Cosmotechnologies of Community and Collaboration in Vandana Singh's Speculative Architectures

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Abstract
Yuk Hui, referring both to climate change and its accompanying social upheavals, writes that 'to confront the crisis that is before us', humans will have to rethink the idea of technological universality and how it constructs our relationship to each other and to the natural world. For architects, this means considering how much architecture today is constrained by a singular technological paradigm, and how architects can think the many technologies of architecture differently.

This essay considers architectural cosmotechnology through discourses in global speculative fiction (SF), fictions proceeding from different ways of understanding and being in the world, to explore the future implications of these fictions for architecture and other technological practices in contrast to the hegemony of global modernism – what I have called cosmotechnologies of community and collaboration. The short fiction of SF author Vandana Singh supplies an image of architecture that proceeds from different images of and concerns about the future, and is an exemplary practice in cosmotechnology. She reframes existing technologies and invents new technologies in a mode of practice that centres the experience of diverse cultures in technologies of community and collaboration where architecture becomes central to new ways of being in the world.

Keywords
Architectural technology, global futurism, CoFuturisms, Vandana Singh, science fiction, architectural sustainability, technodiversity

> Let me give you a preliminary definition of cosmotechnics: it is the unification of the cosmos and the moral through technical activities, whether craft-making or art-making. There hasn't been one or two technics, but many cosmotechnics. What kind of morality, which and whose cosmos, and how to unite them vary from one culture to another according to different dynamics. I am convinced that in order to confront the crisis that is before us – namely, the Anthropocene, or the intrusion of Gaia (Latour and Stengers), or the 'entropocene' (Stiegler), all presented as the inevitable future of humanity – it is necessary to reopen the question of technology, in order to envisage the bifurcation of technological futures by conceiving different cosmotechnics.[1]

By way of a quote from Yuk Hui in which he succinctly summarises his 'cosmotechnics', I start this essay by looking for the concept's affordances for a thinker in architecture. First, the concept helps us understand the emergence of architecture-as-technology in relation to the cosmology with which it is co-constituted. Second, it

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shows how architectural technology is not the result of linear progress, a teleological fantasy, and thus might be radically different from how it is presently imagined. Third, following Hui, we can understand that using technological systems enmeshed in the existing hegemony of global neo-liberal capitalism can do little to confront the present ecological crisis – a challenge to the entire practice of contemporary architecture including its conceptions of sustainability.

While the concept of cosmotechnics supplies the architectural reader with considerable ammunition to critique how the discipline values itself as a technological practice, the final portion of Hui's quote is something that is simultaneously an observation and an impassioned imperative: 'in order to confront the crisis that is before us... it is necessary to reopen the question of technology... by conceiving different cosmotechnics'. In this essay, I probe this question, arguing that this project of 'conceiving different cosmotechnics' is already ongoing, with consequences for architecture, within the global speculative storytelling traditions collected under the moniker of CoFuturisms, a project of imagining futures that bears superficial similarities to science fiction, but with important differences. The imagined futures emerging from cosmologies informed by diverse cultures, geographies and life experiences are a potent site from which to imagine the collaboration of moral and technical domains in these futures, with radical consequences for more just and ecologically sensitive forms of architectural practice. Finally, in order to demonstrate how technology can be reframed within speculative fiction, I explore architectural technologies of community and collaboration in the work of SF author Vandana Singh.

Architecture-as-technology

This essay sets out from an understanding of architecture, not as an accumulation of technical devices – mechanical and structural systems for example – but taking a view where it is possible to speak of architecture as a technology in itself as much as an assemblage of other technologies. I follow Hui through Heidegger and Simondon in defining technology as an intervention by a being in its environment in order to change its relationship with that environment, but Hui goes on to argue that there cannot be a universal conception of technology; building upon Simondon, the expression of any technology in a culture is entwined with that culture, its politics and cosmology, and so, Hui writes it is not appropriate to speak of one technics but rather many cosmotechnics – many ideas about what technology is and what it should be used for.[2] In naming cosmotechnics, Hui asks what is accorded place of privilege – as technological – in the imagined progress of the Western narrative of modernity, and what other ideas about technology might be forgotten or erased in that process, along with the cosmologies with which they are co-constituted.

By understanding contemporary technology as an inevitable consequence of a linear narrative of scientific progress, architects might be tempted to understand technology as innocent of any social consequence, a license for political agnosticism, or worse, a substitute for social or political innovation. As I argue elsewhere, many 'technological' approaches in architecture, from Buckminster Fuller through to contemporary practices in digital architecture, make claims for the social benefit of technology alongside claims to rationalism and enlightenment progress.[3] I conclude that essay by writing: 'While digital practices are often predicated on their implied futurity, any futurity that does not situate its imagination of aesthetic and material novelty within an imagination of an improved human or environmental condition only promises a future very like the dystopia of the present'.[4]

