CPH3.1.2

Science Faction: Posthumanism After Science Fiction

> In essence, we are all already characters in a science fiction novel.[1]

Yes, science *faction*, not science *fiction* and also not science *fact* but all of them together! The syntax of this phrase – science faction – is complex and requires some disentangling. It will be necessary to consider each of its elements and see how they work together in practice as a meshwork: science and its practices, fiction and its 'imagineerings',[2] facts and their politics, faction and its confusions. Together, so is the argument, they constitute the specific and very peculiar future-oriented political framework in which posthumanism, as a sign of our times, operates.

Science in Practice and Science in Action[3]

> Most thought-provoking is that we are still not thinking… This situation is grounded in the fact that science itself does not think, and cannot think – which is its good fortune, here meaning the assurance of its own appointed course.[4]

Few would argue with the fact that science can be understood as a social practice; that it is a factual discourse that derives objective truths from investigations into things or phenomena that exist in the natural world, or, by abstraction into phenomena or laws that lie behind the workings of an empirical, material world. It is a social practice because it is performed by humans for humans and on nonhumans within a more-than-human world. It is also social because it uses concepts and theories, symbols and language, metaphors and images to represent and explain these phenomena on the basis of which it makes realist claims about reality – a reality that is 'out there' and functions independently from human (or indeed nonhuman) observers, but which is of course absolutely relevant for 'social reality', or reality as it appears to humans and on the basis of which humans live their lives. This complex situation is nevertheless usually taken by science as justification for telling 'us', its public: this is how things are, this is how the natural world functions, and by implication: this is what we have to accept or work with (if not live by), i.e. scientific realism. Hypotheses are developed, analyses are carried out, facts are established, claims are either proven, rejected or revised, and as a result, new hypothesis are then emitted and the process starts again, towards the always receding horizon of 'Truth' with a capital T. The realism of science is based on the idea that things, the world, obviously function independently of science, of its explanations and, more importantly, of the human 'observer'. In this sense science is foundationally posthumanist and nonanthropocentric. The 'real' of science, however, pre-exists it and also escapes it, necessarily, because science can only ever be an approximation of the entire truth which always remains to be discovered. Science, in this sense, is 'ancestral' – it functions without and also 'before' the human, as

[1] Gerald Alva Miller, *Exploring the Limits of the Human Through Science Fiction* (Houndmills: Palgrave Macmillan, 2012): vii.

[2] I am borrowing the term 'imagineering' from Manuela Rossini, "Figurations of Posthumanity in Contemporary Science/Fiction – all too Human(ist)?" *Revista canaria de estudios ingleses* 50 (2005; special issue "Literature and Science", ed. T. Monterrey): 21– 36. See my discussion of the term below.

[3] Cf. Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Harvard: Harvard University Press, 1987).

[4] Martin Heidegger, *What Is Called Thinking?* [1954] Trans. J. Glenn Gray (New York: HarperCollins, 2004): 4, 7-8.

well as necessarily 'after' it.[5] Behind every scientific insight, however, arises a new mystery whether it lies in the discovery of ever smaller (and weirder) particles or ever bigger (and unfathomable) dimensions of time and space – this is what has been driving both the rationalism and the speculations of (Western) modernity, its spirit of exploration with its global and universalist aspirations. Science and its seemingly unstoppable progress has fired the imagination of the brightest human minds and has improved the lives of billions of humans over time. It has debunked non-scientific myths, advanced civilisation and given sense to historical development. For all of this, science needs to be thanked, of course, and denying the necessity and legitimacy of science is not an option, but critique must be allowed both from within and from without scientific practice.

There are nevertheless a few dents in modern science's success story. As a practice, science does not just 'discover' but also manipulate (in the literal, non-moralistic sense) objective realities, it transforms them, experiments and imagines alternatives, in short, it 'engineers' them, in both abstract, theoretical (or philosophical) terms, by thinking, as well as concretely, practically, by using tools and technologies, and thus by making and changing 'things'. Science develops technologies, and these, in turn, also lead to changes in science. The role of technology is ambiguous in this context. It is therefore no coincidence that it forms a major puzzle for contemporary posthumanist discourse, i.e. the discourse that attempts to think and negotiate to what extent traditional humanist notions of what it means to be human are inadequate and to what extent recent technological developments may be leading to a posthumanist understanding of what it is to be human, or even to new posthuman ontologies. The highly complex and ambiguous role technology plays lies in the fact that on the one hand it is largely seen as instrumental, as merely a means to an end. It is basically a tool chosen and honed by its users (humans and nonhumans alike). On the other hand, technologies, even rudimentary ones like a hammer, perform conceptual, behavioural, existential changes in their users.[6] In fact, technology can be seen as destabilising the idea of user and tool by becoming not only 'prosthetic' but increasingly autonomous, so that beyond an instrumental use technology develops its very own dynamic, for some even a 'will', that leads to various forms of technological determinism.[7] Arguably, contemporary society sees technological development and scientific practice, usually combined in the compound 'technoscience',[8] as the main driver of the trajectory of modernity and its future. From a kind of 'reverse-teleological' and paleoanthropological point of

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[5] This is Quentin Meillassoux's argument in *After Finitude: An Essay on the Necessity of Contingency* (London: Continuum, 2008).
(London: Continuum, 2008); see my commentary in Stefan Herbrechter, *Before Humanity: Posthumanism and Ancestrality* (Leiden: Brill, 2023), *passim*.

[6] This is the focus of chapter X (Technogenesis).

[7] For a classification of various forms and degrees of technological determinism see Allan Dafoe, "On Technological Determinism: A Typology, Scope Conditions, and a Mechanism", *Science, Technology and Human Values* 40.6 (2015): 1047-1076. See also Merrit Roe Smith and Leo Marx, eds., *Does Technology Drive History: The Dilemma of Technological Determinism* (Cambridge: MIT Press, 1994), and Raymond Williams's classic "The Technology and Society", *Television: Technology and Cultural Form* [1974] (London: Routledge, 1990): 1-25. Williams's classic take on technological determinism is that it is in opposition to social and cultural constructivism; it continues to be hugely influential and still provides a powerful critical handle on technocratic ideologies. Critical posthumanism has to a certain extent remain undecided about questions like: who controls technological change? Does technology have agency and autonomy? Is technology the main driver of social change in modern societies? And so on. Nevertheless, Williams's focus on intentionality in techno-scientific development certainly remains a valid critical tool in assessing the ambient utopian techno-euphoria *and* dystopian techno-phobia that are symptoms of contemporary posthumanisation (cf. Williams, p. 7).

[8] On the notions of "technoscience" and "technoculture" see Raphael Sassower, *Cultural Collisions: Postmodern Technoscience* (New York: Routledge, 1995), Mike Michael, *Technoscience and Everyday Life* (Maidenhead: Open University Press, 2006), and, more recently, David F. Channell, *A History of Technoscience: Erasing the Boundaries between Science and Technology* (London, Routledge, 2017).

view, one might even argue that technology is what made us human.[9] In that sense, it is 'originary' – even if that is not an exclusive dynamic of hominisation (nonhuman animals do use tools and develop complex cultural techniques as well). This idea of the originariness of technology has in fact become one of the main topoi of posthumanist thinking and is the main 'object' of investigation of this volume.[10]

The Greek 'tekhne' (*τέχνη*) originally covered mainly notions of ability or dexterity and included techniques that were both, manual and mechanical (art and craft), and cognitive (e.g. rhetoric), as well as, indeed, practical and theoretical. The modern term 'technique', most generally refers to a specific way of doing things, a solution to a specific problem, a practice that is regarded as isolated and repeatable, a swimming technique for example. 'Technics', one might argue, is the anthropologically descriptive term that covers all of these techniques (or 'skills'), or the sum of practical knowledge, any kind of practical art, with its cognitive aspects and its manners of execution and performances. Technology, interestingly, involves a 'discursive' and 'systematising' level (cf. the morpheme 'logos' that it contains). It is already at a certain remove from *tekhne*, technique and technics, therefore, in the form of a general reflection on certain techniques, arts, skills, special languages they involve, leading to what one might call 'applied science', e.g. food technologies. Under the conditions of modernity, rationalisation, mechanisation and industrialisation technology develops an increasingly entangled relationship with 'science', understood both as a social practice of systematic knowledge accumulation and as a modern institution (understood as legitimating centres of power, e.g universities, science societies, professional bodies, laboratories). Under these modern conditions and in combination with the rise of capitalism and the development of intensive or high technology and its commodification, one may refer to the compound of 'technoscience' or the phrase 'technoscientific capitalism' as descriptors of our contemporary social landscape and to 'technocracy' (bureaucratic or administrative rule through modern technology and 'experts') as a system of political organisation.[11]

Therefore, if posthumanism today speaks of 'originary technicity' it constructs a strategic paleoanthropological (or one might say evolutionary, but no longer exclusively bio-evolutionary but techno-bio-evolutionary) argument that runs against the purely instrumental notion of technology which has come to dominate our modern liberal capitalist societies and which basically serves the needs of commodification and 'extractive' (of natural resources but human and human resources like labour) and often colonial (exploration, 'discovery', expansion, domination, exploitation) practices. If the fact or state of existence cannot be dissociated from the fact or state of technicity, if our being is always a being-in-technics, a technical-being, then our relationship with techniques and technical objects (i.e. machines) is co-constitutional and not (purely) instrumental (again, this should not be seen as an anthropological argument for human exceptionality). This is a 'strategic' or political move, because contemporary technoscientific and technocultural societies have reached a point where technicity has become so central, where technologies and science are so powerful, and where technologisation has become so 'invasive', that the relationship between 'us' and 'technology' is about to fundamentally change, or might indeed already have 'flipped'. This might in fact lead to an inverted instrumentalism, one might say, where humans (but also nonhuman animals) themselves

[9] Cf. my discussion in *Before Humanity*, p. 3-4 and *passim*.
[10] See chapter X (Technogenesis).
[11] On the notion of 'technocracy' see Neil Postman, *Technopoly: The Surrender of Culture to Technology* (New York: Knopf, 1992) and Val Dusek, *Philosophy and Technology: An Introduction* (Oxford: Blackwell, 2006), chapter 3.

increasingly become technical support structures, or one might say 'media' (even "biomedia")[12] for increasingly autonomous, economically and scientifically driven technologies (esp. AI). It seems therefore that the so-called 'posthuman' (the technically enhanced human being, or the technically superseded human), or 'posthumanity' (the entirety of humans thus transformed) in their hypermediated, virtual and dematerialised form have always been the projected or teleological endpoint or the 'natural' outcome of rationalist, technoscientific, capitalist modernity.

