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## Chapter 5

### Infinity, enclosure and false closure in Lucretius' *De Rerum Natura*

Donncha O'Rourke

In Lucretius, the philosopher's commitment to the finitude of life and the end of the world sits uneasily with the poet's ambition to perpetuate the teachings of Epicurus in immortal verse.<sup>1</sup> This paradox was appreciated by Ovid, whose own bid for *fama perennis* at the close of *Amores* 1 includes 'sublime Lucretius' among the poets who have secured everlasting fame through poetry<sup>2</sup> (*Am.* 1.15.23-4):<sup>3</sup>

carmina sublimis tunc sunt peritura Lucreti,  
exitio terras cum dabit una dies;

The poetry of sublime Lucretius is destined to perish at that time when a single day consigns the earth to destruction.

In this witty yet respectful acknowledgment of Epicurean doctrine, Ovid sets Lucretius apart from those poets whose immortality goes unqualified by making his literary fame coterminous with the lifespan of the earth. Homer may have believed in κλέος ἄφθιτον (*Iliad*

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<sup>1</sup> For some responses to this paradox see Segal 1989, 1990: 180-86; Edwards 1993.

<sup>2</sup> On this couplet see McKeown 1989: 407-9 ad loc. In general on *Am.* 1.15 see Vessey 1981; Boyd 1997: 166-70.

<sup>3</sup> The translations in this chapter are my own unless otherwise noted. The text of Lucretius is that of Rouse and Smith 1992.

9.413 ‘imperishable renown’), but the Epicurean could not (cf. *Ep. Hdt.* 74 φθαρτούς φησι τοὺς κόσμους, ‘he says worlds are destructible’).<sup>4</sup> As the commentators note, Ovid’s pentameter invokes to this end the apocalypse as described at *DRN* 5.92-5 *maria ac terras caelumque tuere*: | *quorum naturam triplicem, tria corpora, Memmi*, | *tris species tam dissimilis, tria talia texta*, | ***una dies dabit exitio*** (‘behold the seas, earth and sky: their threefold nature and three bodies, Memmius, their three aspects so unlike, three such compositions, a single day will consign to destruction’). Ovid’s allusion anticipates a tradition of Lucretius-interpretation that the chapters in this section of our volume take up, namely that the poem stands in a relation of analogy – on multiple levels and in varying degrees of proximity – to the universe it describes: the *DRN* presents an itself as an *imago mundi* beginning with creation in the Hymn to Venus and ending with destruction in the Athenian plague, and composed of *elementa* (‘letters’) whose arrangement complements that of the *elementa* (‘atoms’) that constitute the physical fabric of the world (see further in the Introduction, p. 000, above). By way of this metapoetic analogy, the passage of Lucretius to which Ovid alludes might itself be taken to hint at the concomitant destruction of the *DRN*, invoking as it does the title of the poem, its *corpora* and its *texta*.<sup>5</sup>

As every Epicurean knows, the counterpart to the death and destruction contingent on the inevitable disaggregation of atomic compounds is the renewal guaranteed by the necessity that those same atoms, being of infinite number in the infinite universe that lies outside this *kosmos* or world (Lucretius’ *mundus*), will reunite in new combinations (Epicurus, *Ep. Hdt.* 39, 41-2, 45, 54-5; *DRN* 1.215-64, 1.951-1051, 2.67-79, 2.569-80, 2.991-1022, 3.964-77,

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<sup>4</sup> On κλέος ἄφθιτον (not necessarily formulaic in Homer, but the phrase caught on) see Finkelberg 2007 with earlier bibliography. See also Garcia 2013, with the Appendix for the close semantic (but technically not cognate) relation of φθίνω and φθείρω.

<sup>5</sup> At the opening of the third third of the *DRN* (see Farrell 2007: esp. 78-85), it is tempting to see in *tria corpora* and *tria texta* a gesture to the tripartite organisation of the poem as well as of the world it describes.

5.247-60).<sup>6</sup> Indeed the *vis infinitatis* (as Cicero's Velleius hails it at *Nat. D.* 1.50)<sup>7</sup> enables the Epicurean to 'postulate accident on a staggeringly vast scale',<sup>8</sup> such that the *very same* atomic configurations can be expected, sooner or later, to recombine anew (*DRN* 3.847-60).<sup>9</sup> Alessandro Schiesaro has argued that the *DRN* sees itself implicated in this process of palingenesis elementally, at the level of its letters and its atoms.<sup>10</sup> While some modern readers have resisted this degree of equivalence between the word and the world of the *DRN*, the reconstitution of the text is an implication of the analogy that seems to have been familiar to Cicero (*Nat. D.* 2.93):<sup>11</sup>

Hoc qui existimat fieri potuisse, non intellego, cur non idem putet, si innumerabiles unius et viginti formae litterarum vel aureae vel qualeslibet aliquo coiciantur, posse ex is in terram excussis annales Enni, ut deinceps legi possint, effici; quod nescio an ne in uno quidem versu possit tantum valere fortuna.

As for anyone who supposes that this can happen [i.e., that atoms randomly collide to produce the world in all its variety], I cannot understand how he does not also believe that, if countless copies of the twenty-one letters of the alphabet, made of gold or whatever, were thrown together somewhere, it would be possible to reproduce from

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<sup>6</sup> On infinity in Epicurean physics see Furley 1981; Asmis 1984: 261-75, esp. 261-7 on the infinite universe; Giannantonini 1989; Sedley 2007: 136-9, 155-66; Bakker 2018. For the principal texts, see Long and Sedley 1987: I.44-6 (10 A, B, C). See further n.15 below.

<sup>7</sup> For discussion of this phrase in its context see Kleve 1979a.

<sup>8</sup> Sedley 2007: 155. The point remains under discussion: see Bersanelli 2011: 200-1.

<sup>9</sup> The reconstitution of the individual is, of course, heavily qualified (cf., e.g., *DRN* 3.670-78): see Warren 2001.

<sup>10</sup> Schiesaro 1994.

