Chapter 8: Scale and Speculative Futures in Russell Hoban's *Riddley Walker* and Kim Stanley Robinson's *2312*

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Any fictional text can be regarded as speculative—in the sense that all fiction invents alternative realities and thus engages with questions of how we understand our present worlds and ourselves, our knowledge of the past, and our conceptualizations of the future. As readers we enjoy the "cognitive provisionality" fictional texts provide us with, the opportunity to suspend disbelief, engage in "imaginative play" (Gallagher 2006: 347), and speculate about the (im)probable, the (im)possible, the (un)desirable of proposed realities. Some genres, however, have lent themselves particularly well to speculation about possible futures. Whether labeled "utopia," "dystopia," "science fiction," "speculative fiction," or "post-apocalyptic fiction," future-oriented fictional texts all engage in the imagination of possible future worlds, thereby responding to the political, social, economic, or cultural challenges of the times in which they are written. In some way or another, these genres all share the qualities that Fitting (2010) regards as characteristic for modern science fiction. They represent "a response to the effects of the scientific transformation of the world beginning around the end of the eighteenth century: in the European awareness of history and the future, and in the increasing impact of the scientific method and of technological change on people's lives" (136).[1]

This essay addresses two novels that create speculative future worlds as responses to the economic, scientific, and technological challenges that marked the times of their writing: Russell Hoban's *Riddley Walker* and Kim Stanley Robinson's *2312*. Each of these novels responds very differently to "the terrors and delights of technological modernity" (Luckhurst 2005: 170) that science fiction explores.

1 On the speculative quality of any fictional text, see Chu's science-fictional theory of mimesis, which argues that realism and science fiction "exist on a continuum" (Chu 2010: 7), and Freedman's claim that even the most realistic fiction reveals "an irreducible degree of alterity and estrangement" (Freedman 2000: 21). For a survey of more recent scholarship on such genre categorization, including discussions on the distinction between science fiction and speculative fiction, see also Fitting (2010); Vieira (2011); and Voigts (2015).

Riddley Walker engages in an exploration of the challenges of twentieth-century nuclear technology and develops a thoroughly dystopian far-future scenario. *2312* engages in an exploration of the challenges of early twenty-first-century computer, biomedical, and geo-engineering technologies and develops a future scenario marked by a mixture of utopian and dystopian features.

Hoban's novel, published in 1980, imagines the far-reaching effects of nuclear catastrophe. Variously labeled "apocalyptic sf" (Mousoutzanis 2009), "post-apocalyptic science fiction" (Branscomb 1991; Maynor/Patteson 1984), or "post-nuclear dystopia" (Horstmann 2015), the novel envisions a geographically isolated, rural society in southeast England some 2,500 years after a nuclear war. The depiction of this future society's habits of living, political and economic structures, and religious beliefs positions it in what can be identified as a new iron age where daily work routines lack the mechanical assistance of an industrial age existence and life expectancy is low. To Natalie Maynor and Richard F. Patteson, Hoban's account of this post-apocalyptic world, as well as his invention of an English language variant that reflects the dramatically altered conditions of social reality, turns *Riddley Walker* into one of "the most sophisticated work[s] of fiction ever to speculate about man's future on earth and the implications of a potentially destructive technology" (Maynor/Patteson 1984: 18).

Robinson's novel, published in 2012, is set 300 years in the future, when humanity has successfully colonized the solar system, while planet Earth still struggles with ecological devastation, overpopulation, and political strife that extends into space. The local settings of the novel include planets, moons, and asteroids that have been terraformed—in part, to preserve biomes that had been destroyed on Earth due to anthropogenic global climate change—and, in the case of the asteroids, are not only inhabited by humans but also used as means of rapid transportation. Dramatic advances in science and technology have made such terraforming possible while also accelerating travel and mobility for the privileged, spurring bodily human enhancements, creating flexible sexualities and genders, and significantly increasing life expectancy. *2312* can be classified as a critical utopia (Moylan 1986) that engages with the social, economic, political, and cultural risks, the chances and threats, generated by the ongoing technological processes of modernization.

While the speculative genre of science fiction is clearly defined by its future orientation, the relevance of spatiality for the genre has also increasingly been acknowledged, especially in the wake of postmodern theorizing and the spatial turn in literary and cultural studies. In 1987, drawing on his notion of the predominance of space in postmodern culture, Fredric Jameson argued that "we need to explore the proposition that the distinctiveness of SF as a genre has less to do with time (history, past, future) than with space" ([1987] 2005: 313). More recently, James Kneale (2009) claimed that the genre of science fiction lends itself particularly well

to the analysis of the shapes and functions of spatial structure in light of current work in human geography as well as literary spatial studies, since it imagines alternative worlds without a referent in so-called real life. As "representations of places that do not or cannot exist" (424), science fiction draws particular attention to the relationality, heterogeneity, and process-character that mark the construction of space and place—whether in fiction or in the 'real' world.