To return to the question of science (as) practice, the role that posthuman*ism* plays in the face of this *trans*humanist drift of human perfectibility (i.e. the desire to make humans 'better', which presumably means to produce better humans)[13] and self-surpassment is a mediating and, in my view, *critical* one (hence the emphasis on *critical* posthumanism).[14] As I mentioned, science especially in its modern technoscientific form, is itself posthumanist in the sense of being fundamentally non- or postanthropocentric in its epistemological self-understanding – it produces knowledge *for* humans, *by* humans and *of* humans (including nonhumans and a more-than-human world) but it is knowledge that per definition is independent of the humanity of its observers. The 'coldness' of such a "great outdoors"[15] that science implies is what leads to anti-science resistance, which resents the fact that science challenges the 'integrity' of the human and keeps inflicting 'narcissistic wounds' on the *anthropos*. In this sense, science should be a natural ally of posthumanism despite the fact that posthumanism, at least in its 'critical' denomination, still has a strong anthropological interest in that it can be said to be a return *to* (but not necessarily *of*) the human.

There is, however, another snag to science's success story that needs to be addressed. From a socio-political point of view, even though science claims objectivity for its discoveries and its knowledge, and clearly depends on this for its self-legitimation, science is done by scientists – individuals, groups, teams or communities. Scientists embody the role of 'experts', which presupposes that due to their impressive knowledge of usually very specialised fields and which usually remains 'obscure' in its depths and implications for a 'lay' public, scientists are invested with a privileged access to questions regarding the importance and impact of their own field. They are often given the role of public intellectuals where they are invited to explain, to connect but also to speculate on the social consequences of scientific insights and practices. How else could we explain publications like Jeremy Stangroom's *What Scientists Think* (picked at random out of a large pool of scientific popularisation outlets).[16] On the one hand, asking what scientists think is going against what Heidegger said, quite provocatively, namely that science does not think, an aspect which he sees as its strength by the way,[17] meaning: science does not (need to and therefore arguably should not) do philosophy, which in Heidegger's terms is the same as 'metaphysics', or indeed trying to find answers what nature (physis) *is* and what it all *means*. It is in fact a perfectly logical derivation of philosophy's basically anthropological vocation in asking: what is man? – a question that science replaces with a postanthropocentric topology by focusing instead on 'man's' environment. Scientists should probably feel honoured by Heidegger's remark even though of course it was also designed to keep science (and technology) firmly in their place.

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[12] Cf. Eugene Thacker, *Biomedia: The Merging of Computer Science and Molecular Biology, Genetic Codes and Computer Codes* (Minneapolis: University of Minnesota Press, 2004).
[13] Cf. Michael Hauskeller, *Better Humans: Understanding the Enhancement Project* (Durham: Acumen, 2013).
[14] On perfectibility and transhumanism see my "Perfectibilities, or, How (Not) to Improve Humans", *(Un)Learning to be Human? Collected Essays on Critical Posthumanism*, Volume 1 (Leiden: Brill, 2024), pp. 208-219; see also Karin Knorr Cetina, "The Rise of a Culture of Life", *EMBO reports* 6 (2005): S76-S80.
[15] Cf. Meillassoux*, After Finitude* on the notion of the "great outdoors", *passim*.
[16] Jeremy Stangroom, ed., *What Scientists Think* (London: Routledge, 2005).
[17] See the epigraph from Heidegger's *What Is Called Thinking?* above.

What Scientists Think concludes with a short interview with Martin Rees, Astronomer Royal and author of *Our Final Century*, about the dangers of science. Rees is alarmed and indeed sceptical that humanity should make it out of the twenty-first century. Its demise, however, would be a shame because as a cosmologist Rees also believes that *homo sapiens* is merely one step in the evolution of 'complexity' in the universe, an idea similar to Teilhard de Chardin's 'noosphere' as well as various strands of transhumanism and their belief in a (technologically-induced) 'singularity', and which basically presupposes another level, i.e. cosmic, consciousness. The danger and the challenge for science according to Rees thus becomes to steer a course that minimises the risks and maximises the potential of technoscientific progress so that humanity might still fulfill its 'cosmic' destiny. This return of apocalyptism in large parts of contemporary science, from astrophysics to geology, from bioscience to geo-engineering, shows that scientists at least as individual members of the human species cannot escape Kant's fourfold of questions that constitute philosophical anthropology, namely: what can we know? What should we do? What can we hope for? All three feeding into the most fundamental question: what is 'man'? Or, rather, 'what does it mean to be human?' i.e. the question that posthumanism has started posing again with renewed insistence under new, arguably *post*human, conditions.

However, let us try and stay with the trouble at hand, namely the analysis of the 'science' element in the phrase 'science faction'. It is not only about what science is as a social practice, but also what its subjects think and what they do. What it means to be a subject of science quite obviously depends on your position within or indeed outside of scientific discourse. As expert scientist subject you have the epistemological privilege of being a subject-supposed-to-know which comes with authority and power, but also with a special responsibility, as Rees makes clear in asking whether the scientists who created the atomic bomb were responsible for Hiroshima and Nagasaki (and the nuclear world order and its constant threat of annihilation that has been a major extinction threat for humanity and the world ever since, one might add). While the 'public', who are subjects of science in the sense of being subjected *to* it, are torn between its undeniable benefits and worries about its 'immoralism' – scientific knowledge and its technological applications do not necessarily benefit humanity and certainly not all of it to the same degree as the history of colonialism and the wars of the 20th century, and even the latest pandemic have so clearly demonstrated. What were anthropological questions constituting Kant's eighteenth-century Enlightenment with its motto of *sapere aude* – dare to know – and its ideal of a mature and responsible self governed by reason, have now in fact become science questions. What can I know? What should I do? What can I hope for? And what is the human? These, today, usually concern domains addressed by the sciences while the so-called 'humanities' which used to hold the monopoly over these questions have been in decline to a point where their funding is being withdrawn – which itself may also be seen as a sign of a certain 'posthumanism'.[18]

What scientists think and do under these conditions is therefore eminently political in the sense that it is about the power and legitimation of knowledge production – a contest between faculties and knowledge 'bases' or 'cultures' in which a transdisciplinary discursive formation like posthumanism tries to interfere by mediating between the sciences and humanities and by transforming their disciplinarities and protocols to produce what some have called a "third culture"[19] – i.e. a bridge

[18] Cf. my contributions to the debate on posthumanism and education in *(Un)Learning to be Human?*

[19] Cf. Jerome Kagan, *The Three Cultures: Natural Sciences, Social Sciences and the Humanities in the 21st Century* (Cambridge: Cambridge University Press, 2009), and Wolf Lepenies, *Between Literature and Science: The Rise of Sociology* (Cambridge: Cambridge University Press, 1988; the original German title is *Die drei Kulturen: Soziologie zwischen Literatur und Wissenschaft* (Munich: Hanser, 1985)). Apart from these ground-breaking works there are also many initiatives, like John Brockman's "Edge Foundation" (cf. https://edge.org/about-

across C.P. Snow's unfathomable gulf between the "two cultures" of the sciences and the humanities.[20] At the same time as science has continued to extend its field of expertise throughout modernity, the traditional humanities and the social sciences have become more interested in science, its practices, methodologies, its sociologies, its politics and its 'ideas' and their history more generally.[21] In a time of scarce funding resources and enormous economic stakes this continues to create quite hostile exchanges and rivalries, the most damaging and recent of which was the so-called 'Sokal Hoax'.

This is certainly not the place to work through the escalatory history of the 'science wars' of which the Sokal 'affair' was maybe the most public episode.[22] Elie During aptly summarises the main context and misunderstandings (one might say: mistranslations) of the affair:

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edgeorg; accessed 04/02/25) for example – a series of encounters and discussions between leading scientists invited to speculate on "the frontiers of knowledge in areas of evolutionary biology, genetics, computer science, neurophysiology, psychology, and physics" and their social implications – which is Brockman's take on a "third culture" and a "new natural philosophy, founded on the realization of the import of complexity, of evolution". See Brockman's *The Third Culture: Beyond the Scientific Revolution* (New York: Simon & Schuster 1995), itself a response to Thomas Kuhn's *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970). Connected to Brockman's initiative are also a number of other publications that all aim at connecting scientists and their ideas with a larger reading public and to push scientists (back) into the role of 'public intellectuals', a position seen by Brockman as too often occupied by humanities scholars; see for example Brockman, ed., *The New Humanists: Science at the Edge* (New York: Barnes and Noble, 2003) and Brockman, ed., *What Is Your Dangerous Idea? Today's Leading Thinkers on the Unthinkable* (New York: Simon & Schuster, 2006).

[20] Cf. C.P. Snow, *The Two Cultures: And the Scientific Revolution* (Oxford: Oxford University Press, 1959): "I believe the intellectual life of the whole of western society is increasingly being split into two polar groups… Two polar groups: at one pole we have the literary intellectuals, who incidentally while no one was looking took to referring to themselves as 'intellectuals' as though there were no others… Literary intellectuals at one pole – at the other scientists, and as the most representative, the physical scientists. Between the two a gulf of mutual incomprehension – sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding" (pp. 11-12).

[21] Cf. for example David Wooton's monumental study of the history of science and its 'inventions' in *The Invention of Science* (Harmondsworth: Penguin, 2016) in this respect.

[22] For an excellent and brief account of the history of the lead-up within the 'science wars to the 'Sokal Hoax' see Ziauddin Sardar, *Thomas Kuhn and the Science Wars* (Cambridge: Icon Books, 2000). For a collection of the most important interventions that followed Alan Sokal's placing of a 'hoax' article' on 'postmodern science' in one of the leading cultural studies journals, *Social Text*, and his subsequent revelation in *Lingua Franca*, pointing out the 'nonsensical' nature of his claims about science and the idea of science's 'social *constructedness*' - at least from a scientific 'realist' point of view that is, see Lingua Franca, eds., *The Sokal Hoax: The Sham That Shook the Academy* (Lincoln: University of Nebraska Press, 2000). Since 'French Theory' was the main target of what came to be known in France as his '*canular*', the science wars also generated an international or transatlantic debate, mainly because the US-American physicist Alan Sokal teamed up with his Belgian colleague, Jean Bricmont, to launch a fully developed version of his persiflage of French philosophers and their 'misuse' of scientific 'metaphors' in France first (and not in the US – which was originally the discursive context out which the perceived need for his critique had arisen); cf. Alan Sokal and Jean Bricmont, *Impostures intellectuelles* (Paris: Odile Jacob, 1997). The gauntlet was taken up by many others, in France and elsewhere, most importantly by Yves Jeanneret, *L'Affaire Sokal ou la querelle des impostures* (Paris: PUF, 1998) and Baudouin Jourdant, ed., *Impostures scientifiques: Les malentendus de l'Affaire Sokal* (Paris: La Découverte, 1998). For a thorough explanation of the misunderstandings and the mistranslations of the intentions and reactions on both sides of the Atlantic see François Cusset, *French Theory: How Foucault, Derrida, Deleuze, & Co. Transformed the Intellectual Life of the United States* (Minneapolis: University of Minnesota Press, 2008): 1-13, the original French of which was published in 2003. See also my modest contribution in "Postmodernism", in: Bruce Clarke and Manuela Rossini, eds., *The Routledge Companion to Literature and Science* (London: Routledge, 2011), pp. 518-528.