<sup>11</sup> See Pease 1958: 780-1 ad loc. on the tradition of these objections prior to Cicero. For this passage in connection with the *DRN* see esp. Armstrong 1995: 224-5; cf. Snyder 1980: 35-6.

these, when shaken out onto the ground, a readable version of the Ennius' *Annales*; I'm not sure whether chance could pull off such a feat even for a single line!

So Balbus may scoff, invested as he is in Stoic providence, but for those who postulate a boundless universe with an unlimited supply of atoms, chance palingenesis is – according to what philosophers call the ‘principle of plenitude’ – an inevitability: in an infinite universe of infinite *elementa*, anything that *can* happen, *will* happen eventually – necessarily, not providentially (cf. *DRN* 2.522-80, 1048-89).<sup>12</sup> As far as the *Nachleben* of Ennius is concerned, the intertextual and ideological reconfiguring of the *Annales* in the *DRN* is signalled in Lucretius' rationalizing take on his epic precursor's self-presentation as the reincarnation of Homer (1.112-26), and in his own reproduction of their ‘originality’ in the ‘second proem’ or ‘apologia’ later in the same book (1.921-50, cf. 4.1-25): it was Ennius ‘who first brought down from pleasant Helicon a garland of evergreen foliage’ (117-18 *qui primus amoeno | detulit ex Helicone perenni fronde coronam*) and sang ‘in everlasting verses’ (121 *aeternis ... versibus*) about the ghost of ‘ever flourishing Homer’ (124 *semper florentis Homeri*) expounding to him a very unEpicurean nature of things; now it is Lucretius who ranges over the trackless haunts of the Muses where none before have set sole (1.926-7, 4.1-2 *avia Pieridum peragro loca nullius ante | trita solo*), drinking from the springs and plucking the flowers of Callimachean originality (1.927-8, 4.2-3) for a ‘distinguished garland’ (1.929, 4.4 *insignem ... coronam*).<sup>13</sup> In the *DRN*, intertextuality is tantamount to palingenesis: as in nature, so in literature there is – to borrow a phrase – *nil novi sub sole*.

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<sup>12</sup> On the ‘principle of plenitude’ in this connection see Bakker 2018: 56 with n.60 and 58 with n.69.

<sup>13</sup> See Gale 2001b on Lucretius' thematization of poetic succession through paronomasia in this passage and elsewhere in the *DRN*. On Lucretius' poetic admiration but philosophical rejection of his literary forbears see Gale 2007b, esp. 59-67 on Ennius, and 70-74 for the Callimachean dimension. For the former see also Gigon 1978b; Nethercut 2014. For the latter, see also Kenney 1970; Brown 1982.

Since the nature of things is contingent on infinity, it may be asked how this poem *On the Nature of Things*, to the extent that it doubles *as* the universe, can contain infinity within the limited confines of its text.<sup>14</sup> There is in addition the more purely philosophical question of the extent to which Lucretius can achieve didactic closure on a topic that is inherently open.<sup>15</sup> If closure is always provisional, as Don Fowler pointed out to Classicists not once but twice,<sup>16</sup> the problem will be especially gaping in the case of infinity. In the history of human thought, infinity is a concept that, perhaps more than any other, defies description, nurtures paradox, and generally makes the head ache.<sup>17</sup> Adrian Moore identifies a principal ‘paradox of thought about the infinite’ as follows: ‘We appear to have grasped the infinite as that which is ungraspable. We appear to have recognized the infinite as that which is, by definition, beyond definition.’<sup>18</sup> In antiquity, the mind-bending implications of infinity were formulated in the *ad infinitum* paradoxes of Zeno, whose anti-teleological mischief was tackled most influentially by Aristotle in his denial of extracosmic space<sup>19</sup> and in his celebrated distinction at the level of number between the notion of an ‘actual’ infinity (impossible since one cannot have infinity ‘all at once’) and ‘potential’ or theoretical infinity (a temporal projection that cannot in practice be reached or traversed).<sup>20</sup> This was a solution of fundamental importance to Aristotle’s world-view, as Jonathan Lear has noted: ‘the possibility of philosophy – of man’s ability to comprehend the world – depends on the fact

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<sup>14</sup> The question is posed by Gale (forthcoming) in a discussion of Lucretius’ contribution to the tradition of name-puns and acrostics in didactic poetry.

<sup>15</sup> The major treatment of infinity in Lucretius is now Morenval 2017. Salemme 2011 is a detailed commentary on *DRN* 1.951-1117. See also Keyser 1919; Saint-Denis 1963; Avotins 1983; Clay 1983: 131-45; Segal 1990: 74-93; Kennedy 2013; Bakker 2018. Cf. Fitzgerald 2016a: 100-11 on Lucretius’ celebration of nature’s infinite variety.

<sup>16</sup> Fowler 1989b, 1997b. See also Grewing, Acosta-Hughes, Kirichenko 2013.

<sup>17</sup> See Moore 2001; Zellini 2004; Barrow 2005; Achtner 2011; Bersanelli 2011.

<sup>18</sup> Moore 2001: 12.

<sup>19</sup> See Sorabji 1988: 125-59.

<sup>20</sup> From an ever-expanding bibliography see Lear 1979; Sorabji 1983: 210-13; Moore 2001: 34-44; White 2013: esp. 260-65. On Aristotle’s cosmic teleology see Sedley 2007: 194-203.

that the world is a finite place containing objects that are themselves finite. And the possibility of philosophy is one possibility that Aristotle spent his life actualizing.<sup>21</sup>

If Aristotle solved a problem, however, he also gave expression to an anxiety.<sup>22</sup> To sample just two responses from the later history of this anxiety, Boëthius associates unlimited numerical progression with evil itself (*Inst. ar.* 1.32 ‘malitiae dedecus’); and Hegel condemned the Aristotelian conception of potentially infinite progression as a ‘false’ or ‘bad’ infinity (‘die schlechte Unendlichkeit’) that he saw symbolized in the never-ending punishments in the underworld.<sup>23</sup>

Prometheus, for example, is chained to a mountain in Scythia where the eagle insatiably devours his liver which ever grows afresh; similarly Tantalus in the underworld is tormented by an endless unquenched thirst, and Sisyphus has always uselessly to trundle up anew the rock that continually rolls down again. Like the Titanic powers of nature themselves, these punishments are the inherently measureless, the bad infinite, the longing of the ‘ought’, the unsatiated craving of subjective natural desire which in its continual recurrence never attains the final peace of satisfaction. For the Greek correct sense of the Divine, unlike the modern longing, did not regard egress into the boundless and the vague as what was supreme for men; the Greeks regarded it as a damnation and relegated it to Tartarus.

