

Posthumanism and Design

Abstract Since at least the mid-1980s, design has been dominated by a human-centered and user-centered paradigm. Currently, the implications of technological and environmental transformations are challenging designers to focus on complex socio-technical systems. This article traces emergent discussions around posthumanism from across a range of disciplines and perspectives, and considers examples from emerging design practices that emphasize the interrelations between human and nonhuman actors. Specifically, this article reviews literature from actor-network theory (ANT), feminist new materialism, object-oriented ontology, non-representational theory, and transhumanism to inform the development of new methodologies and practices in the field of design. Finally, this article presents critiques of posthumanism from critical race theory and decolonial theory to consider how emergent design perspectives might better support values such as equality and justice for humans and nonhumans that have been traditionally ignored in design processes.

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Introduction

A river in New Zealand has the same legal status as a human being. A major chicken producer aims to improve the lives of its chickens. Climate change and environmental sustainability have become widely recognized as significant, pressing concerns. At the same time, there are emerging technologies that are shaping everyday life, and have begun to play a greater role in socio-cultural, political, and economic transformations. A robot is now a partner in a law firm. Driverless cars are being tested in many cities around the world. Voice-activated, in-home personal assistants are becoming common household devices. Wearable technologies are being embedded into clothing. Medical devices have become so sophisticated that some now take on what we used to think of as human functions.

These developments blur the boundaries between the familiar binaries of human and nonhuman, culture and nature, and human and animal that have dominated Western thinking since at least the Enlightenment. They underscore the ways in which nonhumans – whether environmental or technological – have new kinds of agency in the world. They also reveal new perspectives and raise questions about what, how, and why we engage in the design of the so-called “artificial” world. Over the past several decades, a growing body of social theory has developed around concepts that attempt to make sense of this blurring of boundaries and introduce hybrid, non-binary, relational modes of thinking about being in the world. This article will discuss the importance of these hybrid modes of thinking – especially that of *the posthuman* – for design research and practice.

The hybrid figure of *the posthuman* – and related concepts, such as *the non-human*, *the multispecies*, *the anthropocene*, *the more than human*, *the transhuman* and *the decentering of the human* – greatly expands our understandings of the multiple agencies, dependencies, entanglements, and relations that make up our world. This consideration of humanity’s role in environmental and sociotechnical changes, and the ways these changes shape humans and the world, makes it possible for us to reflect on the implications of these hybridized notions for epistemology, ontology, and ethics. Furthermore, as we adjust our fundamental understandings of human and non-human knowledge and ways of being in the world, it is likely that we will also develop corresponding design methods, frameworks, and practices that better address the challenges we face as a planet.

This article serves as a brief overview of some of the most important ideas by key thinkers contending with the implications of socio-technical and environmental changes. My purpose is to present a set of related theories and concepts of the posthuman to set the stage for emerging design practices that grapple with current problems and questions facing the field. This article does not, however, offer a comprehensive literature review of the extensive scholarly work related to the posthuman, which would require a much longer discussion. While many scholars in a wide range of fields have contributed to the rich discussion of the posthuman, there are also reasons to critique and question this new theoretical framing as well as its potential application in the field of design. Even though design scholars, researchers, and practitioners are already beginning to see the relevance of these theories, associated practices remain undeveloped, leaving much of the translation work to be done in order to move from theory to practice.

What a Chicken Wants

Human-centered design is founded on understandings of the human as a discrete, individual subject. Yet, our new relations to the natural world and to socio-technical systems are calling these previous understandings into question. The field of design is also commonly beholden to neoliberal, capitalist economic models that

1 Fritz J. Roethlisberger and William J. Dickson, *Management and the Worker: An Account of a Research Program Conducted by the Western Electric Company, Hawthorne Works, Chicago* (Cambridge, MA: Harvard University Press, 1939).

2 Lucy A. Suchman, *Plans and Situated Actions: The Problem of Human Machine Communication* (Cambridge: Cambridge University Press, 1987).

3 Alana Semuels, "What a Chicken Wants," *The Atlantic*, October 11, 2016, <https://www.theatlantic.com/business/archive/2016/10/perdue-chicken/503423/>.

4 Ibid.

5 Eleanor Ainge Roy, "New Zealand River Granted Same Legal Rights as Human Being," *The Guardian*, March 16 2017, <https://www.theguardian.com/world/2017/mar/16/new-zealand-river-granted-same-legal-rights-as-human-being>.

define the individual subject, primarily as a consumer with the power to make choices, but whose agency and participation in communal modes of resistance, and power to counter corporations and governments, has been weakened. As design expands into the social sector, and engages with problems within complex socio-technical systems, it is vital that we reflect on the basic assumptions that have underpinned earlier methods, models, and frameworks, and consider the relevance of emerging social theory.

Social science methods have been used to study people in the workplace since the 1920s. The Hawthorne studies applied social psychology to the study of workers, forming the basis for the field of organizational behavior.¹ In the mid to late 1980s, ethnographic research was integrated in to the study of technology use in the workplace at Xerox PARC.² The use of ethnographic research methods such as observations and interviews allowed technology companies to move from techno-centric to human-centric approaches. While there are many domains of human activity that have yet to incorporate human-centric and user-centric methods – including healthcare and the public sector – such methods have now become widely applied and commodified. Furthermore, their advent and use **in the commercial sector** suggests that they may not be well suited to problems within complex socio-technical systems that cross traditional silos, categories, and domains. Just at the field of human centered design (HCD) has historically incorporated theories of the human and methodologies from the social sciences alongside more dominant quantitative methods, it is necessary for the field to continually stay up to date with theoretical and methodological advances. What if, rather than understanding the needs of humans, designers are tasked to understand what chickens want? What expertise or theories might be needed in order to address this problem? What models, methods, frameworks, and sensibilities might be essential for exploring possible solutions? What new languages, questions, and alternatives might emerge in the pursuit of such a project, and how might it form the basis for new kinds of design knowledge? I argue that engaging with concepts of the posthuman is the very beginning of just such a discussion in the field of design.

Let's unpack some of the examples mentioned at the beginning of this article. First, according to a recent article, Perdue chicken – which produces 640 million birds annually at 2100 contracted farms – is currently working on a series of reforms that would "improve conditions for both chickens and humans."³ Their reforms include "thinking about the wants and needs of animals, improving relations with the farmers that raise the chickens, being open to criticism of current policies, and continuing to advance its knowledge about animal care."⁴ Perdue was motivated to pursue these changes after an animal rights group documented appalling conditions at a chicken farm, as well as learning from practices at organic farms. They are currently working with a veterinarian as well as several master's and doctoral students to research animal behavior and, specifically, what makes chickens active, happy, and healthy. The improvements – which have been proven to lower mortality rates in chickens – include more windows for natural light, play structures, and different types and textures of vegetarian feed. At the same time, the company notes that these changes are expensive, and that, for the most part, consumers are not necessarily willing to pay more for humanely-raised chicken. From this article, it is not clear whether these initiatives are primarily motivated by public relations or a genuine interest in the lives of other species. However, the effects are material and substantial for the chickens.

In another interesting example, the Whanganui River in New Zealand has recently been granted the same legal rights as a human being after a local Māori tribe fought for its recognition as an ancestor.⁵ For 140 years, the tribe has been arguing that the river should be regarded as a living entity rather than a resource that can

be owned and managed. By granting the river legal rights, crimes against the river can now be treated as crimes against the tribe. While the field of sustainable design has a long history, these new ways of understanding and valuing the environment may allow for it to gain greater traction.