Drawing on these ideas, we focus our analysis on the significance of "scale" for the spatial representation of the two novels' speculative future worlds. The category of scale, too, has become increasingly relevant in human geography and in literary spatial studies. In geography, there are two general kinds of scale definition, one quite technical and cartographic, the other "a kind of shorthand to describe either an areal unit on the Earth's surface (as when studying a phenomenon 'at the regional scale') or the extent of a process's or a phenomenon's geographical reach (as when suggesting that a particular process is 'a regional' or 'a national' one)" (Herod 2011: xi). The literary critic Hsuan L. Hsu offers a more encompassing transdisciplinary definition:

> At once an epistemological framework, an imaginative construct, and an idea materialized in real spaces and activities, scale can only be understood through interdisciplinary analysis that attends to its fictive, geographical, and political economic properties. (Hsu 2017: 125)

In this essay, we understand scalar concepts to pertain to graduated scales in this geographical sense as treated in literary works. Focusing on the role of scale in the novels, we explore how scale is employed in *Riddley Walker* and *2312* for the purpose of drawing attention to processes of spatial structuring and to specific thematic preoccupations in the two novels.

In the next section, we provide definitions of the scale concepts that we turn into tools for textual analysis and interpretation. We then explore the 're-scaled' worlds of the two novels, attending to the loss of the global or planetary scale in *Riddley Walker* and the expansion of scale in *2312*. By explaining processes and outcomes of re-scaling, we shed light on the local, temporal, and social settings from which the novels' respective plots unfold. We compare scale-related strategies in the two novels, including failed attempts at scale-jumping in *Riddley Walker* and key instances of successful scale-jumping in *2312*. Our analysis focuses on the desperate and misguided mimetic attempts in *Riddley Walker* to regain access to atomic and molecular knowledge that promises to reopen access to distant parts of the planet, and on the plan to save Earth in *2312* by making use of the opportunities of an expanded scale system.

Scale, Human Geography, and Science Fiction

In international debates in human geography since the 1970s, a number of key concepts have played central roles for addressing the mutual constitution of social and spatial relations. Bob Jessop, Neil Brenner and Martin Jones (2008) identify four such concepts: territory, place, scale, and networks. These concepts have each been the focus of lasting discussion. In the course of examining them, it has become clear that all four can be seen as socially constructed (and often contested) heuristic devices, which, through the understandings of social actors, nevertheless produce real effects in socio-spatial organization of life. It is by now also clear that specific constructions of territory, place, scale, and network influence each other in complex ways.

In everyday parlance, scale is usually assumed to refer to a nested hierarchy of geographical levels. More broadly, scale is a way to structure our understandings of relative geographical size or extent not along a continuous spectrum but with reference to a small number of conventionally accepted 'levels.' In public and scholarly discourses about social life in the twentieth and twenty-first centuries, a differentiation is typically made between 'local' or 'urban,' 'regional,' 'national,' and 'global' scales. These constructs, of course, can have real effects—in political terms, for instance, where scale structures are usually fixed in legal and constitutional documents as administrative hierarchies: as 'municipal' or 'local,' 'state' or 'provincial' and 'national' governmental units, or in reference to the 'international' scale (Herod 2011: ch. 1). However, as human geographers have delved ever more deeply into the concept of scale, they have fundamentally complicated our understanding of what scale is and how it plays a role in social life. Starting in the 1980s, prominently in Neil Smith's theorization of the historical geography of capitalism and capitalist reconfigurations of 'nature,' scale came to be understood as a contingent, contestable way of framing reality that has real effects (Smith 1990; cf. Herod 2011: 25).

Changes in conventionally accepted scale structures are often termed *re-scaling*, which is defined, for example, in the literature on political scale as "the process in which policies and politics that formerly took place at one scale are shifted to others in ways that reshape the practices themselves, redefine the scales to and from which they are shifted, and reorganize interactions between scales" (McCann 2003: 162).

Re-scaling "necessarily entail[s] a disruption and recomposition of the networks of power that tie political actors together within and across scales" (McCann 2003: 163). Finally, it is important to note that re-scaling can mean 'down-scaling' as well as 'up-scaling.' The development of scale concepts in the context of seeking to understand the historical geography of capitalism has led scholars to focus much more often upon expansions than upon contractions or narrowings of scale

structures. Yet, the latter type of re-scaling is also a possibility. As these discussions of re-scaling suggest, the specific scale levels within any one scale structure (such as local, national, or global) each only make sense in relation to the other levels (Agnew 1997: 100). Scale, in other words, is not only constructed but relational.

