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Science Fiction and the Limits of Narrativizing Environmental Digital Technologies[*]

Hanna-Riikka Roine

Tampere University

Esko Suoranta

University of Helsinki

Literature, and science fiction (SF) in particular, have always provided spaces to construct and try out imaginaries of phenomena that elude human awareness. Contemporary authors of SF have taken up the challenge in terms of addressing digital technologies that fundamentally differ from earlier ones — and especially from earlier media — in their *environmental* aspect, exemplified by networks whose dynamics operate at levels "above" and "below" that of a human subject (see Galloway & Thacker 157). In Mark B. N. Hansen's (3) terms, 21s-century media is described as atmospheric: in our interactions with it, "we can no longer conceive of ourselves as separate and quasi-autonomous subjects, facing off against distinct media objects; rather, we are ourselves composed as subjects through the operation

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of a host of multi-scalar processes." Another way of describing how digital technology functions is to approach it as an assemblage, involving not only many forms of human labor and material resources (see Finn 7), but also a meshwork of entities performing cognitive acts, "collectivities through which information, interpretations, and meanings circulate," as N. Katherine Hayles (2021: 37) has put it in her account of cognitive assemblages. While these collectivities obviously do involve human subjects pursuing different interests, the way that the assemblage functions as a whole does not correspond to human levels of behavior, perception, or scale.[1]

In this article, we build on the idea of the environmental aspect of digital technologies to examine strategies used in science-fictional attempts to represent the effects of these technologies on both individual and societal levels. We aim to account for the shift from separate, quasi-autonomous subjects to the assemblages where agency is technically distributed and dispersed.[2] Our approach is informed by frameworks that see such distribution and dispersal through the concept of ecology: for instance, Erich Hörl's "ecology of a natural-technical continuum" — computational media surrounding and permeating human individuals and societies drive the "ecologization" not only of sensation but also of cognition, thought, and desire as well as power and governmentality (2013: 127–28; see also 2018). For her part, Hayles emphatically includes nonhuman lifeforms in her "ecology of cognitive assemblages" (2021: 37) and locates human cognition along a continuum with the cognitive capabilities of nonhuman life and the artificial cognition of digital technology. She argues that for all of these entities, cognitive acts consist of interpreting information that connects it with meaning and, while they may perform

these acts as individuals, more frequently they function as assemblages, thus impacting "the very idea of human subjectivity" (2021: 37).

Our two case studies, Ann Leckie's *Ancillary Justice* (2013, *AJ*) and Annalee Newitz's *Autonomous* (2017, *A*), are examples of contemporary SF focusing on the effects of digital technologies. In their attempts to represent these effects both novels hinge on the literalization of three literary conventions: omniscient narration, character-focalization, and mind-reading of fictional characters. Through these literalizations, the environmental aspect of digital technologies and their effects are woven into the plots, worldbuilding, and narration of the novels, and they are able, up to a point, to represent the ways in which such technologies may shape and transform the intentions and choices of an individual. However, while literalizing such conventions to make the effects accessible to readers, the novels cannot escape the constraints that these conventions impose, bringing the limits of narrativizing digital technologies to the fore. In fact, the very nature of the digital as a human-technical assemblage resists narrativization not only by surpassing the scope of human consciousness, behavior, and perception but also in terms of resisting narrative itself, as the operations of narrative are based on human-scale parameters. The novels by Leckie and Newitz thus risk hindering a fuller, critical interpretation of the treatment of technologies with environmental effects, as they focus on individual, conscious actors.[3] They are, in other words, held back by the human-scale parameters of narrative, a constraint in stark contrast to the mundane complexity of the effects of digital technologies (see, for instance, Shoshana Zuboff's account of the rise and operations of surveillance capitalism, a phenomenon devilishly unsuited to be contemplated through singular actors[4]).

Consequently, our analysis focuses on the ways in which both novels employ more or less technological, individual actor-characters to guide readers to think about the consequences of human-technical assemblages within the wider fictional worlds. *Ancillary Justice* introduces us to the first-person narrator, Breq, who nineteen years earlier was *Justice of Toren*, a colossal sentient starship controlling thousands of ancillaries, or brain-wiped "corpse soldiers" (*AJ*, 77), in the service of the galaxy-wide Radch Empire. An act of betrayal has torn *Justice of Toren* apart, and now the ship's consciousness and memories are embodied in its last surviving fragment, ancillary One Esk Nineteen (Breq), who seeks to avenge the death of her crew (and to a great extent herself) on the Radch emperor Anaander Miaanai. *Autonomous*, for its part, is set in the mid-22nd century, where humans work alongside advanced robots, most of whom are indentured to the companies that have paid the cost of their creation. Access to easily manufactured drugs which can cure almost any disease is guarded by pharmaceutical companies and the International Property Coalition (IPC), an organization that violently neutralizes intellectual property dissidents and patent pirates. The character-focalized robot protagonist Paladin is indentured to serve the IPC and assigned to hunt down the human protagonist, Judith "Jack" Chen, a patent pirate. .

