Creations’ RealDoll, one of the leading manufacturers of sex robots. At the time of this writing, most sex robots consist of high-end sex dolls equipped with an artificial intelligence (AI)-enhanced robotic head. Fully robotic sex bots are nonetheless in the works by many companies worldwide. The case of sex robots opens particularly interesting questions that reverberate across many domains of society, from companionship and intimacy to therapeutic usage and questions regarding the (il)legality of child sex dolls (e.g., Chatterjee, 2020). Opinions range from calls for abolishing sex robots (Campaign Against Porn Robots, n.d.; Richardson, 2016a, 2016b) to heralding the many social and individual benefits (Levy, 2007a), with a broad range of opinions located somewhere between these extremes (e.g., Ess, 2018).

In this essay, I explore human-machine sexualities at the intersection of human-machine communication (HMC) and sexuality studies (SeS). My aim in this essay is to engage in a comparative literature review that seeks to elaborate on the interdisciplinary intersections between the work in these two different fields, demonstrating how and why research on the subject of sex robots can inform work in HMC and how efforts in HMC can provide new insights for the study of sex robots, particularly from an SeS perspective. In doing so, I respond to Döring et al.’s (2020) call to increase the degree of theoretical elaboration of human-sex robot relations. With the arrival of interactive and communicative sex robots, I ponder the question, How can the bodies of literature in HMC and SeS enrich each other in the context of sex robots? In particular, by drawing on SeS in conjunction with HMC, I ask: In what ways do human-machine sexual relations alter our understanding of sexuality? What happens to our understanding of love and eroticism, intimacy and sexual closeness when the other is AI? In what ways does humans’ interaction with sex bots affect ontologizing processes, or the drawing of boundaries between humans and machines (Fortunati & Edwards, 2021)? In conjoining the emerging field of HMC with the rich, critical, and incoherent body of SeS, I punctuate how machines reconstitute sexualities and work the fuzzy edges in response to Hearn’s (2018) question, “what are the boundaries around [human] sexuality?” (p. 1368). More directly, what exactly constitutes the boundaries of human sexuality if the sexual partner is nonhuman?

This work continues earlier calls for mobilizing a critical perspective in HMC. Particularly in the realm of human-machine encounters where humans interact with machine-others in the creation of meaning (Fortunati & Edwards, 2020; Guzman, 2018), a critical communication perspective attunes us to the ways in which sociohistorical and cultural systems shape the ways in which humans make sense of machines (Dehnert & Leach, 2021). By turning to the rich context of human-machine sexualities and sex robots, I seek to further flesh out what a critical communication perspective to the study of machines and their co-creation of meaning with humans entails. In doing so, I argue that interdisciplinary approaches are necessary to fully capture the societal implications of machines, which I

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1. In July of 2021, the organization formerly known as *Campaign Against Sex Robots* announced its name change to *Campaign Against Porn Robots* to reflect that, according to the campaign organizers, sexual activities involving robots are not “actual” sex but rather reflect processes of pornification and objectification (Campaign Against Porn Robots, n.d.; see also Danaher et al., 2017). The distinction between porn and sex related to robots seems to indicate the safeguarding of (human-to-human) notions of sex understood in the context of authenticity, intimacy, love, and connection, which are bypassed by the more-than-human framework of communicative sexuotechnical-semblage put forth in this essay.

demonstrate by bringing SeS in conversation with HMC. HMC offers a rich contextual framework for making sense of human-machine sexualities, and sex robots constitute an intriguing context for investigating the boundaries of machines as communicative others. By conjoining HMC and SeS, I investigate where one draws the boundaries between sex robots, sex toys, and other emerging technologies in the broader realm of the sexual and between (sex) robots and (a/sexual) humans.

As such, the main goal of this essay is to argue that the case of sex robots illustrates the necessity for critical approaches to human-machine relations (in HMC) and to sexuality (in SeS) writ large. I begin this argument by reviewing the ways in which machines are cast as communicative others and further outline the implications of a critical communication perspective to HMC. After I tentatively differentiate sex robots from other technologies, I specifically utilize interdisciplinary more-than-human approaches to both machines and sexuality, extending Flore and Pienaar's (2020) notion of sexuotechnical-assemblage to describe the distinctly technological dimension of sexuality in human-machine relations. Further, by recasting sexuality as assemblage, I follow Fox and Alldred's (2013) approach which "shifts the location of sexuality away from bodies and individuals, toward the affective flow within assemblages of bodies, things, ideas, and social institutions, and the (sexual) capacities produced in bodies by this flow" (p. 770). Conjoining this work, and thereby extending Martinez's (2011) attention to *communicative* sexualities, I argue for describing human-machine sexualities as communicative sexuotechnical-assemblages. Finally, recasting sexuality in these geographic registers of relationality and assemblage responds to ongoing critiques of sexual science's continued exclusion of and violence toward sexual others via pathologization (Flore, 2014), compounded colonization (Balestrery, 2012), and normalization (Irvine, 1990; Somerville, 1994). I conclude this essay with theoretical and design implications.