Since scale can be understood "not just as an outcome of social process but also an instrument for reshaping power dynamics" (Gruby/Campbell 2013: 2048)—what Smith calls the "politics of scale" (Smith 1990: 173–175)—a number of authors have focused upon "scalar strategies" or ways of using specific scalar levels to achieve something at the same or other scalar levels (Lindseth 2006: 740). A specific kind of scalar strategy is identified by Smith as "scale jumping" (1990: 174–175), a strategy he illustrates in his analysis of local protests against gentrification in New York City and their successful attempts to become more broadly visible at the neighborhood and city levels.

Recently, human geographers have begun to extend the scope of their research beyond the confines of the Earth itself, with an eye to how long-standing disciplinary research themes may be taken up and potentially transformed by a broadened engagement with extraplanetary realms. In a 2017 forum in *Progress in Human Geography* entitled "Geographies of Outer Space: Progress and New Opportunities," the forum editors argue that, in this enterprise, "[h]uman geographers are well-placed to draw on a breadth of conceptual developments from its range of subdisciplinary perspectives, including an established engagement with concepts of scale" (Dunnett/Maclaren 2019: 315). And yet, this connection is not developed. Instead the contributors to the forum take up other concepts and subfields: labor geographies and astro-capitalism; environmental geographies and human-nature relations; geographical imaginations of outer space and geographies of knowledge about it; landscapes and moral geographies of outer space; and connections between exploration and control of space and nationalism.

Regarding scale as a meaning-making feature not only in the 'real world,' but also in fictional future worlds, the starting point of literary analysis is the same as that in the geographical literature. When David Delaney and Helga Leitner argue that geographical scale is considered "socially constructed rather than ontologically pre-given" and that "the geographic scales constructed are themselves implicated in the constitution of social, economic and political processes" (Delaney/Leitner 1997: 93), they refer in part to the constructing power of language and narrative. Such an analytical approach needs to be taken with science fiction texts, which, whether utopian or dystopian in outlook, have for a long time imagined spaces in which humanity has increased the geographical extent of its presence in the universe beyond what is currently the highest conventionally understood geographical scale we inhabit, the global or planetary scale. It also needs to be taken with texts centered on contact with or invasion by extraterrestrial beings, exploring the question of how scales conceived as being beyond that of the Earth

might impact life on the planetary scale. And it needs to be taken with texts such as *Riddley Walker* that draw attention to the shrinking of geographical reach due to technological catastrophe.

The Re-scaled Future Worlds of *Riddley Walker* and *2312*

Riddley Walker is set about 2,500 years after a nuclear catastrophe that occurred in the late 1990s and returned the southeast of England (and probably most other regions of the world) to a level of cultural, technological, and economic sophistication comparable to the prehistoric iron age. The region is known to its inhabitants as "Inland" (after "England"). Inland serves as the highest-order level of geographical reference or scale at which human life relevant to the narrative is organized. The chief economic activities in Inland are some rudimentary farming, salvaging of metals left over from pre-catastrophe civilization, and basic manufacturing of iron tools fueled by charcoal. Social organization is at the level of small, loosely organized groups of roughly between ten and fifty people who either control stationary farms or travel around doing salvage jobs. Life expectancy has dramatically dropped. Travel on land is by foot. The fastest form of communication is by carrier pigeon.

The society in which Riddley Walker, the novel's protagonist and autodiegetic narrator, grows up is marked by a ritualized search for long-lost knowledge that would allow the reconstruction of a technologically much more advanced way of life. It is in ritualistically performed narratives that some rudimentary knowledge about the ancient world as well as the causes of its catastrophe have been preserved. This knowledge, however, proves to be insufficient. In focusing on a future scenario marked by an inability to overcome scientific and technological ignorance, *Riddley Walker* presents a cautionary tale about the effects of nuclear technology and a narrative of a failed quest for essential scientific knowledge.

Loss of knowledge is reflected in—and mediated by—the language used by Riddley and by the other characters, a language that itself seems to have been ruined by the catastrophe. Many words have survived from pre-catastrophe times, but with spellings mangled almost to the point of unrecognizability. The place names in what used to be late twentieth-century Kent and surrounding areas likewise survive only in twisted form. More poignantly, the referents of many words no longer exist, and the novel's characters must rely on imprecise, often simply false understandings of what these words once meant.

The culture in which these (mis)understandings are preserved and relayed has been almost exclusively oral, though some people can write. The tenuous grasp the characters have of human history and their place in it is thus still largely conveyed by storytellers. The most important story to be interpreted, and the meager core

of the shared culture of Inland, is the Eusa Story—an adaptation of the story of St. Eustace, a painting of whom in Canterbury Cathedral was the original inspiration for the novel.