> Reading French theory and contemporary science studies through the prism of problems developed in the American philosophy of science some thirty years ago (Quine, Kuhn, Feyerabend), Sokal is driven to address issues of relativism that are, ironically, foreign to his critical targets. The authors he quotes and criticizes for abusing scientific jargon (Lacan, Deleuze, or Baudrillard) are in fact not interested in scientific theories as such, nor in their capacity to describe 'reality', but in the concepts they provide, and their possible reappropriation for other purposes. As Bruno Latour says, "For a French person, saying that facts are constructed is a banality. Relativism is like an infantile disease: for us who contract it in our high-school philosophy class when we are 18, it is harmless. Yet when it is transferred to the U.S., it can infect entire departments of philosophy and literature". [23]

While it thus might make sense to highlight some radically relativist or nihilistic anti-science tendencies that are much more influential in the U.S.A., to call for what has been ironically referred to as 'scientific correctness' in an attack against the excesses of 'political correctness' does not invalidate arguments for a social investigation and critique of science's discourse, knowledge production and institutions.[24]

Even though the Sokal Hoax, the science wars and their effects have disappeared from the front pages they continue to have their impact behind the scenes and certainly have played their role in preparing the terrain for the enormous populist conservative and (culturally) illiberal backlash that has been occurring in the U.S, and subsequently also Europe over the last two decades or so, with a steady rise of ultra-conservative anti-liberal political movements in combination with an ultra-liberal (or libertarian) economy-driven global neoliberalism.[25] The role of science (new technologies and new media) in this development is far from neutral. So, even while new discursive formations like posthumanism represent an attempt to overcome the two or three cultures chasm through new forms of transdisciplinary practices, methodologies and 'convergences', we are a long way away of some kind of 'level playing field' between the sciences, humanities and social sciences. Overall, what the hoax demonstrated apart from being an obvious struggle over competencies, acceptable practices of critique, and 'turf wars', was that scientists are eager to disseminate their knowledge to the wider public and that, in that process, all kinds of interested parties who are seeking to 'apply' this knowledge for various purposes experience the need to 'police' this process. That this basically hermeneutic process of interpreting what scientific knowledge and practice 'mean' does obviously not happen in a value-free, asocial space, but in concrete and culturally specific and political contexts with economic interests implied, seems relatively uncontroversial. Controversial (and eminently political) this becomes, however, as soon as we find ourselves in a situation where hard choices need to be made. These choices are closely linked to what one might call the 'construction of the future',[26]

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[23] Elie During, "Supplement C: Sokal's New Clothes (Intermezzo)", in: Sylvère Lotringer and Sande Cohen, eds., French Theory in America (New York: Routledge, 2001), pp. 309-314 [313]. The Latour quote is translated by During from an article by Nathalie Levisalles, "Le Canular du Professor Sokal", *Libération* (3 December 1996), available online: https://www.liberation.fr/sciences/1996/12/03/le-canular-du-professeur-sokal_192248/ (accessed 05/02/25). The US American panic regarding the spectre of relativism referred to by During is best captured in Paul R. Gross and Norman Levitt's influential *Higher Superstition: The Academic Left and Its Quarrels with Science* (Baltimore: The Johns Hopkins University Press, 1994), which was in fact also the source of inspiration for Sokal.

[24] Sokal persisted in his conservative defence of scientific realism in subsequent publications like Sokal, *Beyond the Hoax: Science, Philosophy and Culture* (Oxford: Oxford University Press, 2008), or, again for the French 'market', Sokal, *Pseudosciences et postmodernisme: adversaires ou compagnons de route?* (Paris: Odile Jacob, 2005).

[25] I analyse the role critical posthumanism might have played in this context in chapter X (The Future of Democracy).

[26] Cf. chapter X (Constructions of the Future).

and this is where we re-join the earlier argument about 'science faction' as a discursive device, a genre or maybe a mode, which is fundamentally future-oriented.

Before we get there, however, I need to say a few things about the main *institutional* target of the Sokal Hoax, namely the immensely popular and influential cultural (and media) studies of the 1990s and 2000s seen during the backlash as the major proponents of (cultural) relativism, identity politics, political correctness (supposedly responsible for the extremes of 'woke', or 'cancel culture', in contemporary language), all arguably reunited in an attack on 'social' or 'cultural constructivism' (and, ultimately, underpinned by 'deconstruction(ism)').[27] A central aspect of the rise of cultural studies and cultural constructivism lies in their focus on the notions of 'textuality' and the 'politics of representation'.[28] The reason I have always defended the idea that posthumanism (like any -ism) is a (social) discourse while the posthuman is its central trope or transcendental signifier is that this allows for a critical analysis (hence: *critical* posthumanism) of the ways in which the discourse represents a 'reality' through 'texts' (in fact very similar to but also in competition with science practice). Texts are here understood in the widest sense – anything that is invested with meaning or any 'combination of signs', given that the semiotic sphere cannot and be clearly separated from the 'materialities' it refers to and given that signs themselves are not 'immaterial' entities. This is basic poststructuralism, if you want.[29] Some strands of posthumanism are rejecting the idea of constructivism on the basis that it might be too 'linguacentric' (which is another way of saying that it might therefore still be too anthropocentric in an unquestioned notion of language as the predominant and exclusively *human* characteristic, i.e. Aristotle's notion of the human as *animal rationale* or *zoon logon echon*). However, the idea that access to reality is always mediated by language or signs is not necessarily anthropocentric in this sense. Instead it has been the most liberating political insight that reality is 'constructed' and that 'truth claims' are therefore always relative. If that were not the case, changes within and changes to (social) reality would strictly speaking be unthinkable. Whatever is the truth and whatever constitutes reality as it is mediated in a social sphere with its culture(s), i.e. its values, beliefs, behaviours etc., is subject to conflict and negotiation. Some posthumanist strands are however also targeting the 'cultural' in 'cultural constructivism', in the sense that this is based on the exclusion of 'nature'. Indeed, there is nothing that is 'natural' about nature, since it is impossible to experience nature unmediated and because the transformation of nature into culture is a process that is at the centre of modernity – a process that is so advanced that there is literally very little 'nature' left in this world that is not affected by human endeavours[30] – which, ultimately, is also the idea behind the term 'Anthropocene', understood as that geological period in which humans have become the most single determining factor of the planetary climate, as read by a 'future' geologist studying the contemporary sedimentation process.[31]

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[27] Cf. the current and very belated French epigonal reaction to the much earlier backlash in the U.S. culminating in the kind of Trumpian populism and cultural illiberalism we are witnessing throughout the 'West' today, in: Emmanuelle Hénin et al., eds., *Après la deconstruction: L'université au défi des idéologies* (Paris: Odile Jacob, 2022).

[28] See my *Posthumanism: A Critical Analysis* (London: Bloomsbury, 2013), pp. 81ff. The classical reference to the 'politics of representation' as understood in cultural studies can be found in Stuart Hall, ed., *Representation: Cultural Representations and Signifying Practices* (London: Sage, 1997).

[29] For a very useful summary and illustration see Tony Thwaites, Lloyd Davis and Warwick Mules, *Introducing Cultural and Media Studies: A Semiotic Approach* (Houndmills: Palgrave, 2002).

[30] On these conceptual complications see Vicki Kirby's edited volume *What if Culture Was Nature All Along? New Materialisms* (Edinburgh: Edinburgh University Press, 2017).

[31] See my *Before Humanity*, and "Posthumanism and Deep Time", in: Herbrechter et al., eds, *The Palgrave Handbook of Critical Posthumanism*, Volume 1 (Cham: Springer, 2022), pp. 29-54. There is good reason to argue

How to square this, on the one hand, with natural science that relies on the existence of an independent objective and 'ancestral' reality? This is connected to a traditional ecological view that something like the current climate crisis is in a sense a 'return of the real', nature or the planet striking back so to speak against human hubris and 'mismanagement'. On the other hand, how does constructivism chime with new materialist strands within (critical) posthumanism that insist on the idea that there is no dualism between nature and culture, but only naturecultures,[32] i.e. hybridity, entanglement, meshwork etc. and that the ethical thing to do is to do justice to the 'shared' forms of agency this implies? The answer probably lies in accepting the partial validity of all these views but also in defending the usefulness of the constructivist political or 'strategic' methodology. While as a non-scientist I neither cannot nor do I want to dispute the fact of gravity, to take the usual extreme example levelled against so-called cultural 'relativists'. I also do not dispute that gravity is a much more complex 'phenomenon' that has both semiotic and material effects – gravity is the centre of intensive 'metaphorical' work and plays a very important part not only in physical but also in *social* reality, of course, since these are 'entangled'. However, gravity – the word and concept – starts out as a metaphor before it is used to designate or signify a 'natural' i.e. physical phenomenon with associated 'laws'. In this sense, it is shot through with a semiotic-material dynamic. What the 'truth' of gravity is in this context is subject to negotiation – as the film *Interstellar* shows.[33] If 'we' can overcome gravity, 'our' species might have a future in escaping this planet. However, what a critical posthumanism can and must do in this 'situation', where some members of 'humanity' are preparing their exit from planet Earth, lies precisely in the discursive or constructed nature of the conflictual politics that arises out of science's realist claims and the opposing, equally realist, claims by new materialism, for example. Given that the conflict is about opposing views of and claims towards reality (including the reality of these invoked realities), one has to enter a careful and critical evaluation of how these respective claims are constructed in order to get any closer to some kind of truth that can be 'good' for as many as possible, and that of course does not only include humans.