Machine learning, artificial intelligence, algorithms, big data, automation technology, and robotics are currently being applied in a wide range of fields, and designers are just beginning to understand the implications of these developments for design practice.⁶ In 2010, two robots – Apollo Cluster and Daria XR-1029 – became partners in law firm Robot, Robot & Hwang.⁷ This is a first in the legal profession, and part of a wider trend of using artificial intelligence to automate routine legal tasks.⁸ As of August 2017, IBM's ROSS application is being tested at 16 law firms. In biotechnology, CRISPR/Cas9 is an editing technology that can alter the genes of many organisms to treat disease; it can even be used to pre-determine the genetic characteristics of a human embryo.⁹ At the center of ethical, legal, and commercial controversies, these developments are calling into question what it means to be human now and in the future.¹⁰

While not identified explicitly as posthuman design, these examples illustrate that considerations of the nonhuman – whether animals and the natural environment, or things and the artificial world – require new forms of expertise and open up new problems, questions, opportunities, and solutions for the field of design that it is not yet equipped for. Designers carrying out projects that engage with these emergent problems might start with the following questions.

- 1) Who or what – human/nonhuman, human/animal, individual/organizational/network¹¹ – are the user(s), and for whom or what should the design be desirable?
- 2) How, and in what ways – competitively/collaboratively, hierarchically/horizontally – are capabilities, agency, and power distributed across human, machines, and natural systems?
- 3) What new knowledge(s), questions, stakeholders, and partnerships are needed in order to adequately design for this problem?
- 4) How are ethics,¹² values, and responsibilities reflected and embedded throughout the design process?

As committed humanists, designers have often advocated for people in the face of a techno-centric rationale for “innovation” and “progress.” As natural skeptics, designers can – to an extent – defend against the often-revolutionary claims about new technology that emanate from Silicon Valley. And, as environmental and socio-technical changes complicate our understandings of the human world, it is possible to make way for new design practices that take such questions, stakeholders, perspectives, and subjectivities¹³ into account. Such questions will undoubtedly be reflected in the methods designers use to plan research, collect data, and test prototypes – and, more concretely, how and what they design.

There is already evidence that new design practices are being developed. For example, there is a growing interest in design for complex, adaptive systems,¹⁴ design as participation,¹⁵ design futures,¹⁶ and transition design.¹⁷ For the most part, these nascent practices are still confined to design research and scholarship within universities. However, as will be illustrated later in this article, some practicing designers are already advocating for these approaches as they consider the implications of and experiment with emerging technologies; and, in addition, as clients introduce new kinds of problems that have not been addressed in the past.

6 Josh Clark, “Design in the Era of the Algorithm,” *Big Medium*, June 7, 2017, <https://bigmedium.com/speaking/design-in-the-era-of-the-algorithm.html>.

7 Robot Robot & Hwang's website, accessed August 19, 2017, <http://www.robotandhwang.com/attorneys/>; Martha Neil, “2 Name Partners at ‘Robot Robot & Hwang’ Are Legal Machines,” *ABA Journal*, July 20, 2010, http://www.abajournal.com/news/article/2_name_partners_at_robot_robot_hwang_are_legal_machines/.

8 Jane Croft, “Legal Firms Unleash Office Automaton,” *Financial Times*, May 17, 2016, <https://www.ft.com/content/19807d3e-1765-11e6-9d98-00386a18e39d>.

9 Heidi Ledford, “CRISPR: Gene Editing Is Just the Beginning,” *Nature* 531, no. 7593 (March, 2016): 156–59, DOI: <https://doi.org/10.1038/531156a>.

10 Lucy Odling-Smee, Heidi Ledford, and Sara Reardon, “Genome Editing: 7 Facts about a Revolutionary Technology,” *Nature News*, November 30, 2015, DOI: <https://doi.org/10.1038/nature.2015.18869>.

11 Karen EC Levy, “The User as Network,” *First Monday* 20, no. 11 (2015), available at <https://ssrn.com/abstract=2834358>.

12 “Defining Practices,” accessed August 19, 2017, <https://www.definingpractices.com/>.

13 Laura Forlano and Ramia Mazé, “Demonstrating and Anticipating in Distributed Design Practices,” *Demonstrations: Journal for Experiments in Social Studies of Technology* (Inaugural Issue, forthcoming).

14 Hugh Dubberly and Paul Pangaro, “How Cybernetics Connects Computing, Counterculture, and Design,” in *Hippie Modernism: The Struggle for Utopia*, ed. Andrew Blauvelt and Ross Elfine (Minneapolis: Walker Art Center, 2015), 126–41.

15 Kevin Slavin, “Design as Participation,” *Journal of Design and Science* 1, no. 1 (2016), accessed August 23, 2017, <https://www.pubpub.org/pub/design-as-participation>.

16 Rachel C. Smith et al., eds., *Design Anthropological Futures* (New York: Bloomsbury, 2016).

17 Terry Irwin, Gideon Kossoff, and Cameron Tonkinwise, "Transition Design Provocation," *Design Philosophy Papers* 13, no. 1 (2015): 3–11.

18 *The Oxford English Dictionary Online*, s.v. "post-humanism," accessed August 19, 2017, <https://en.oxforddictionaries.com/definition/post-humanism>.

19 *The Oxford English Dictionary Online*, s.v. "posthumanism," accessed August 19, 2017, <https://en.oxforddictionaries.com/definition/posthumanism>.

20 Thomas P. Hughes, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, ed. Wiebe E. Bijker, Thomas P. Hughes, and Trevor J. Pinch (Cambridge, MA: MIT Press, 1987): 51.

21 Donald A. Norman, *The Design of Everyday Things* (New York: Doubleday, 1990); Anne-Laure Fayard and John Weeks, "Photocopiers and Water-Coolers: The Affordances of Informal Interaction," *Organization Studies* 28, no. 5 (2007): 605–34; Gina Neff, Tim Jordan, and Joshua McVeigh-Schultz, "Affordances, Technical Agency, and the Politics of Technologies of Cultural Production," *Culture Digitally*, January 23, 2012, <http://culturedigitally.org/2012/01/affordances-technical-agency-and-the-politics-of-technologies-of-cultural-production-2/#sthash.tZejCj8.dpuf>.

22 Langdon Winner, "Do Artifacts Have Politics?," in *The Whale and the Reactor: A Search for Limits in an Age of High Technology*, ed. Langdon Winner (Chicago: University of Chicago Press, 1986): 19–39.

23 Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," *Social Studies of Science* 14, no. 3 (1984): 399–441. DOI: <https://doi.org/10.1177/030631284014003004>.

24 Marilyn Strathern, "Robust Knowledge and Fragile Futures," in *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*, ed. Aihwa Ong and Stephen J. Collier (Malden, MA: Blackwell Publishing, 2005), 471.

Posthuman Thinking

As outlined above, there are two primary reasons – environmental and socio-technical – for the exploration of theories around the posthuman. According to the Oxford English Dictionary, "post-humanism" (hyphenated) is "A system of thought formulated in reaction to the basic tenets of humanism, especially its focus on humanity rather than the divine or supernatural."¹⁸ In particular, this definition emphasizes the traditions of postmodernist and feminist writing, which reject the rational, autonomous individual and, rather, emphasize the partial, situated, and socially-constructed self. An alternate spelling, "posthumanism" (no hyphen), originated in science fiction in the 1970s, and is defined as "The idea that humanity can be transformed, transcended, or eliminated either by technological advances or the evolutionary process; artistic, scientific, or philosophical practice which reflects this belief."¹⁹ Both of these definitions are important to our understandings of the theories outlined and developed here.