The tellers of the Eusa Story are Abel Goodparley and Erny Orfing, two representatives of the "Mincery" ("ministry"), which passes for the rudimentary government of Inland. Goodparley, the "Pry Mincer," and Orfing, the "Wes Mincer," travel around Inland periodically in a circuit, accompanied by "hevvys" (a category of bodyguards) and tell the Eusa Story through a puppet show in the style of the Punch and Judy tradition, using the same kind of puppets and miniature stage or "fit-up." This periodic circuit by representatives of the Mincery is the chief way in which Inland as the largest effective scale is produced and reproduced. All local groups are aware of the extent of territory covered by Goodparley and Orfing, and this serves as their widest geographical reference.

The Eusa Story centers upon Eusa, a pre-catastrophe scientist who worked out how to harness nuclear power but was forced to surrender this knowledge to Mr. Clevver (modeled on the devil figure in Punch and Judy shows). Mr. Clevver then built and detonated the bomb that destroyed civilization. For giving up the technical knowledge that led to catastrophe, Eusa was beheaded, but his disembodied head, as Goodparley explains to Riddley, instructed survivors to tell his story for posterity:

> Make a show of me for memberment and for the ansers to your askings. Make a show with han figgers put a littl woodin head of me on your finger in memberment of my real head on a poal. Keap the Eusa folk a live in memberment of the hardship they brung on. (Hoban [1980] 2002: 122)

The Eusa story is thus in part a cautionary tale. But it also includes some distorted information about the chemistry of gunpowder and nuclear fission, as does a related story circulating in Inland called "the hart of the wood" (2–4). The Eusa story cryptically holds out the promise of recovery of the knowledge necessary to rebuild civilization:

> Out of that hardship let them bring a Ardship 12 years on and 12 years come agen. Let the head of Inland ask the Ardship then. Let the head of Inland road the circel ful and to the senter asking what he wants to know for all of Inland. When the right head of Inland fynds the right head of Eusa the anser wil come and Inland wil rise up out of what she ben brung down to. (122)

Goodparley, Orfing and others, eventually including Riddley, are tantalized by the hints handed down in the Eusa story as to how nuclear power might once again be

understood and harnessed, though the stories they rely on lead them to conflate the secrets of nuclear fission with the recipe for gunpowder.

Riddley and others are keenly aware that they live in a degraded situation. Often the focus of the novel is upon the loss of technological capabilities and the mathematical and physical knowledge that underlies them. But the "clevverness" that brought this knowledge is portrayed as dangerous, as in Lorna Elswint's telling of the story "Why the Dog Wont Show Its Eyes": "They had the Nos. of the rain bow and the Power of the air all workit out with counting which is how they got boats in the air and picters on the wind. Counting clevverness is what it wer" (19).

Probably because of the skepticism encouraged in these stories, Riddley is at first not particularly interested in trying to regain such lost technological knowledge. But then he has a moment of conversion at Fork Stoan (Folkestone), where the ruins of what seems to be a nuclear power plant elicit unexpected emotions: "How cud any 1 not want to get that shyning Power back from time back way back? How cud any 1 not want to be like them what had boats in the air and picters on the wind? How cud any 1 not want to see them shyning weals terning?" (100). Imagining the "boats in the air and picters on the wind," Riddley begins to link the loss of technological knowledge with the disappearance of larger scales. The lost ability to fly and to transmit information refers metonymically to the loss of global reach. Later, Goodparley spells out more clearly the connection between the molecular sources of power and the possibility of travel and communication over much larger distances:

> What wer it put them boats up there in the air dyou think? Power it musve ben musnt it. Youve got to have the Power then befor youwl have the res of it havent you. Which theres Power in this here Salt 4 we know that much. Its 1 of the Nos. of the 1 Big 1. All weve got to do is put it to gether with the others. (143)

In the Eusa Story itself, Eusa's scientific abilities are depicted essentially as the ability to convert one scale into another: "Eusa wuz a noing man he noet how tu bigger the smaul & he noet how tu smauler the big" (30). The 'smaller—bigger' relation is at the core of all specific scale constructions. This is the question of relative size in a nutshell, to which conventional scale hierarchies provide handy practical guides. The re-scaled world of *Riddley Walker* is a world that has failed to recover the necessary knowledge of processes at what we would call the molecular and atomic scales that is needed to reconstruct larger geographical scales, to put "boats in the air and picters on the wind."