This is why the work on 'technocultural studies' done throughout the 1990s for example is still very much relevant because it helps explain how science faction works, and "the ways in which technology and science relate to one another and organize, orient, and affect the landscape and inhabitants of contemporary culture".[34] The relations between technoculture and technoscience could therefore be described thus: "technology shapes culture; science epistemologically grounds technology; science as an epistemology presupposes the technological; (techno)culture produces (techno)science; culture is always technological but not always scientific (…) science often legitimates one cultural practice over another as in the normative approach to physiology in which science distinguishes/legitimates what is 'natural' and prescribes corrective therapy for what it deems 'unnatural'.[35] From the point of view of (poststructuralist or 'postmodern') cultural studies of science and technology, posthumanism is thus part of a longer term transition from a more 'descriptive' social studies of science to a more 'interventionist' understanding of 'critical science studies'.[36]

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that geology under these conditions changes from a science interested in the past and distant (prehuman) past to a 'futural' or indeed 'speculative' (posthuman) science.

[32] This is Latour's term taken up by Haraway.

[33] *Interstellar*, dir. Christopher Nolan (Warner Bros., 2014). Cf. my detailed reading of *Interstellar* in Chapter X (Constructions of the Future).

[34] Michael Menser and Stanley Aronowitz, "On Cultural Studies, Science, and Technology", in: Stanley Aronowitz, Barbara Martinsons and Michael Menser, eds., *Technoscience and Cyberculture* (New York: Routledge, 1996), pp. 7-28 [7].

[35] *Ibid*.

[36] For a good overview see Steven Best and Douglas Kellner, *The Postmodern Adventure: Science, technology, and Cultural Studies at the End of the Millennium* (London: Routledge, 2001), esp. chapter 3 ("Postmodern

A special part in any such critical science studies concerns the role of scientists in science practice or to use Latour's phrase again, 'science in action'. Since scientists exercise their profession in institutions which are funded by either governments or private corporations there is a great potential for conflicts of interest, since science and its proclaimed 'independence' is a key component of liberal democracies where political, economic and social implications of scientific knowledge production and technologies are at the heart of the public decision process. This democratic dimension of science also informs formations like critical science studies, science and technology studies, Actor-Network-Theory (ANT) or Object-Oriented-Ontology (OOO), and comes to the fore in times like 'ours' (times of global pandemics, climate change, AI, geo-engineering, post-truth, populism etc.) where science is called upon to inform political action for the benefit of as many humans and nonhumans as possible. Scientists with regard to their science practice are, in analogy with (psycho)analysts, subjects-supposed-to-know, subjects who are by their positioning in the situation of a 'privileged' observer, or expert – this is fundamental to a modern (liberal humanist), critical, Kantian-Enlightenment understanding.[37] It is this position – not science as such, understood both as a practice and institution, that has come under increasing scrutiny in postmodern technocultural studies and posthumanist critical science studies. While the former emphasises the social and cultural constructedness and the social-identity aspect of the scientific knowledge production, posthumanist approaches, in addition, challenge the underlying subject-object distinction of modern science and instead emphasise the co-implication of human and nonhuman actors and actants in the production process,[38] as well as the ontological, political and ecological implications this has.[39]

The postmodern critique of modern science – and posthumanism is, on the one hand, a continuation and radicalisation of this, while on the other hand, it is also an attempt at changing science practice – is that science traditionally relies on the timelessness and ancestrality of the results of its investigations. The predominant narrative of modern science is that of progress and teleology. However, the idea that scientific progress 'automatically' leads to social progress – maybe in the face of some 'cultural' resistance that needs to be overcome – was based on a consensus that received some serious dents as a result of the ways in which the two world wars were fought and the inhumane nature in which technological development was implicated in the Holocaust, Hiroshima

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Turns in Science"), pp. 100-148; and Iain Hamilton Grant, "Postmodernism and Science and Technology", in: Stuart Sim, ed., *The Icon Dictionary of Postmodern Thought* (London: Icon, 1998), pp. 65-77.

[37] Under posthuman(ist) conditions, science as a social practice is no longer undisputedly done by scientists alone, if it ever really was. Science practice has become an important aspect of contemporary (posthumanist) art, especially in the forms of 'lab art' or 'artscience' (cf. David Edwards, *Artscience: Creativity in the Post-Google Generation* (Cambridge: Harvard University Press, 2008)), which is just one more indication that science has become part and parcel of our contemporary cultural imaginary. For a very accessible overview see Andrew Murphie and John Potts, "Art and Technology", *Culture and Technology* (Houndmills: Palgrave Macmillan, 2003), pp. 39-65. See also my contribution on "Posthumanism" to Charlie Gere and Francesca Franco, eds., *The Encyclopedia of New Media Art, History and Theory* (London: Bloomsbury, forthcoming) in which I discuss examples by the Critical Art Ensemble, SymbioticA (Oron Catts and Ionat Zurr) and Eduardo Kac, all of whom use scientific methods which they submit to aesthetic critique to show the social and ethical implications of what one might call "promissory" technologies like tissue-cultured artificial meat or genetically modified new life forms.

[38] This entanglement between scientists and their practice with nonhuman forms of agency is what Andrew Pickering refers to as the "mangle of practice"; cf. Pickering, *The Mangle of Practice: Time, Agency and Science* (Chicago: University of Chicago Press, 1995) and Pickering and Keith Guzik, eds., *The Mangle in Practice: Science, Society, and Becoming* (Durham: Duke University Press, 2008).

[39] Cf. for example Pickering's self-assessment of the trajectory of the "mangle of practice" idea in "New Ontologies", in: Pickering and Guzik, eds., *The Mangle in Practice*, pp. 1-14: "we live in the thick of things, in a symmetric, decentred process of the becoming of the human and the non-human. But this is veiled from us by a particular tactic of dualist detachment and domination that is backed up and intensified… by science as our certified way of knowing" (p. 8).

and Nagasaki, and endless other military campaigns since (as well as the proliferation of 'weapons of mass destruction'), right up to current means of 'cyber warfare', drones and satellite-based 'star wars'.[40]

It is the essentially future-oriented legitimation of technoscience as the main driving force of modernity that explains its close connection to speculation, in both senses of the word, i.e. placing a wager on procedures like hypothesisation, extrapolation, thought experiments, imagination etc., and 'betting' in a financial sense by monetarising risk (stock markets, insurance brokering, etc.) – which explains the close relation between capitalism, technoscience, the 'industrial-military complex' and liberal democracy. Posthumanism and transhumanism, as essentially techno-speculative discourses, are at once a 'symptom', maybe even the logical consequence of this speculative modernity, while also, at least in the form of *critical* posthumanism, sometimes provide a critique of it. There is a very specific connection between speculation, constructivism and critique that is at work in critical posthumanism in its close connection to (a certain understanding of) science fiction. To describe our 'posthuman condition' as one in which science, science fact and science fiction are thoroughly entangled also means that posthumanism is maybe fundamentally complicit in this description and analysis of science as a (contemporary but future-oriented) social practice, which is why, before looking at science faction and some examples in more detail, it will be necessary to clarify the relationship between posthumanism and science fiction first.

Posthumamism and Science fiction

> In posthumanism's shift from being 'purely' science fictional to being 'pragmatically' possible, the fluctuating status of what counts as scientific knowledge is at stake.[41]

The specific affinity between science fiction and posthumanism lies in their shared future-orientedness, or, in other words, both are concerned with 'constructions of the future'[42] and the political and ethical implications this has. This cannot be the place to provide a detailed history of the genre (or, indeed, mode)[43] of science fiction. Sf is probably best understood as a "cultural mode that struggles with the implications of discoveries in science and technology for human social lives and philosophical conceptions", As Sherryl Vint writes.[44] While sf does not simply 'predict' the future, "it

[40] Cf. chapter X (The Continuation of War and Violence under Posthuman(ist) Conditions).
[41] Sherryl Vint, *Science Fiction: A Guide for the Perplexed* (London: Bloomsbury, 2014), p. 104.
[42] Cf. chapter X (Constructions of the Future).
[43] See Veronica Hollinger's discussion in "Genre vs, Mode", in: Rob Latham, ed., *The Oxford Handbook of Science Fiction* (Oxford: Oxford University Press, 2014), pp. 139-151. Hollinger refers to John Clute's notion of SF as "something more than a particular kind of narrative complex – generally understood to be an archive of stories with particular themes, motifs, and figures, a kind of storytelling oriented toward the future, closely related to the realist novel in its rhetorical verisimilitude, at once an estranged mirror of the present and an imaginative extrapolation of worlds to come". Instead, as a mode, sf becomes "a way of thinking and speaking about contemporary reality so that SF becomes integrated with other discourses about late-capitalist global technoculture, including science and technology studies, cyberculture studies, and studies of posthumanism" (pp. 139-140).
[44] Sherryl Vint, *Science Fiction* (2014), p. 4. In my view, Vint has established herself as an outstanding authority in science fiction studies over the past two decades. Her work is particularly important in that it traces the parallel rise of (critical) posthumanism and science and speculative fiction to dominant cultural paradigms. I will be following some of the important markers she has set in her work. I will also be drawing on my earlier chapter on "Posthumanism and Science Fiction", *Posthumanism: A Critical Analysis*, pp. 107-134. See also Vint's illuminating comments on science fiction and critical science studies in her contributions to various collections and handbooks on science fiction, e.g. "Science Studies", in: Mark Bould et al., eds., *The Routledge Companion*

is the mythological language of technoculture", which means that "it plays a central role in producing the future through the dreams and nightmares it offers for our contemplation".[45] It is a "cultural site" that serves to "show", imagine, discuss, problematise, extend, critique… the implications of the "new" that science and technology are proposing to develop. It is a commentary and sometimes also a driver for social change, since the relationship between science and science fiction is no one-way street. From its beginnings in Hugo Gernsback's *Amazing Stories* magazines as a means to popularise scientific discoveries and to tie technoscientific to social progress,[46] sf developed from a small fan-based phenomenon to arguably the dominant literary and filmic genre of the late 20th and early 21st century. In the course of this development, however, sf significantly changed its 'mode' in becoming a much more ambiguous discourse torn between techno-utopian and techno-dystopian visions. There is a large consensus that, following Roger Lockhurst's formulation in his cultural history of the genre, that sf is the literature that emerges from and engages with the particular preoccupations of late modernity and can thus be characterised as "the literature of technologically saturated societies".[47] Vint summarises the implications of this understanding of sf thus:

> Thinking sf as the literature of technologically saturated societies… encourages us to see the genre as a cultural and aesthetic response to how technoscience changes not only our material world but also our cultural values and practices. It may even be asking us to rethink what it means to be human. The genre's engagement with science runs the spectrum from celebration to critique… Conceptualizing the genre in this way creates an understanding of sf as a link to the intellectual dominance of science, and as an aesthetic mode centered on responding to attendant cultural changes.[48]

In early 21st-century everyday-life popular culture, one is constantly confronted with figurations of the posthuman and visions of posthumanising technology. It is as if 'we' are intent on 'living out science fiction', so much so that "SF in some sense does not exist any more as such: as mode it is everywhere and nowhere".[49] There is a growing certainty then that the world 'has grown into sf' and that sf has become "an essential mode of imagining the horizons of possibility", while 'science fictionality' has become "a way of thinking about the world"[50] that feeds into the 21st-century technocultural (and posthumanist) imaginary of 'our time'.