What then of the profession's recent fascination with digital technology: BIM, parametric form making, fabrication, or AI? If we can define technology as all the ways humans intervene in their environment, then the enthusiasm for digital technology is only one path among many; we can no longer privilege the robot over the brick, nor reinforced concrete over bamboo. Nor can we abide a Eurocentric bias that sees a primitive hut in the architecture of non-Western cultures while celebrating the supposedly subtle genius of Western production. From this point of view, making architecture has always been technological: a process of invention which manipulates the material environment in order to make it safer, more comfortable, and more amenable to – largely human – life. Then, architecture-as-technology is a fluctuating assemblage of many human interventions in the material world. Some parts of that assemblage are specifically tuned to manipulate the physical environment: keeping out the rain or wind. Some architectural technologies mediate social conditions; walls, doors and windows are technologies of including and excluding. Some architectural technologies manipulate an inhabitant's psychological conditions in producing well-being, comfort or pleasure. Within such an expanded frame, there are as many potential conceptions of architecture-as-technology as there are cosmotechnics.

As Hui argues, the present ecological crisis requires conceptions of technology that arise from outside the dominant cosmological paradigm. While there are many responses to the climate crisis in the profession, we might ask how much these are actually tuned to reproducing an existing lifestyle and world-view. Within the present paradigm, much of architectural sustainability attempts

to minimise to energy use of the building, as it is built, through its operating life, and after its use is finished. To achieve this, architects and engineers turn to quantitative metrics: from a material's U-value to kilowatt hours(KwH) and global warming potential (GWP). While admirable, each of these measures of architecture sustainability is tuned to preserve rather than question the existing way of building; they make a small substitution within an already existing assemblage of architecture-as-technology, and don't question many of the assumptions shaping our cities, homes and workplaces. Thus, they reproduce the same social, political and infrastructural relations that created the present ecological emergency. Given the global dominance of Western architectural culture, rubrics of sustainability largely defined by Western academics or software companies are deployed across the world. While such metrics focus on minimising harm, none of them offer the possibility to reframe affirmative relations with other humans and more-than-human ecologies and to fundamentally alter a destructive relation to the natural world. Such a commitment to a fixed cosmological paradigm, Hui argues, actually precludes the possibility of searching out practices in technology that reframe human relations with each other and with the planet.

In contrast, by analogy to biodiversity, Hui is searching for 'technodiversity': technological paradigms that arise from and are adapted to unique environments, geographies, cultures and historical contexts; 'technodiversity', he writes, 'is fundamentally a question of locality'.[5] By cultivating the emergence of local practices, each presents its own interventions in the world adapted to its unique circumstances and like biodiversity, cultivating such technodiversity also produces resilience in relation to the crises of the present; when multiplied together these practices overwhelm the dominance of a universal technics and universal cosmology and multiply the possible ways of being in and intervening in the world.

By no small coincidence, in the time before the rapid spread of architectural modernism alongside Western culture in the twentieth century, many historical building practices could be understood as both more ecologically sensitive and culturally attuned. However, while we can learn from vernacular practices, it does not follow that a conception of architecture from local cosmologies demands a return to pre-modern ways of living. Hui is emphatic that locality does not mean a return to traditionalism.[6] The same cosmological paradigms that informed such historical practices continue to exist, and it is incumbent upon the architect to seek out the potential in these cosmological paradigms for the imagination of sustainable and equitable futures appropriate to different localities.

In a rudimentary sense, a framework such as Kenneth Frampton's critical regionalism also aims to supersede modernism in its sensitivity to place and understanding of local technics.[7] However, as Keith Eggener argues, critical regionalism rests on a binary opposition between centre and periphery that does not value both equally, but rather romanticises certain so-called peripheral practices for consumption by the extant disciplinary hierarchy. He continues that the architects identified as critical regionalists are firmly within the disciplinary bounds of authority – generally male and educated within the academy.[8] To return to Hui's terminology, such practices make an attempt to approach locality while keeping a universal, 'critical' cosmology in place. Thus, a cosmotechnological view of architecture is neither a renewal of a vernacular, nor an appropriation of regionalism by an elite; it is rather a comprehensive reappraisal of architecture itself and its place in relation to different cosmologies, perhaps to the extent of undoing architectural disciplinarity itself.

While there are normative forces in the discipline – constraints imposed by a history of Western imperialism and patriarchal sexism as much as by operating in a neoliberal economy – I do not accuse all architects of proceeding from the same cosmology. There are many inspirational practices already engaged in rethinking architecture's technicity and its cosmological underpinnings. As Arturo Escobar reminds us, in contrast to the perceived dominance of Western systems of thought, we already exist in a pluriverse made up of the coexistence of diverse local peoples in the self-determined design of their socio-natural communities.[9] These local practices not only exist in the present, they also produce their own futures. It is within these futures that we can multiply possibilities both for the architectural profession and for our world; many architectures are possible within this pluriverse.