Hegel here takes up a way of reading Hades also witnessed in *DRN* 3, where the eternal punishments of legendary convicts in the underworld symbolize the pathologies to which non-Epicureans are condemned in real life: Tityus is the lover in whose guts the vultures

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<sup>21</sup> Lear 1979: 202. Cf. Furley 1981; Bakker 2018: 57 with nn.65-6.

<sup>22</sup> For the following examples and others see Zellini 2004: 13-16.

<sup>23</sup> Hegel, *Aesthetics* (I, II.ii, Ch. 1.2c), trans. Knox 1975: I.466.

rummage ‘for all eternity’ (3.986 *perpetuam aetatem*); to roll Sisyphus’ rock is ‘to seek power which is empty and never granted, and therein forever to endure hard labour’ (998-9 *petere imperium quod inanest nec datur umquam, | atque in eo semper durum sufferre laborem*);<sup>24</sup> the Danaids’ vain attempt to fill their perforated *vas* communicates in layman’s terms the difference between the two categories of pleasure, those that are ‘katasematic’ or enduring being preferable to those that are ‘kinetic’ or transitory.<sup>25</sup> Bound up with the concept of infinity, then, are feelings of yearning and desire, but also doubt and uncertainty, and even intimations of death. In *Lucretius on Death and Anxiety*, Charles Segal has drawn attention to Lucretius’ studied association of infinity and death throughout the *DRN* as a response to ancient criticism of Epicurus that saw scant therapeutic benefit in ‘the thought of the soul being poured into infinity as though into a gaping sea’ (Plut. *Non posse* 1107A ἡ ἐπίνοια τῆς ψυχῆς ὥσπερ εἰς πέλαγος ἀχανὲς τὸ ἄπειρον ἐκχεομένης).<sup>26</sup> On Moore’s view, the paradox of thought about infinity is a function of human finitude with which all writing on infinity, including his own, is necessarily preoccupied:<sup>27</sup>

The roots of this paradoxical nature lie in our own finitude (however construed). For it is self-conscious awareness of that finitude which gives us our initial, contrastive sense of the infinite and, at the same time, makes us despair of knowing anything about it, or having any kind of grasp of it. This creates a tension. We feel pressure to acknowledge

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<sup>24</sup> The adjective *inane* associates Sisyphus’ pursuit of power with the (infinite) void; cf. Hor. *Sat.* 1.2.113 with Gowers 2012: 113 ad loc.

<sup>25</sup> See Reinhardt 2002.

<sup>26</sup> Segal 1990: 14-17, 74-93.

<sup>27</sup> Moore 1993: xi, now reworded at Moore 2001: xvii. Compare Segal 1990: 17: ‘There remains the very troubling tension that many people, both ancients and moderns, continue to feel between our finitude and the infinity of our own future non-being. The proof, based on the soul’s mortality, that we do not experience infinity after death does not necessarily eliminate our anxiety about an infinite void stretching before us.’



the infinite, and we feel pressure not to. In trying to come to terms with the infinite, we are in effect trying to come to terms with a basic conflict in ourselves.

Not for nothing, then, does Ovid in the *Amores* recognize Lucretius', as well as his own, preoccupation with death and infinity. Lucretius, for his part, is required to instruct his reader in a topic on which an understanding of the nature of things is contingent, but which also threatens to engulf the principles on which the possibility of the good life is predicated.

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The introductory considerations above show the validity in antiquity as well as today of the remarks – often quoted in discussions of infinity – of German mathematician David Hilbert (1862-1943): 'The infinite has always stirred the emotions of mankind more deeply than any other question; the infinite has stimulated and fertilized reason as few other ideas have.'<sup>28</sup>

This synthesis – or collision – of emotion and reason is especially pertinent in the context of a philosophy that seeks to avoid mental disturbance. Epicurus' surviving discussions of infinity in its various forms are, to be sure, more cerebral than emotional in manner (*Ep. Hdt.* 41-2, 56-7, 60, 72).<sup>29</sup> By contrast, Lucretius' Epicurus rises to a Promethean victory against the heavens (1.72-7):

ergo vivida vis animi pervicit, et extra  
processit longe flammantia moenia mundi  
atque omne immensum peragravit mente animoque,

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<sup>28</sup> Quoted at, e.g., Moore 2001: 1 (as epigraph to the Introduction).

<sup>29</sup> On Epicurus' terminology, see Morenval 2017: 31-63, comparing Lucretius at 63-154.

unde refert nobis victor quid possit oriri, 75

quid nequeat, finita potestas denique cuique

quanam sit ratione atque alte terminus haerens.

Thus the lively power of his mind prevailed, and he advanced far beyond the blazing ramparts of the world and traversed the immeasurable whole in mind and spirit, from where he victoriously reports to us what can come about, what cannot, *in fine* the reason why each thing's capacity is limited and its boundary-stone lodged deep.

Reason and poetry here join forces to trample religion underfoot (78-9 *quare religio pedibus subiecta vicissim | obteritur*). Form matches sense also in the enjambment of *extra | processit* (72-3), as the Greek hero discovers infinity in the manner of a triumphant general surveying newly conquered territory (*peragrarē* is a t.t. of ordnance survey).<sup>30</sup> This is no dispassionate account of Epicurean enlightenment: Lucretius arrogates military language to a philosophy that advocates peaceful withdrawal, that relativizes Roman claims to predestination and world-power, and that rewrites knowledge and, with it, a system of sociopolitical power that enlists divine cooperation.<sup>31</sup> The ethical implications of the infinite universe are witnessed in the tears to which Alexander the Great was reduced upon hearing the Democritean Anaxarchus: 'Is it not worthy of tears that when there are infinite worlds (κόσμων ὄντων ἀπείρων) we have not yet become masters of even one?' (Plut. *De tranq. anim.* 466D; cf. Val.