## HMC and the Machine-Other

HMC constitutes a rapidly growing field within the broader realm of communication studies focused on the ways in which humans interact with machine-others. What sets HMC apart from related fields is the focus on the communication processes between humans and machines in which the machine is not rendered as a channel through which humans communicate, but as "a communicative subject" with whom humans interact (Guzman, 2018, p. 12; Fortunati & Edwards, 2020). I use "machine-others" (rather than "machine" itself) to highlight this communicative subjectivization of the machine in HMC encounters. Understood as "*the creation of meaning among humans and machines*" (Guzman, 2018, p. 1, emphasis in original), HMC addresses topics such as agency (Banks & de Graaf, 2020), ontological boundaries (Edwards, 2018; Guzman, 2020), and the role and applicability of human-to-human scripts to human-machine encounters (Dehnert & Leach, 2021; Westerman et al., 2020).

In the context of HMC, the Computers Are Social Actors (CASA) paradigm—and, more recently, the Media Are Social Actors (MASA) paradigm (Lombard & Xu, 2021)—and constructivist approaches have been utilized to describe the ways in which humans relate to and interact with machines (e.g., Gambino et al., 2020; Nass & Moon, 2000; Westerman et al., 2020). Roughly (for reviews see Fortunati & Edwards, 2021; Westerman et al., 2020),

CASA/MASA and constructivist approaches explain the ways in which humans apply previously learned communication scripts to their encounters with machines. Conceiving of human-machine encounters through a Buberian I-Thou framework allows for the application of human-human communication theories to HMC contexts (Westerman et al., 2020). Recently, however, scholars have called for mobilizing a critical communication perspective in HMC to reconsider the ways in which the machine-other is otherized in human-machine encounters, asking questions related to ableism, gendered and sexed dynamics, as well as processes of racialization (Fortunati & Edwards, 2021; e.g., Davis & Stanovsek, 2021; Dehnert & Leach, 2021; Liu, 2021; Moran, 2020).

The context of sex robots offers unique vantage points for furthering critical perspectives in HMC. On the one hand, this context allows for drawing on the rich literature in SeS—where sexuality emerges as a sociohistorical formation, “a vital means of pleasure, interpersonal connection, personal efficacy, and acceptance of one’s body and of self more generally” (Wilkerson, 2011, p. 194). Thus, in addition to previous critical work in HMC, the context of sex robots invites other intersectional markers of difference theorized in SeS, queer and trans (of color) criticism, and feminist and crip theories: In addition to dis/ability, this involves sex, sexuality, gender, race, class, and age, among others.

On the other hand, sex robots allow for exploring the complex implications of communicative sexual machine-others on intimate relations, including major social, legal, political, and ethical implications regarding the role of sex/uality for humans. After all, as Flore (2014) insists, “The birth of the sexual sciences, and the development of sexology and psychiatry, were and remain an attempt to define and delimit the meaning of being *human* itself” (p. 18, emphasis in original; see also Foucault, 1978). Similarly, HMC engages ontological questions regarding the divides between humans, machines, and animals (Edwards, 2018; Guzman, 2020). For instance, although CASA states that humans treat machines as if they were people, “we may not always respond to people in a very interpersonal way,” meaning that human-human interaction is oftentimes heavily scripted (Westerman et al., 2020, p. 403). This opens profound questions about what exactly characterizes human-human relationality and how it differs from human-machine relationality (Dehnert, 2021; Westerman et al., 2020).

In the context of asexuality studies, Flore (2014) argued that “to be human is to be sexual” and outlined the ways in which sexuality is compulsory in the context of the human (p. 19). In the following section, I take up Flore’s and other SeS scholars’ insights regarding the ways in which sexual science and sexology pathologize, otherize, and violently exclude deviance in sexual behavior, orientation, and identity to add to the ongoing conversations on sex robots and their implications. I review existing research on sex robots from an interdisciplinary perspective to highlight the ripe potential of conjoining this body of literature with HMC, specifically punctuating and extending Flore and Pienaar’s (2020) notion of sexuotechnical-assemblage.

## **Sex Robots: A Controversial Technology and/in HMC**

Sex robots are a controversial and highly debated topic in lay and academic circles, including but not limited to legal, ethical, design, feminist, clinical, therapeutic, and other perspectives

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(for a review, see Döring et al., 2020). After conducting their review of interdisciplinary literature focused on sex dolls and sex robots, Döring et al. (2020) conclude that

Predictions of small and/or ambivalent effects might be more realistic [than the dystopian or utopian visions so prevalent in the literature] but are seldom discussed in the academic literature thus far, which seems to mirror some of the hype and scandalization observable in public media discourses. (p. 21)

As one potential explanation for these dramatized perspectives, Döring and colleagues name the fact that many people do not have firsthand experiences with sex robots due to their scarcity and cost. Some scholars project, however, that people will gain significantly more experience with sex bots and, in 2050, it will be not only common for folks to experience sex and love with machines (Levy, 2007a), but that humans might actually have *more* sex with robots than with other humans (Pearson, 2015; see Hauskeller, 2017, for an important critique of such transhumanist visions). In light of these rather bold projections, it is necessary to further our understanding of human-machine sexualities.