CoFutures

Hui's call for a 'technology-environment complex[es]' – which finds its genesis in ' a cosmic reality which is proper to [its] milieu' – finds a close ally in the critical discourse concerning Indigenous knowledge traditions, sciences very unlike the science that emerged from European cosmology.[10] Grace Dillon, learning from Gregory Cajete, points out that that locality is integral to Indigenous science:

> Indigenous scientific literacies are those practices used by Indigenous native peoples to manipulate the natural environment in order to improve [their] existence ... And since Indigenous scientific literacies are shaped by the diverse natural environments of the Indigenous groups that use them, no single set of practices summarises the possibilities.[11]

Importantly, these are not static or vanished traditions, they are ways of knowing the world that continue to evolve.[12] For Dillon, this junction of cosmology and scientific literacy continues within Indigenous futurism – stories about the future from Indigenous peoples all over the world drawing on notions of time, progress, and futurity very different than those in Western SF: 'this overcoming of global technoscientism', she writes, 'occurs by going back, way back, to tradition through the telling of story/ceremony, and by going forward, way forward, by mining the imagination to construct an ameliorated technology informed by Indigenous tradition and practice'.[13]

Dillon's introductory essay to the fiction anthology *Walking the Clouds* elaborates further: despite a 'lack of resemblance to taxonomic Western systems of thought', Indigenous knowledge constitutes a science in itself, especially as it ties together 'sustainable forms of medicine, agriculture, architecture, and art' in a deeply rooted 'spiritual interconnectedness among humans, plants, and animals', with significant consequences for sustainable relationships to place.[14] As an example, Dillon discusses SF author Nalo Hopkinson's *Midnight Robber*, especially an aspect Dillon calls 'reciprocal altruism', a knowledge of interspecies relations and mutuality that stretches backwards and forwards into deep time. This kind of fluid intergenerational conception of time, of the past and the future always being with us, is a significant difference from the linear progress and privilege of newness that characterise Western science and technology.[15]

Dillon develops the concept of Indigenous futurisms with reference to Afrofuturism – a term coined in the 1990s for a form of cultural expression that the centres the African diaspora's experiences of and expectations for the future in direct contradistinction to the supposed universality of Fukuyama's end of history or McLuhan's global village.[16] Both Afrofuturism and Indigenous futurism are examples of a recent fluorescence of futurisms that, although defined more recently, describe sometimes centuries-old speculative storytelling traditions. They are joined by futurisms from other localities: from South and East Asia, Latin America, Africa and the Arab world, among many others of increasing geographical specificity.[17] They are also joined by other speculative practices claiming a space in the future, from people marginalised on the basis of, for example, gender, sexuality or ability.

Bodhisattva Chattopadhyay argues that these 'futures from the margins' should be jointly valued as 'CoFutures'. Playing on the 'co-' prefix, Chattopadhyay argues that these futures be understood as complex, co-eval, and compossible; they arise separately from different positions in all their unique complexities, but none precludes another from being possible either in fiction or in the realm of praxis – they require 'solidarity' in 'recognition of difference'.[18] In recognising that the 'science' of science fiction often refers to nineteenth-century discourses that, for all their claims to enlightenment rationalism, are explicitly racist and exclusionary,[19] these CoFutures arise from different geographical, linguistic, and cultural world-views, defining the aesthetics and politics of each one's own future in ways which supersede both Western science and Western imaginations of the future while reclaiming continuing practices of speculative futuring from their imperialist denomination as SF.[20]

While each of these futuring practices maintains a vibrant tradition of storytelling, they are not only fictional, but also find their expression in community politics, activism and advocacy, forming a 'complex of ideas' that is at once political as much as it is artistic.[21] For peoples all over the world, this blending of the political and aesthetic is an ongoing agency in the imaginative construction of cosmopolitical and paradigms for the future as well as an affirmation in the present. As the discourse around Indigenous futurism and CoFutures shows, Hui's call for different cosmotechnics in order to confront the challenge of climate change is already answered by practices all over the world. Escobar's 'pluriverse' is already at work imagining its own futures, futures that reshape contemporary ideas about science, ecology, and technology, including ideas about what architecture is and can be in the future.

There are already architectural commentators who explore the contributions of SF to thinking architectural futures, especially those not constrained by profession's historical baggage. In just two examples, David Fortin explores the architecture of Indigenous futurism, while Amy Butt, alongside a cogent defence of why architects should read SF, also engages with architecture in works of feminist SF.[22] The present essay joins this work in showing how CoFutures resist the homogenising tendencies within so-called mainstream SF, not only in examining which cosmology takes precedence in a given future imagination, but also in the consequences for the concepts of science or technology as such. Using two short stories by Vandana Singh, I explore how architecture is considered as an assemblage of technologies especially when confronted with other social, economic and environmental strictures.