In addition to these actor-characters, our analysis focuses on the social and economic circumstances of the fictional worlds as well as gender trouble to draw out the ways in which both novels guide readers to think about human-technical assemblages and their effects on individuals and societies through the representation of forms[5] that remain human-centric in scope. To illustrate the difference between the assemblages and the forms that are used to pursue them, we distinguish unconscious environmental effects from nonconscious ones. The

distinction is like that of Hayles, who likens the processes of human nonconscious cognition to the cognitive capabilities of technical, digital systems: unlike the unconscious, they are too complex and noisy to be accessible to conscious introspection and narration;— for instance, they process information faster than consciousness and discern patterns and draw inferences (2017: 27; 2021: 37–38). As technical cognitions are designed to keep human consciousness from being overwhelmed by massive amounts of information, Hayles (2017: 11) argues that they represent "the exteriorization of cognitive abilities." Biological and technical cognition can thus be said to interpenetrate, which manifests in the way in which most aspects of human experience are now permeated by digital technologies (see also Hörl 2018). *Ancillary Justice* and *Autonomous* attempt to alert the readers to such nonconscious interpenetration through various unconscious effects that human, social, and cultural forms have, using the nonhuman characters Breq and Paladin to invite further reflection on these forms. The effects include repercussions that various cultures, laws, and infrastructures have for individual agency, as well as interrogations of gender and sexuality, ongoing in the SF canon at least since the 1960s.[6] In this article, we engage with the various conventions — gender roles as well as narratives of bildung, quest, and romance: the novels interrogate the tension between conscious actors and the forms within which they operate, thus attempting to guide the readers to notice the nonconscious effects of digital technologies. This way, we explore the limits of narrativizing such technologies in SF.

Narrative Representation of Environmental Effects: Literalized Conventions

While the environmental aspect of digital technologies is at odds with narrativization, its effects on humans and other actors are made available to

narrative representation in *Ancillary Justice* and *Autonomous* by a technique typical of SF: the literalization of conventions of literary narration. Here, we focus on the ways in which these literalizations concretize — and thus make accessible — Breq's and Paladin's entanglement with complex assemblages. In the case of Breq, an omniscient narrator is literalized as a first-person narrator with extended technological capabilities, while Paladin as a focalizer reads other machines as if they were "minds," literalizing the convention of fictional mind-reading. At the same time, these literalizations are troubled by digital systems and socio-political forms in which the assemblages function. As a result, the challenges of narrativizing environmental effects of digital technologies manifest themselves both on the level of the fictional worlds and on that of the novels as constructs. In this section, we unpack the literalizations in more detail, while the following sections discuss the resulting troubles in relation to world-building and the respective arcs of Breq and Paladin.

As a genre, SF tends to literalize conventions of literary narration as it reveals and reflects on both its generic devices and concepts of narrative theory, such as focalization, omniscience, and world-building (McHale 2018; Polvinen 2018).[7] Both Leckie and Newitz represent digital technologies and their functioning through nonhuman protagonists, making those processes accessible to "the confabulations of conscious narration" (Hayles 2017: 28), or to cognition that makes sense of phenomena through narrative form (see Walsh). Through Breq and Paladin, both novels showcase SF's ability to (speculatively) expand our knowledge beyond the metaphorical —as in Samuel R. Delany's famous example of readers applying a literal understanding to potentially metaphorical phrases such as "Her world exploded" (qtd. in Gregory 27). Similar expansion can concern phenomena

that are part of our daily lives but remain inaccessible to us because they are not designed to be experienced by humans. One example is the level of code at work in contemporary life, remaining beyond the scope of human awareness but almost constantly at play in encounters between humans and machines, in an invisible and unfelt process (see Taffel 13). How, then, do *Ancillary Justice* and *Autonomous* attempt to make such ubiquitous-but-inaccessible phenomena available to narrative representation?

Ancillary Justice alternates between two timelines, both narrated in the first person by Breq. One details her past through the distributed embodiment of twenty ancillary soldiers on the surface of planet Shis'urna and as the ship itself in orbit. In the other timeline, the narrative present after the ship's destruction, a single unit remains from what used to be a multitude. In addition to alternating chapters, explicit comparisons between Breq's past and present occur from the very beginning of the novel, where she[8] finds her former lieutenant Seivarden Vendaai — supposedly a thousand years dead — bruised and unconscious on a frozen planet: "Once I would have known her core temperature without even thinking, her heart rate, blood oxygen, hormone levels. I would have seen any and every injury merely by wishing it. Now I was blind" (*AJ* 5). Such almost nostalgic comparisons point to the differences between the limited perspective of Breq as a single actor and the assemblage-like *Justice of Toren* containing a multitude. They are the first sign that Leckie's novel operates in what Merja Polvinen (2018: 77) calls "the self-conscious poetics" of SF, where readers are invited to engage with fiction and its worlds as constructed and artificial without awareness of constructedness interfering with imaginative engagement.

Breq of the narrative present is, in diegetic terms, a nonhuman protagonist, even if she originally was created to serve as a part of the larger human-technical whole. Thus her near-human narrating I is juxtaposed with the focalization through the near-omniscient experiencing I of *Justice of Toren*. In the following excerpt, Breq recounts how she perceived the city of Ors, on the planet Shis'urna, as the "distributed I" of *Justice of Toren*:

> Outside the doors of the Temple I also stood in the cyanophyte-stained plaza, watching people as they passed. . . .
>
> To the north, past a rectangular stretch of water called the Fore-Temple after the neighbourhood it had once been, Ors rose slightly where the city sat on actual ground during the dry season, an area still called, politely, the upper city. I patrolled there as well. When I walked the edge of the water I could see myself standing in the plaza.
>
> Boats poled slowly across the marshy lake, and up and down channels between groupings of slabs. . . . Away from the town, east and west, buoys marked prohibited stretches of water, and within their confines the iridescent wings of marshflies shimmered over the water weeds floating thick and tangled there. . . .
>
> The view to the south was similar except for the barest hints on the horizon of the actual sea, past the soggy spit that bounded the swamp. I saw all this, standing as I did at various points surrounding the temple, and walking the streets of the town itself. It was twenty-seven degrees C, and humid as always.
>
> This accounted for almost half of my twenty bodies. (*AJ* 13–14)