The posthuman resists binary categories and, instead, integrates the human and the nonhuman. As such, it is an important concept that provides an entry-point into thinking about socio-technical systems as "both socially constructed and society shaping."²⁰ Specifically, technological systems include technologies, organizations, and things. These artifacts can be understood to have not only affordances²¹ as are commonly discussed in the field of design but also a politics.²² In a well-known account of the history and development of the penny-farthing bicycle, Pinch and Bijker discuss how the designers stabilized issues related to speed and safety through a long-term process of iteration between the producers and a number of different "relevant social groups" including women, tourists, elderly men, and athletes.²³ Conflicts around speed and safety specifically entail technical, legal, and moral debates such as, for example, whether or not it was appropriate for women to ride bicycles, for what purpose, and in what attire – as it was not common for women to wear trousers at the time. Marilyn Strathern critiques the separation of technology and society that is common in government approaches to scientific or technological advancements, stating "Depicting the technologies as having implications for society renders them notionally beyond it: technology is 'outside' society."²⁴ Instead, by using the language of networks of human and non-human actors, socio-technical systems, or assemblages, it is possible to develop a more nuanced understanding of the relationships between technology and society.

A wide range of social theory from fields including science and technology studies, communications and media studies, and architecture, urban planning and geography that has emerged to grapple with emergent conditions – both environmental and socio-technical – that are decentering the human. Scholars in the humanities and social sciences have recently been studying the socio-cultural, political, economic, and environmental implications of computing and digital technology, including software and hardware; hacking and making;²⁵ social media;²⁶ algorithms,²⁷ big data,²⁸ platforms,²⁹ artificial intelligence, and robotics;³⁰ Wi-Fi and cellular networks; smart (and sentient) cities,³¹ mapping,³² ubiquitous computing,³³ sensor networks³⁴ including the internet of things,³⁵ wearable technology³⁶ and the quantified self,³⁷ drones,³⁸ and driverless cars. This includes consideration of the ways these socio-technical systems are configured by, and play a role in configuring, gender,³⁹ race, class, age, disability,⁴⁰ sexuality, and intersectional identities.

At the same time, there is a large and growing body of scholarship on the environment that has contributed to theories of the posthuman. Investigations include everything from icebergs and waterways, air and land, plants and animals, mushrooms,⁴¹ insects,⁴² and even spores.⁴³ While such scholarship has likely contributed to approaches such as biomimicry.⁴⁴ Cradle-to-Cradle,⁴⁵ and triple bottom

line⁴⁶ in the field of sustainable design, they are still not widely used. While some companies such as Nike and Patagonia have managed to become less wasteful while cutting costs and increasing profits, these are still isolated examples. The integration of theories of the posthuman in the design field might allow some of these practices to gain greater traction. Five areas of thought are explored here.

Actor-Network Theory and the Non-human

Within the field of science and technology studies, *actor-network theory* (ANT) has advocated for understanding the relations between networks and “assemblages” of humans and non-humans – “actors” that share equal agency in participating in the shaping of issues. According to Bruno Latour – one of the theory’s key proponents – this approach emerged in the late 1980s as a way for theorists to grapple with the role of things and objects in the social studies of science and technology, saying “it was at this point that non-humans – microbes, scallops, rocks, and ships – presented themselves to social theory in a new way.”⁴⁷ In this view, objects – such as seatbelts and door closers, or door-closers – are the “missing masses” that stand in for human actors, embed specific socio-political values and ethical commitments, and serve to enroll human actors into certain *programs of action*.⁴⁸

A recent book by Mike Michael describes ANT as “a complex, and oftentimes disparate, resource (closely aligned with a particular, evolving, set of sensibilities) that opens up a space for asking certain sorts of methodological, empirical, analytic and political questions about the processes of the (more-than-) social world.”⁴⁹ According to Michael, drawing on John Law and Annemarie Mol, ANT is a multiple and adaptable sensibility that orients one towards particular understandings of the world that can be illustrated through specific, empirical cases. He elaborates

“For ANT, the ‘social’ is not a given but a heterogeneous product laden with the nonhuman–technologies and natures are as much a part of society as humans. Further, the ‘social’ is not structured in micro, meso and macro layers or spatially arranged into the local and the global (and sometimes the ‘glocal’); rather, according to versions of ANT, the social is ‘flat’, made up of a single layer of associations amongst human and nonhuman entities, though the layer itself can be ‘topologically’ contorted in all sorts of ways. Moreover, such standard social scientific categories as class, or gender, or ethnicity have been largely eschewed. In ANT accounts, instead, the conversation is more usually about actors or actants, mediators and intermediaries, and, of course, these need not be human. Indeed, sometimes the heterogeneity of these entities is emphasized: as both human and nonhuman they are hybrids, or monsters.”⁵⁰

Thus, according to ANT, it is nonhumans and their specific relationships to humans that make up the ‘social’ and, as a result, the ways in which scientific knowledge and technology are “made durable.” Rather than essentialized categories, ANT supports the emergence of hybrid configurations. Though addressed only briefly, Michael argues that while notions of the post-human are relevant to ANT approaches, this is not understood as a radical break from existing theory, but rather merely a continuation of ideas that had already been advanced in sociotechnical systems theory (STS). In a recent book, Adam Greenfield offers a definition of the “post-human everyday” that is aligned with ANT approaches, proposing that “human perception, scale and desire are no longer the primary yardsticks of value.”⁵¹

Feminist New Materialism and the Posthuman

In her book *The Posthuman*, Rosi Braidotti traces three lineages of posthuman thought, each of which creates its own interpretations and variations of post-humanism: 1) moral philosophy; 2) science and technology studies; and 3)

25 Silvia Lindtner, Shaowen Bardzell, and Jeffrey Bardzell, “Reconstituting the Utopian Vision of Making: HCI after Technosolutionism,” in *CHI '16 Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (2016), 1390–1402, DOI: <https://doi.org/10.1145/2858036.2858506>.

26 Alice E. Marwick, *Status Update: Celebrity, Publicity, and Branding in the Social Media Age* (New Haven: Yale University Press, 2013).

27 Nick Seaver, “Knowing Algorithms,” in *Media in Transition 8* (unpublished draft, last modified February, 2014), 1–12, accessed August 23, 2017, <https://static1.squarespace.com/static/55eb004ee4b0518639d59d9b/t/55ece1bfe4b030b2e8302e1e/1441587647177/seaverMiT8.pdf>.

28 Danah Boyd and Kate Crawford, “Critical Questions for Big Data: Provocations for a Cultural, Technological, and Scholarly Phenomenon,” *Information, Communication & Society* 15, no. 5 (2012): 662–79. DOI: <https://doi.org/10.1080/1369118X.2012.678878>.

29 Tarleton Gillespie, “The Politics of ‘Platforms,’” *New Media & Society* 12, no. 3 (2010): 347–64. DOI: <https://doi.org/10.1177/1461444809342738>.

30 Lilly Irani, “Justice for ‘Data Janitors,’” *Public Books*, January 15, 2015, <http://www.publicbooks.org/justice-for-data-janitors/>.