Vandana Singh's speculative technologies

Vandana Singh writes SF alongside her daily work as an associate professor of physics at Framingham State University. She is someone who exemplifies the challenge of naming regional futurisms, and the necessity of a descriptive framework like CoFutures. Born in India,

often engaging with themes from Indian history and mythology, and locations in the country, she is part of a centuries-long speculative storytelling tradition that continues in India, and indeed, she has published in venues that identify as South Asian or Indian SF. However, more than other regions, the rich linguistic and geographic variety of the subcontinent, not to mention its global diaspora, makes delimiting Indian SF very difficult.[23] In addition, Singh finds common cause with many other futuring traditions, including Indigenous voices both within India and across the world. Therefore, in Singh, we see a conception of locality not strictly constrained by geographic boundaries, but also, in perhaps a challenge to Hui, gesturing to the planetary as well as the local

Singh's literary output is largely in the form of short stories and novellas, gaining her considerable critical attention. In this essay, I will focus on two stories: 'Indra's Web', first published in 2011 in an anthology,[24] and later more widely in *Ambiguity Machines and Other Stories*, and 'Reunion', a novella first published in 2019.[25] In these stories, existing architectural technologies are reframed as technologies of community, while Singh's own practice offers insights into working beyond one's own experience in her technologies of collaboration.

Both of these stories revolve around an experimental settlement called Ashapur – Hindi for 'city of hope' – and one of the progenitors of this settlement, a scientist named Mahua. 'Indra's Web' is told through Mahua's inner monologue as she troubleshoots the settlement's energy infrastructure, while in 'Reunion', she awaits news of a long-lost friend while reminiscing about her role in the 'Great Turning', an imagined late twenty-first century shift away from a global capitalist economy. Both stories are told against the backdrop of climate change; 'Indra's Web' near an overheating Delhi, and 'Reunion' near a future Mumbai flooded by the rising ocean.

The stories share similarities with an ever-increasing number of fictions exploring the challenges of and adaptations to climate change. As many authors show, the global scale and import of climate change and the Anthropocene has long been available to representation and critique within SF.[26] In fact, climate fiction is especially present in SF from outside the Anglo-American sphere, from communities most affected by it; in his survey, Chattopadhyay draws examples ranging from the emergence of Solarpunk in Latin American to energy futures from the Arab world.[27] Singh's stories fit comfortably here in exploring the impact of climate change from the point of view of a specific community, in exploring local adaptations from local cosmologies, and in understanding such storytelling through the lens of 'postcolonial' SF.[28]

Singh's settlements are built from a mixture of ancient and modern techniques: structures are made of mud and straw and covered with lime plaster, while the roofs of the settlement are 'an uneven carpet of green and silver – rooftop gardens broken by the gleam of solar panels'.[29] The settlements are divided into smaller domiciles, 'dome-shaped to reduce the impact of storms' with 'thick walls of clay, straw, and recycled brick', 'vegetables cascading off the walls', and with the space between given over to gardens. Within the settlements, the need for food is met by urban gardening, while former agricultural land is returned to wilderness. Energy needs are met by 'sun towers', an imagined solar power plant similar to the existing heliostat technology. Singh's smaller settlements are networked, connected to transportation, information and ecological infrastructures to share both knowledge and resources.[30]

If we follow a logic of discrete classification, it would seem that what Singh is describing is not really science fictional at all. Each technology in the list is already possible; sun towers and urban gardening, mud bricks and the fifteen-minute city are familiar or even banal to an architectural audience. They are not new individually, but when joined together in a different cosmological paradigm, they become technological assemblies imagined from and for very different futures. Thus, Singh dissociates the conception of technology from Western modernity's myth of linear progress with its sole claim to technicity; 'humans have always been technological', she writes; 'a traditional Navajo Hogan, for example, is a technology, as are the hunting tools of the Inupiaq people of the Alaskan North shore'.[31] In these stories, local technologies are no less advanced, and are perhaps even better adapted to life after the 'Great Turning'. In a move that is much more difficult in the epistemic space of Western SF, Singh is able to wrest futurity apart from mere technical novelty.

Singh's story also contains a warning about how so-called sustainable technologies might end up doing more harm than good when uncritically transplanted into the context of the Indian subcontinent. She shows how technology can be a (neo-)colonialist agent as its imposition without an understanding of locality risks alienating people, perpetuating inequality, and endangering local ecosystems. Technologies that would be uncomplicated technical innovations in Western SF are the object of consternation in Singh's future: a Santhali women's cooperative stops a project that replaces forests with artificial trees to enhance photosynthesis, transport workers in Odisha and Andhra Pradesh organise the largest strike in history to protest a robotic train, and experimental crops under foreign corporate control are set alight by local farmers in Karnataka.[32]

What is science fictional in Singh's text is not the technology itself, but the future context that imagines human societies feeling the intensified effects of climate change and corporate oligarchy, giving rise to a radical break as human societies organise themselves in ways which 'move civilization away from self-destruction'.[33] In short, Singh asks what human settlements look like in the context of a new cosmological paradigm that is both newer and far older than the 'madness of the twenty-first century'.[34] Beyond the explicit critique of capitalist excesses, the space of Singh's short stories offers some clues about how the human and more-than-human members of this society learn to live together, and how a cosmology centring such mutual care comes to reassert itself. Earlier, I discussed technologies of energy, food and housing in Singh's story, when in fact, by naming technologies one way or another, we limit how to view such technologies. And so, I propose two new constellations, and I provisionally suggest naming them technologies of community and technologies of collaboration.