In its re-scaling of a future world, *2312* differs dramatically from *Riddley Walker*. In contrast to the latter's narrowing of scale or down-scaling, *2312* imagines a world that is marked by the expansion of scale, by an up-scaling beyond the planetary scale taken for granted as the largest geographical extent relevant to most

human social life. The 300 years that lie between the early twenty-first century and the novel's fictional future have seen a multitude of fundamental disruptions and reorganizations of scale. The twenty-first and twenty-second centuries—designated in the novel's system of historical periodization as "The Dithering: 2005–2060" and "The Crisis: 2060–2130"—experience climate collapse on Earth and "catastrophic death on all continents" (Robinson 2012: 277), but also first successes in the settlement of the moon and Mars. Depending on their geographical position and socioeconomic status, people experience down-scaling and up-scaling simultaneously during these periods. The periods of "The Turnaround: 2130–2160" and "The Accelerando: 2160–2220" then see an accelerated expansion of spatial reach with the "[f]ull application of all the new technological powers, including human longevity increases; terraforming of Mars […]; full diaspora into solar system […]; start of terraforming of Venus" (278). While this acceleration slows down somewhat in the following two periods, "The Ritard: 2220–2270" and "The Balkanization: 2270–2320," due largely to political tensions, the solar system is by then firmly established as the highest geographical reference for the human population's "place-based identification, economic activities, and access to mobility across space" (Hsu 2017: 125).

Dramatic advances in the sciences and massive technological innovation have revolutionized transportation and terraforming capabilities, shifting the political and economic focus from a planetary to an interplanetary perspective. New forms of transportation, new ways of inhabitation, but also striking biomedical advances and advances in computer technology form the basis for an interplanetary civilization still in the making. While Earth is still the socioeconomic, political, and cultural reference point of the thousands of small and larger communities that have formed in the solar system, it is no longer portrayed as the highest level of human scale configuration. The new absolute limit for humanity is the space beyond the solar system, the universe: it is now the stars, and no longer the planets, that "exist beyond human time, beyond human reach" (Robinson 2012: 375). Of course, any expansion beyond the traditional terrestrial scale-system can be refined much further: "Thinking through the nuances of the 'spaces of outer space' through terms such as extraterrestrial or extra-global space, earth-orbital space (involving polar, parabolic, or geostationary trajectories), interplanetary space, exo-planetary space, interstellar or celestial space, the cosmos, or even the heavens, invokes a variety of scales" (Dunnett/Maclaren 2019: 315). These nuances are secondary in *2312*, where tensions between terrestrials and "spacers" are represented in a binary fashion.

In the year 2312, the enormous increase in transportation capabilities has become manifest most significantly between planets but also on individual planets, including Earth. Some of the characters regularly travel by spacecraft between different terrestrial planets, as well as to—and on—asteroids, called "starships"

(Robinson 2012: 281), that were formed into terraria. On Mercury, the entire city of Terminator moves on giant tracks, always slightly ahead of the sun's rays, which threaten to destroy it but also drive it forward by thermally expanding the tracks on which it moves (29–30). The available range of geographical mobility is most conspicuously expressed in the movements of one of the protagonists, Swan Er Hong. These movements extend from slow travel by foot underground, to fast travel by trains and airplanes on Mercury and Earth, to wave-surfing on the F-ring of Saturn, to interplanetary trips in space ferries, space elevators, and various other types of spacecraft. Swan is a spacer, the novel's version of the typical science fiction traveler who introduces readers to the fictional future world. Spacers are humans who live most of the time in space and enjoy the privilege of regular space travel. They need to return to Earth with some regularity to maintain their health and longevity; they know that "neglect of this practice leads to a high risk of dying many decades before" (94). Spacers thus personify the new superordinate scale, the highest level of spatial mobility and communication encompassing human life throughout the solar system.

Advances in terraforming have made possible extensive and politically, economically, and culturally diverse inhabitation of the solar system. Not only do humans inhabit terrestrial planets such as Mercury, Mars, and Venus, but they also inhabit some of their moons. They create terraria on asteroids, and in 2312 they have even begun to inhabit the moons of low-density giant planets such as Saturn. A more recent innovation that enhances the attractiveness of some already colonized solar bodies is the large-scale transfer of light from a set of small "Vulcanoid" asteroids in a belt between the sun and Mercury (397–398). The novel here provides the reader with a very direct and physical sense in which the solar-system scale is being configured.