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<sup>30</sup> The classic discussion of this passage is Buchheit 1971. The analogy derives force from a possible pun on Epicurus' name, ἐπίκουρος meaning 'ally' or 'mercenary soldier': for this paronomasia in other passages see Snyder 1978: 229-30; Snyder 1980; Gale 1994: 137; O'Hara 1998. In the proem to *DRN* 3, the verb *suppedito* at 10 *suppeditas praecepta* ('you [Epicurus] supply precepts') and 23 *omnia suppeditat ... natura* ('nature supplies everything') calques the verb ἐπικουρέω with the same pun in view.

<sup>31</sup> For a Foucauldian reading of this passage in the context of the *DRN* and the didactic tradition as a whole see O'Rourke (forthcoming).

Max. 8.14.ext.2).<sup>32</sup> The universe is infinite, then, but this is not the *imperium sine fine* that Virgil's Jupiter prophesies to the Aeneadae.<sup>33</sup>

This passage's claim to universal authority is not just politically controversial. It also straddles a major philosophical debate on the nature of the infinite, here encapsulated in the phrase *omne immensum* – a totality (*omne*) that is yet beyond measurement (*immensum*). This paradox elides rival views of infinity rooted in the Presocratic tradition: viewed as an all-encompassing whole ( $\pi\tilde{\alpha}\nu$ ), the infinite is absolute, perfect, perhaps even divine; viewed, on the other hand, as unlimited ( $\acute{\alpha}\pi\epsilon\iota\rho\nu$ ), it is incomplete, imperfect and unattainable.<sup>34</sup> Duncan Kennedy has argued that Epicurus' mental apprehending of this 'immeasurable whole' *mente animoque* is informed by Aristotle's dismissal of 'actual' infinity in favour of a merely theorized 'potential' infinity.<sup>35</sup> As Kennedy argues, the phrase *mente animoque* qualifies Epicurus' claim to universal knowledge as being grounded in theory rather than practice – that is, in the provision of a *ratio* by which everything in the infinite universe can be explained, rather than in taking us through an explanation for every individual facet of the infinite universe. On the one hand, then, Lucretius here affords Epicurus a kind of post-Aristotelian 'get-out clause' that keeps the *DRN* safely in the realm of the potential rather than actual infinite; on the other hand, however, the ambition to proceed beyond the ramparts of the world to survey the 'whole immeasurable' ('all at once', as it were, rather than potentially and over time), couched as it is in imperialist language suggestive more of

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<sup>32</sup> On the ethical and theological repercussions of infinity see Warren 2004b. See also Giannantonini 1989: 25-6.

<sup>33</sup> See Schiesaro 2007a: 42, qualified by Kennedy 2013: 59-61. Alex Hardie brilliantly suggests (*per litteras*) that 'within *imperium sine fine* lurks a Graecising [created] 'etymology' *imperium* /  $\acute{\alpha}\pi\epsilon\iota\rho\nu$ '. On the temporal and spatial dimensions of Virgil's *imperium sine fine* (though not explicitly related to the philosophical contexts discussed in the preceding essays of its volume) see Pavan 1989. See further n.76 below.

<sup>34</sup> See Morenval 2017: 13-27 and *passim*. From an immense bibliography, see the overviews by Moore 2001: 17-33, esp. 17-19, 23-5; Zellini 2004: 1-37.

<sup>35</sup> Kennedy 2013: esp. 54-5.

Aristotle's pupil than of Alexander's teacher, is a totalizing claim that throws down a challenge to Aristotle's redefinition of *apeiron* as 'not that which never has something outside it, but that which always has something outside it' (*Ph.* 3.6, 206b34-207a1).

Lucretius' *omne immensum* conceptualizes infinity in a way that elides this distinction and imposes didactic closure where closure is at its most elusive.

The manoeuvring of this passage highlights at the start of the *DRN* not just Epicurus' ambition as a philosopher of the infinite, but Lucretius' as its poet. The rival conceptions of infinity that the *DRN* must represent, the *omne* and the *immensum*, correspond to the rival modes of enclosure distinguished by Umberto Eco in *The Infinity of Lists*.<sup>36</sup> Eco takes Homer's Shield of Achilles and Catalogue of Ships as paradigms for alternative modes of enclosure, demoting the self-contained wholeness of the former perhaps surprisingly in favour of the never-ending concatenation of the latter.<sup>37</sup> Homer's ancient readers would have subscribed to Eco's reading of the Shield as a totality, allegorizing it as they did as a composite expression of Empedocles' cosmic cycle (Heraclitus, *Quaest. Hom.* 49).<sup>38</sup> One such reader may well have been Lucretius, whose *DRN* begins with a gesture to the allegoresis of the Homeric Mars and Venus as Empedoclean Strife and Love (Heraclitus, *Quaest. Hom.* 69.1-11; schol. *Od.* 8.267; Eustathius 1.298 [= *Od.* 310ff.] ad Hom. *Od.* 8.367),<sup>39</sup> and enacts as a whole a cosmic cycle from creation to destruction, and back again, its *elementa* themselves subject to palingenesis, as we have seen. The *DRN*, then, may be said to embody the form demoted by Eco. It presents as its totalizing philosophy a closed system

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<sup>36</sup> Eco 2009.

<sup>37</sup> Eco 2009: 8-35. It is not entirely clear how seriously Eco intends to valorize the list; for a classicist's perspective see Beard 2009.

<sup>38</sup> See Buffière 1956: 159; Hardie 1985, 1986: 340-41.