Technologies of community

The city of Mumbai, the financial centre of contemporary India, becomes an icon of collapse in 'Reunion', and Singh uses that icon of architectural modernism, the 'glass towers ris[ing] above drowned streets', to implicate both the architecture and economics of globalisation in this 'Age of Kuber'.[35] However, the drowned streets are not only an image of collapse; she also asks whether the technology of the city itself is appropriate for human settlement. As Tony Fry has argued, while humans have long lived in cities, many present-day cities may be understood as a colonial technology, as they encode colonial authority and remain riddled with the fear of the colonial apparatus.[36] The fixation with the city itself is hardcoded into European languages; the Latin *civitas* conflates the physical city with citizenship, civilisation, and civility. Singh asks us to question the city as a technology for community. 'Maybe', Mahua asserts, 'the city isn't the right idea for what we're trying to do', because as a technology, the city promotes acceleration, isolation, work and stress, moving 'beyond the scale of human social adaptation'.[37] By contrast, Singh proposes to nurture community in different modalities and scales of interaction, and even to extend the notion of community to those often excluded; she advocates not only more equitable social relations between humans, but also with other species.

In terms of physical community, Singh proposes a network of small settlements, she calls them 'bastis', adapted to the scale of human mobility and social relationships. The first settlement is a former city dump, and her protagonist invites slum dwellers and climate refugees from a flooded Bangladesh to become the first inhabitants of her settlement and to collaborate with her in that development. In Hindi, 'basti' can mean dwelling, but also carries a more pejorative sense of village or slum.[38] Singh uses the word to play upon the antagonism between the city and this new form of dwelling, as much as on the antagonism between global capitalism and the other cosmologies waiting in the wings.

The smallest scale of community she suggests is the individual domicile, of up to fifty people – she writes about 'families related by blood and by choice' – to explore the social technology of an extended notion of kinship in the settlements.[39] Each of these domiciles is clustered into a basti of a few hundred inhabitants. The spaces between the domiciles are devoted to food production, pleasure, and to the comfortable banalities of everyday life, 'allowing room for people to congregate in front of this chai-house or in that niche, so that old women could gossip and mind the little ones, and the wandering cows and pariah dogs had room to rest'.[40] The communities produced from this perspective give preference to marginal, everyday practices that would be largely unconsidered in modern conceptions of the city; the basti prioritises leisure and the – often unpaid – labour of childcare over economically productive land use.

Up to this point of my synopsis, Singh could be accused of a kind of romanticism for the rural village and the democratic decentralization of the Gram Sabha (village council). Singh does imagine that this particular technology of community continues, although it is a model that, for all its promise, is not without its problems.[41] But Singh also imagines connection at other scales; individual settlements are joined by multiple infrastructures. Some of these connections are physical: transportation infrastructure between settlements, a shared energy infrastructure, and ecological corridors to cultivate biodiversity. Some of the connections are informational; as a technologist, Singh's protagonist is pivotal in developing an open data infrastructure to aid governance and community – 'embedded intelligence agents' communicating information about climate, ecology, biodiversity, and local resources are an aid both to cooperative governance and to being 'companionably present with the non-human and inanimate'.[42] 'Indra's Web' describes how this 'myconet' technology, based on the way fungal networks enable communication between trees, is also the basis for decentralised communication networks between people. In 'Reunion', the characters turn their attention to deciphering this language in order to 'speak' to the more-than-human world, especially to the remaining, threatened major forests of the world.[43] The digital infrastructure that Singh imagines bears similarities to imaginations of smart cities the world over, in

the ubiquitous sensing, cataloguing and transmission of data. However, it differs in the way that information is produced, shared and consumed, and for whose benefit; rather than information infrastructures that are determined by the imperatives of shareholder value, the open data infrastructures that Singh imagines are for the purpose of equitable governance by a well-informed and connected populace.

While some may see nothing new in Singh's basti, it does differ drastically in the relations of authority, ownership, connection, and belonging within the community, revealing how much physical infrastructures intersect with other technologies of community, from politics to digital infrastructures. Like mud bricks and urban farming, her technologies of community also learn from real life practices: 'I imagine a positive (in all senses) feedback loop between such a [SF] literature and the material possibilities on the ground', she writes, 'each inspiring and being inspired by the other'.[44] As examples, she highlights the political self-determination and sustainable forest management in Mendha Lekha village, the participatory ecological agriculture of the Dalit women of the Deccan Development Society, and the Dongria Kondh tribals in Odisha, who have long sought to live harmoniously with their environment, in spite of their ongoing battles against the mining company Vedanta.[45] Technologies of community is one way of describing the intersection of diverse scales and modalities of being together; some of these are explicitly architectural, and some show how these spatial and material infrastructures reflect or reproduce other technologies of community in the political relations they allow or disallow.