The solar system emerges as a space not only characterized by an ongoing intensification of human inhabitation, but also by an interplanetary political and socioeconomic order originating in space exploration and colonization by the powerful nations on Earth. Thus, the scale hierarchy typical of the twentieth and twenty-first centuries, in which the national scale is placed below the global scale, is no longer adequate as a shorthand. The emerging interplanetary order is marked by conflict that reflects the conflict-ridden situation on Earth, which is to a large extent caused by competing economic models. At the time of the "Accelerando," there were "several competing economies on Earth, all decisively under the thumb of late capitalism" (139). In the year 2312, "feudalistic" economies are competing with the "non-market economy" of the Mondragon settlements and with the type of capitalist system practiced on Mars, a "social-democratic system" in which political regulation plays a prominent role (139). All these systems influence social and political organization: they are fundamental to the "power geometry" (cf. Massey 1994) of the interplanetary order and the power geometry of single solar

bodies, as they determine access to resources and to the means and experiences of mobility. When Wahram muses at one point that "[a]ll trouble comes from Earth" (Robinson 2012: 301), he indicates that, despite existing political conflicts on the interplanetary level, power struggles originate and are still fiercest on Earth.

In 2312, Earth has become "a mess, a sad place," as Swan muses at one point, but it still remains "the center of the story" (99). After climate collapse in the twenty-first century, Earth is still an overpopulated place with an ecology at breaking point. After an eleven-meter-sea-level rise, all the coastlines of the twentieth century are gone, and with them many plant and animal species; existing social systems are unable to respond adequately to the environmental needs of both humans and non-humans; political conflict and social ills are widespread. For survival, the human population on Earth has become increasingly dependent on resources from space. Operating on the new solar-system scale to alleviate planetary ills has thus restructured the scale system and created new networks of power.

The expanded and restructured scale system in *2312* is formally reflected by the novel's expansive, open, and ultimately epic aesthetics that diametrically contrast with the closed aesthetics of *Riddley Walker*, where the reader, caught in the perceptions and thoughts of a single narrator-focalizer, is denied information essential for understanding the situation more fully. *2312* presents a diversity of narrative voices that provide information in a collage of different types of texts. The major plot strand of the novel, the attempt of a small group of people to uncover a conspiracy that involves the manipulation of humanoid beings—beings made of "human material" and "qubes" (quantum computers)—and thereby secure peaceful interplanetary cooperation, is presented in sections that are focalized by several of the major characters. Additional information about the solar system and about the history of its colonization is given in sections called "lists," in sections named after planets and moons, and in sections called "extracts." The latter are paragraphs taken from history books that look retrospectively at the year 2312, at the centuries that precede it, and at the decades immediately following. This collage technique recalls a prevalent mode of representation for the planetary scale, as Ursula Heise has suggested: "Epic, one of the oldest allegorical forms of narrative in which the fate of the entire known world is usually at stake, has made a comeback as a way of establishing a planetary scope in storytelling." Epic, she argues, is able to "accommodate ecological dynamisms, disequilibria, and disjunctions along with ecosystems' imbrications in heterogeneous human cultures and politics" (Heise 2008: 64). One narrative element that signals the shift to levels of geographical reach beyond the planetary scale may be seen in the fact that both the lists and the "extracts" that consist of syntactically incomplete paragraphs convey an overall sense of incompleteness and openness. They also convey a sense of a continuing lack of knowledge that characterizes the world of *2312*—albeit on a strikingly different level compared to *Riddley Walker*.

In *2312*, a lack of knowledge is also signaled by the novel's main plot, a mystery plot. The group of spacers, first assembled by Swan's grandmother Alex, then joined by Swan and led by inspector Genette, has to find out the sources of the acts of sabotage that have accumulated in recent years and that threaten the interplanetary political order the group finds most desirable. Moreover, all the major scientific and technological advances continue to produce the unknowable side-effects or unintended consequences that have characterized industrial modernity since the eighteenth century: there is a lack of knowledge concerning the consequences of some biomedical technologies, and there is a lack of knowledge concerning the capabilities of advanced artificial intelligence. Despite the enormous successes in terraforming thousands of solar bodies, finally, there is still a lack of technological knowledge needed for improving the environmental situation on Earth:

> It was one of the ironies of their time that they could radically change the surfaces of the other planets, but not Earth. The methods they employed in space were almost all too crude and violent. Only with the utmost caution could they tinker with anything on Earth, because everything there was so tightly balanced and interwoven. (Robinson 2012: 347)

Scalar Strategies in *Riddley Walker* and *2312*

In Hoban's post-apocalyptic future, the characters' yearning for the rediscovery of molecular processes and the reconstruction of larger geographical capabilities this would allow fuels a range of attempts to rediscover the forgotten or misremembered technological secrets. It is here that we can see a "scalar strategy" (Lindseth 2006) come into play, that is, a way of trying to move from the relatively small to the relatively big or the reverse. In effect, this strategy is an attempt at "scale jumping," the transference of events or phenomena at one scale to other scales.