31 Mark Shepard, ed., *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space* (Cambridge, MA: MIT Press, 2011).

32 Laura Kurgan, *Close Up at a Distance: Mapping, Technology, and Politics* (Cambridge, MA: MIT Press, 2013).

33 Kang Lang and Dana Cuff, “Pervasive Computing: Embedding the Public Sphere,” *Washington & Lee Law Review* 62, no. 1 (2005): 93–146, available at <http://scholarlycommons.law.wlu.edu/cgi/viewcontent.cgi?article=1264&context=wluir>.

34 Jennifer Gabrys, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet* (Minneapolis: University of Minnesota Press, 2016).

35 Philip N. Howard, *Pax Technica: How the Internet of Things May Set Us Free or Lock Us Up* (New Haven: Yale University Press, 2015).

36 Natasha Dow Schüll, "Data for Life: Wearable Technology and the Design of Self-Care," *BioSocieties* 11, no. 3 (2016): 317–33, DOI: <https://doi.org/10.1057/biosoc.2015.47>.

37 Gina Neff and Dawn Nafus, *Self-Tracking* (Cambridge, MA: MIT Press, 2016).

38 Carl DiSalvo, "The Irony of Drones for Foraging: Exploring the Work of Speculative Interventions," in *Design Anthropological Futures*, ed. Rachel Charlotte Smith et al. (New York: Bloomsbury Press 2016), 139–54.

39 Christina Dunbar-Hester, "Beyond 'Dudecore'? Challenging Gendered and 'Raced' Technologies through Media Activism," *Journal of Broadcasting & Electronic Media* 54, no. 1 (2010): 121–35. DOI: <https://dx.doi.org/10.1080/08838150903550451>.

40 Meryl Alper, *Digital Youth with Disabilities* (Cambridge, MA: MIT Press, 2014).

41 Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015).

42 Hugh Raffles, *Insectopedia* (New York: Pantheon Books, 2010).

43 Anna Lowenhaupt Tsing, "Strathern Beyond the Human: Testimony of a Spore," *Theory, Culture & Society* 31, no. 2-3 (2014): 221–41, DOI: <https://doi.org/10.1177/0263276413509114>.

44 Janine M. Benyus, *Biomimicry: Innovation Inspired by Nature* (New York: William Morrow, 1997); Michael Pawlyn, *Biomimicry in Architecture* (London: Riba Publishing, 2011).

45 William McDonough and Michael Braungart, *Cradle to Cradle: Remaking the Way We Make Things* (New York: North Point Press, 2002).

46 Andrew W. Savitz, *The Triple Bottom Line: How Today's Best-Run Companies Are Achieving Economic, Social, and Environmental Success—and How You Can Too* (San Francisco: Jossey-Bass, 2006).

47 Bruno Latour, introduction to *Reassembling the Social: An Introduction to*

anti-humanist philosophies of subjectivity.⁵² All three agree that science and technology have the power to reshape our understandings of self and the relationships we have to machines and other species. However, they also differ in important ways. The first mode of posthumanism, drawn from moral philosophy, is *reactive* in that it strongly reasserts Western Humanistic values around universalism, cosmopolitanism, and individualism as the solution to current crises and challenges, while rejecting feminism, post-colonialism and other perspectives that acknowledge diversity, difference, and the multiplicity of identities and subjectivities. The second mode of posthumanism, drawn from science and technology studies, is *analytic* in that it attends to questions about values and ethics by acknowledging the relationships, interconnections, and interdependencies between humans and nonhumans (machines and animals), which are considered to have equal agency in a network or assemblage. However, even though Braidotti acknowledges the importance of this approach, she criticizes it for its contradictions, pan-humanism, political neutrality, and lack of consideration for questions related to subjectivity. The third mode, critical posthumanism – advocated by Braidotti – is based on the tradition of anti-humanism, which is built upon post-structuralism, feminism, and post-colonial theory. Critical posthumanism takes racism, sexism, colonialism, classism, and other –isms seriously as part of the history and present conditions that have been created by Western Enlightenment. It also acknowledges connections between humans and the environment.

She writes, "This practice of relating to others requires and is enhanced by the rejection of self-centred individualism. It produces a new way of combining self-interests with the well-being of an enlarged community, based on environmental inter-connections."⁵³ According to Braidotti,

"In my own work, I define the critical posthuman subject within an eco-philosophy of multiple belongings, as a relational subject constituted in and by multiplicity, that is to say a subject that works across differences and is also internally differentiated, but still grounded and accountable. Posthuman subjectivity expresses an embodied and embedded and hence partial form of accountability, based on a strong sense of collectivity, relationality and hence community building."⁵⁴

Her position rejects self-centered individualism (as well as relativity) and argues for a materialist, embodied, non-unitary subject with a nomadic subjectivity that emphasizes an "affirmative" interconnection between the self and others (including the non-human) that "locates the subject in the flow of relations with multiple others."⁵⁵ According to Braidotti, "Affirmative politics combines critique with creativity in the pursuit of alternative visions and projects."⁵⁶

Along these lines, a group of cultural anthropologists studying *matsutake* mushrooms have explored "collaborative experiments for ethnographers of scale making, global connection, and human–nonhuman relations."⁵⁷ In this collaboration, they use the sense of smell as a way of bridging human–nonhuman relations, stating "We collectively imagined the mushroom itself as a collaborator. The shared sensitivity to chemicals of both humans and mushrooms, which might broadly be called "smell," bridges human–nonhuman differences. Smell signals multi-species connection from the mushroom's point of view as well as from the human's."⁵⁸ They have created a "new form of collaboration," arguing that studying global, multi-sited phenomenon demands such methods and corollary institutional changes. In the article, they argue that cultural anthropology tends to be individualistic and, often, bounded to a specific geography or field site (despite some well-developed practices such as multi-sited ethnography),⁵⁹ and they propose a

more iterative, generative and expansive repertoire of anthropological practice.

Donna Haraway has been one of the pioneers of advocating for multiple ways of being that go beyond the human, with her two well-known manifestos on cyborgs⁶⁰ and companion species.⁶¹ With respect to the cyborg, she describes three specific boundaries that are continually transgressed and reconfigured – human and animal, animal and machine, and physical and non-physical. In the “Cyborg Manifesto,” she writes “The cyborg is our ontology; it gives us our politics,”⁶² and, in the “Companion Species Manifesto” she expands by saying “Cyborgs and companion species each bring together the human and non-human, the organic and technological, carbon and silicon, freedom and structure, history and myth, the rich and the poor, the state and the subject, diversity and depletion, modernity and postmodernity, and nature and culture in unexpected ways.”⁶³

Object-Oriented Ontology and Things

Drawing on a branch of philosophy called speculative realism, object-oriented ontology (OOO) conceives of a world of objects broadly defined “whether human, immaterial, durable or fleeting” including “human beings as well as dragons, stones and the Dutch East India Company.”⁶⁴ According to Graham Harman, OOO is understood as a flat ontology (philosophy of being) that is concerned with the “real and sensual” qualities and aesthetics of objects.⁶⁵ Ian Bogost expands on these definitions.