Technologies of collaboration

One other significant theme that emerges in Singh's work is the practice of the technologist, both of her characters and of herself as author working in technologies of collaboration. In the stories, the character Mahua works by building collaborations across gender, religion and caste. While also recruiting promising scientists to her project, Mahua's innovations are made possible by building collaborations and trust with marginalised people: those in precarious housing, climate refugees and tribal peoples. The latter are especially important as the reader joins the character's journey from 'progressive urbanite' to a rediscovery of her own tribal ancestry and the corresponding forms of knowledge found there, especially as it is the Santhal people's 'reverence for the web of life' that forms the cosmological framework to critique the excesses of global capitalism.[46]

Both as a professor of physics who engages with climate change and as an author of SF, Singh supplies an idea of the technologist which invites investigation, an image that asks the technologists to engage in cosmopolitics within and through a practice in cosmotechnology. As an author of SF, Singh is cautiously optimistic about technology, but uses her fiction to ask us to consider the context and power relationships around technology:

> when I imagine 'positive' technologies, I think about the context – from where, and for whose benefit does the technology arise? What is its impact on people and their interactions, and on the rest of nature? How does it affect natural cycles within which we live? To think about any technology being positive or negative without thinking about its context is to see only part of the picture.[47]

She continues:

> So, there are two things we can do. One: ... to imagine, seek and build a truly egalitarian societal structure. Two: to listen to marginalised people – not only to become aware of the horrors of their predicament, but also to learn how they live in dystopia. They have important insights. Their experience, intelligence and creativity need to be acknowledged.[48]

That is to say, Singh demonstrates how technology is inseparable from political power, and that no technologist – and no architect – can reasonably ignore this aspect of the practice. She offers two courses of action: first, to imagine new social structures, and second, to listen to marginalised people. If the first is captured in, for example, the Ashapur stories, the second is better exemplified in her own writing practice. As someone who thinks about the future of technology, Singh also listens to and learns from diverse peoples. She invites others to share her writing practice, for example in inviting members of the Dalit community or various Indigenous peoples as advisors and teachers to inform her fiction and teaching. It is in this sense that Hui's locality might be thought in a more post-geographical sense; particular cosmologies might emerge from particular places, but are also enriched in the new planetary alliances they cultivate between marginalised cosmologies.[49]

Importantly, Singh is diligent about citation in her practice. While we might be familiar with citation within the conventions of academic scholarship, in feminist writing citation becomes a tool to showcase different points of view, to acknowledge one's own situated perspective, but also to give credit to those you are learning from, even if such learning is outside the auspices of academic authority.[50] Working with voices and identities other than her own, Singh acknowledges, is to walk the narrow 'path between erasure and appropriation'. This

engaged practice of citation is integral to understanding what voices are heard, and thus are given authority, and reveals voices that might be overlooked. Therefore, at its best, Singh invites the reader to listen to other voices as her acts of citation become 'pathways for readers to discover other stories and other writers'.[51]

In one citation, Singh draws upon the knowledge of Indigenous scholar Kyle Whyte in illustrating how the practice of technology needs to listen to other perspectives. This is especially true when the rhetoric of sustainability proceeds upon the same epistemic fallacies that created climate change:

> Indigenous narratives of climate change are stories about changes in kinship relationships, where kin are all we are connected to, not just biological relations – thus trees, rocks, ants, birds… Such an epistemology of coordination, to use Whyte's term, cannot make the fatal error of simply substituting fossil fuel infrastructure with green energy, nor can it endorse the displacement of Indigenous people from their lands for a wind farm, or permit the mining of the ocean for minerals for electric vehicles'.[52]

Technologies of collaboration are thus necessary for a technological practice in the future, and Singh invites us to understand this social technology as the thing that makes all other technologies possible. Importantly, the scale of such collaboration is left open. On the one hand this means to understand one's own body as a part of such social technology; Singh's character Mahua must eventually leave her mediated interfaces behind in order to learn 'the language before language that the earth speaks'.[53] On the other hand, in what could be an amendment to Hui's discussion of locality, Singh would also have us understand that 'local' and 'planetary' are not mutually exclusive categories.[54] Hui's pursuit of technodiversity necessitates that we remain in constant conversation, with our own situatedness as much as with voices and communities much farther afield, but as Singh reminds us, with 'humility as a key principle'.[55]

Conclusion

As an author of speculative fiction, Vandana Singh's is one example of a practice in searching out cosmotechnologies, both from her own experience and from humble and respectful collaboration with others. In the Ashapur stories, Singh explores the technological paradigms of a future society that centres the well-being of both people and planet, and in doing so, she asks us to reframe our view of technology. In re-framing already existing architectural and infrastructural technologies, Singh shows how even these can be reconsidered in the context of radically different cosmologies; in seeing community – with non-humans as much as humans – and collaboration as technologies in themselves, even seemingly mundane technologies can be adapted to 'reverence for the web of life' on local and planetary scales.[56]

From the architect, Singh asks for a critical perspective that is aware of how much of existing architectural technology is bound up within the singular worldview of neoliberal capitalism. She also shows that equating technology with newness actually misses the potential revolutions of existing technologies. However, Singh's stories should not be taken as a coherent political programme, and are rather more useful as a thought experiment about what we might fear from or hope for the future. It is one speculation among many; like Singh's basti, it is one of a 'million mutinies' and 'experiments in alternative ways of living and being'.[57] The continued experiment of seeking out new cosmotechnics is one that all architects can pursue in understanding the discipline itself as its own speculative storytelling tradition, able to search out community and invite collaboration within our own practice, and thus continue in the project of reframing architectural technology. Architects are substantially helped in this endeavour if they continue to read and learn from the many storytellers who work, often from marginalised positions, and to understand architecture using their own technologies of speculation from the positions afforded by these CoFutures.