The passage literalizes omniscient narration through this particular unit of *Justice of Toren*'s bodies, situated at various points of the town and temple. As Jonathan Culler has argued, the concept of omniscience includes several distinct narrative phenomena bundled into one. For Culler, the appearance of what is generally called omniscience can arise from passages that establish the authority of the narrator, from "telepathic translation" (32) of the thoughts of characters, the foregrounding of authorial creativity, and the accumulation of knowledge from multiple perspectives, as is customary in realist fiction. Breq, as a first-person narrator recalling her own distributed perception and agency, stands out as a literal example of the obfuscation that Culler sees in omniscience as a narratological concept: she embodies narratorial authority as the author of her past. She telepathically accesses the thoughts of others through her technological sensorium; Breq foregrounds Leckie's "nifty short-circuit around one of the more obvious limits of a first-person narrator" (*AJ* "Extras," 386); and perceives "like a sharp operator, who gets around and knows a lot," to borrow the phrase Culler (32) uses to describe the knowledgeable narrators of realist fiction.

By having the same character exist simultaneously in the different guises of omniscient narrator and several characters, the novel draws readers' attention to the juxtaposition of a single entity and a totality, bringing to the fore the relationship between an individual actor and the larger human-technical assemblage. This is further emphasized by the alternation between the distributed past version and the current, contained, and singular version of the character. The whole of what used to be the *Justice of Toren* is able not only to witness events happening in several places simultaneously but also to know (or accurately infer) the emotions and

thoughts of its officers by means of various sensors and implants, resulting in a chilling parallel to the gathering and reading of behavioral data to which digital technologies currently subject us: "Lieutenant Awn's face heated, her distress and anger plain to me. I couldn't read her mind, but I could read every twitch of her muscle, so her emotions were as transparent to me as glass" (*AJ* 17).[9]

The literalization of omniscient narration therefore also literalizes the "mind-reading" discussed in cognitive narratology. Through an analysis of Virginia Woolf's *Mrs. Dalloway* Lisa Zunshine (270–71) argues that readers can "automatically read a character's body language as indicative of his thoughts and feelings." In Leckie's novel, however, this automatic reading of character's bodies is problematized in Breq's spending considerable effort to infer and narrate the mental states and thoughts of the people she meets. The result is a meticulous detailing of links between body language and mental states: "Inspector Supervisor Skaaiat's eyes narrowed slightly at my tone of voice, muscles tensing just perceptibly around her mouth. She thought, it seemed, that I was hiding something, and she was interested now, and more curious than before" (*AJ* 279). As *Justice of Toren*, Breq similarly narrates reading a multitude of internal states with detail and effort but retains the automatization of inference through her distributed and invasive sensorium. The dimension of unreliability appears to be removed from the narration as emotions are, in fact rather than in metaphor, transparent to the all-knowing *Justice of Toren*. Leckie does not leave the matter there, however, as it is revealed in the course of the novel that the Emperor of Radch has manipulated the *Justice of Toren*'s stored memories. Leckie returns to the problem of assuming automatized inference of mental states from behavior and of trying to remember such inferences reliably, even in circumstances of seemingly unerring technological

perception and data retention. The weirdness of mind-reading is further reflected in Breq's attempts to pass as a human during her quest, as she is shown to be aware of all her gestures, tones of voice, and body movements: "I raised one eyebrow and a shoulder, as if to say, *That's how she is*" (*AJ* 281).

Like *Ancillary Justice*, *Autonomous* is not exactly an experimental SF novel; even as it foregrounds the effects of environmental digital technologies, it literalizes and estranges conventions of realist character focalization in a fairly straightforward way. Readers follow the robot protagonist Paladin finishing his training, joining his agent partner Eliasz for his first mission, and learning about human behavior, sexuality, and the possibility of autonomy for robots — all the while conducting an investigation into the world of drug patent pirates and enforcing the interests of the International Property Coalition. One of the most salient features of Paladin's arc is his romance with Eliasz, intertwined with the bot's gradual discovery and choice of a gender identity and, finally, acquiring an autonomy key that allows the couple to leave for Mars at the end of the novel. Despite the plot's focus on Paladin's adventures and bildung, the narration focalized through the vaguely humanoid military robot foregrounds the relationship between embodiment and perception, showing what it could be like to incorporate networked technologies into one's sensory experience, and how those networks are part of technological assemblages that are implicated in overarching forms of socio-political power.