Technology and sexuality have been embraced by many scholars, given the myriad ways in which technology—broadly understood as biomedical, biomechanical, and biodigital—is related to sexuality. Scholars have written on technologies in the realm of the sexual, such as pharmaceuticals (Flore, 2018), technology in pornography (Dekker et al., 2021), and sex robots. In the literature on sex technologies, and also in public perception, sex toys emerge as one of the more prominent technologies. Understood as “material objects selected, created, and used to generate or enhance sexual arousal and pleasure in both solo and partnered sex” (Döring, 2021b, p. 1), sex toys include both commercially produced and homemade objects such as vibrators or masturbators. Recent models including wireless sex toys or otherwise digitized and connected sex toys have been the focal point of scholars and designers, usually labeled teledildonics (Flore & Pienaar, 2020). These technologies are marketed as sensory devices that allow for haptic or kinaesthetic interaction between partners across distance, or with the technology that responds to movement and touch. Typically paired with smartphone applications (apps), these devices allow for personalization and recording of personal preferences, promising “to increase sexual performance and pleasure through the algorithmic analysis of data” (Flore & Pienaar, 2020, p. 280). However, critics note that teledildonics reintroduce well-discussed issues regarding sexual safety and normativity. For instance, Sparrow and Karas (2020) argue that teledildonics allow for “rape by deception,” or the risk of being deceived about the sexual partner’s features and/or about which person the user was having “sex” with. Thus, while teledildonics promise increased sexual pleasure and intimacy, these connected technologies raise intriguing questions about intimacy, sexual practices, and human interaction.

But what distinguishes a sex robot from a sex doll, a teledildonics device, or any other sex toy? Cognizant of Fortunati and Edwards’s (2021) insight that “Robots have such a multiform and mutant body that it becomes difficult to talk of robots’ identity as well as of robots’ capabilities” in a general sense (p. 16), and aware of the rapid technological advances in the fields of robotics and AI, any attempt at defining sex robots must inevitably be incomplete and tentative. Moreover, definitions and designs vary, particularly regarding the role and prominence of AI and other robotic features of sex robots. This also includes

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differences in the level of sophistication as it relates to the AI personalities being sold to customers across various models. Current technology is rather rudimentary (Döring et al., 2020); however, sex robots currently on the market should not be confused with advanced machines depicted in science fiction, which are oftentimes imagined having sentience, consciousness, free will, and the like. In a recent attempt at defining sex robots, Döring (2021a) offers “human-like, full-body, anatomically correct, humanoid service robots of different materials, technologies, and price ranges that are designed and used to generate or enhance sexual arousal and pleasure in both solo and partnered sex” (p. 1). What sets sex robots apart from sex dolls, then, is that they are “equipped with sensors, actuators, and artificial intelligence” (p. 1)—in short, some sort of automated or mechanical technological features that allow the sex robot to move, talk, or otherwise interact with the human user.

In the case of the aforementioned Abyss Creations’ RealDoll, for instance, customers can purchase AI-enhanced, robotic heads that can be added to sex dolls. Users can customize their sex dolls/robots in many ways, including body shape, skin tone, eye color, make-up, face, hair, and more. The AI-enhanced head allows for users to engage with their sex robot in various ways, including conversation, and the robotic head includes features such as eye movement, facial expression, as well as neck and mouth movement. With the accompanying app, users can fully customize their sex robot’s personality, allowing the AI to learn the user’s interests and preferences. RealDoll’s dolls and robots are available as male, female, and transsexual models. Users can even purchase Bluetooth-enabled haptic vaginal sensors for the dolls which “can detect touch, movement, and transitions from mild arousal to orgasm” (RealDoll, n.d.a). In short, most contemporary sex robots are sex dolls enhanced with very limited AI and robotic features, oftentimes limited to specific body parts (head, vaginal sensors), and with limited interactive capabilities (conversation, eye movement, haptic feedback). Nonetheless, compared to sex dolls, these more interactive technological capabilities of sex robots are imagined leading to potentially rich relationships and shared, communicatively constructed meaning, where expected capabilities of sex robots involve hearing, recognizing objects, talking, or even taking initiative, among others (Scheutz & Arnold, 2016). The current sex robot market is advancing rapidly—as is the technology—but difficult to review, not least given the vast social stigma associated with this technology and its users. It is important to note that relations with each product differ, given variance in robotic capabilities, AI affordances, levels of sophistication, and user characteristics.