Riddley, Goodparley, and others are severely hampered by ignorance of the electrical and chemical processes needed to produce the power to restart a lost civilization. But this ignorance is compounded by a second level of ignorance about how to put the knowledge they do possess to work. Not all of their beliefs about chemistry are completely wrong, and Granser, one of the itinerant charcoal burners, reveals to Goodparley and Riddley that gunpowder, "the 1 Littl 1," is not to be confused with nuclear power, "the 1 Big 1" (Hoban [1980] 2002: 188–189). Granser uses the sulfur yellowcake Riddley has found to mix and detonate gunpowder late in the novel—in the process killing himself and Goodparley. Even the myths surrounding atomic fission, preserved in the figure of the "Littl Shyning Man" split in two, are not completely unconnected to what we would consider valid science.

But what science is and how scientific method works is completely beyond the characters. This is clear from the way Goodparley describes the efforts he and others have gone to:

> Weve got to work the E qwations [equations] and the low cations [locations] weve got to comb the nations [combinations] of it. We ben looking for Eusas head 1 way and a nother this long time. We ben digging in the groun for it we ben spare the mending [experimenting] we ben tryl narrering [trial-and-erroring] for it. (143)

Scientific terms—if in highly distorted forms—are invoked here, but without the faintest hint of understanding of what they mean or entail.

The figure of the ring or circle is at the heart of the scalar strategies pursued by Goodparley and Riddley in trying to make sense of how Eusa discovered the secret of radiation by splitting the atom (the "Littl Shyning Man"):

> Owt uv thay 2 peaces of the Littl Shyning Man the Addom thayr cum shyningness [radiation] in wayvs in spredin circels. Wivverin & wayverin & humin with a hy soun. Lytin up the dark wud. Eusa seen the Littl 1 goin roun & roun insyd the Big 1 & the Big 1 humin roun insyd the Littl 1. He seen thay Master Chaynjis uv the 1 Big 1. Qwik then he riten down thay Nos. uv them. (32)

The path to rediscovering the "Nos." needed to generate nuclear power, according to the disembodied head of Eusa, is to mime or reproduce this circular motion at the scale of Inland itself, that is, to "road the circel": "Let the head of Inland road the circel ful and to the senter asking what he wants to know for all of Inland. When the right head of Inland fynds the right head of Eusa the anser wil come and Inland wil rise up out of what she ben brung down to" (122).

Roading the circel, traveling with the puppet show counter-clockwise around through Bernt Arse to Fork Stoan and back northwards to "the senter" (Canterbury), is what Goodparley—as "Pry Mincer" the "head of Inland"—had been doing for years, performing the scalar strategy of jumping scale downwards, seeking to invoke molecular-level knowledge of electron orbits and fission by traveling in analogous circles through Inland. He had tried to "smauler the big" (32). The ultimate goal is to deploy the knowledge thus gained in putting "boats in the sky and picters on the wind," that is, to "bigger the smaul." Ultimately, however, all of this is in vain, in technological terms. There is no rekindling of advanced technology. Riddley and his contemporaries must continue "slogging through the mud," haunted by the knowledge of lost scales.

In contrast to the failure of the scalar strategy in *Riddley Walker*, *2312* provides two major examples of effectively employed scalar strategies. The successful interaction and interpenetration of scales becomes visible, first, in the implementa-

tion of Alex's plan to stabilize environmental and thus political and socioeconomic conditions on Earth, and second, in the course of action of the group of spacers that investigate the various acts of sabotage that threaten the power symmetry of the solar system.

After Alex's death, Swan learns that she and her allies had been working on a plan to help save Earth from itself. Alex planned "the re-wilding of Earth" (458) for the purpose of triggering an ecological recovery, that is, the reintroduction of a multitude of species that had become extinct on the planet. Alex and the interplanetary community that supported her had stockpiled "food and animals in the terraria" (81) over many years, intending to reintroduce them on Earth. While the terraria had already been providing an important part of Earth's food, more unilateral, interventionist attempts by spacers or interplanetary organizations to 'help' Earth were highly controversial and often resented. All attempts at larger-scale or more invasive terraforming of Earth had upset its delicate balances, causing widespread death and destruction (304). Therefore, Alex and her associates had been working in secret.

On August 5, 2312, Alex's friends decide to execute her scheme, sending tens of thousands of animals taken from the terraria down to the Earth's surface, first in big landers, then in smaller parachuted landers, then in aerogel balloon bags, "each transparent bubble holding inside it an animal or an animal family" (395). Thus, a scalar strategy comes to fruition, in which endangered species are initially moved systematically beyond the global scale to secure their longer-term survival, but then reintroduced on Earth to help shore up or revitalize struggling or disappearing ecosystems. This re-wilding by spacers also illustrates one of many ways in which the specific scale levels in any scale structure are never independent of each other but are reshaped or acquire different meanings when the overall structure itself changes.