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Notes

1. Yuk Hui, ‘Cosmotechnics as Cosmopolitics’, *e-flux Journal* 86 (November 2017): 7, https://www.e-flux.com/journal/86/161887/cosmotechnics-as-cosmopolitics/.
2. Yuk Hui, ‘On Cosmotechnics: For a Renewed Relation between Technology and Nature in the Anthropocene’, *Techné: Research in Philosophy and Technology* 21, no. 2 (2017): 319–41, https://doi.org/10.5840/techne201711876.
3. Joel P.W. Letkemann, ‘Critical Dystopias in the Digital Project’, *In Folio* 36 (2021): 90–97.
4. Ibid, 96.
5. Yuk Hui, ‘Machine and Ecology’, *Angelaki* 25, no. 4 (3 July 2020): 64, https://doi.org/10.1080/0969725X.2020.1790835.
6. Ibid.
7. Kenneth Frampton, ‘Towards a Critical Regionalism: Six Points for an Architecture of Resistance’, in *The Anti-Aesthetic: Essays on Postmodern Culture*, ed. Hal Foster (Port Townsend, WA: Bay Press, 1983), 17–34.
8. Keith L. Eggener, ‘Placing Resistance: A Critique of Critical Regionalism’, *Journal of Architectural Education* 55, no. 4 (1 May 2002): 228–37, https://doi.org/10.1162/104648802753657932.
9. Playing on the idea of simultaneous universes, both from theoretical physics and popular science fiction, Escobar proposes that these many universes of value coexist in the world, in contrast to the global hegemony of Western ideology. These diverse worldviews have the possiblity for self-deterimined practices in ecological community, with radical consequences for sustainable and equitable world-building. See: Arturo Escobar, *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds* (Durham, NC: Duke University Press, 2018).
10. Hui, ‘Machine and Ecology’, 59.
11. Grace L. Dillon, ‘Indigenous Scientific Literacies in Nalo Hopkinson’s Ceremonial Worlds’, *Journal of the Fantastic in the Arts* 18, no. 1 (2007): 25, https://doi.org/10.5040/9781474248655.
12. Gregory Cajete, *Native Science: Natural Laws of Interdependence* (Santa Fe: Clear Light Publishers, 2000).
13. Dillon, ‘Indigenous Scientific Literacies’, 24–25.
14. Grace L. Dillon, ‘Imagining Indigenous Futurisms’, in *Walking the Clouds: An Anthology of Indigenous Science Fiction*, ed. Grace L. Dillon (Tucson: University of Arizona Press, 2012), 7–8; Dillon, ‘Indigenous Scientific Literacies’, 26.
15. Elsewhere, she discusses the Anishinaabe concept of ‘kobade’, a recognition of intergenerational connections that stretch backwards and forwards from the present; see: Grace L. Dillon, ‘Taking the Fiction Out of Science Fiction: A Conversation about Indigenous Futurisms’, interview by Pedro Neves-Marques, *e-flux Journal* 120 (September 2021), https://www.e-flux.com/journal/120/417043/taking-the-fiction-out-of-science-fiction-a-conversation-about-indigenous-futurisms.
16. Although the term was coined by Mark Dery in 1994, Dillon cites Alondra Nelson’s primary scholarship as her influence. See: Alondra Nelson, ‘Introduction: Future Texts’, *Social Text* 20, no. 2 (2002): 1–15, https://doi.org/10.1215/01642472-20-2_71-1.
17. Joy Sanchez-Taylor, *Diverse Futures: Science Fiction and Authors of Color* (Columbus: The Ohio State University Press, 2021).
18. Bodhisattva Chattopadhyay, ‘Manifestos of Futurisms’, *Foundation: The International Review Of Science Fiction* 50, no. 2 (Summer 2021): 8–23.
19. John Rieder, *Colonialism and the Emergence of Science Fiction* (Middletown, CT: Wesleyan University Press, 2008).
20. Bodhisattva Chattopadhyay, ‘Recentering Science Fiction and the Fantastic: What Would a Non-Anglocentric Understanding of Science Fiction and Fantasy Look Like?’, in *Speculative Fiction 2013: The Best Online Reviews, Essays and Commentary*, ed. Ana Grilo and Thea James (London: Jurassic, 2014), 213–28, http://strangehorizons.com/non-fiction/articles/recentering-science-fiction-and-the-fantastic-what-would-a-non-anglocentric-understanding-of-science-fiction-and-fantasy-look-like.
21. Bodhisattva Chattopadhyay, ‘Fictioning the Futures of Climate Change’, *Fafnir: Nordic Journal of Science Fiction and Fantasy Research* 9, no. 1 (2022): 10.
22. David T. Fortin, ‘Indigenous Architectural Futures: Potentials for Post-Apocalyptic Spatial Speculation’, in *Beyond Architecture: New Intersections & Connections* (ARCC/EAAE 2014 International Conference on Architectural Research, University of Hawai’i at Manoa, 2014), 475–83; Amy Butt, ‘“Endless Forms, Vistas and Hues”: Why Architects Should Read Science Fiction’, *Architectural Research Quarterly* 22, no. 2 (June 2018): 151–60, https://doi.org/10.1017/S1359135518000374; Amy Butt, ‘As Plain as Spilt Salt: The City as Social Structure in The Dispossessed’, *Textual Practice* 35, no. 12 (14 September 2021): 1–16, https://doi.org/10.1080/0950236X.2021.1974536; Amy Butt, ‘“It Was Quiet”: The Radical Architectures of Understatement in Feminist Science Fiction’, *Cultural Geographies*, 14 October 2022, https://doi.org/10.1177/14744740221126986.
23. Suparno Banerjee, *Indian Science Fiction: Patterns, History and Hybridity*, New Dimensions in Science Fiction (Cardiff: University of Wales Press, 2020).
24. Stephen Cass, ed., *TRSF 2011* (Cambridge, MA: Technology Review/The MIT Press, 2011).
25. Vandana Singh, ‘Indra’s Web’, in *Ambiguity Machines and Other Stories* (Easthampton, MA: Small Beer Press, 2018), 145–54; Vandana Singh, ‘Reunion’, in *New Horizons: The Gollancz Book of South Asian Science Fiction*, ed. Tarun K. Saint (London: Orion Publishing Group, 2022), 341–65.