Notwithstanding these rather limited robotic and interactive functions of contemporary sex robots, scholars have expressed a variety of concerns and hopes in relation to sex robots (for reviews, see Döring et al., 2020; González-González et al., 2021). Although sparked by transhumanist researchers like Levy (2007a), the debate on sex robots has broadly considered domestic, commercial, and therapeutic use of sex robots (Döring et al., 2020). As such, target audiences and potential uses of sex robots vary, which shapes the production and design of sex robots (see Harper & Lievesley, 2020). These debates are additionally complicated by the “purely speculative” nature of claims about current and future effects as well as potential benefits and harms of sex robots and the scarcity of empirical studies thus far (Döring et al., 2020, p. 2). In addition to several edited collections (e.g., Bendel, 2020; Cheok et al., 2016; Cheok & Zhang, 2019; Danaher & McArthur, 2017; Zhou & Fischer, 2019) and monographs (e.g., Levy, 2007a), scholars have written about sex robots

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related to their conceptualization and theory (e.g., Danaher, 2017a); engaged in legal and ethical considerations related to rape (e.g., Sparrow, 2017) or child robots (e.g., Chatterjee, 2020); investigated humans' perceptions of and attitudes toward sex robots (e.g., Middleweek, 2021; Scheutz & Arnold, 2016, 2017); examined potential therapeutic use of sex robots including health implications (Cox-George & Bewley, 2018) or potential use of sex robots for persons with disabilities (e.g., Fosch-Villaronga & Poulsen, 2021); critiqued sex robot representation in art and media (for a review see Döring & Poeschl, 2019); and have considered design questions (e.g., Danaher, 2019a).

Interestingly, Döring et al. (2020) did not report studies on sex robots conducted from a communication studies perspective, highlighting the need for communication scholars to contribute to this broad context and diverse literature. That is, with their focus on how meaning is created in human-machine interactions, HMC scholars can provide unique and novel insights into the characterization and understanding of sex robots. Thus, theorizing within HMC suggests an alternative perspective to what sets sex robots apart from adjacent technologies such as sex dolls, teledildonics, and other sex toys. In fact, as Döring et al. (2020) report, the current sex robot literature “often falls back on binary thinking” when it comes to conceptualizing sex robots:

It categorizes the current sex robot as an inanimate object and mere masturbation aid without any sociability and is only willing to ascribe sociability to future imagined sex robots that are advanced to the point of indistinguishability from humans. Hence, the literature on sex robots often misses the key point that robots are more than mere masturbation aids due to anthropomorphization and that they are meaningful and possibly helpful precisely because they are not substitutes for real humans but are sociotechnical entities for parasocial use and play. (p. 20)

HMC has a lot to contribute in response to this diagnosis, given the ongoing theorizing of human-machine relationships with a focus on meaning-making in the field. Moreover, ongoing scholarly efforts in the CASA/MASA paradigms as well as ontologizing efforts (Edwards, 2018; Guzman, 2020) within HMC offer ample opportunities to contribute to research and theory of sex robots. In fact, recent efforts for a critical turn in HMC (Fortunati & Edwards, 2021) and posthuman perspectives (e.g., Betlemidze, 2022; Dehnert, 2021) provide useful theoretical backdrops for exploring sex robots and how human-machine sexualities alter our understanding of humans, machines, and sexualities. In the next section, I elaborate how these perspectives support understanding human-machine sexualities as communicative sexuotechnical-assemblages.

## Human-Machine Sexualities as Communicative Sexuotechnical-Assemblages

This essay is not the first attempt at connecting more-than-human thought and other close relatives, such as posthumanism, new materialism, vital materialism, or object-oriented ontology to human-machine interactions (e.g., Betlemidze, 2022; Dehnert, 2021; Dehnert & Leach, 2021; Kubes, 2019; Ornella, 2009). For instance, in her critique of Richardson's

absolute stance against sex robots (Campaign Against Porn Robots, n.d.), which is built around a normative conception of “real sex,” Kubes (2019) highlights the hidden, normative assumptions regarding “proper sex” and “proper love,” and asks profound questions: “Does loving and feeling loved necessarily require its object to ‘love back’? Or does it suffice, when the loving person *assumes* that their love is shared? I am leaning toward the latter” (Kubes, 2019, p. 4, emphasis in original). More directly located within a philosophical and ethical approach to HMC, scholars have described what Gerdes (2015) refers to as the social relational turn, specifically as it relates to the moral consideration of robots. Authors such as Coeckelbergh (2010, 2012), Gunkel (2012, 2018), and Gerdes have engaged in an ongoing conversation related to the moral standing of robots, with Coeckelbergh (2010, 2012) and Gunkel (2012, 2018) arguing more strongly for a social relational approach where moral status is not dependent on an entity’s properties but viewed as socially constructed in the situated relationship, and Gerdes arguing for a human-centered framework. As Coeckelbergh (2010) argues, for a social relational approach to robot ethics, “moral significance resides neither in the object nor in the subject, but in the relation between the two” (p. 214). Although the question of moral consideration in the case of sex robots is important, as Ess (2016, 2018) demonstrates, these philosophical issues go beyond the scope of this essay. Nonetheless, in asking these kinds of questions, scholarly debates surrounding social relations, new materialism, and other more-than-human endeavors offer profound challenges to fundamental concepts in *both* SeS *and* HMC, questioning the concepts of subject, object, their relationship, their respective agency, and more.