<sup>39</sup> For the allegory see Buffière 1956: 168-72; Hardie 1986: 62. It is not clear if this allegory goes back to Empedocles himself, but it is generally agreed that Lucretius was aware of it: on the philosophical and literary aspects of the subtext see Furley 1970 and Sedley 1998: 16-32, esp. 27. See further Clay 1983: 22-3, 82-110; Gale 1994: 41-2, 71-2, 219-20; Garani 2007: 37-43.

that enables all phenomena to be explained in like terms (what philosophers call the ‘principle of uniformity’),<sup>40</sup> propounding (itself as) an infinite universe that, as Kennedy has argued, encapsulates a ‘Theory of Everything’ without having to explain everything, a model of knowledge based on compression rather accumulation, a ‘cosmogram’ rather than an encyclopedia.<sup>41</sup>

The first term of Lucretius’ *omne immensum* thus seems to be well covered by the *DRN* in its pursuit of ataraxic closure.<sup>42</sup> At the same time, however, the Epicurean principle of multiple explanation (*Ep. Hdt.* 78-80, *Ep. Pyth.* 86; *DRN* 5.526-33, 6.703-11),<sup>43</sup> itself a corollary of the ‘principle of plenitude’,<sup>44</sup> creates in the *DRN* effects of the opposite kind, most famously in Book 3 where the accumulation of proof after proof for the soul’s mortality really does begin to look as if it might go on (and on) *ad infinitum*.<sup>45</sup> Passages such as this deploy what Eco describes as a ‘rhetoric of enumeration’,<sup>46</sup> in particular in their use of

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<sup>40</sup> On the ‘principle of uniformity’ in this connection see Bakker 2018: 56 with n.59.

<sup>41</sup> Kennedy 2013: esp. 63-7. Morenval 2017: 231-50, 419 makes the attractive suggestion that Epicurus’ *Epitome* (cf. *atomos*) was likewise to be seen as a miniature of the massive *On Nature*. Henderson 2011 applies the term ‘cosmogram’ to Pliny’s ‘hyperlinked’ *Natural History*, also listed (but for its list-like qualities) by Eco 2009: 153. On Pliny’s lists see Doody 2010: 23-30, contrasting Lucretius at 23: ‘This vision of a nature that can be broken into sections and catalogued, fact by fact, name by name, item by item, until all of it is listed, represents a new idea about what it is to know about the nature of things. In the *Natural History*, nature becomes exactly the sum of its parts, a catalogue of details that anyone can grasp, but that only Pliny has contained and organised.’

<sup>42</sup> But only ‘seems’: as the anonymous reader points out, *omne* is itself a less totalizing equivalent for *πᾶν* than *totum*, suggesting that there is ‘a “cultural translatability” issue hidden here in full view’. On this view, the move from *totum* to *omne* at *DRN* 3.17-30 (quoted below) is instructive.

<sup>43</sup> On multiple-explanation see Asmis 1984: 321-30 (on Epicurus); Hankinson 2013 (comparing Lucretius); Hardie 2009: 231-63 (Lucretius and his epic successors).

<sup>44</sup> See Bakker 2018: 59-63, with text to n.12 above.

<sup>45</sup> This section ends with a (for Lucretius quite rare) catalogue of proper names spanning the mythological sinners in the underworld to historical celebrities who are no longer with us, including (last but not least) Epicurus himself (3.978-1044): see Kyriakidis 2007: 87-93.

<sup>46</sup> Eco 2009: 133-7. For Lucretius’ use of rhetorical figures to convey the infinite see generally Morenval 2017: 354-425.

anaphora, asyndeton, polysyndeton and tautology:<sup>47</sup> these figures are on display in (e.g.) Book 6 when, having accounted for thunder, lightning, waterspouts, cloud formation and the rainbow, Lucretius rattles off various other meteorological phenomena that could be explained according to the same principles (6.527-31):<sup>48</sup>

Cetera **quae sursum crescunt sursumque** creantur,  
et **quae concrescunt** in nubibus, **omnia**, prorsum  
**omnia**, nix venti grando gelidaeque pruinae  
et vis **magna** geli, **magnum** duramen aquarum,  
et mora quae fluvios passim refrenat aventis ...

The other things that grow above and are produced above, and that grow together in the clouds, everything, absolutely everything, snow winds hail and icy frost and the great might of ice, that great hardening of water, and the retardation that everywhere reins in the eager rivers ...

Despite the claim to totality and omniscience here, this open-ended congeries is closer to the *immensum* than to the *omne*. In such instances as these the text gestures to an infinity of a much less stable order, to inexhaustible progressions that cannot be contained or narrated to their end, not even – as Homer put it – if you had ‘ten tongues and ten mouths, or a voice never to be broken’ (*Il.* 2.489-90).<sup>49</sup> As Eco explains, invoking Aristotle’s distinction, the list

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<sup>47</sup> Deutsch 1939 painstakingly compiles rhetorical figures in Lucretius, but only barely senses the significance of her labours at pp. 172, 175-6. Interpretative approaches are taken by Friedländer 1941; Snyder 1980; Dionigi 1988. Cf. Fitzgerald 2016a: 105-6.

<sup>48</sup> See Wills 1996: 131-2, 442, 284.

<sup>49</sup> See Sammons 2010 on the unstable authority of Homer’s catalogues. At *DRN* 1.398-417 Lucretius encourages the addressee to adduce further proofs for the existence of void, threatening Memmius, if he demurs, with a never-ending series of his own.

is ‘an *actual* infinity, made up of objects that can perhaps be numbered but that we cannot number – and we fear that their numeration (and enumeration) may never stop’.<sup>50</sup> On this view, it is perhaps surprising to find that, as in Homer, this alternative mode of enclosure – emphasising the *immensum* rather than the *omne* – is also represented in Lucretius’ text.

The ‘uneasy pleasure’<sup>51</sup> of Lucretius’ lists, then, is to some extent at odds with the infinite totality conquered in Epicurus’ universal triumph in *DRN* 1. If that passage elides the *omne* and the *immensum* in a way that closes down the inherent openness of Aristotle’s potential infinite, the series of proofs for the infinite universe at the end of the same book tends in the opposite direction.<sup>52</sup> Here the principle of multiple explanation is such that the *DRN* might be said to reflect, and in so doing to enact, the infinite nature of things.<sup>53</sup> The most famous of these explanations provocatively Romanizes a thought-experiment attributed to Archytas of Tarentum (Eudemus apud Simpl. *in Phys.* 467.26-40 = fr. 47 A.24 DK)<sup>54</sup> as a Fetial rite that declares war on the idea of there being a limit to the universe (1.968-83, cf. Livy 1.32.12).<sup>55</sup>

Praeterea si iam finitum constituatur  
omne quod est spatium, siquis procurrat ad oras  
ultimus extremas iaciatque volatile telum, 970  
id validis utrum contortum viribus ire

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<sup>50</sup> Eco 2009: 15.