“OOO puts things at the center of being. We humans are elements, but not the sole elements, of philosophical interest. OOO contends that nothing has special status, but that everything exists equally – plumbers, cotton, bonobos, DVD players, and sandstone, for example. In contemporary thought, things are usually taken either as the aggregation of ever smaller bits (scientific naturalism) or as constructions of human behavior and society (social relativism). OOO steers a path between the two, drawing attention to things at all scales (from atoms to alpacas, bits to blinis) and pondering their nature and relations with one another as much with ourselves.”⁶⁶

While OOO has similarities with philosophies such as the ANT and the post-human – in that they are also concerned with the relationships between human and non-human actors at a variety of scales – Bogost argues that ANT is more focused on dynamic and changing associations and alliances between actors. Furthermore, he believes that post-humanism clings firmly to humanism and, as result, has not gone far enough in its critique of anthropocentrism. Timothy Morton, another scholar associated with this approach, has advanced the concept of *hyperobjects* – defined as non-local, distributed (temporally and spatially), and viscous – that display interobjectivity.⁶⁷ Morton offers climate change as an example of a hyperobject, saying, “They are viscous, which means that they ‘stick’ to beings that are involved with them. They are nonlocal; in other words, any ‘local manifestation’ [citing Levi Bryant] of a hyperobject is not directly the hyperobject. They involve profoundly different temporalities than the human-scale ones we are used to.”⁶⁸

Non-representational Theory and Lifeworld Inc

Turning to the field of geography, another branch of theory that is helpful for understanding the posthuman is that of non-representational theory.⁶⁹ Nigel Thrift’s concept of “Lifeworld Inc” captures the ways that new epistemologies of information technology used to track people and objects through space produce new ontologies such as “movement space.”⁷⁰ He writes:

“A new ontology is multiplying, which is able to survive by virtue of technologies which seem to lead to irresistible inferences about the world, because

Actor-Network-Theory (Oxford: Oxford University Press, 2005), 10.

48 Bruno Latour, “Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts,” in *Shaping Technology/Building Society: Studies in Sociotechnical Change*, ed. Wiebe E. Bijker and John Law (Cambridge, MA: MIT Press, 1992).

49 Mike Michael, introduction to *Actor-Network Theory: Trials, Trails and Translations* (New York: Sage Publications, 2016), 3.

50 *Ibid.*, 3–4.

51 Adam Greenfield, *Radical Technologies: The Design of Everyday Life* (Brooklyn: Verso Books, 2017), 185.

52 Rosi Braidotti, *The Post-human* (Boston: Polity Books, 2013).

53 *Ibid.*, 47–48.

54 *Ibid.*, 49.

55 *Ibid.*, 50.

56 *Ibid.*, 54.

57 Matsutake Worlds Research Group, “A New Form of Collaboration in Cultural Anthropology: Matsutake Worlds,” abstract, *American Ethnologist* 36, no. 2 (2009): 380, accessed August 23, 2017, <http://www.jstor.org/stable/27667568>.

58 *Ibid.*, 382.

59 George E. Marcus, “Ethnography in/of the World System: The Emergence of Multi-Sited Ethnography,” *Annual Review of Anthropology* 24 (1995): 95–117, DOI: <https://doi.org/10.1146/annurev.an.24.100195.000523>.

60 Donna Jeanne Haraway, “A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century,” in *Simians, Cyborgs and Women: The Reinvention of Nature*, ed. Donna J. Haraway (New York: Routledge, 1991).

61 Donna J. Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003).

62 Haraway, “A Cyborg Manifesto,” 292.

63 Haraway, *The Companion Species Manifesto*, 4.

64 Graham Harman, "Object-Oriented Ontology," in *The Palgrave Handbook of Posthumanism in Film and Television*, ed. Michael Hauskeller, Thomas D. Philbeck, and Curtis D. Carbonell (London: Palgrave Macmillan, 2015), 401–402.

65 *Ibid.*, 403.

66 Ian Bogost, *Alien Phenomenology, or What It's Like to Be a Thing* (Minneapolis: University of Minnesota Press, 2012), 6.

67 Timothy Morton, introduction to *Hyperobjects: Philosophy and Ecology after the End of the World* (Minneapolis: University of Minnesota, 2013).

68 *Ibid.*

69 Ben Anderson and Paul Harrison, eds., *Taking-Place: Non-Representational Theories and Geography* (Oxford: Routledge, 2016).

70 Nigel Thrift, "Lifeworld Inc—and What to Do about It," *Environment and Planning D: Society and Space* 29, no. 1 (2011): 5–26. DOI: <https://doi.org/10.1068/d0310>.

71 *Ibid.*, 26.

72 *Ibid.*, 5.

73 *Ibid.*, 16.

74 *Ibid.*

75 *Ibid.*, 17.

76 W. Patrick McCray, *The Visioneers: How a Group of Elite Scientists Pursued Space Colonies, Nanotechnologies, and a Limitless Future* (Princeton: Princeton University Press, 2012).

they, quite literally, put things in their place. For, at the heart of inference is the ability to weave space and time into a fabric which acts as an automatic default: each ladder and snake seems to follow on from each other, as though no other solution was available. What is happening currently with Lifeworld Inc is that practical vocabularies for understanding and constituting this ontology are running ahead of any theoretical vocabulary. That might not matter if these vocabularies were a benign development but many of them are not. They are caught up with new expressions of power, the aim of which is to reterritorialize the world through the deployment of resources that, rather like the apple in the fairy tale, have the ability to poison how we live. Lifeworld Inc needs to be reworked so that its excesses can be halted and its undoubted treasures can be brought to the fore."⁷¹

Specifically, new kinds of sensing technologies construct the world "as a surface in continuous motion," "a world always almost there, and thus always elastic in the way it leans into the moment, a world of infinite mobilization."⁷² For Thrift, new phenomenologies, epistemologies, ontologies, and subjectivities are produced by the following five socio-technical developments: 1) horizontal networks, links, media, and communications that are perpetually in motion by design; 2) the nature of interfaces such as touchscreens, gestural interfaces, and context-aware, interactive objects and surfaces; 3) ubiquitous computing and location tagging; 4) constant feedback, including fingerprinting and biometrics as well as social media and bots; and, 5) human machine cognition and the agency of things. These developments produce a new kind of human subjectivity that is not formed around an inner core but rather on a "mobility of identity" formed around the outside of the body and mediated by what Thrift calls "the security-entertainment complex."⁷³ He writes:

"Subjects are enmeshed in a web of markings which define their existence, which brand them as them: search engines, social networking sites, web pages, video clips, ringtones and mixes, and maps combine to produce new forms of identity paper which act as passports to particular kinds of experience, replacing the seals, letters of introduction and conduct, registers and lists and certificates, travel documents, and other means of recording proof of authenticity and assurance that once defined a person's existence."⁷⁴

As a result, according to Thrift, humans are "simultaneously embedded and lost." The security-entertainment complex creates an "instant phenomenology" that is "dynamic and designed," elevating objects and human-object assemblages to a place of higher significance in terms of making sense of the world.⁷⁵ Yet, new technologies are not the only developments that underpin new ontologies. Thrift also briefly refers to the incorporation of nature and evolution into architecture and urbanism, illustrating the constant interplay between nature and culture. Finally, Thrift describes three kinds of new knowledges that are emerging at the intersection of society and technology from the perspective of geography: 1) new understandings of phenomenology; 2) the emergence of a "biopolitics of space;" and 3) new ways of writing the world differently through mapping. Specifically, mapping represents both the power of the security-entertainment complex – as in Google Maps – as well as the possibility of resistance and participation – as in OpenStreetMap.