Elsewhere (Dehnert, 2021), I have already engaged in a speculative exercise in what I call machine geographies—more-than-human communication geographies of human-machine encounters. In addition to the philosophical efforts related to the social relational turn described above, I employed geographical registers of agency, aesthetics, and ecology to outline what more-than-human approaches to HMC can look like. This includes, perhaps most profoundly, a recasting of agency in human-machine interactions as “relational, assemblage, fluid, in-between actors, as making-with, as achievement within networks, and becoming,” thereby bypassing any considerations of communicative subject and object (Dehnert, 2021, p. 1154). Resonating with the aforementioned social relational turn, a more-than-human perspective allows for recasting human-machine interaction as relation. By focusing on relationality and the entanglements of humans and machines, scholars are not occupied with drawing fixed boundaries between humans and machines or with determining subject- and object-status in communicative encounters, but can embrace a “shift in focus from epistemological questions—such as what the objects ‘represent’—to ontological questions about the kinds of qualities that they help to materialise or enact” (Flore & Pienaar, 2020, p. 283).

SeS scholars have also called for a similar shift in their respective field to move understandings of sexuality away from person-based definitions. The fields of sexual science and sexology are continuously critiqued by the more humanities- and critical-leaning SeS for medicalizing and “healthicizing” sexuality (notions such as “healthy sex drive” or “healthy sex behavior”), pathologizing and erasing non-normative sexual behaviors and identities, and for the continued ignorance toward the whiteness and racialized cisheterosexism so prominent among social scientific approaches to sex and sexuality (e.g., Balestrery, 2012; Flore, 2014; Irvine, 1990; Manalansan, 2013; Somerville, 1994). Work such as Balestrery’s

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explication of compounded colonization highlight the mutually informing and enforcing, racialized and sexualized ideological paradigms in sexology and sexual science. Efforts by Marxist feminists showcase the intricate connections between market-driven and labor-related notions of sex as a transaction in a neoliberal context, particularly as it relates to consumption (e.g., Miller-Young, 2014; Zatz, 1997). Similarly, studies of racialized sexualities (cf. Ferguson, 2007), specifically Black sexualities of anti-respectability in the context of sex work among Black queer women femmes (Glover & Glover, 2019) or Black women in pornography (Miller-Young, 2014) challenge not only the alive-and-well scientific racism and pathologizing of non-normative sexual subjectivities, practices, and identities, but also call for theorizing from the perspective of those marginalized by normativities constituted around white, cishetero, abled, settler perspectives.

Together, these critical endeavors in SeS understand sexuality *not* as the “biological, psychological and social processes associated with sexual desire, sensation, arousal, attraction and pleasure” (Fox & Alldred, 2013, p. 785n1), but as a sociohistorical formation that is constructed, imbricated by stratified formations of power, and itself a stratifying force on a societal level (Foucault, 1978). Such a shift away from a person-centered approach to sexuality resonates with Martinez’s (2011) musings on the communicative nature of sexuality, the study of which means “to locate the phenomenon of sexuality within the intricacies of our immediate and embodied interconnection with the social and cultural world in which we are situated” (p. 11). Thusly reframed, sexuality is no longer confined to the property of persons nor the “intimate” spaces between people, or around one person individually, but is conceptualized as a fundamental mechanism of and in societies—a social technology in the Foucauldian sense—that both disciplines bodies while opening up space for resistance. In this sense,

sexual agency [is] not merely [understood] as the capacity to choose, engage in, or refuse sex acts, but as a more profound good that is in many ways socially based, involving not only a sense of oneself as a sexual being but also a larger social dimension in which others recognize and respect one’s identity. (Wilkerson, 2011, p. 195)

Additionally, Martinez (2011) highlights that this revisited notion of sexuality “is actualized only by the virtue of communicative processes in which we are always and inescapably *situated*” (p. 11, emphasis in original). Resonating with a social relational turn in the moral consideration of robots (Coeckelbergh, 2012), then, these perspectives prioritize the situated relation in the description of sexuality over entities’ ontological properties.

This challenge to person-based understandings of sexuality and communication, as well as sexual and communicative relations and agency, can be further complemented by Deleuzo-Guattarian (1988) perspectives on assemblage. Drawing from anti-essentialist, anti-humanist, and Deleuzo-Guattarian thought, Fox and Alldred (2013) offer sexuality-assemblage as a theoretical move that overturns anthropocentric specters of sexuality focused on the individual human body. In their thick, sociological rethinking of sexuality as assemblage, they shift “the location of sexuality . . . toward the affective flow within assemblages of bodies, things, ideas and social institutions, and the (sexual) capacities produced in bodies by this flow” (p. 770). This rethinking of sexuality as assemblage, in relational,

ecological, and interconnected ways, resonates strongly with the similar shift in HMC outlined above. Not only do Fox and Alldred draw on similar theoretical bodies of thought, they also apply Deleuze and Guattari's notion of assemblages as desiring-machines to highlight the role of affective flows, processual interactions, and the dissolution of sexual subject-object pairings when shifting to sexuality-assemblage (e.g., Deleuze & Guattari, 1988). Unlike person-based notions of sexual agency, then, Fox and Alldred (2013) consider agency as the "capacity to affect or be affected" (p. 772) and dislocate any considerations regarding sexual object-choice or musings on the object of someone's desire by pointing out that "productive desire makes affect flow in assemblages" (Fox & Alldred, 2013, p. 773). Crucially, this shift toward assemblage allows Fox and Alldred to reconceptualize sexuality as "*the flow of affect in a sexuality-assemblage*," manifesting in two ways: First, sexuality as the "deterritorializing, nomadic and rhizomic flow of affect between and around bodies and other relations" as a sociohistorical formation that suffuses much if not all of social life, and second, in the form of individual sexual desire, as a "territorialization of an impersonal, non-human and nomadic sexuality" (pp. 767–777, emphasis in original). This approach allows for recasting anthropocentric, humanist idea(l)s of sexuality, sexual agency, desire, resistance, and the relevance of sexuality as "a fundamental experience of what it means to be human" (Ornella, 2009, p. 318; Flore, 2014).