Autonomous calls attention to both how digital, networked technologies afford uses that can significantly extend actors' cognitive capabilities. Likewise, it shows how nonconscious cognitive actors within distributed spheres of influence are also potentially objects of use as their functions can be controlled. These are concretized, for instance, in the literalization of character-focalization in Paladin's

technologically enhanced perspective and his ability to read the "minds" of human and nonhuman actors, both conscious and not, inferring mental states from multiple sources of perception data. He[10] sees in multiple wavelengths, senses the minutiae of chemical particles in the air, accesses digital feeds, and perceives changes in both autonomous nervous systems and in technological arrays — storing all in a seemingly endless cloud of data for easy recovery. Paladin's attunement to nonconscious cognitive actors around him is a clear contrast to the distributed I of *Justice of Toren* and its instantiations, which include conscious actors (such as humans, other ships, and AI-driven stations). This reveals one way in which the two novels present different pictures of the hierarchies between the actors and their environments as well as possibilities of action within assemblages. In the following passage, for instance, Paladin covertly accesses the network of a solar farm[11] that acts as a front for a group of patent pirates, allowing readers to approach this otherwise inaccessible realm as if through his focalized vision:

> He carefully scanned devices around the room, from the atmosphere sensors to the kitchen appliances, and got lucky with the sprinkler system. The device sat on the network waiting for requests from tiny sensors peppered throughout the soil floor. Once in a while, those sensors would signal that it was dry enough to start watering the furniture.
>
> But the sprinkler system was also waiting for requests from other devices. Somebody careless had set it up to pair with any new device that looked like a moisture sensor.
>
> So Paladin came up with a plan. He initiated a pairing sequence with the sprinklers by disguising himself as a really old sensor model. Because the

> sprinkler system wanted to pair with sensors, it agreed to download some ancient, unpatched drivers so it could take requests from its new, elderly friend. (*A* 59)

Paladin's technological embeddedness allows him to incorporate an assemblage made up of smart devices into his perceptual field. His focalization is emphasized with verb choices such as "scanned," or deictic markers such as "devices *around* the room." At the same time, the sprinkler system is represented as if it were a character to whose thoughts the focalizer has limited access, alerting readers to the possibility of mind-reading. From how the sprinkler system behaves, the narrator is able to tell how it "[sits] on the network waiting for requests," wants things and agrees to suggestions, and even has the capacity of making a "new, elderly friend" in Paladin disguised at the level of code as an old sensor. The sprinkler system is presented as if it had states of mind, and the state of that mind explains its falling for Paladin's subterfuge.

Furthermore, Paladin's sensorium does not differentiate between the recipients of his perceptual advances. Consider, for example, the following quotes: "Paladin stepped closer and tuned the signal connecting the two men's devices, decrypting and copying data to his own memory" (*A* 27), and, "Paladin watched the senator receive a small stream of data packets. He routed it from a neural hub to a device implanted in his right cornea, which he tried to check unobtrusively" (*A* 111). In both, focalizing through Paladin's technologically enhanced cognition makes information that would otherwise stay inaccessible to readers available to narrative representation — even if, ironically, one could argue that the ways in which mental states represented as divinable from behavior in the realist canon are

equally preternatural (see Mäkelä). Thus, Paladin's interactions with nonconscious actors such as the sprinkler system, as well as with characters that readers can assume to have fictional minds with conscious and unconscious thoughts and experiences — people and conscious bots, literalize the convention of writing characters with an emphasis on mind-reading.[12]

It should be noted how Paladin's sensory array, his considerable capability of knowing what others think and feel, is employed in the service of a totalitarian surveillance capitalist regime to protect the corporate interests of the IPC. Observing, decrypting, and retaining data from people's devices and their very person are obvious intrusions of privacy, but Paladin does not need to consider each breach case-by-case with regards to privacy legislation or against a probable cause. His mandate as an enforcer of the IPC gives him near-universal rights of intrusion while performing his duties. Thus, narrative representation of digital technologies and their effects on individuals and larger contexts through science fictional literalization of conventions is no straightforward matter. In SF criticism, the critical potential of the genre and its works is usually found in the dynamics of literalization, estrangement, and thought experiment as meaning-making strategies that could engender critical, political, and ethical resonance (see, e.g., Suvin 378; Jameson). This convention of reading and interpreting SF texts can obscure more nuanced and troubling findings that emerge when these dynamics are interrogated further. We turn next to the thematic issues that arise from the attempts to make environmental effects of digital technologies available to narrative representation through the depiction of cultures, laws, and infrastructures, as well as interrogations of gender and sexuality in SF worldbuilding. These further alert us to the limits and pitfalls of narrativizing such technologies.

Human-Technical Assemblages and Worldbuilding

The question of what it means to be an individual, conscious actor in relation to the surrounding forms that have unconscious and nonconscious effects is central to both *Ancillary Justice* and *Autonomous.* In addition to the literalizations of literary conventions, Leckie and Newitz use worldbuilding to focus on such relationality through Breq's and Paladin's actions and perceptions, attempting to make accessible not only the unconscious encounters between actors but also the ways in which environments shape them. The protagonists' place at the boundary between an autonomous actor and an involuntary (programmed) part of a larger whole is used to explore not only the relationship between the human and the computational, but also the assemblages humans try to function in, joining information to meaning (see Hayles 2017: 28–9, see also Suoranta 2021 on how these dynamics can be corrupted through surveillance capitalist power).