Transhumanism and Human Enhancement

In his fascinating history of space colonies, nanotechnology, and the construction of technological futures, W. Patrick McCray traces the lineage of transhumanism.⁷⁶ The concept refers to the "transitional human," or the time when humans

will transcend our biology through technology, including biotechnological and computational enhancement. More recently, this concept has been referred to as the Singularity, and has even created a membership organization and a university to advance its agenda.⁷⁷ Recent films such as the 2014 science fiction film *Transcendence* offer a dystopian glimpse of this phenomenon.⁷⁸ Whether explicitly acknowledged or not, a great many existing and emerging technologies might be said to ultimately fall within this frame of a future utopia predicated on the replacement of humans by a transhumanist entity. While I am less interested in this particular framing – due to its drastically uncritical, tech-centric ‘silver bullet’ approach aligned with a revolutionary change in what it means to be human – that does not devalue its usefulness in terms of rethinking existing design approaches. Transhumanism captures particular values, perspectives, and questions that we might consider in the design process. Furthermore, designers may potentially be engaged to work on projects that implicitly embrace this approach. Knowing the history of transhumanism and how it is situated within discussion of the posthuman will allow the designers and design scholars to better evaluate their participation in – or rejection of – these projects.

Design and the “State of Our Species”

“To talk about design is to talk about the state of our species.” So says a book about the 3rd Istanbul Design Biennial documenting the work of over 75 architects, designers, artists and scholars who take on the topic “Are We Human,” and in doing so, “the state of design today, when everyday reality has outpaced science fiction.”⁷⁹ As notions of the anthropocene – the proposed geologic era in which the human impact on the earth becomes significant and dominant – have captured our attention, it is clear that talking about design is also about the state of the planet and the impact of climate change. Design “makes the human” but it also “engineers inequalities” such that “design itself needs to be redesigned.”⁸⁰ According to an article⁸¹ written by Keller Easterling

“Design is an excellent arena in which to observe the relentlessly human as well as the possibilities of the *more than human*. Within the narrow framework of the human, design can be about the total extension of rationality into the surrounding environment with universal systems of proportion or geometry that make claims to ‘natural laws.’... But design can also be about extending other powers of that nervous system. There are so many underexploited faculties of voice, skin, skeleton, muscles in interplay with other solids, photons, and waves. The *more than human* doesn’t negate human design; it only multiplies those designs in a larger field so that there are always many instead of only one.”⁸²

Rather than emphasizing the rational, the plan, the loop, and the binary, Easterling argues that design offers a range of indeterminate, agile changes and “dispositions” in a “network of possibilities.” And, it is possible to design these “reagents, mixtures, interdependencies, chemistries, chain reactions and ratchets.”⁸³

The Biennial is just one of a myriad of conferences, workshops, and exhibitions that have called for an examination of the human, the non-human, the post-human, the trans-human and other associated concepts. For example, in 2016, ACADIA – a community of digital design researchers and practitioners – themed their annual conference, “Posthuman Frontiers: Data, Designers and Cognitive Machines.”⁸⁴ Similarly, while the Society for Literature, Science, and the Arts (SLSA) 2016 conference focused on “Creativity,” the call for proposals specifically

77 For more information, see <https://singularityhub.com/>.

78 For more information, see for example IMDb’s page for *Transcendence* (2014), <http://www.imdb.com/title/tt2209764/>.

79 Beatriz Colomina and Mark Wigley, eds., *Are We Human? Notes on an Archaeology of Design* (Zurich: Lars Müller Publishers, 2016).

80 Beatriz Colomina and Mark Wigley, eds., abstract to *Are We Human?: The Design of the Species: 2 Seconds, 2 Days, 2 Years, 200 Years, 200,000 Years* (Zurich: Lars Müller Publishers, 2016).

81 This article was published as part of *Superhumanity*, a project created for the Biennial aimed at understanding design by exploring notions of the self. For more information, see <http://www.e-flux.com/architecture/superhumanity/>.

82 Keller Easterling, “No You’re Not,” *e-flux.com*, accessed August 19, 2017, <http://www.e-flux.com/architecture/superhumanity/66720/no-you-re-not/>.

83 Ibid.

84 For more information, see <http://2016.acadia.org/workshops.html>.

85 Society for Literature, Science, and the Arts, “30th Annual Meeting Call for Proposals: Creativity,” accessed August 19, 2017, <http://litsci-arts.org/slsa16/wp-content/uploads/2016/02/SLSA2016CFP-Nov2015.pdf>.

86 “HYBRID MATTERS Symposium,” accessed August 19, 2017, <https://symposium.hybridmatters.net/>.

87 For more information, see <http://www.posthumans.org/nyu-symposium-2016.html>.

88 Laura Forlano, “Decentering the Human in the Design of Collaborative Cities,” *Design Issues* 32, no. 3 (2016): 42–54.

89 Carl DiSalvo and Jonathan Lukens, “Nonanthropocentrism and the Nonhuman in Design: Possibilities for Designing New Forms of Engagement with and through Technology,” in *From Social Butterfly to Engaged Citizen: Urban Informatics, Social Media, Ubiquitous Computing, and Mobile Technology to Support Citizen Engagement*, ed. Marcus Foth, Laura Forlano, Christine Satchell, and Martin Gibbs (Cambridge, MA: MIT Press, 2011); Li Jönsson, *Design Events: On Explorations of a Non-anthropocentric Framework in Design* (Copenhagen: The Royal Danish Academy of Fine Arts, 2014).

90 Anne Galloway, “Emergent Media Technologies, Speculation, Expectation, and Human/Nonhuman Relations,” *Journal of Broadcasting & Electronic Media* 57, no. 1 (2013): 53–65, DOI: <https://doi.org/10.1080/08838151.2012.761705>.

91 Tim Ingold, “Working Paper #15—Bringing Things Back to Life: Creative Entanglements in a World of Materials” (working paper, ESRC National Centre for Research Methods, University of Manchester, July 2010), available at http://eprints.ncrm.ac.uk/1306/1/0510_creative_entanglements.pdf.

92 Haakon Faste, “A Post-Human World Is Coming. Design Has Never Mattered More,” *Fast Co.Design*, June 9, 2016, <https://www.fastcodesign.com/3060742/a-post-human-world-is-coming-design-has-never-mattered-more>.

93 Ibid.

referenced the ways “new technologies; new understandings of the human, the nonhuman, and the post-human; and emerging theories in science and aesthetics affect understandings of creativity.”⁸⁵ A smaller 2016 symposium held at the University of the Arts Helsinki, entitled “HYBRID MATTERS,” referred to a hybrid ecology in which “biological actors like humans, animals, and plants share a life-world with machines, networks and increasingly also genetically altered organisms and other post-natural actors.”⁸⁶ Also in 2016, a symposium held at New York University called “Posthuman Futures” argued that humanism has failed to address global conflicts and crises, whether they be political, economic, social, cultural, or environmental.⁸⁷ Among other issues, the conference addressed questions around human and nonhuman migration, nonhuman animals, and robot personhood. Along with the overarching post-humanistic frame given to this event, notions of the post-anthropocentric, post-gender, post-dualistic, and post-humanities are also relevant.

There are many signs that ideas about the posthuman are already being incorporated into the field of design and drawing on these varied lineages with discussions about decentering the human,⁸⁸ non-anthropocentrism,⁸⁹ and human/non-human relations.⁹⁰ This shift towards the posthuman includes the consideration of animals, machines, and – drawing on Tim Ingold’s more expansive definition – other things⁹¹ such as trees, rocks and other kinds of everyday artifacts and objects. What follows below is an overview of a few related design projects that engage the posthuman.