This ambient science fictionality arguably has become the predominant ideology of contemporary Western liberal democracies. It relies on a 'naturalisation' of an amalgamation of fiction and reality, of future and present tense, erased by the ubiquitous principle of extrapolation – one of the fundamental principles of technological determinism. It is this circumstance which justifies seeing

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to Science Fiction (London: Routedge, 2009), pp. 413-422, and "The Culture of Science", in: Rob Latham, ed., *The Oxford Handbook of Science Fiction* (Oxford: Oxford University Press, 2014), pp. 305-316.

[45] *Ibid*., pp. 5-6.

[46] More on Gernsback below. As Elaine Graham writes about Hugo Gernsback as a "promoter of scientific futurism": Gernsback's titles advocated the values of progressivism and tecnological benevolence", and that he "had a keen eye for the fusion of science fiction and science realism. (…) Under Gernsback's influence, science fiction as representation of a particular vision of technocratic futurism helped to legitimate the very future it predicted" (cf. Graham, *Representations of the Post/Human: Monsters, Aliens and Others in Popular Culture* (Manchester: Manchester University Press, 2002), p. 27.

[47] Roger Lockhurst, *Science Fiction* (Cambridge: Polity Press, 2005): 3.

[48] Vint, *Science Fiction* (2014), pp. 34-35.

[49] Cf. Jonathan Benison, "Science Fiction and Postmodernity", in: Francis Barker, Peter Hulme and Margaret Iversen, eds., *Postmodernism and the Re-Reading of Modernity* (Manchester: Manchester University Press, 1992), pp. 138-158 [142, 150].

[50] Istvan Csicsery-Ronay, *The Seven Beauties of Science Fiction* (Middletown: Wesleyan University Press, 2011), pp. 1, 3.

science fiction as the posthumanist genre *par excellence*, not just on the basis of content, however, but also because of the role it plays within the formation of a techno-posthumanist and technocultural imaginary. Science fictionality therefore needs to be understood as a 'symptom' of change which needs be investigated through a critical reading that reveals the hidden causes and the inscribed but repressed desires at work in it, from the genre of science fiction itself to everyday cultural and media practice, advertising, including scientific discourse and its popularisations. Since science fiction is such an integral part of the contemporary human imagination, technological and scientific developments can and in fact increasingly are being 'explained' to, or are being made explicit for, the public through analogies with well-known science fiction scenarios or topoi. Hence, quite legitimately, the question arises: is fiction still following any reality here? Is science fiction inspired by the possibilities of scientific research, which are then exploited and 'extended' so to speak? Or has reality, following Jean Baudrillard's well-known claim, long disappeared within this nexus of fictionalisation and de-realisation and turned into something like "hyperreality"?[51]

Technologisation and mediatisation go hand in hand in the process of social posthumanisation, and for Baudrillard, the genre of science fiction is not just any genre taking part in this process; it is the one that is closest to 'theory' and thus to his own way of thinking and writing (but also to critical posthumanism). Science fiction is indeed 'simulation' *par excellence*, because it represents a form of consciousness that aims to depict scientific and technological transformation 'realistically' and thus discusses the questions of probability and 'realisability' with their associated problems of teleology, or inevitability, ontology and ethics. As a mediating (and popularising) force between science and everyday life practice, science fiction floats in a simulative space, in between realism and fictionality – i.e. the space, I have called 'science faction'. This is a space of futures as yet unknown, as well as fictional pasts or defamiliarised presents. Science fiction has become the most posthumanist of all genres and modes because it deals with a definition of the human at a time when science and technology are unquestionably seen as constitutive of 'our technocultural (posthuman) condition'. In the age of Baudrillardian hyperreality as the interpenetration of culture and simulation technologies, science fiction becomes the typical form of expression of a 'technological imaginary', a fiction, which has lost its dialectical other and for which 'reality' has become the highest and most unattainable form of utopia. As a consequence, the boundary between social reality and science fiction has become even more of an "optical illusion", as Haraway already mentioned in her "Cyborg Manifesto".[52]

From a form of "cognitive estrangement"[53] sf in a cultural environment that has become more and more science fictional itself is thus in danger of losing its 'edge' as a form of social critique – an effect critical theory (including critical posthumanism) might have contributed as well and is now, in turn challenged by. Since for Baudrillard, theory, philosophy or thinking more generally has joined science fiction and as a result has in fact become almost indistinguishable from it in many cases (cf. Haraway, but also Hayles, large parts of media theory, including in fact most *technological* conceptualisations

[51] Cf. Jean Baudrillard, *Simulacra and Simulation* [1981] (Ann Arbor: University of Michigan Press, 1994), esp. "The Precession of Simulacra" (pp. 1-42), "Simulacra and Science Fiction" (pp. 121-128) and "On Nihilism" (pp. 159-164), as well as the special issue of *Science-Fiction Studies* 18.3 (1991) on "Science Fiction and Postmodernism" with two essays by Baudrillard on science fiction.

[52] Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century", *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991): 149-181; see also Sherryl Vint, "'A Family of Displaced Figures': An Overview of Donna Haraway", *Science Fiction Film and Television* 1.2 (2008): 289-301.

[53] Cf. Darko Suvin, *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre* (New Haven: Yale University Press, 1979).

of the posthuman) the role of critical theory in the way Carl Freedman, for example envisaged it, becomes a lot less clear-cut.[54] Vint hints at this when she says:

> If we think of critical theory as a set of tools and techniques that help us understand how ideology creates the world with specific values and identities, how it encourages us to understand certain things as natural and fixed and others as historical and mutable, we might think of sf as genre that lets us see the traces of this ideological work.[55]

However, if precisely this gap, the 'difference that makes a difference' between the cognitively estranged world of science fiction and the science fictionality of the 'real' world disappears, the critique of ideology risks failing – as is becoming increasingly obvious in the case of transhumanism and its growing acceptance.

This also explains the move towards replacing the science fictional sf with the more encompassing sf of 'speculative fiction', which is also paralleled in a shift away from a traditional (confrontational) notion of critique towards a more 'creative' or 'speculative' understanding of the critical – which is of course also affects the 'critical' in '*critical* posthumanism'.[56] If the difference between fiction and reality disappears, ideology critique based on realist claims implode – an insight that deeply informed both poststructuralism and postmodernism. To see this as the 'end of ideology', however, would be a misreading since ideology thrives on this kind of 'disappearance' and invisibility.[57] Arguably, therefore, the more 'visual' a society becomes, the more difficult it is to 'see' its ideological effects and the more decisive the notion of the 'speculative' becomes. After all, this is what the etymology of speculation implies – a close connection with the 'imaginary'. As Vint explains:

> The category of 'speculative fiction' emphasizes social and cultural change as much as – if not more than – technological change. Speculative fiction is interested in the aesthetics of imaginative story-telling, and its themes are about the cultural power of myths of science and technology. Speculative fiction is a way of conceiving of sf that encourages examination of the irrational and affective dimensions of experience as well as logical extrapolation. Like the postmodern culture with which it emerged, speculative fiction critiques and rethinks the discourses by which we understand commonplace reality. It is thus not merely a fiction about the difference between the fictional world and our own, but one in which the ontology of 'reality' itself is unstable.[58]

The moment within the history of sf and its 'postmodern context' when speculative fiction becomes its dominant strain is probably locatable in the birth of cyberpunk. In the words of Bruce Sterling in his preface to *Mirrorshades*: "The cyberpunks are perhaps the first SF generation to grow up not only within the literary tradition of science fiction but in a truly science-fictional world. For them, the techniques of classical 'hard SF' – extrapolation, technological literacy – are not just tools but an aid to daily life. They are a means of understanding, and highly valued".[59] It is during this period that an sf imaginary becomes part of everyday culture and Western liberal democracies through advertising

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[54] Cf. Carl Freedman, *Critical Theory and Science Fiction* (Hanover: Wesleyan University Press, 2013).
[55] Vint, *Science Fiction* (2014), p. 49.
[56] Cf. my entry on "Critique" to the *Genealogy to the Posthuman* (2020); available online: https://criticalposthumanism.net/critique/ (accessed 16/02/25).
[57] Cf. the controversy around Daniel Bell's *The End of Ideology: On the Exhaustion of Political Ideas in the Fifties* (Harvard: Harvard University Press, 1960), and Francis Fukuyama's *The End of History and the Last Man* (New York: Free Press, 1992).
[58] Vint, *Science Fiction* (2014), p. 90.
[59] Bruce Sterling, "Preface", in: Sterling, ed., *Mirrorshades: The Cyberpunk Anthology* (London: Paladin, 1988): viii-ix.

and popular science magazines, the beginning of large-scale digitalisation, new forms of 'online' or 'virtual' communities, gaming and the rise of 'cyberculture' and 'social media', which makes a differentiation between scientific 'reality' and technological 'virtualisation' much more problematic. However, cyberpunk also infuses sf with an increased dose of scepticism and dystopia regarding the new precariousness of the human under neoliberal economic deregulation – a trend that has been intensifying ever since the 1980s to a point where the 'noir' IT-hacker-hero figure has entered the centre of contemporary power in the White House, a tendency foreseen and thematised by Fredric Jameson and the notion of neoliberalism's 'political unconscious' according to which sf and cyberpunk no longer function "to dramatize our incapacity to imagine the future" but to "defamiliarize and restructure our experience of our own *present*".[60] Arguably, today's Silicon Valley culture with its transhumanist ideology would be unthinkable without a deliberate fusion of *both*, cyberpunk *and* informational technology, mathematics and neuroscience – or the rise of 'cybernetics' initiated by the Macy conferences from the 1940s to the 1960s – in which a commitment towards a 'posthuman' future was first made.[61] Vint speaks in this context of a "kind of sf culture externalized into contemporary reality".[62]