Worldbuilding is the most fundamental of the devices literalized by SF, as suggested by Brian McHale (2018: 327). McHale goes on to argue that "every sf text reflects more or less explicitly on its own worldmaking operations" and "lays bare" its devices in general (2018: 329). While worldbuilding is predominantly approached as representative of the ontological operations of fiction (see, e.g., Ryan and Bell), in SF it must also be recognized as a crucial communicative device. SF relies on a "scale-model" of reality that is, in some sense, systematically and openly different from the one inhabited by readers, thus appearing literally as a separate world. From the perspective of communicative purposes, such a model develops possible consequences of an idea for the process of "the actual trying out or trying on of the idea" (McHale 2010: 21; see also Roine 47). Elements, such as characters,

settings, and action, are built along with this model and conform to its regularities and possibilities as they diverge from real-life contexts.[13]

As a result, characters inhabiting various worlds of SF are imaginable or accessible only in relation to how the contexts in which they appear are constructed and received. Characters such as Breq and Paladin are constructed relative to their actions and positions within their respective worlds — contexts that connect them with meaning — rather than, for instance, on the sole basis of an inner world available for understanding through practices of mind-reading (see Zunshine; Roine 172–73). Farah Mendlesohn likewise observes that SF is typically concerned with "our relationship to the world and the universe" (1) rather than inter-human relationships or the events of the mind.

As characters quite literally situated at the fuzzy boundary of individual and the larger whole, Breq / *Justice of Toren* and Paladin concretize the entanglement of actors with their environments — both in the sense of imagined worlds and the novel as an artefact. Breq's quest for revenge, change of status from near-omniscience to an orphaned part of a whole, and capacity for action in relation to the opportunities and constraints of the surrounding world are inextricably connected to her identity. Her attempts to pass as a human highlight not only the negotiable boundaries of humanity — or human-like behavior — but also her existence as *made* in two different senses of the word. Breq says as much in expressing her view on the Radchaai religion which teaches that nothing can happen that is not already designed by God: "'I am,' I said, 'as Anaander Miaanai made me. Anaander Miaanai is as she was made. We will both of us do the things we are made to do. The things that are before us to do'" (*AJ* 138). Here, Breq does not only refer to "being made" by Miaanai in the concrete sense, or in the sense of

her previous existence as an instrumental part of the functioning of the Raadch Empire but in the sense that, by her actions, Miaanai has incurred Breq's revenge and thus initiated the quest that aims at Mianaai's own death.

Similarly to Breq being made through her quest for revenge and the actions that lead to it, Paladin is constructed in terms of the quest to hunt down the patent pirate Jack, and this cannot but inform and contextualize her romantic subplot, the bildung, and the ways in which her entanglement as an individual actor with technological assemblages are presented.[14] From the frictions between these contexts, it is possible to see how reading Paladin cannot be a straightforward matter. Character focalization through her, the developing romance between Paladin and Eliasz, as well as her arc of self-discovery, all elicit sympathy and identification. They invite reading Paladin's tale as one of emancipation from the algorithms and legislation that rein in her personal freedom as a conscious robot. Her journey from a "*newbie*" (*A* 16) indentured bot to an autonomous one is, however, starkly juxtaposed with many of the events and arrangements she participates in: readers see her acting coercively, oppressively, and treating people as means to an end, often with violence. At the same time, as a robot indentured to a system of violence, Paladin is coerced, oppressed, and instrumentalized by the powers controlling her. This casts her romantic subplot in a dubious light as Paladin's consent to Eliasz's sexual desire is ambiguous and Eliasz's acute homophobia colors their first sexual encounters. Paladin begins to observe some of these contexts, raises some critical questions, but never quite challenges the justifications of the IPC's system of violence in the service of property rights. As the dedication of the novel is "For all the robots who question their programming," it is almost deceivingly easy to root for Paladin on her journey of self-discovery, but

the issue of questioning one's programming is not fully resolved at the conclusion of the novel.

It could thus be argued that the ways in which Leckie and Newitz make use of certain conventions and structures — such as those of quest, romance, and bildung narratives — are aimed toward guiding readers to "look at" the novels in certain ways; toward actions that make the novels as well as their worlds and characters present to readers. Furthermore, by learning to look at characters as "being made" through their capabilities of action in relation to the opportunities presented by their surrounding worlds, readers are invited to look at the environmental effects shaping or "making" those characters in the context of their cultures, laws, and infrastructures. An illustrative example of such guidance is the interrogation of gender and sexuality in both novels. Consider the following excerpt from *Ancillary Justice,* where Breq and her accidental traveling companion Seivarden have arrived at the apartment of a doctor called Strigan. While Breq's gender is (once again) left undetermined, the pronoun referring to Seivarden is switched to male for one of the few times in the novel, and Breq's efforts to determine the doctor's gender are highlighted:

> "I thought I knew what you were doing here. Now I'm not so sure." She [Strigan] glanced at Seivarden, to all appearances completely undisturbed by our talking. "I *think* I know who *he* is. But who are *you*? *What* are you?"
>
> . . .
>
> "I came here to buy something," I said, determined to keep from staring at the gun she held. "He's incidental." Since we weren't speaking in Radchaai I had to take gender into account — Strigan's language required it.

> The society she lived in professed at the same time to believe gender was insignificant. Males and females dressed, spoke, acted indistinguishably. And yet no one I'd meet had ever hesitated, or guessed wrong. And they had invariably been offended when I *did* hesitate or guess wrong. I hadn't learned the trick of it. I'd been in Strigan's own apartment, seen her belongings, and still wasn't sure what forms to use with her now. (*AJ* 76)

In the case of Strigan, the reader needs to adjust their mental image of the character more than once and see them not only as described by Breq who refers to everyone she meets solely with female pronouns. At the start of the novel, the confusions concerning gender suggest that there is something strange either about the first-person narrator Breq or the people she encounters. However, as Leckie's novel fixes the strangeness of this sort onto the context and culture of a fictional world instead of focusing on discrete actors, there emerges a potential for both drawing readers' attention to the socially determined formal arrangements surrounding an individual and unconsciously shaping them and for turning the initial question around: is it not strange that we can (and want to) discern the gender of the people we meet?