As designer Haakon Faste argues, “We must transcend the limitations of human-centered design.”⁹² In order to move beyond these limitations, Faste advocates for a posthuman-centered design that accommodates the “dramatic and revolutionary” changes being introduced by increased computational power, and the ways he believes that these changes will make human labor obsolete. As a future-oriented field, Faste believes that design should be tackling questions such as “is it possible to design intelligent systems that safely design themselves?”⁹³ Faste recommends speculative futures and histories, simulations, and futures scenarios as ways of considering the social, political, environmental, and ethical dimensions of intelligent systems, and encourages design practices that acknowledge the “reciprocal relationship that values intelligent systems as partners.”⁹⁴

Drawing on Faste’s definition, John Payne – founder and Managing Director of design consultancy Moment – identifies the need for new ways of conceptualizing the human in order to design for “near future fit” across the following questions: How can we expand our purview beyond the user and their problems? How can we help our audience make sense of what is new? How do we create something for people who don’t yet have a need to find? How do we build empathy for every participant in a complex system?⁹⁵ He summarizes this emergent design practice, saying we must make five shifts: 1) from the user to their activities and network; 2) from needs to aspirations and goals; 3) from existing meanings to new meanings; 4) from problem solving to cultural invention; 5) from empathy to perspective taking. Payne also refers to some of the shifts related to the need to move beyond the user in a recent article that addresses the integration of empathy, systems thinking, and complex problems.⁹⁶ Thomas Wendt, on the other hand, comes at the question of decentering the human from a more ecological perspective, focusing on the inherent unsustainability of human-centered design in capitalist society.⁹⁷ In a critique of empathy, he writes

“The crux of human-centered design is that human needs should be considered before business and technological needs. If a design does not meet a defined human need, then its business viability and technical feasibility don’t matter. This human-business-technology model ignores other components of design,

such as sustainability, ethics, and egalitarianism.... This tendency has to do with emphasizing the individual over the collective, thus reinforcing deep-seated notions of anthropocentrism that run through the history of western epistemology. Empathy does not consider ecological sustainability because human-centricity, forecloses on ecological thought, as argued by actor-network theory, deep ecology.... If humans are at the “center,” then things like environmental sustainability, social justice, care for ourselves, economic equality... most political aspects of design, cannot be adequately considered.”⁹⁸

Anne Galloway and her colleagues at the More-Than-Human Lab⁹⁹ use wireless, networked technologies and drones to engage with multispecies ethnography, including the living and dying of animals such as sheep and other livestock. In a recent talk at the University of Queensland titled “The Internet of Beings: Or, What are the Animals Telling Us?”¹⁰⁰ Genevieve Bell discussed what Critter Cams – cameras placed on pets and other animals – might tell us about nonhuman subjectivity. Researchers are also exploring posthuman subjectivities and their relationship to design in narratives around the cyborg, with specific reference to networked medical devices;¹⁰¹ these engagements include much more than animals and machines. For example, Åsa Ståhl and Kristina Lindström are engaging with specific “hybrid matters” such as plastiglomerates – the fusing of rocks and plastics.¹⁰² Ron Wakkary and his colleagues create fictional everyday objects that co-exist in people’s homes to examine the ways that “counterfactual artifacts situated in the everydayness of our world offer a new ontological perspective that over time makes more visible assumptions, implications, and possible change.”¹⁰³

Perhaps, understandably, many of these emergent projects draw on speculative design,¹⁰⁴ design fiction,¹⁰⁵ and speculative fabulation.¹⁰⁶ Yet, there is no reason that they should be confined to these more arts-based domains. Rather, there are a number of emerging conversations that serve to muddle the distinctions between different design traditions such as speculative design, participatory design,¹⁰⁷ and more traditional, human-centered design practices. Furthermore, as we continue to extend the human via digital technologies, and grapple with the impact of climate change, these phenomena will become less speculative, more common modes of existing in the world.

Critiques of the Posthuman

This article would not be complete without a discussion of an important critique of the posthuman from critical race studies. It relates to the notion that design, architecture, and related fields have incorporated an understanding of the human based on the notion of a universal subject – usually white, male, privileged, well-off, and young – that does not exist in reality. For example, Michelle Murphy’s work on sick building syndrome (SBS) gives an account of a literal “Man in a Box” that was used to test early air conditioning systems.¹⁰⁸ She writes, “Inside the box, young white men, mostly engineering students, sometimes stripped to underwear, repetitively lifted light weights. Outside the chamber, the researchers, sleeves rolled, used sensitive instruments such as the hot-wire anemometer and the whirled psychrometer to monitor the interior atmosphere.”¹⁰⁹

In his recent book on black feminist theories of the human, Alexander Weheliye writes

“Though the human as a secular entity of scientific and humanistic inquiry has functioned as a central topos of modernity since the Renaissance, questions of humanity have gained importance in the academy and beyond in the wake of recent technological developments, especially the advent of

94 Ibid.

95 John Payne, “Future Perfect: What Comes after Human Centered Design?” (presentation, Institute of Design, Illinois Institute of Technology, Chicago, IL, April 26, 2017).

96 John Payne, “What’s So Funny ‘Bout Peace, Love and (Empathic) Understanding,” *EPIC People*, August 5, 2016, <https://www.epicpeople.org/whats-so-funny-bout-peace-love-and-empathic-understanding/>.

97 Thomas Wendt, “Decentering Design OR a Critique of Human Centered Design,” 58 slides, March 25, 2017, available at <https://www.slideshare.net/ThomasMWendt/decentering-design-or-a-critique-of-human-centered-design>.

98 Thomas Wendt, “Empathy as Faux Ethics,” *EPIC People*, January 10, 2017, <https://www.epicpeople.org/empathy-faux-ethics/>.

99 For more information, see <http://morethanhumanlab.org/> and <http://countingsheep.info/>.

100 “The Internet of Beings: Or, What are the Animals Telling Us?,” YouTube video, 37:52, from Genevieve Bell, posted by Research Computing Centre, August 9, 2016, <https://www.youtube.com/watch?v=iEosTa-PyxOs>.

101 Laura Forlano, “Hacking the Feminist Disabled Body,” *Journal of Peer Production*, no. 8 (2016), available at <http://peerproduction.net/issues/issue-8-feminism-and-unhacking-peer-reviewed-papers/hacking-the-feminist-disabled-body/>.

102 Kristina Lindström and Åsa Ståhl, “Plastic Imaginaries,” *Continent*, no. 6.1 (2017): 62–67, available at <http://mobile.continentcontinent.cc/index.php/continent/article/view/282>.

103 Ron Wakkary et al., “Material Speculation: Actual Artifacts for Critical Inquiry,” in *AA’15 Proceedings of The Fifth Decennial Aarhus Conference on Critical Alternatives* (Aarhus: Aarhus University Press, 2015), 105, DOI: <https://doi.org/10.7146/aaahcc.v1i1.21299>.

104 Anthony Dunne and Fiona Raby, *Speculative Everything: Design, Fiction, and Social*

Dreaming (Cambridge, MA: MIT Press, 2013).

105 Julian Bleecker, "Design Fiction: A Short Essay on Design, Science, Fact and Fiction," *Near Future Laboratory* (blog), March 17, 2009, <http://www.nearfuturelaboratory.com/2009/03/17/design-fiction-a-short-essay-on-design-science-fact-and-fiction/>.