It is only under these conditions, where speculation becomes at once the main characteristic in the genre of sf as well as the main driving force of technoscientific capitalism and contemporary technoculture, as well as the main tool of critique that a critical posthumanism could arise. The ubiquity of the 'thought experiment', or the question 'what if?' in the search for 'alternative scenarios' are all symptoms of a desperate search for futurity where a combination of technoscience, neoliberalism, and cultural and economic globalisation have occluded any possibility for radical, i.e. non-technological and non-scientific, alternatives.[63] Critical posthumanism is complicit in this erasure of the difference upheld by the boundary between science fiction and social reality – now an "optical illusion" according to Haraway – as well as in turning the 'speculative' into the main political avenue for a 'radical imaginary' based on various 'con- and re-figurations',[64] all this in the hope of out-imagining the techno-euphoric combination of the Silicon Valley IT ideologues. To keep critical posthumanism's 'hopes' alive (i.e. the hope for a socially more just and inclusive world beyond anthropocentric humanism) it will therefore be necessary to analyse this co-implication more honestly and self-critically, especially critical posthumanism's relation to technology and science, in my view, hence my current focus on 'science faction' as part of thinking a 'posthumanism "without" technology'. Sf might well continue to be a critical imaginative resource for critical posthumanism, however, the problem remains that any critique of ideology, including a critique of ambient

[60] Cf. Frederic Jameson, "Progress versus Utopia, or Can We Imagine the Future?" In: Heather Masri, ed., *Science Fiction: Stories and Contexts* (New York: St. Martin's Press, 2009): 876-891 [883]. See also Jameson's *The Political Unconscious: Narrative as a Socially Symbolic Act* (Ithaca: Cornell University Press, 1981) and *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions* (London: Verso, 2005) which will be discussed in more detail in chapter X (Constructions of the Future).

[61] As N. Katherine Hayles has shown in *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999).

[62] Vint, *Science Fiction* (2014), p. 103.

[63] See Quentin Meillassoux's fascinating, let us call it 'hyper-speculative' notion of "extro-science fiction" in this respect which aims at a form of 'science fiction without science' it seems where the following no longer applies: "Every science fiction implicitly maintains the following axiom: in the anticipated future it will *still* be possible to subject the world to a scientific knowledge. Science will be transfigured by its new power, but it will always exist". Cf. Meillassoux, *Science Fiction and Extro-Science Fiction* (Minneapolis: Univocal, 2015), p. 5. Instead, the extro-fictional challenge would be to imagine a world in which science (and by implication maybe: technology) will be impossible – herein lies in my view a parallel with a 'posthumanism "without" technology'; cf. the Introduction above.

[64] On this politics of figuration in critical posthumanism see my "Postfiguration, or, the Desire of the Posthuman", *(Un)Learning to Be Human?* Pp. 163-207.

technoscience and technoculture, will at some stage have to make its own 'realist claims' about some 'better alternative' if it wants to remain credible and not merely an extension (or indeed just another 'extrapolation') of the imaginary it seeks to critique.[65]

Vint's take on the relationship between critical posthumanism and (speculative) science fiction in the context of ambient 'science fictionality' is quite representative in its 'hopefulness' in this respect regarding the resistance to transhumanist techno-euphoric ideology and the ambiguous role that the speculative necessary plays for critical posthumanism:

> If the intensified human of transhumanism can migrate from sf to material practice, my hope is that the more radical posthumanist refusal of the historically limited category of the human can have similar impact.[66]

For sf this therefore means that:

> Although the genre is not inherently oriented toward posthuman frameworks of greater social justice, it offers a set of tools well-suited to this project, able imaginatively to craft the human and the world anew. The genre offers a deep archive of ways of thinking about different embodiment, nonhuman agency, and diverse futures, often at scales far beyond a human lifetime, at times beyond the lifetime of our species. It is thus a valuable methodology for rethinking our species to make a more livable world.[67]

What this means, however, is that critical posthumanism needs to select 'its' speculative science fiction wisely if this is supposed to serve as a critical methodology to support the strategy of rewriting (or 'reprogramming'?) the human as a more ecologically-friendly and socially-just entity.[68] This is particularly urgent given the close alignment between speculative fiction and speculative finance – an aspect mentioned above and which Vint addresses more extensively in her most recent work.[69]

3. From Science Fiction to Science Fact and Back: Science faction

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[65] The turn towards a 'strategic biocentrism', in my view, would constitute the first move towards taking up such a position (cf. Chapter X, Biocentrism). It is also, once again, informs the idea of a 'posthumanism "without" technology' (see the Introduction to this volume).

[66] Sherryl Vint, "Speculative Fiction", in: Vint, ed., *After the Human: Culture, Theory, and Criticism in the 21st Century* (Cambridge: Cambridge University Press, 2020), pp. 220-235 [227].

[67] *Ibid*., p. 232.

[68] In this 'methodological' context see also Vint's classification of speculative fiction's engagement with the posthuman into "three streams of thought": the transhuman, the new human and the nonhuman, of which only the last really promises any critical value. Cf. Vint, "Posthumanism and Speculative Fiction", in: Stefan Herbrechter et al., eds., *The Palgrave Handbook of Critical Posthumanism*, Volume 1 (Cham: Springer, 2022), pp. 225-246. Vint in fact prepares this move in her shift towards biopolitics from *Bodies of Tomorrow: Technology, Subjectivity, Science Fiction* (Toronto: University of Toronto Press, 2007), in which she recruits sf for an 'embodied' and 'ethical' posthumanism and for creating new forms of 'posthuman subjectivity', to her *Animal Alterity: Science Fiction and the Question of the Animal* (Liverpool: Liverpool University Press, 2010) in which she focuses on sf's contribution to rethink the human-animal boundary, and further, to *Biopolitical Futures in Twenty-first-Century Speculative Fiction* (Cambridge: Cambridge University Press, 2021), which tracks the changes of ideas about life and the living as reflected in sf and contemporary neoliberal globalised Western society, particularly "the real subsumption of life by capital" (p. 5ff).

[69] Cf. Vint, *Science Fiction* (Cambridge: MIT Press, 2021), esp. chapter 8 ("Economics and Financialisation"). The aspect of speculation, futurity and financialisation is also dealt with in Chapters X and Y (Constructions of the Future; and The Future of Democracy).

> It is most unwise in this age to declare anything impossible, because you may never be sure but that even while you are talking it has already become reality.[70]

Needless to say that I am largely sympathetic to the trajectory of Sherryl Vint's argument for the usefulness of (speculative) science fiction for critical posthumanism. However, I think we are now in a better position to also evaluate the 'risks' of too close an alliance between the two discourses. This is where I finally return to the phrase 'science faction' and the role it might play in keeping the 'critical' in 'critical posthumanism' critical (at least for a while longer). It is a move that is in fact long overdue, since I did not really substantiate my proposal, in 2009, to characterise posthumanist discourse, or the discourse about the posthuman and posthumanisation, as 'science faction'.[71] Even though science faction is obviously closely related to the genre of science fiction and the problematisation of factuality and (science) fictionality outlined above, as well as the growing consensus on the 'we-are-living-in-an-increasingly-science-fictional-world' fact, the phrase 'science faction' does have some more semantic dimensions to it. This means that it goes, on the one hand, beyond the idea that science fiction can be used as a 'lens' to read other, especially 'scientific', texts,[72] by highlighting the permeability of the boundaries between the two discourses, without, however, ultimately abandoning them – which would indeed be counter-productive for any realist claims about the attainability of alternative scenarios as pointed out above.[73] It would also again attract the accusation of relativism. What we have here is in fact a 'dialogism' of two separate genres – science and science fictional discourse – a dialogue of two forms of texts with obviously different social status and functions whose hybridisations 'visualise' the 'constructedness', limitations of their exclusionary and self-legitimatory practices and so on. However, science faction, on the other hand I would argue, has moved beyond this dialogism and created a new 'genre' for which the issue of (science) fictionality simply is no longer an issue. This is what I in fact tried to show in my survey of popular science magazines at the time and it would no doubt be even easier to demonstrate by using contemporary social media discourse under the condition of post-truth politics and generalised AI.[74]

What are the characteristics of this new genre of science faction? To begin to answer this involves to a certain extent a shift of perspective onto the other side of the dialogue, namely by asking what science is getting out of its 'encounter' with science fiction apart from the obvious 'inspiration' of imaginary scenarios projected onto the future, speculative visualisations or 'anticipatory' structures, or 'guidelines' or maybe 'guard rails/crash barriers [*Leitplanken*]' to follow, transgress or negotiate? It is this sense that science fiction may have become a major 'methodology' for science practice and science 'planning'. Faction is obviously a blend of fact and fiction whose result, however, tends to remain 'safely' fictitious in the sense of 'fiction based on fact'. By reassigning this fictionality to discourses that deliberately play with the boundary of fact and fiction one thus believes that through

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[70] Hugo Gernsback, "Fiction versus Fact", in Grant Whythoff, ed., *The Perversity of Things: Hugo Gernsback on Media, Tinkering, and Scientifiction* (Minneapolis: University of Minnesota Press, 2016), p. 291.

[71] Cf. my *Posthumanismus: Eine kritische Einführung* (Darmstadt: WBG, 2009) translated as *Posthumanism: A Critical Analysis* (London: Bloomsbury, 2013).

[72] A typical example would be Haraway's reading of primatology in *Primate Visions: Gender, Race, and Nature in the World of Modern Science* (New York: Verso, 1989; see in particular: "Reprise: Science Fiction, Fictions of Science, and Primatology", pp. 368-382), which served as a reference point and example for her later work and also for the huge interest and following, but also the severe critique from science quarters Haraway has attracted (and continues to do so).

[73] This clearly goes beyond an approach that would see science and science fiction as being in a form of 'mutuality' as Mark L. Brake and Neil Hook (and many others before them and since) suggest in *Different Engines: How Science Drives Fiction and Fiction Drives Science* (London: Macmillan, 2008). See also Brake and Hook, *Futureworld: Where Science Fiction Becomes Science* (London: Macmillan/Boxtree/Science Museum, 2008).