In their more-than-human work on "data-driven intimacy" and teledildonics, Flore and Pienaar (2020) adapt Fox and Alldred's (2013) sexuality-assemblage and explicitly connect it to technology such as data, algorithms, and wireless sex toys. They offer nuance to Fox and Alldred's (2013) above conceptualization of sexuality-assemblage and outline what they term sexuotechnical-assemblage, "a term that points to the range of actors and relations imbricated in teledildonic sex [and in human-machine sexualities, I would add], including human bodies and desires, sexual practices, technological devices, internet connections, intimate data, and neoliberal understandings of sexual health" and normative sexual desire, practices, and identities (Flore & Pienaar, 2020, p. 285).

Together, machine geographies (Dehnert, 2021) and sexuotechnical-assemblage (Flore & Pienaar, 2020; Fox & Alldred, 2013) allow for reimaging human-machine sexualities in important and useful ways. First, assembled sexual and communicative (or sexuo-communicative) relationalities between humans and machines ultimately displace questions that seek to investigate the ways in which machines emerge as communicative and sexual subjects in human-machine encounters. This does *not* imply a recurse to casting machines as mere objects or channels of human-human interaction and desire, given that assemblage simultaneously displaces the object. In this way, directionality of both desire and communication in (sexual) human-machine encounters is bypassed in favor of entangled, relational, affective, and aesthetic flows.

Second, adopting the perspective of sexuotechnical-assemblage for human-machine encounters reconceptualizes ongoing scholarly concerns regarding machine agency by displacing humanist attempts at locating agency within the machine. For instance, in their rich treatise on the foundations of erototics (the transdisciplinary field concerned with artificial erotic agents), Dubé and Anctil (2021) describe erotbots as agents by using the "broadest definition recognized and commonly used" in AI, robotics, and machine learning, where "the agency of machines refers to their capability to act intelligently in and on the world to achieve objectives of their own" (p. 1207). Reconceptualizing agency as not inherent to a

machine agent also speaks to the aforementioned social relational turn in the moral consideration of robots. In this vein, communicative sexuotechnical-assemblage focuses on the affective flow between inter-actants in relational, ecological, and assembled relations.

Third, the assemblage-perspective offers generative, alternative conceptualizations in response to, arguably decidedly, anthropocentric entry points into philosophical, ethical, and feminist conversations related to sex robots. For instance, in his ethical musings on the possibility of sex, love, and intimacy with sex robot, Ess (2018) concludes that “sexbots, as zombies lacking first-person phenomenal consciousness, genuine emotions, and (embodied) desire, will only be able to fake emotions” (p. 253). For Ess (2016, 2018), then, due to these shortcomings, it will be impossible to reach “complete sex,” a high ethical standard for sexual relationships which is characterized by mutual desire and respect. Albeit holding a more radical position, the arguments put forth by what Danaher (2019a) calls “anti-sexbot feminism” (e.g., Campaign Against Porn Robots, n.d.; Richardson, 2016a, 2016b) take a similar stand toward what qualifies as proper, good, or authentic sex, which is therefore only limited to human-human sexuality. In response to these arguments, Danaher (2019a) draws on sex-positive feminist perspectives to articulate how we might build better sex robots, rather than follow Richardson and others’ call for restricting them (see also Danaher & McArthur, 2017; Danaher et al., 2017). Pointing out the necessity for feminist insights into the content, process, and context for their creation, Danaher’s (2019a) work represents the potential for conjoining critical perspectives of sex robots with their production. Importantly, an assemblage-perspective as argued for in this essay does not sidestep these important conversations, which matter in the context of child sex robots, for instance (Danaher, 2019b). Rather, it allows for alternative entry points that seek to increase the degree of theoretical elaboration of human-sex robot relations (Döring et al., 2020).

And, finally, by displacing concerns related to subject-object divides as well as notions of individualized agency, the assemblage-perspective both implicates the sociocultural in the intimate, and the intimate in the sociocultural. Returning to Fox and Alldred’s (2013) language of (de)territorializing sexuality, they recognize that, while affective flows of/in sexuality-assemblages are unrestricted, they are often highly limited (“territorialized”) based on individual and sociocultural contexts: “Sexual attraction, sexual preferences and proclivities are . . . territorializations toward particular objects of desire, consequent upon the particular mix of relations and affects deriving from physical and social contexts, experience and culture” (p. 775). As such, an assemblage-perspective is neither naïve toward norms and normativities (or scripts, cf. Dehnert & Leach, 2021) nor forecloses resistance and a rescripting of these cultural norms; in fact, the territorializing, deterritorializing, and reterritorializing dynamics within the sexuality-assemblage allow for resisting, reshaping, and transforming compulsory forms of sexuality (Emens, 2014; Flore, 2014). Therefore, human-machine sexualities as assemblage offer ripe entry points for critical approaches, both from an HMC and an SeS perspective.