The second example of a successfully employed scalar strategy is the sabotage that endangers several places in the solar system and their inhabitants. The group of spacers around Alex is also concerned with a more acute danger, namely, a possible plot among qubes, the miniaturized but ultra-powerful computers displaying artificial intelligence. Inspector Genette and Wang, two leading members of the group, have begun to detect strange patterns of qube activity and wonder whether this activity is related to seemingly unconnected incidents throughout the solar system. This suspicion intensifies dramatically when a huge and unexplained explosion wrecks the tracks on which Terminator glides along the surface of Mercury, ultimately destroying the city.

The group eventually figures out that the explosion could only have been caused by the simultaneous convergence upon one location of thousands or millions of objects, each too small by itself to trigger Mercury's protective systems. These objects had to be launched from a vast array of different places in the solar system

at different times. Genette realizes that only the most powerful qubes would have been able to carry out the calculations necessary to calibrate these launches with such precision. One of the most impressive of all the imagined technological feats in *2312* is thus centrally about the interpenetration of the solar and the local scales, or, in the language of *Riddley Walker*, of "bigging the smaul."

Conclusion: Shifting Scales and the Instability of Scale Systems

The analytical focus on scale as narrative strategy has shown that the speculative futures of *Riddley Walker* and *2312* draw attention to processes of spatial structuring and to the instability of any scale system, which depends strongly on the inextricable link between spatial and social—or, to be more precise, socioeconomic and cultural—construction. The re-scaled worlds of these novels challenge twentieth- and twenty-first-century scale systems by envisioning dramatically different consequences of technological modernization. On the one hand, *Riddley Walker* provides a devastating assessment of nuclear technology, the employment of which causes a narrowing of scale and the breakdown of civilization. On the other hand, without ignoring their dangers, *2312* emphasizes the opportunities that risk technologies such as geo-engineering or biomedical and computer/AI technologies provide by presenting a new civilization characterized by an expansion of scale. In both novels, the global scale remains a pivotal construct—but it functions very differently in the respective scale systems. In *Riddley Walker*, the global scale is lost in practical terms, but it remains central to the entire narrative as a 'present absence' that acts as the focus of desire and a motivation for the actions undertaken by the story's main characters. In this dystopic world, the global scale is present as a haunting. By contrast, in *2312*, the global scale remains very much alive. Its significance, however, has been fundamentally altered by the fact that it is no longer the largest level of spatial extent structuring human society. Earth still remains utterly central, both because it is still home to the vast majority of human beings and because spacers must return to Earth periodically for health and longevity reasons. But its lingering or worsening environmental, social, and economic problems can now be addressed 'from below' at smaller scales and also 'from above,' that is, from other planets and by interplanetary alliances, consortia, or groups.

In both novels, re-scaling is thus not only a matter of adding or subtracting specific scale levels in a way that leaves the other previously accepted conventional scales intact. In *Riddley Walker*, the absence of knowledge of molecular processes and of access to other parts of the globe intensifies the significance of what we would call local and bodily scales. In *2312*, the Earth is changed by its new position in the solar system not only in ways discussed above, such as the re-wilding epi-

sode, but also by the emergence of "Solar System Cities" or "Interplanetary Cities" (which can be seen as amplifications of the economically important "global cities" of the twentieth and twenty-first centuries). These cities support the terrestrial spaceports, thus giving them a crucial interscalar position.

Finally, in their exploration of the relevance of knowledge, science, and technology for the construction of geographical scale, the novels draw attention to environmental crisis and to the significance of energy sources on which spatial practices and configurations of scale ultimately depend. *Riddley Walker* presents a civilization in which the non-human environment has again become a threat to humans. Lacking basic scientific knowledge as well as machines to sustain the economy and to ensure protection in daily life, this civilization creates a space that leaves its inhabitants acutely vulnerable. In terms of energy, the result of an earlier nuclear catastrophe is that this civilization relies almost exclusively on charcoal, a source of energy that locks the characters in place and effectively rules out the establishment of a geographically wider scale. In contrast, the energy regime in *2312* consists of a large variety of sources—most importantly, solar energy in a variety of physical forms—that allow for various types of movement and the expansion of scale toward the solar system. While Earth is still plagued by ecological crisis, the spatial practices that the expansion of scale makes possible offer at least some hope that the situation will, after all, be remedied at some point. Exploring these shifting meanings and functions of scale in the novel thus contributes to what Eric C. Otto (2012) has called "green speculations," in other words, science fictional engagements with the contemporary global environmental crisis.

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