26. Mark Bould, *The Anthropocene Unconscious: Climate Catasrophe Culture* (London: Verso, 2021); this hasn't escaped the attention of the architectural community either; see, for example: Dehlia Hannah, ed., *A Year Without a Winter* (New York: Columbia University Press, 2018).
27. Chattopadhyay, 'Fictioning the Futures of Climate Change'.
28. Amit R. Baishya, '"Because We Are Not Apart, We Are a Part": An Interview with Vandana Singh', *Postcolonial Studies* 25, no. 3 (3 July 2022): 7, https://doi.org/10.1080/13688790.2021.1957200.
29. Singh, 'Indra's Web', 147.
30. Singh, 'Reunion', 342–43, 355, 358.
31. Baishya, 'Because We Are Not Apart', 13.
32. Singh, 'Reunion', 351–52.
33. Ibid., 342.
34. Ibid., 351.
35. Singh gives the name of the Hindu divinity to this age of unfettered pursuit of wealth; ibid., 353.
36. Tony Fry, *Remaking Cities: An Introduction to Urban Metrofitting* (London: Bloomsbury Academic, 2017), 34–35.
37. Singh, 'Reunion', 354.
38. As the word comes into English, it only maintains this pejorative sense. My thanks to Bodhisattva Chattopadhyay for a discussion of this word in Hindi, Bengali, and its derivations from Sanskrit.
39. Singh, 'Reunion', 358; an image of kinship that echoes Haraway's call to 'Make Kin, Not Babies', or Sophie Lewis' imperative to 'abolish the family'; see: Donna J. Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016), 99; Sophie Lewis, *Abolish the Family: A Manifesto for Care and Liberation* (London: Verso, 2022).
40. Singh, 'Indra's Web', 148.
41. Vani S. Kulkarni, 'The Making and Unmaking of Local Democracy in an Indian Village', *The Annals of the American Academy of Political and Social Science* 642, no. 1 (July 2012): 152–69, https://doi.org/10.1177/0002716212438207.
42. Singh, 'Reunion', 348.
43. Ibid., 359.
44. Vandana Singh, *Utopias of the Third Kind, Plus: Lamentations in a Lost Tongue, Plus, Arctic Sky, and Much More* (Oakland, CA: PM Press, 2022), 35.
45. Ibid., 21.
46. Singh, 'Reunion', 365.
47. Baishya, 'Because We Are Not Apart', 14.
48. Ibid.
49. See Chattopadhyay, 'Recentering Science Fiction', for a discussion of Gayatri Chakravorty Spivak's 'planetarity'.
50. Sara Ahmed, 'Making Feminist Points', *feministkilljoys* blog, 11 September 2013, https://feministkilljoys.com/2013/09/11/making-feminist-points; Donna Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies* 14, no. 3 (1988): 575–99.
51. Both quotes are from: Vandana Singh, 'CSI Roundtable: Crafting Locally Situated, Culturally Responsive Climate Futures' (chaired by Joey Eschrich, Community Speculations and Technopolitics: CoFUTURES Conference no.18, June 2023).
52. Singh, *Utopias*, 32.
53. Singh, 'Reunion', 364.
54. Singh, *Utopias*, 27.
55. Ibid., 29.
56. Singh, 'Reunion', 365.
57. Ibid., 360.

Biography

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