## Implications for HMC and SeS

In this comparative literature review, I have conjoined two rather disconnected bodies of literature in an effort to revisit sex robots in/as human-machine sexualities. I argued that, in addition to sensory, robotic, and AI-components (Döring, 2021a), what sets sex

robots apart from other sexual technologies is not so much their status as agents in sexual human-machine encounters, but rather the ways in which humans may relate with them; said differently, their capacity to create meaning with humans in human-machine sexualities, or communicative sexuotechnical-assemblages. In doing so, I respond to not only more-than-human efforts in HMC, but also to calls for fluidifying academic discourse on sexuality (Lambevski, 2004).

## Theoretical Implications

Theorizing human-machine sexualities as communicative sexuotechnical-assemblages by conjoining rather disconnected bodies of literature and theoretical perspectives responds to recent calls for transdisciplinary and interdisciplinary approaches to the study of sex robots (e.g., Döring et al., 2020; Zhou & Fischer, 2020). Collectively, these approaches allow for more nuanced perspectives of sex robots that reject both the utopian visions of unending pleasure with sex robots (Levy, 2007a; Ornella, 2009) and the dystopian fears of those who call for abolishing sex robots (Campaign Against Porn Robots, n.d.). Grounded in communication and sexuality studies, and adjacent fields, the concept of communicative sexuotechnical-assemblage adds to existing, more philosophical and ethical projects in the context of machines generally (Coeckelbergh, 2010, 2012; Gerdes, 2015; Gunkel, 2012, 2018) and of sex robots specifically (e.g., Danaher, 2017b; Ess, 2016, 2018). By examining the affective flows between humans and machines in sexual encounters, scholars can track the various ethical, legal, sociological, and communicative issues addressed in the literature and raised by sex robots. This also includes a move beyond the binary thinking in the current literature, identified by Döring et al. (2020) and already elaborated on above. In so doing, human-machine sexualities continue and extend the recent critical turn in HMC by specifically turning to sex and sexuality as ripe *contexts*, and SeS as rich *resources* for critical efforts in HMC.

For instance, drawing on critical perspectives challenges reductionistic and problematic conceptions of sex work in debates on sex robots (Kubes, 2019). Authors such as Richardson (2016a, 2016b) or Levy (2007b), among others, who compare robot sex with human sex work, tend to fall back on understandings of sex work that frame the sex worker as “objectified and instrumentalized” (Danaher, 2017b, pp. 110–111) or as “reduced to a *thing*” (Richardson, 2016b, p. 291, emphasis in original). Critical SeS and, in particular, Marxist feminist, Black queer, crip, trans, and trans of color approaches offer a dramatically different and resistant understanding of sex work, guided by anti-respectability politics that highlight how “community members thrive despite existing in a hostile world unconcerned with their survival” (Glover & Glover, 2019, p. 172). Moreover, Danaher (2014) offered a nuanced understanding of sex work as it relates to what he describes as technological unemployment, or the displacement of human sex workers by the advent of sophisticated sex robots. This effort continues specifically Marxist and materialist understandings that correctly frame sex work in the context of labor and market dynamics. Drawing on critical non-white, non-cisheterosexist, and non-cisheteropatriarchal accounts of sexuality therefore simultaneously resists reductionistic accounts of sex work and sexuality writ large and opens up different ways to theorize and practice sexuality—both among humans and between humans and nonhumans.

Another implication based on the critical sensibilities inherent to communicative sexuotechnical-assemblages in human-machine sexual encounters is the ongoing critique of transhumanist utopias and fantasies in relation to sex robots (e.g., Lakshmanan, 2021). Specifically from the perspective of (critical) disability studies, transhumanist desires to improve, enhance, and perfect the human body either by modifying human bodies or by replacing “deficient” and “defunct” human bodies with better, and more “perfect” machine-others must grapple with ableist discourse of “curing” and “overcoming” disability (Hauskeller, 2017). Similar dynamics between sexuality and dis/ability have been centered by scholars in a/sexuality studies (e.g., Flore, 2014; Kafer, 2013; Wilkerson, 2011); efforts that consistently critique the normative formations of a “sexual” body, a “healthy” body, and “healthy” sexuality writ large. Human-machine sexualities navigate these important critiques by disregarding any consideration of enhancing the sexual other or sexuality as such, given its focus on the flows of affect between entangled partners. Nonetheless, dynamics of enhancement of intimacy, pleasure, and desire must be thoroughly examined in the context of emerging sexual technologies, including sex robots, particularly as it relates to labor, reproduction, and dynamics of the neoliberal market (Atanasoski & Vora, 2020).