<sup>51</sup> Eco 2009: 17.

<sup>52</sup> For detailed commentary see Salemme 2011.

<sup>53</sup> For this suggestion see Fratantuono 2015: 62, noting that the argument is longer still, given the lacuna after line 1013.

<sup>54</sup> For the argument and some ancient replies see Sorabji 1988: 125-8.

<sup>55</sup> Or, as Clay 1983: 137-40, at 40, suggests: ‘The infinite universe of Greek atomism is approached as if it were an alien and hostile world lying beyond the *ager Romanus*.’ Full discussion at Morenval 2017: 342-53; see also West 1969: 46-8. The allusion is disputed by Gottschalk 1975 and Salemme 2011: 44-5 ad loc.

quo fuerit missum mavis longeque volare,  
an prohibere aliquid censes obstareque posse?  
alterutrum fatearis enim sumasque necessest;  
quorum utrumque tibi effugium praecludit et omne 975  
cogit ut exempta concedas fine patere.  
nam sive est aliquid quod probeat officiatque  
quominu' quo missum est veniat finique locet se,  
sive foras fertur, non est a fine profectum.  
hoc pacto sequar atque, oras ubicumque locaris 980  
extremas, quaeram quid telo denique fiat.  
fiet uti nusquam possit consistere finis  
effugiumque fugae prolatet copia semper.

Furthermore, suppose for a moment all of space were finite: if someone ran right out to the farthest edge and threw a flying spear, does it, as you would have it, go where it has been sent, whirled with powerful force, and fly afar? Or do you think that something can prevent and block it? For you must concede and choose one or the other possibility. Each of them precludes your escape and obliges you to acknowledge that the universe stretches out without end. For whether there is something that prevents the spear and obstructs it from going where it has been sent and from lodging itself in an endpoint, or whether it is borne outside that, it did not start out from an end. In this way I shall follow along and, wherever you locate your farthest edge, I shall ask what ultimately happens to the spear. What will happen is that the end can nowhere exist and the opportunity for flight forever defers your escape!



In contrast to Epicurus' traversal of the whole infinite at the start of the book (*omne immensum peragravit*), Lucretius in effect subscribes here to Aristotle's numerical infinite as something that can never be traversed – but re-imagined in spatial terms the argument now subverts Aristotle's telos-oriented denial of actual infinity in space.<sup>56</sup> As at 1.72-3 above, the enjambments at 969-70 (*siquis procurrat ad oras | ultimus extremas*) and 980-1 (*oras ubicumque locaris | extremas*) audibly and visually accompany Lucretius as he demonstrates that there is no end-of-the-line in the universe.<sup>57</sup> By its very nature, this is an argument that has no conclusion – or better, its lack of conclusion is the argument, since the limited counterargument takes refuge in a position that proves there is no escaping the infinite. Revelling in this paradox, Lucretius is prepared to make us concede his *QED* over and over again *ad infinitum*.

The emphasis at the beginning of *DRN* 1, then, is on the infinite as something that can be comprehended in its wholeness (*omne immensum*); by contrast, here at the end of the book, the emphasis is on the infinite as something that cannot be grasped. If the earlier passage imposes didactic closure on the question of infinitude, the end of the book is rather more open and, as such, potentially less conducive to *ataraxia*, as the reception-history of this conception of infinity has tended to show.

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Returning at the end of the book to unpack the idea of the infinite universe introduced at its start, *DRN* 1 appears to organize itself in a neat ring-composition. Such an impression is

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<sup>56</sup> Morenval 2017: 45 locates this 'glissement' between numerical and spatial infinity in Epicurus.

<sup>57</sup> Sharing the same root as ἐπίκουρος (see n.30 above), *procurrat* here encodes Epicurus' name at another strategic juncture (cf. *DRN* 3.1042 *ipse Epicurus obit decurso lumine vitae*, with Gee in this volume, p. 000).

merely temporary, however, since Lucretius' treatment of the topic spills over into *DRN 2* with discussion of the atoms' perpetual motion (62-332) and inexhaustible supply (522-80), and culminates in the revelation that there is an infinite number of finite worlds just like ours (1023-1174). Comparing the finales of the six books of the poem, Müller finds that *DRN 1* and 2 merge more closely than the other books, with a 'continuity of train of thought' in the reprise of the phrase *nunc age* at 2.62 after its previous occurrence at 1.953, where the theoretical discussion of infinity proper begins.<sup>58</sup> Lucretian infinity thus seems to run on *ad infinitum* not only at the end of *DRN 1*, but in breaking the confines of that book with further expatiation on the topic in *DRN 2*. Comparable here is Ovid's thematically apposite straddling of the book division of *Metamorphoses 1* and 2 with Phaethon's extramundial flight towards his father Sol/the sun,<sup>59</sup> a narrative that Alessandro Schiesaro reads as 'as a probing comment on Epicurus' metaphoric flight, and by extension on Lucretius' poetic and philosophical project'.<sup>60</sup> In general terms, then, but perhaps also quite specifically, we can take up Don Fowler's invitation to consider the ways in which the *DRN* – for all 'its belief in truth, in the discovery of correct ways to divide up the world rather than of simply persuasive or attractive ones' – is in fact less 'segmented' and more invested in Ovidian variety and continuum than might be expected.<sup>61</sup>

At the start of *DRN 2* the continuum is presented in the 'distant views' over the sea and plain, these traditional images for the cosmos thus reinforcing the thematic continuity between the first two books, but revamped for Epicurean purposes in Lucretius' focalisation of the philosopher's quasi-divine detachment from those imperilled by storm and warfare.<sup>62</sup>

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<sup>58</sup> Müller 1978: 201 (= 2007: 237, whence the translation).

<sup>59</sup> See Holzberg 1998: esp. 88-91 on this example.