[74] I am dealing with this in chapter X (The Future of Democracy).

various policing, forensic or 'critical' strategies it is possible to ultimately return to some secure difference between the two. Anything else would hurt science's status within modern society, after all – at least that is the established belief. But in taking over speculation as one of its main methodologies, science practice also gains access to new forms of social and economic status that are not necessarily based on 'old-fashioned' factuality and realism. It is henceforth enough to claim that something *could* be true to warrant scientificity. Realism itself – and this is fundamentally what has exchanged methodological camps here – has become 'futuristic' or, indeed, 'promissory'. The science expert now gains credibility, at a social level at least, by saying 'I promise you, this could be true; listen to me, if we don't do x, y will happen…' In other words, science – especially under 'posthuman' conditions – has become *predominantly* visionary.

This is particularly intriguing since this is precisely the rationale that lay behind the beginnings of science *fiction*. Before settling on the phrase 'science fiction', Hugo Gernsback was using the term 'scientifiction' to designate the kind of contributions he was publishing in his pulp magazines and whose main aim was to describe and explain new media and technologies and the scientific progress they constitute through stories.[75] The purpose of these stories was not only to anticipate or popularise scientific discoveries and new technologies, however, but also to serve as an incentive for the 'tinkerers' to experiment and become inventors for themselves: "the seriously-minded scientifiction reader absorbs new knowledge contained in such stories with avidity, with the result that such stories prove an incentive in starting some one to work on a device or invention suggested by some author of scientifiction".[76] In fact, scientifiction is to 'lure' its fans into making sf *real* and thus guarantee the trickling down of a technoscientific imaginary into everyday practice in order to feed scientific 'progress'. The 'mutuality' of this inventing process was indeed seen by Gernsback, the entrepreneur, as a major business opportunity a mindframe that large corporations have since taken up to produce the technoscientific capitalist 'web' that characterises our contemporary social reality and its obsession with technofuturity and scientifictionality.[77]

Most important for my purposes here, however, is that Gernsback himself also seems to have invented the phrase 'science faction'. He was in fact looking forward to a time – our time – in which "science fiction will be looked upon with considerable respect by every thinking person":

> In time to come, also, our authors will make a marked distinction between science fiction and science *faction* [Gernsback's italics, also below], if I may coin such a term. The distinction should be fairly obvious. In science fiction the author may fairly let his imagination run wild and, as long as he doesn't turn the story into an obvious fairy tale, he will still remain within the bounds of pure science fiction. Science fiction may be prophetic fiction, in that the things imagined by the author may come true in some time; even if this 'some time' may mean a hundred thousand years hence. (…) In sharp counter-distinction to science fiction, we also have science *faction*. By this term I mean science fiction in which there are so many scientific facts that the story, as far as the scientific part is concerned, is no longer fiction but becomes more or less a recounting of fact.[78]

[75] See Grant Wythoff's "Introduction" to his edited volume of Gernsback's writings in *The Perversity of Things*, pp. 1-59.
[76] Gernsback, "The Lure of Scientifiction", in: Wythoff, ed., *The Perversity of Things*, p. 290. Gernsback also remarks that "the educational value of the scientifiction type of story is tremendous" (p. 292).
[77] There is an early analysis of this nexus in relation to Gernsback's role and William Gibson's (meta-science-fictional) commentary in his short story "The Gernsback Continuum" (in Sterling, ed., *Mirrorshades*, pp. 1-11) by Andrew Ross in "Getting out of the Gernsback Continuum", *Strange Weather: Culture, Science, and Technology in the Age of Limits* (London: Verso, 1991): 101-135.
[78] Gernsback, "Science Fiction versus Science Faction", in: Wythoff, ed., *The Perversity of Things*, p. 342.

It seems that today, however, this distinction while maybe still being applied within the literary discourse of science fiction (the genre, or the mode), in the everyday world which fuses science as a social practice and the technocultural imaginary of which it has become part, this distinction actually no longer applies because the fictionality has swallowed the factuality it was supposed to support. "Which is the better story", Gernsback asks, "the one that deals with pure science fiction or the one that deals with science faction?" The answer to his own question is: "That is a difficult thing to say. It depends, of course, entirely upon the story, its treatment and the ingenuity of the author".[79] Apart from a large dose of disingenuity, Gernsback in fact here admits that ultimately the two might become interchangeable, as long as 'the story' is told with enough 'ingenuity – one might rephrase this by saying: as long the author-engineer is equally good at engineering as at 'imagineering', in other words, storying 'his' inventions.

For critical posthumanism this means that a straightforward alliance with science fiction as a fictional and critical commentary on contemporary technocultural societies and technoscientific capitalism is not without risks. Rereading my own commentary from 2009, I feel that now I have to relativise and problematise the 'enthusiasm' and critical 'trust' in the genre of science fiction to be able to provide a resource for critique of the ongoing process of 'posthumanisation' (of the human and of society"# more generally), i.e. of "seeing science fiction as the posthumanist genre *par excellence* (…) because of the role it plays within the formation of a techno-posthumanist and technocultural imaginary".[80] This process of imagineered 'posthumanisation' in which science fiction has certainly played an important preparatory role has, if anything, accelerated in the 2010s and 2020s, with the proliferation of posthumanising technologies, new mobile media, social media platforms, generative AI and the increasing acceptance of transhumanist ideas like enhancement and prosthesisation, right up to its current fusion with neo-conservative and neo-liberal populist politics. While it had something liberatingly 'critical' to see science fiction as a "'symptom' of change which should be investigated through a critical reading that reveals the hidden causes and the inscribed but repressed desires at work in it",[81] today, this "erasure of the boundary between science and fiction" seems to have lost all its 'criticality' and might even have to be resisted, or at least evaluated differently. If science fiction used to be a 'symptom' it might now have become unrecognisably absorbed within the 'bloodstream' of contemporary posthumanist reality. Science faction today is clearly more than a mixture of "the fictionality and facticity of scientific culture",[82] while "technologisation and mediatisation [continue to] go hand in hand in the process of social posthumanisation".[83]

Basically, I am no longer as confident that critical posthumanism (if merely understood as (techno)cultural criticism) is still "well advised to take science fiction seriously, not in the sense of its factual 'realisability' but rather on the basis of its cultural influence". In other words, if "a critical reading of a society which is in the process of becoming posthumanist if not posthuman uses science fiction as one of its most important sources for analysing the symptoms that are at work within the contemporary cultural imaginary",[84] this may no longer guarantee sufficient critical detachment in a situation where science *faction* seems to have become a new and increasingly dominant genre outside its original literary, or cinematic (or indeed 'ludic') and fictional context. Even at the time, however, there were already clear signs of this development in the very practices I highlighted, and in which "the transmission of scientific research is being effectuated… by means of science fiction

[79] *Ibid*., p. 343.
[80] Herbrechter, *Posthumanism: A Critical Analysis*, p. 113.
[81] *Ibid*., p. 113.
[82] *Ibid*., p. 114.
[83] *Ibid*., p. 115.
[84] *Ibid*.

within popular and everyday culture, in order to gain political and economic support for research ventures and the development of new technologies".[85]

The conclusion one might draw from this potential collusion is that sf has indeed prepared and contributed to the scienfictionalisation of science and reality by being such a successful 'translator' or 'mediator' between science, economy and socio-technological change, as already encouraged by Gernsback. At the time, I was not only unaware of Gernsback's coignage of the phrase 'science faction' but also of a few other significant usages of the phrase. This includes an earlier use in the context of 'risk assessment'.[86] The rise of risk assessment both as an economic insurance practice as well as a separate field of scientific investigation is here informed not by the fictionality of sf but, on the contrary, by the integration of sf scenarios or 'thought experiments' more generally, into 'factual' social science discourse.[87] In practice, however, this leads to a similar plea for a 'softening' of the boundaries between scientific practice and futurology. Nevertheless, this has given birth to an entire field of investigation, in Germany, called '*Technikfolgenabschätzung*' – which might translate as 'technological impact assessment', or indeed 'vision assessment',[88] and which grapples with the tensions between a 'democratic' ethos to make the public aware of the (usually negative) potential consequences of technologies and its own association with 'commissioned' research sponsored by the technology industry – an ambiguity that is not entirely alien to the one that critical posthumanism finds itself in with regard to science fiction, or indeed critical science studies and science practice, all of which operate under the conditions of neoliberal technoscientific capitalism and institutions funded by it.

Speculation thus meets 'visioneering' where the question of 'facticity' is deliberately suspended, as Armin Grunwald states: "Even a vision without any facticity at all can influence debates, opinion forming, acceptance, and even decision making".[89] Since visions have a great influence on the scientific agenda and also help determine what knowledge will be available in the future there is a "strong argument in favour of providing early policy advice in the fields of technovisionary sciences with a view to increasing reflexivity and transparency in these debates".[90] This, in fact, sounds almost like critical posthumanism's own 'wager' that bets on science fiction as a critical instrument to evaluate what kind of techno-utopian visions are 'better' or 'worse' (i.e. which might be able to provide some kind of 'policy advice'), always presupposing that 'we' (today) know what 'better' or

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[85] Ibid., p. 118.

[86] Cf. Elke Schönberger and Reinhold Schrappeneder, "*Homo communicans* in Wissenschaft und Öffentlichkeit: 'Science Faction' als transdisziplinärer Ansatz der Risikoakzeptanz", *Trans – Internet Zeitschrift für Kulturwissenschaften* 2 (1997): n.p.; available online at: https://www.inst.at/trans/2Nr/schrappen.htm (accessed 14/02/2025). The argument here is that science faction is a 'transdisciplinary' development which might lead to a "competent, responsible but at the same time creative science journalism", or "futurologically-oriented non-fiction" which can then serve as a useful tool for a 'realistic' risk-assessment of techno-future-related risks. The hope is that science fiction as a mixture of fact and science fiction uniting the best of both 'worlds' will be able to fulfil the demand of an effective or trustworthy anticipation of technological development to inform the public opinion. The question of 'risk' and its possible 'assessment' is also discussed in chapter X (The Future of Democracy), in the context of Ulrich Beck's *Risk Society: Towards a New Modernity* (London: Sage, 1992).

[87] On the notion of the 'thought experiment [*Gedankenexperiment*]' see Thomas Macho and Annette Wunschel, eds., *Science & Fiction: Über Gedankenexperimente in Wissenschaft, Philosophie und Literatur* (Frankfurt: Fischer, 2004).

[88] Cf. Armin Grunwald, *Technikzukünfte als Medium von Zukunftsdebatten und Technikgestaltung* (Karlsruhe: KIT Scientific Publishing, 2012).