106 Donna J. Haraway, "Sf: Science Fiction, Speculative Fabulation, String Figures, So Far," *ADA: A Journal of Gender New Media & Technology* 11, no. 3 (2011), available at http://adanewmedia.org/2013/11/issue3-haraway/?utm_source=rss&utm_medium=rss&utm_campaign=issue3-haraway.

107 Elizabeth B. -N. Sanders and Pieter Jan Stappers, "Co-creation and the New Landscapes of Design," *CoDesign* 4, no. 1 (2008): 5–18, DOI: <https://doi.org/10.1080/15710880701875068>.

108 Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham: Duke University Press, 2006), 19.

109 *Ibid.*, 20.

110 Alexander G. Weheliye, *Habeas Viscus: Racializing Assemblages, Biopolitics, and Black Feminist Theories of the Human* (Durham: Duke University Press, 2014), 8.

111 "Critical Dialogues on Race and Modern Architecture," YouTube video, 1:32:47, panel discussion, posted by Columbia GSAPP, March 2, 2016, <https://www.youtube.com/watch?v=nLLhiyN2xc>.

112 *Ibid.*

113 Kimberlé W. Crenshaw, "Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color," *Stanford Law Review* 43, no. 6 (1991): 1241–99, DOI: <https://doi.org/10.2307/1229039>.

114 Elizabeth (Dori) Tunstall, "Decolonizing Design Innovation: Design Anthropology, Critical Anthropology, and Indigenous Knowledge," in *Design Anthropology: Theory and Practice*, ed. Wendy Gunn, Ton Otto, and Rachel Charlotte Smith (New York: Bloomsbury, 2013), 232.

biotechnology and the proliferation of informational media. These discussions, which in critical discourses in the humanities and social sciences have relied heavily on the concepts of the cyborg and the posthuman, largely do not take into account race as a constitutive category in thinking about the parameters of humanity."¹¹⁰

As an example, at a recent panel discussion, "Critical Dialogues on Race and Modern Architecture,"¹¹¹ held at Columbia University's Graduate School of Architecture, Planning, and Preservation, the conversation turned to a critique of object-oriented ontology (OOO) and related discussions of "decentering the human" and the posthuman. From the perspective of critical race studies, it is not productive to speak of the posthuman when so many people – non-white, less privileged/powerful, female, older, indigenous, people with disabilities, and so on – have not been historically included in the category of the human in the first place. Thus, rather than focusing on the agency of things and the nonhuman, the panel addressed the ways things are always entangled with bodies and subjectivities. Specifically, the panel addressed how, according to the panel's description, "'Race' – an aesthetic category based on concepts of human difference that establishes hierarchies of power – has been integral in shaping architectural discourse from its conceptualization in the Enlightenment to the present," and "the racial has been deployed to organize and conceptualize the spaces of modernity from the building to the city to the nation to the planet."¹¹² From the perspective of critical race studies, the panelists discussed the ways that architecture has promulgated universalist notions of subjectivity. These notions make claims on behalf of all 'users' without a deep understanding of the situated intersectional¹¹³ experiences of difference introduced through socio-technical and spatial categories, because they are entangled with subjectivities and identities constructed through race, class, gender, sexuality, and ability – to name just a few. From this perspective, it makes little sense to declare that we are now operating in a post-human, post-racial, or post-everything world. For example, according to Columbia University's Saidiya Hartman, race is produced in descriptions of universal experiences of space that construct whiteness. Furthermore, Charles Davis, from the University of North Carolina, adds that if we cast away the universal subject then race becomes central.

Perhaps, unlike architecture, human-centered design – with its long history of integrating anthropological methods and approaches such as ethnographic observation and qualitative interviews – is more highly attentive to the specific, situated, and partial knowledge and lived experiences of 'users.' Yet many of the resulting products, services, and systems are equally as reductive when it comes to the integration of lived experiences of race, class, gender, sexuality, and ability. This is primarily due to the ways in which the market – understood as relationships between funders, clients, start-ups, designers, retailers, and users – ignores, dismisses, and fails to account for the needs of certain individuals and groups in favor of others, thereby potentially exacerbating existing structural inequalities.

Along these lines, in a recent book chapter, Elizabeth (Dori) Tunstall writes about "the role of design innovation in continuing projects of neocolonialism and imperialism."¹¹⁴ Drawing on anthropological research, she illustrates the ways that Western, European values and categories are often used in order to describe and understand people constructed as "others," rather than integrating their own self-definitions. Furthermore, these narratives often present a hierarchy in which the universal, rational, scientific, and civilized – understood as "European" – occupies a dominant position as compared to the local, embodied, subjective, and primitive – understood as "indigenous." Tunstall argues that there are three assumptions about design innovation that are widely circulated: 1) "individual elites or

companies generate innovation,” 2) “innovation promotes modernist values,” and 3) “innovation benefits individual companies, individual entrepreneurs and inventors, or the undifferentiated masses of society”.¹¹⁵ Based on an overview of research by critical design scholars and practitioners, Tunstall summarizes some of the main critiques of current framings of design and innovation, which in many ways mirror the previous arguments about anthropology. Specifically, narratives around design and innovation serve to reify the boundaries between craft and design, position design thinking in opposition to local knowledge, and create a hierarchy of design that emphasizes the superiority of Europe and Japan.

Tunstall’s critique foregrounds the many, pressing, emergent conversations around decolonizing design, which have become more visible through workshops, symposia, and conferences in recent years.¹¹⁶ At the same time, these particular critiques of OOO and decentering the human seem to have much in common with feminist new materialism, in that they aim not to essentialize distinct categories, but rather to complicate them and illustrate the ways the human and nonhuman, nature and culture are mutually co-constitutive. Posthuman design might take up these critiques seriously in order to make way for a truly decolonized design practice.

Conclusion

The challenges of environmental and socio-technical change are enabling new ways of thinking about the state of our species. This article reviews literature by key thinkers from philosophy, science, and technology studies, geography, and history around notions of the nonhuman, the posthuman and the more than human. In particular, the most relevant strands of this theory such as actor-network theory, feminist new materialism, object-oriented ontology, and transhumanism are covered. With new epistemologies and ontologies to help make sense of the current conditions, it is likely that design practices will also need to evolve in order to stay relevant and to cope with new problems and questions. There is already some evidence that design researchers (and, even, businesses) are taking these concepts into account. These nascent projects provide important precedents for the evolution of the design field as it moves into areas that cross traditional silos, categories, and domains, and operate in more complex systems and networks.

At the same time, while it is valuable to engage with theories of the post-human and develop nascent design practices, these approaches are not without their critics. In particular, it is essential to acknowledge that like humanism, the posthuman – while it makes room for multiple subjectivities – may not serve those that have been traditionally been excluded, such as women, people of color, LGBTQ communities, people with disabilities, indigenous communities, migrants, and people of diverse ethnicities and nationalities in all regions of the world. As such, it is important to ask how emergent design practices, including those that might de-center the human, might simultaneously support equality and justice for humans and nonhumans alike.

¹¹⁵ *Ibid.*, 233–34.

¹¹⁶ For example, see Luiza Prado de O. Martins, “Privilege and Oppression: Towards a Feminist Speculative Design,” in *Proceedings of DRS 2014: Design’s Big Debates*, ed. Youn-Kyung Lim et al. (Umeå: Umeå Institute of Design, Umeå University, 2014).