This way, a process we have internalized so well that it is automatic, or at least something we do not consciously reflect on, inspires a sense of wonder.[15] A similar "learning process" can happen while reading *Autonomous*: what exactly is the role of autonomy in the sexual act (as opposed to any other action)? Rhetorically, these learning processes are examples of double exposure in action (see Nielsen, Phelan, and Walsh 68), inviting science-fictional estrangement and a mapping of that *which is* strange onto *what is not* in equal measure. Therefore,

readers are not so much estranged from the world they live in but learn to map new relationships with it through, in this case, reflection on unconscious processes. This is made even more suggestive by the self-conscious poetics of SF, as readers are readily invited to recognize the double nature of worldbuilding, where characters are made both by the imaginative context in which they appear and by the context of various literary conventions, such as the quest narrative.

When it comes to gender and sexuality, *Ancillary Justice* and *Autonomous* are quite successful in drawing out the various unconscious actions and elements that can guide and shape our conscious perceptions and judgments. For one thing, this is aided by the long continuum of SF texts where the encounter with difference is used to focus on gender concerns. Compared with early classics such as Ursula K. Le Guin's 1969 *The Left Hand of Darkness*, *Ancillary Justice* lays even more emphasis on the cultural environments, as human physiology in Leckie's novel is identical to the world inhabited by readers, but the ways in which it is looked at and put into words is divergent. *Autonomous*, for its part, especially in its depictions of sexual encounters between Eliasz and Paladin (queer robot sex with overtones of a gun fetish), creates uneasy tensions for readers, and possibly reveals unconscious prejudices or raises questions of acceptance with regard to sexual diversity.

Trouble with Narrated Agency and Environmental Technologies

We move to discuss the nonconscious features of environmental technologies that do not lend themselves as readily for narrativization. We have already mentioned one of the major problems in representing digital technologies: whereas works of literature such as novels are designed to correspond to the scope of human experience and consciousness, digital technologies are not (see Hansen; Hörl 2018),

even if their environmental effects can be made available to representation by, for instance, science-fictional literalizations. Another problem is linked specifically to *narrating* such technologies. As Hanna-Riikka Roine and Laura Piippo (63) argue, the attempt to impose an inherently human logic — such as that of conscious narration — onto environmental effects runs the risk of giving false impressions of the technologies behind such effects.

In *Ancillary Justice* and *Autonomous*, such a risk arises from the narrativization of the relationship between individual, conscious actors and the technologies that nonconsciously surround and shape them. In his critical treatment of the human tendency to narrativize the countless emergent processes of the material world, Juha Raipola names narrated agency as an attribute that is assigned to someone or something by means of narrative representation, "always ascribed after the fact or in anticipation of a fact, in an effort to make sense of the temporal progress of action" (277). With this interpretative act, agency is projected onto individual actors: although the resulting narratives are based on the actual emergent processes and matter, their binding to narrative logic ultimately fails to represent the complexity of the meshwork. From this perspective, both *Ancillary Justice* and *Autonomous* can be read as examples of the interpretative act of narrated agency, projecting agency onto actors such as Breq and Paladin within the assemblage of entangled activities. The doubled structure of Breq's quest for revenge and the ambiguities of Paladin's narrative of self-discovery, as well as the authors' choice to show the characters' environmental shaping through the prism of gender concerns, can be read as symptoms of this projection.

As an actor, Breq simultaneously owes her very existence to the expansionist, violent logic of the Radch Empire and is a victim of it, which is

concretized, for instance, in the traumatic event of Anaander Mianaai giving *Justice of Toren* no other choice but to kill Awn Basnaaid, one of the ship's most beloved lieutenants. Throughout the novel, the complexity of the Empire as the creation of an emperor who is a distributed consciousness similar to the ships with thousands of bodies and who is divided into warring factions within herself is contrasted with Breq as a single actor, committed to incremental progress — a sentiment highlighted by the last two sentences of the novel: "Choose my aim, take one step and then the next. It had never been anything else" (*AJ* 384). While the limits of narrated agency are thus recognized and even thematized in *Ancillary Justice*, they are easily shadowed by the quest for revenge and Breq's attempts to come to terms with what has been done to her. In *Autonomous*, nonhuman embodiment brings a science-fictional thrill into reading about Paladin's experiences of the world, but at the same time the novel underlines how environmental effects of digital technologies affect the ways in which identities are built within their purview. Note, for example, how Paladin begins his education in human sexuality, an area of study not much covered by his military bot programming. After Eliasz rides on Paladin's back while the bot shoots umpteen rounds at a gun range and the man is clearly aroused by the experience, he vehemently denies being a "faggot." Paladin consequently looks up and compiles a database of the slur (while in the middle of pacifying some pirates, one might add), and realizes how body-bound Eliasz's view of the robot's identity really is:

> [Eliasz] thought the bot's body parts were just like a human's, and that a heavily armored body signified manhood. . . . This also explained why Eliasz had been so curious about the origin of the bot's brain [a deceased

> human brain inserted into the bot and used strictly for facial recognition]. He assumed it was the seat of Paladin's identity. (*A* 92)

Later, Paladin witnesses Eliasz's inner struggles about his sexuality as he says in a drug-induced hallucination that "two men cannot lie together," prompting Paladin to explain that he is "not a man, I'm a bot. I belong to the African Federation" (*A* 153). When Paladin finds out that the single biological component in his body, the brain housed in his lower carapace, used to belong to a woman, he decides to use what he has learned of Eliasz's ways of thinking and begins to use the female pronoun "she," giving in to Eliasz's need to categorize bots with binary, human gender labels. As a result, Eliasz is relieved of his conflicted feelings of (auto-) homophobia and can retain a semblance of his cis-heteronormative self-image even when feeling attraction for Paladin. At the end of the novel, the pair leaves for Mars in a seeming happily-ever-after worthy of a good popular romance, with the last lines professing how Paladin "wrapped her wing shields completely around both of them, creating a private shelter with her armored embrace" (*A* 291).