[89] Armin Grunwald, "What Does the Debate on (Post)Human Futures Tell Us? Methodology of Hermeneutical Analysis and Vision Assessment", in: J. Benjamin Hurlbut and Hava Tirosh-Samuelson, eds., *Perfecting Human Futures: Transhuman Visions and Technological Imaginations* (Wiesbaden: Springer, 2016), pp. 35-50 [37].

[90] *Ibid*., p. 38.

'worse' societies might actually *be*, under conditions we cannot control and which, in anticipating them, we can only submit to the regime of 'extrapolation' and, indeed, 'speculation', both of which are if anything reflections of 'our' perceived *present*. This entire epistemological set-up obviously always contains the danger that envisioning the future is the best way of stopping the future, or indeed any future that would deserve this name, from happening. It is in fact a technique of 'pre-emption' in the literal sense which is opposed to any 'radical' imaginary that lurks behind the question of speculation: what if…?[91]

Another case in point would be a "sociology of expectations in science and technology" approach that sees expectations as "wishful enactments of desired futures" together with the "performative" dynamic this entails.[92] The process usually involves a 'vision assessment' that looks at potential risks (or benefits) as set against a background of contemporary social reality, governmentality and normativity projected (or extrapolated) into the future – all presupposing the kind of 'risk society' that Ulrich Beck argued is the main characteristic of the kind of 'second modernity' we apparently live in today.[93] However, vision assessment suffers from the same epistemological problem as critical posthumanism's own 'assessment' of the closing gap between science and science fiction due to their shared 'speculative' methodologies and their reliance on narrative, or, in short, their 'visioneering' (or indeed 'imagineering') practices.[94] I am thus returning to the beginning of my argument here, namely the term 'imagineering', which Manuela Rossini proposed in 2005 to describe "ways in which images and the imagination drive technoscientific progress as well as with how imaginary constructs materialise in objects and technologies that then have an equally material effect on the lives and livelihood of human beings".[95] Imagineering, according to Rossini, is a "material-semiotic construction… of the future, including the future of the human species".[96]

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[91] This line of argument is developed further in chapter X (Constructions of the Future).

[92] Cf. Mads Borup et al., "The Sociology of Expectations in Science and Technology", *Technology Analysis and Strategic Management* 18.3-4 (2006): 285-298 [286].

[93] As an example of such a 'vision assessment' see Andreas Lösch, "'Vision Assessment' zu Human-Enhancement-Technologien", *Technikfolgenabschätzung – Theorie und Praxis* 22.1 (2013): 9-16.

[94] Cf. W. Patrick McCray, *The Visioneers: How a Group of Elite Scientists Pursued Space Colonies, Nanotechnologies, and a Limitless Future* (Princeton: Princeton University Press, 2013), which understands 'visioneering' as a combination of 'visionary' and 'engineer' to characterise the 'hybridized nature' of certain technologists' future-oriented activities (p. 10), esp. Eric Drexler's invention of the scientific field of 'nanotechnology'. McCray writes that "[v]isioneering connects this emphasis on design, engineering, and construction to a more distant time horizon and an expansive view of a future determined by technology" (p. 11). In sum, visioneering for McCray means "developing a broad and comprehensive vision for how the future might be radically changed by technology, doing research and engineering to advance this vision, and promoting one's ideas to the public and policy makers in the hopes of generating attention and perhaps even realization" (p. 13). See also Martin Sand's commentary in "Responsibility and Visioneering – Opening Pandora's Box", *Nanoethics* 10 (2016): 75-86. The classic study of nanotechnology's 'sciencefictionality' is Colin Milburn's analysis of Drexler's and sf's 'nanovision', cf. his "Nanotechnology in the age of Posthuman Engineering: Science Fiction as Science", in: N- Katherine Hayles, ed., *Nanoculture: Implications of the New Technoscience* (Bristol: Intellect, 2004), pp. 109-130, and Milburn, *Nanovision* (Durham: Duke University Press, 2008), as well as his contribution on "Nanotechnology" to Bruno Clarke and Manuela Rossini, eds., *The Routledge Companion to Literature and Science* (New York: Routledge, 2011), pp- 181-191, and more recently, *Mondo Nano: Fun and Games in the World of Digital Matter* (Durham: Duke University Press, 2015).

[95] Rossini, "Figurations of Posthumanity in Contemporary Science/Fiction – All too Human(ist)", p. ?

[96] *Ibid*., p.? Rossini's wager (and critical posthumanism's hope more generally) is that by using concepts like imagineering and by describing the science fictionality of contemporary social reality "we have the freedom to imagineer posthumanity in our own terms" (p. ?). However, if science faction – which has lost imagineering's critical intent – has indeed become the dominant genre, as I argue above, that material-semiotic complex of 'world-making' might be more or less compromised. This does not come entirely as a surprise given that imagineering, on the one hand, has arguably become the central device of both transhumanist political *and* ecocritical thinking, in times of intensifying extinction threats , and that, on the other hand, it was actually

However, it seems that the material-semiotic environment in which it made sense for critical posthumanism to be part of the 'imagineering' project has changed since Haraway provocatively and still somewhat 'subversively' announced that the boundaries between science and culture, and between science and fiction have been breached. In a sense, critical posthumanism like science fiction has become in a sense, part of, not necessarily the problem, but at least has been sucked into and become itself a symptom of contemporary science factional society in turn. Its criticality therefore needs to be re-articulated or shifted.[97]

Basically, in a time of generalised science factionality this means that it is no longer enough to declare that science fictionality is no longer about fiction, it is no longer 'disruptive' to assume that the largely imaginary boundary between science practice and science fiction has been erased by mixed-genre 'world-making', 'prototyping', 'modelling' etc. all versions of speculation.[98] In a world where transhumanist techno-euphoria rules together with neoliberal technoscientific capitalism it is no longer enough to hope that by tapping into the same sociotechnological imaginary[99] a critical posthumanism might be able to conjure up alternative realities of being human to the kinds of techno-posthumans that transhumanism sees as the inevitable endpoint of the new (postbiological) evolution and thus to make a 'critical difference'. My suggestion would therefore be that under these circumstances, the seemingly inevitable nexus between posthumanism, technology and futurity needs to be rethought along the lines Ivan Callus and I suggested some time ago, namely by thinking a posthumanism 'without' technology.[100] In other words, it is the 'disruptive' effect of contemporary

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originally developed in a Walt Disney corporation context and understood as a "blending of creative imagination and technical know-how" obviously for business development and marketing strategy purposes; see Jörg Metelmann and Harald Welzer, eds., *Imagineering: Wie Zukunft gemacht wird* (Frankfurt: Fischer, 2020).

[97] This argument is of course not entirely dissimilar to Baudrillard's notion of 'hyperreality' and the question of what to do under the conditions of 'the precession of simulacra' – cf. the extensive discussion about *The Matrix* series, the films, the franchise and the cultural 'phenomenon', see, for example, Stefan Herbrechter and Miriam Diocaretz, eds., *The Matrix in Theory* (Leiden: Brill, 2006).

[98] Cf. the excellent introduction by Jeanne Cortiel, Christine Hanke, Jan Simon Hutta and Colin Milburn, "Practices of Speculation: An Introduction", in: Cortiel et al., eds. *Practices of Speculation: Modeling, Embodiment, Figuratio*n (Bielefeld: Transkript, 2020): 7-29. However, I do not believe that the distinction between "firmative" and "affirmative" speculation that is made here will hold – one might in fact paraphrase this attempt as differentiating between speculation for politically conservative and for radical imaginary alternative-seeking ends (cf. pp. 12ff) – for reasons I outlined above. Cortiel et al. themselves point towards a major complication, namely that speculation is now shared with capitalism's main means of 'financialisation' of everything. Everything can be speculated on in the form of generalised wagers on all potentialities and probabilities. See also Jens Beckert and Richard Bronk, "Uncertain Futures: Imaginaries, Narratives, and Calculative Technologies", *MPIfG Discussion paper* 19/20 (2019), Max Planck Institute for the Study of Societies, available online at: https://hdl.handle.net/21.11116/0000-0005-78CC-F (accessed 15/02/25). Sherryl Vint's more recent work also addresses this financialisation from the side of science fiction studies. Cf. her "Promissory Futures: Reality and Imagination in Finance and Fiction", *Centennial Review* 19.1 (2019): 11-36 (part of a special issue of *CR* on "Speculative Finance/Speculative Fiction), as well as chapter 8 of her *Science Fiction* (Minneapolis: MIT Press, 2021), "Economics and Financialization").

[99] This is Sheila Jasanoff's term and approach, see Jasanoff, ed., *States of Knowledge: The Co-Production of Science and Social Order* (London: Routledge, 2004), Jasanoff and Sang-Hyun Kim, eds., *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015) and Jasanoff, "Perfecting the Human: Posthuman Imaginaries and Technologies of Reason", in: Hurlbut and Tirosh-Samuelson, eds., *Perfecting Human Futures*, pp. 73-95. I discuss these in more detail in Chapter (Constructions of the Future). See also the commentaries by Thomas Hobson and Anna Roessing, "Questioning the Politics of Human Enhancement Technologies", in: Danielle Sands, ed., *Bioethics and the Posthumanities* (London: Routledge, 2022), pp. 53-66 (esp. 57-59).

[100] See the Introduction to this volume above, and my *Before Humanity*, which suggests that at the time of ambient species angst new futures, other futures, futures that do not lie on the techno-transhumanising

technology on which neoliberal technoscientific transhumanist capitalism à la Trump-Musk thrives and which is, in fact, purely speculative, needs to be itself disrupted, and quite unspectacularly, resisted.

trajectory of modernity, might arise out of non-future-oriented forms of speculation including a new 'geological' or 'deep time' imaginary; see also my "Posthumanism and Deep Time". For Brent Bellamy and Imre Szeman, it is in fact only in the time of extinction angst and proliferating 'world-without-us' scenarios that (a very specific form of) 'science faction' might become available as a genre, in the shape of "quasi-scientific, quasi-science-fictional texts [that] depict the world after the final collapse of civilization and the extinction of the human race"; cf. Bellamy and Szeman, "Life after People: Science Faction and Ecological Futures", in: Gerry Canavan and Kim Stanley Robinson, eds., *Green Planets: Ecology and Science Fiction* (Middletown: Wesleyan University Press, 2014), pp. 192-205 [193]. This is, however, in my view a too restrictive use of 'science faction'. I discuss this idea in more detail in Chapter X (The End of the World).