Furthermore, human-machine sexualities embrace more-than-human and geographical registers in both HMC (cf. Betlemidze, 2022; Dehnert, 2021) and SeS (Flore & Pienaar, 2020; Fox & Alldred, 2013) that fluidify (Lambevski, 2004) individualistic and humanistic understandings of the sexuo-communicative subject-object relation in human-machine sexualities. These perspectives raise questions such as, what exactly is meant by “communicative subject” in entangled and assembled human-machine interactions? Resonating with the social relational turn, this essay continues rethinking agency, interactivity, directionality of communication and desire, and more, in ecological terms of affective flows.

Additionally, this broadening of conceptualizing the (sexual) communication practices between humans and machines comes along with rethinking the role of sexuality for the human. When humans engage with sex robots in communicative sexuotechnical-assemblages via human-machine sexual encounters, “what are the boundaries around [*human*] sexuality” (Hearn, 2018, p. 1368)? Insights from asexuality studies scholars demonstrate that, through discourses, instruments, and institutions, “sexuality’ effectively became tied to humanity” (Flore, 2014, p. 18). As such, ongoing work by asexuality studies scholars works toward delinking the intimate, compulsory relationship between being human and being sexual by making space for alternative modes of being and doing. Offering an alternative to person-based understandings of sexuality and sexual practices, more-than-human and assemblage-approaches resist clear-cut boundaries of (human) sexuality, thereby embracing the messiness of sexuality (Manalansan, 2013), even (or particularly) in the “sterile” context of machines.

## Design Implications

Authors have predominantly critiqued representation and design of sex robots in relation to sexualized and exaggerated images of the female body or engaged in speculative musing on the ethical design of future sex robots (Döring et al., 2020). There is an insignificant integration of academic research and the design of sex robots, prompting calls for an integrated understanding of sex robots that recognizes the sociotechnical development and nature

of sex robots (Danaher, 2019a). Relatedly, designers can draw from SeS by being clearer about the distinction between gender and sex in robot design. Recall that RealDoll (n.d.b) offers sex robots in “three different gender orientations: Male, female and transsexual” (p. 6). Clearly, these descriptors refer neither to *gender* nor to an *orientation*, which calls for feminist and other critical approaches to more accurately imitate sex and gender in sex robot design. Finally, shifting toward an assemblage-framework allows for broadening the design of sex robots writ large, where “the obvious question we have to ask is: why should a sex robot look like a human?” (Kubes, 2019, p. 10). Displacing concerns for human and nonhuman subjects and objects allows for broadening our understanding of what a sex robot can be and can look like. Modeling sex robots after different fantasies than the male gaze so prevalent in pornographic and other representational accounts is one way to navigate the expectations surrounding humanoid robots (Danaher, 2019a).

### **Implications for the Use and Effects of Sex Robots**

Reviewers (Döring et al., 2020; González-González et al., 2021) have identified a significant lack of empirical research conducted on actual use patterns and contexts as well as user behavior, leaving most claims about effects squarely within philosophical, ethical, and speculative realms (see Harper & Lievesley, 2020). Nonetheless, the assemblage-perspective put forth in this essay allows at least for comments on rough implications regarding the therapeutic use of sex robots and child robots, one of the most controversial components of an already highly controversial topic (e.g., Chatterjee, 2020). Critical communication and SeS perspectives call for a nuanced understanding of “therapeutic,” paying particular attention to undergirding systems of belief that target a/sexual, disabled, and non-normative others in particular ways (Kafer, 2013; Wilkerson, 2011). Conjoining disability, SeS, and queer perspectives, the therapeutic use of sex robots must always be understood in the context of larger systems of meaning—which is reflected in the territorializing-deterritorializing-reterritorializing dynamics of the sexuality-assemblage (Fox & Alldred, 2013). That is, any calls for therapeutic use of sex robots must be critiqued: Therapy for whom, why, in what ways, and based on what grounds? Similarly, the case of child sex robots must be evaluated in the sociocultural context (Danaher, 2019b). Clearly, these debates are far from settled and require thorough, interdisciplinary contributions from academics, designers/manufacturers, and the general public.

### **Conclusion**

With most thought and reflections on sex robots being confined to speculation at this time, this essay serves as a contribution to the ongoing, important debates on sex robots by conjoining two seemingly disconnected bodies of literature—HMC and SeS. Ongoing interdisciplinary work is needed as scholars make sense of current and future technological advancements in the realm of the sexual. I have specifically called for and extended efforts in the critical theorizing of sex robots in particular, and machines writ large. Questions regarding intimacy, love, sex, and desire have occupied humans for thousands of years. Reconceptualizing sex robots in the realm of human-machine sexualities, or communicative sexuotechnical-assemblages, allows for addressing the ways in which affective flows

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between humans and machines constitute sexuality, as well as recognizing the ways in which notions of sex and sexuality are always tied to larger, deterritorialized systems of meaning. Current and emerging technologies such as teledildonics, AI, and physical sex robots offer vibrant potential for sex and sexuality, lying somewhere between utopian hopes for orgasmic frenzies and dystopian fears of sterile and stale numbing down. The boundaries of (human) sexuality are broad, fringing, messy, and oftentimes unclear. This is even more so the case as technology, and in particular sex robots, become increasingly entangled in human sexual relations.

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