Despite its conclusion in romance or in Paladin's acquiring a gender-identity that seems to suit her, the arc of romantic progression in *Autonomous* is troubled. Paladin's understanding of sexuality, gender, and romantic feelings is haunted by the environmental technologies that help her gain data about them. She cannot exactly consent to their first sexual encounter as she lacks the categories for understanding human sexuality in a more than clinical sense, and her quest for knowledge begins with the language of homophobia. The derogatory input she uses to start building her database creates a bias in the output. Moreover, the seeds of Paladin's attraction rest on her programming by her owners: as an IPC enforcer, she

cannot but positively regard any partners to whom she is assigned. Later, however, Paladin appears to feel for Eliasz in ways that cannot merely be explained by programming or skewed input data; nevertheless, the interpretation of their happy ending must acknowledge her accommodation of Eliasz's homophobia as well as somewhat binary ideas about gender and bothood.

In both *Autonomous* and *Ancillary Justice*, familiar narrative and genre conventions invite sympathetic readings of the characters with privileged, focalizing positions and arcs of development even when they are constructed by and, to different extents, condone morally deplorable social organization. In so doing, the familiar and conventional can hinder picking up on the tensions between the characters and their positioning in their respective assemblages. Both Leckie and Newitz employ the affordances of character-focalized self-discovery and the intriguing descriptions of nonhuman experience. They construct the processes centered on Breq and Paladin on double exposure: they invite readers to map onto actual human bildung the ways in which (fictional) nonhuman cognition develops with technological assemblages. So, while both novels convey that we as human actors are always "made" by our environments and thus also represent the effects of phenomena we exist with but cannot access, they also run the risk of masking a second layer of double exposure, where one would map how the development of conscious actors always exists within their overall contexts whose nonconscious influence cannot be ignored. Thus, the same conventions and tools that make it possible for us to begin to grasp such effects fall short of capturing them. In other words, they run into the limits of narrativizing environmental technologies because of what literary conventions and, more generally, narratives are geared toward.

Threading the Limits

Polvinen has argued that the sensation of coming across a fictional world may be best understood through the idea of "the perception forming in cooperation between the object and the actions of the embodied mind encountering it — actions which include the meaning-making based on our skill as users of fictional narratives" (2016: 31). In our view, a skillful engagement of this sort with various literary conventions as well as the parameters set by narrative form may explain why readers have no difficulties in understanding and maintaining *Justice of Toren*'s multitudinal perspective or Paladin's multisensory perception. It also hints at the dual implication of using nonhuman actors for making the environmental effects of digital technologies available to narrative representation: with them, *Ancillary Justice* and *Autonomous* both expand the possibilities of science-fictional, and literary, representation and still remain constrained by the focus on individual actors as an inroad to environmental effects.

Both novels guide readers to understand Breq and Paladin in relation to their contexts. Their "making" by the logics of the worlds is concretized not only through their doubled existence as both the oppressors and the oppressed within the human-technical assemblages, but also through the cultural and social forms controlling expressions of gender and sexuality. This way, they manage to make unconscious environmental effects available to narrative representation and interrogate the tension between individual, conscious actors and the forms that shape them. The novels represent the effects of environmental technologies through literalizations of literary conventions and center on, for instance, the details and functions of ubiquitous connectivity, encounters between and entanglement of human and technological actors, and human behavior becoming accessible to technological

cognition. At the same time, however, the patterns that the novels employ in the attempts to narrativize the effects (such as bildung, quest, and romance) are tethered to the scope of conscious human actors and run the risk of masking the nature of digital technologies precisely as environmental and largely nonconscious.

All in all, both novels work with and at the limits of narrativizing digital technologies at multiple levels, some harder to discern than others, drawing on readers' varying skillful engagements with works of fiction. They thus participate in the project of extension typical of SF, both metaphorically and in making accessible aspects of everyday reality that remain beyond the scope of ordinary perception and consciousness. While we are not suggesting that SF would expand our knowledge of mundane reality *as such*, it can influence our meaning-making processes, that is, our making sense of our lived experiences, and in these two novels, of the way environmental effects play a part in those experiences. These novels do not attempt to break the conventional limits of fictional narratives or address them in ways suited for more experimental works of literature. Instead, the demarcation we have charted is situated between the familiar literary conventions as well as the parameters of narrative and phenomena that cannot be fully accessed through conscious narration. As a result, their character-centered narration offers multiple levels of interpretation, the familiar and conventional ones sometimes masking those that are strained or ambiguous and potentially obscuring criticism of the effects of being embedded within human-technical assemblages. Finally, we hope to have demonstrated how the analysis of literary works with a focus on environmental technologies is a fruitful avenue of critical inquiry and can generate nuanced interpretations. *Ancillary Justice* and *Autonomous* reveal how narrative

logic and form can be both constraints and keys to perceiving how digital technologies condition our existence in their various ever-present guises.