<sup>60</sup> Schiesaro 2014: 75 and *passim*.

<sup>61</sup> Fowler 1995, quotation at 15.

<sup>62</sup> De Lacy 1964. See also Clay 1983: 243-4. On the infinite sea in Lucretius see Saint-Denis 1963.

In the finale of the same book, Lucretius encourages the reader to open the mind to a startling new truth about nature – namely, that there is an infinite number of worlds (2.1023-89).<sup>63</sup> To prepare the reader for this revelation, Lucretius points out that the sky, constellations, moon and sun, which we take for granted, would affright us in just the same way were we to look upon them for the first time. Rather than banalizing nature, however, the shock of the new inversely draws attention to the wonder to be found in the familiar by an inquiring mind, even when that wonder is subject to rational explanation (2.1044-7):

quaerit enim rationem animus, cum summa loci sit  
infinita foris haec extra moenia mundi,  
quid sit ibi porro quo prospicere usque velit mens  
atque animi iactus liber quo pervolet ipse.

For, since the sum total of space is infinite out there beyond these ramparts of our world, the spirit seeks to reason what there is yonder where the mind wants continually to look forth and where one's mental leap freely flies forth of itself.

The phrase *animi iactus* ('mental leap') is to be understood as the Epicurean ἐπιβολὴ τῆς διανοίας, the epistemological process whereby the mind apprehends abstract concepts or phenomena of which it can have no immediate sensory experience, such as, in this case, a universe of infinite worlds (or, as at 2.740, colourless atoms).<sup>64</sup> There is instructive similarity between this passage, describing the mind's instinct to understand what is 'out there' *extra*

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<sup>63</sup> On this aspect of Epicurean cosmology see Asmis 1984: 310-15; Morenval 2017: 217-29. On the end of *DRN* 2 see Clay 1983: 239-50.

<sup>64</sup> On this concept see Asmis 1984: 83-9, 124-6 with a review of earlier scholarship, and Schrijvers 1978: 102-6 (= 2007: 277-80) in a discussion of Lucretian analogy; see also Tutrone in this volume (p. 000).

*moenia mundi* by means of this *animi iactus*, and those at the beginning and end of the previous book in which infinity is discussed: Epicurus, too, proceeds *extra ... moenia mundi* in mind and spirit (1.72-4 above), and the spear shot into infinity (1.970 *iaciatque volatile telum*) is a thought-experiment that itself requires the same ‘mental leap’ as in this section of *DRN 2*, in which it is the *animi iactus* that flies forward (*pervolet*). The parallels between these passages point to infinity as a concept that is necessarily beyond the reach of sensory experience, but which can yet be intuited by the sublime mind. The sense of the sublime here is confirmed retroactively by the similarity of (Ps.-)Longinus’ meditation on the inspiration derived from the contemplation of nature, beauty and the unknown (35.2-3):<sup>65</sup>

What, then, did they see, those godlike men (οἱ ἰσόθεοι ἐκεῖνοι) who strove for the greatest things in their writing, and looked down upon precision in every detail? *Inter alia*, the following: that nature did not choose us, man, as a base and ignoble creature, but introducing us into life and into the whole universe (εἰς τὸν σύμπαντα κόσμον) as though into some great festival, to be spectators of its contests and the most aspiring competitors, she immediately implanted an invincible desire (ἄμαχον ἔρωτα) in our souls always for everything great and more numinous (δαμονιωτέρου) than ourselves. Therefore the whole universe is not enough for the **mental leap** of human thinking and intellect, but our thoughts pass beyond even the bounds of space (διόπερ τῆ θεωρίας καὶ διανοίας τῆς ἀνθρωπίνης ἐπιβολῆ οὐδ’ ὁ σύμπας κόσμος ἀρκεῖ, ἀλλὰ καὶ τοὺς τοῦ περιέχοντος πολλάκις ὄρους ἐκβαίνουσιν αἱ ἐπίνοιαι), and if one were to contemplate

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<sup>65</sup> The comparison is noted by Russell 1964: 165-6, 167 ad 35.3 and, in the context of an extended parallel between [Longinus], *Subl.* 35.2-5 and *DRN* 6.608-707, by Porter 2003: 214-19, esp. 217 n.65 and Porter 2007, esp. 174 (in both cases Porter hypothesises a common source).

life in the round, wheresoever it has a greater abundance in all things and is great and beautiful, quickly will one know for what we have been born.

The ἐπιβολή that here transcends the bounds of the universe attests a thought-process about the sublime that is also instantiated in Lucretius.<sup>66</sup> The invocation of the technical language of Epicurean epistemology in both contexts suggests that just as Lucretius' contemplation of infinity reaches out to the ineffable sublime, so the ineffable and the sublime habituate the mind to what the infinite is through the process of πρόληψις or preconception (Lucretius' *notities*).<sup>67</sup> Beyond the bounds of the finale to *DRN* 2, where the universe of infinite worlds is revealed, the same nexus of ideas recurs at the start of Book 3 to introduce Lucretius' 'infinite list' of proofs for the mortality of the soul. Here Lucretius celebrates as 'forever most worthy of eternal life' (3.13 *perpetua semper dignissima vita*) the teaching of Epicurus' 'divine mind' (15 *divina mente*) for the revelation it has imparted to him (3.16-18, 28-30):

diffugiunt animi terrores, moenia mundi  
discedunt, totum video per inane geri res.  
apparet divum numen sedesque quietae  
...  
his ibi me rebus quaedam divina voluptas  
percipit atque horror, quod sic natura tua vi  
tam manifesta patens ex omni parte relecta est.

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<sup>66</sup> On the Lucretian sublime see Conte 1994: 1-34; Porter 2003, 2007; Hardie 2009; Most 2012; Schiesaro 2014: esp. 86-7.

<sup>67</sup> On *prolepsis* see Asmis 1984: 21-3, 61-3. Morenval 2017: 289-90 not dissimilarly suggests that Lucretius creates in the reader feelings of desire in order to promote the sensation of the infinite sublime.