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[1] There are, of course, aspects of digital media that are immediately accessible to human users, such as content, which is designed to be experienced (and manipulated) by us through the interfaces (see, e.g., Taffel 13; Kangaskoski 46), as well as their various material aspects, such as hardware.

[2] What remains outside of the scope of our approach are considerations of the “more-than-human” as well as questions of human/nonhuman boundaries. Such readings of our case studies could, however, be fruitfully guided by thinkers such as Rosi Braidotti and Donna Haraway (see also Kaisa Kortekallio’s essay in this issue).

[3] To clarify the role performed by material processes and nonconscious cognizers, Hayles suggests the term “actors” for cognizers embedded in cognitive assemblages with moral and ethical implications and “agents” for material forces and objects (2017: 31–32).

[4] See also Daniel Newman’s contribution to this issue, on how employing the vividness and ease of narrative to communicate “the strangeness of science” runs the risk of misrepresentation and polarization.

[5] We follow Caroline Levine’s definition of form that is broader than its original usage in literary studies, including, for instance, social and political arrangements: “Form, for our purposes, will mean all shapes and configurations, all ordering principles, all patterns of repetition and difference” (16).

[6] As Brian Attebery (5) has noted, until the 1960s SF did not pay much attention to gender and sexuality. Later, however, writers such as Ursula K. Le Guin (e.g., *The*

Left Hand of Darkness, 1969), Joanna Russ (e.g., *The Female Man*, 1975), and Samuel R. Delany (e.g., *Stars in My Pocket like Grains of Sand*, 1984) focused on these issues, with the result that by the turn of the century, gender had become "an integral part of the genre's intellectual structure" (10). Today, mainstream SF literature is indeed at the front of attempts to diversify representation of gender and sexuality in general.

[7] McHale and Polvinen, respectively, build on earlier observations of SF as a genre of literalization. For Seo-Young Chu, SF does so with regards to figurative language, and she thus associates SF with lyric poetry, rather than narrative, pointing out how, for example, apostrophe is literalized as telepathy. For Adam Roberts, SF is defined formally as metaphorical rather than through metaphorical content. For him a leap "from the known to the unexpected" rather than processes of rational extrapolation capture the uniqueness of the genre (8).

[8] To reflect the gender-troubling aspects of the novels, we follow their use of pronouns as they reflect the narrative situations. In *Ancillary Justice*, Breq's gender identity is kept ambiguous throughout, and her narration uses "she" as a default pronoun for everyone she encounters. With *Autonomous*, the narrator's use of pronouns reflects changes in Paladin's gender identity over the course of the novel from a defaulted "he" to an adopted "she" as the character's bildung narrative progresses. As nonhuman protagonists, both Breq's and Paladin's relation to such human-centric categories is part of their negotiation with environmental social forms.

[9] In the following two installments of Leckie's *Imperial Radch* trilogy, *Ancillary Sword* (2014) and *Ancillary Mercy* (2015) the emphasis shifts from the relationship

between an individual and the larger human-technical assemblage towards Breq's attempts to find her place within both the immediate community surrounding her (especially *Mercy of Kalr*, the ship she is commanding, and its crew) and the galactic order as a whole (especially in terms of the recognition of the rights of AIs within the Radch empire). As Breq is again given the ability to embed herself in the situations and experiences of her crew and *Mercy of Kalr* through her ancillary implants and the help of the ship AI, she again functions as a literalization of an omniscient narrator. For a narratological analysis of the trilogy as a whole, see Töyrylä.

[10] The narrative situation to which we refer here does not yet have Paladin questioning the defaulting of a combat robot's gender identity to masculine by humans. The next section discusses Paladin's adoption of female pronouns as part of the romance arc with Eliasz.

[11] Hayles (2021: 37) uses farms as an example of cognitive assemblages: "It likely involves computational components, for example in the tractor and other automated equipment that the farmer uses and in the computer he powers on to access current market prices for his crops. But it also includes all the lifeforms necessary for the farm to produce its harvests, from the bacteria in the soil to the plants in the fields to the livestock those plants and bacteria help to feed. From microbes to the farmer and his cell phone, all count as cognizers interpreting information and engaging in meaning-making practices specific to their capacities and milieux."

[12] Differences between conscious and nonconscious actors are evident on the page: the conversations between humans and robots are conventionally rendered, but

conscious robots converse between themselves in italics (and with the occasional ASCII emoji) without quotation marks, e.g., "*Let's establish a secure session using the AF protocol*" (*A* 110).

[13] Already Suvin notes how SF has its own relationship to the "zero world" of an author's empirical surroundings as it can concentrate "on possible futures . . . the present and the past . . . from an estranged point of view" (377–88).

[14] To correspond with how *Autonomous* deals with Paladin's choices regarding nonhuman gender-identity, this section uses both male and female pronouns depending on where in the novel we are, as the character's adoption of the latter aligns with the culmination of Paladin's bildung narrative.

[15] It is often argued that along with estrangement, a sense of wonder — a concept suggested by C. N. Manlove, who connected it with "contemplation of strangeness" (7) — is one of the generic markers of SF, or at least that SF excels "at generating that unrigorously termed quality" (Polvinen 2018: 78). Both estrangement and a sense of wonder have been seen as features that help readers expand their understanding of the world they live in, either by penetrating its illusions in the case of estrangement or by making us pause at the face of strangeness in the case of wonder.