... the terrors of the mind take flight, the ramparts of the world part, and through the whole void I see things as they happen. Revealed is the majesty of the gods and their peaceful abodes ... Thereupon from these things a certain divine pleasure and frisson grips me, because thus by your power nature is so manifestly laid out and in every aspect unveiled.

In this thrill of discovery, Lucretius follows in the footsteps of Epicurus who, as described in the proem to *DRN* 1, blazed a trail in mind and spirit beyond the *moenia mundi* (1.73) to uncover the nature of things. In so doing he takes us from *terror* to *horror*, from the fear of the unknown to the frisson of the sublime that intimates infinity itself.

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Lucretius' use of poetry to go where no one has gone before is canvassed in the famous programmatic lines that, as transmitted, occur both at *DRN* 1.926-50 and (with a few differences) as a 'proem in the middle' at *DRN* 4.1-25. As well as signalling his elemental kinship to Homer and Ennius in the epic tradition, as discussed above, the terms in which Lucretius claims poetic originality are strikingly reminiscent also of Epicurus' trailblazing peraginations through the infinite universe at the start of the poem (1.74 *omne immensum peragravit*):<sup>68</sup> as Diskin Clay puts it succinctly, '[t]he ἄπειρον of Epicurus and the *auia Pieridum* are one and the same'.<sup>69</sup> As far as the iteration of Lucretius' programme at *DRN* 1.921-50 is concerned, then, it is hardly incidental that it occurs immediately prior to the

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<sup>68</sup> For further connections between these passages see Gale 1994: 120 n.82, 145-6 with n.62. See also Clay 1983: 340 n.190; Hardie 1986: 21; Segal 1989: 204, 1990: 180; Morenval 2017: 350.

<sup>69</sup> Clay 1976: 209 (= 2007: 24).

book's culminating exposition of infinity from line 951: Lucretius' sublime inspiration uniquely qualifies him to compose the poetry of the infinite.

The recollection of passages from the start of *DRN* 1 here in its programmatic second proem sets up a ring-composition that imparts a sense of closure to the book prior to its finale on the infinity of the universe. This sense of an ending may have been all the more acute for the ancient reader who had Lucretius' Epicurean source-text in view: if David Sedley's reconstruction of Epicurus' *On Nature* is accurate, such a reader would have been familiar with the critique of rival theories of the elements, treated by Lucretius in the immediately preceding section at *DRN* 1.635–920, from the *end* of Epicurus' physical and cosmological exposition.<sup>70</sup> At any rate, an ending has been sensed here in *DRN* 1 by modern scholars,<sup>71</sup> as well as by the ancient reader who, probably in the early/mid third century AD, inserted what our oldest manuscript *O* has transmitted as a transliterated Greek *capitulum* quoting Epicurus, *Ep. Hdt.* 41 τὸ πᾶν ἄπειρόν ἐστι· τὸ γὰρ πεπερασμένον ἄκρον ἔχει· ('the whole is infinite; for what is finite has an extremity') as a heading for the section beginning at 951.<sup>72</sup> The 'false closure' thereby created is, of course, entirely appropriate given that the finale which follows is about, precisely, the impossibility of ever reaching the end – an effect that, as argued above, spills over from the end of *DRN* 1 into the view of the boundless sea at the start of *DRN* 2, and from the proof for infinite worlds at the end of that book to the *divina voluptas atque horror* of Lucretius' sublime insight at the start of *DRN* 3. Reading across this grandly denied closure, then, we pass from Lucretius' manifesto for philosophical poetry, concluding

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<sup>70</sup> Sedley 1998: 123–6, 145–6, 190–2.

<sup>71</sup> Schrijvers 1970: 41-7 sees the second proem rounding off an ensemble of programmatic statements across the book; Müller 1978: 200 (= 2007: 236-7) views it as a 'pause' after the doxography and before the conclusion; see also Piazzzi 2011: 215, 219.

<sup>72</sup> See Butterfield 2013: 136-202, esp. 181-2. In this volume (p. 000), Butterfield discusses the *capitula* that introduce the description of the eternal seats of the gods (1.44-9 and 2.646-51) with the first words of *KD* 1 Τὸ μακάριον καὶ ἄφθαρτον, 'The blessed and indestructible': insofar as ἄφθαρτος is a t.t. of atomism (*Ep. Hdt.* 41, 55, 74; cf. n.4 above), this *capitulum* recognises the atomic principle behind temporal infinity or immortality.

with an explicit reference to his verses and a resounding invocation of the title of the poem, to a new beginning that emphatically tells us that there is no *finis* (1.948-57):

si tibi forte animum tali ratione tenere  
versibus in nostris possem, dum perspicis omnem  
**naturam rerum** qua constet compta figura. 950

Sed quoniam docui solidissima materiai  
corpora perpetuo volitare invicta per aevom,  
nunc age, summai quaedam sit **finis** eorum  
necne sit, evolvamus; item quod inane repertumst  
seu locus ac spatium, res in quo quaeque gerantur, 955  
pervideamus utrum **finitum** funditus **omne**  
constet an **immensum** pateat vasteque profundum.

... [I have chosen to expound Epicurean doctrine in poetry] to see if I might perhaps be able in this way to hold your attention in my verses, while you see right through the whole Nature of Things, the form in which it stands composed.

But since I have taught that the densest particles of matter fly through time eternally and without ever being destroyed, come now, let us unfurl what end there is or is not to their sum total; similarly, what has been discovered as the void, or place and space, in which all things happen, let us examine whether it is completely and utterly finite or opens out beyond measure and to a vast depth.

As Lucretius claims to break new ground poetically, so his text is about to break away from ring-composition and closure to enact a serial progression as proof after proof and line after



line accompany the extension of infinite space. Read in this way, the allusion to the *volumen* that the reader unrolls as Lucretius unfolds his argument (954 *evolvamus*)<sup>73</sup> is all the more *ad rem*. It is only as we unfurl these further columns of text that we come to realise that this is not the end of the book, and in the process we learn that there is no end to the universe.

When, therefore, Virgil's Jupiter unrolls the book of fate at *Aen.* 1.262 (*longius et volvens fatorum arcana movebo*, 'and, further unrolling the scroll of fate, [I] will disclose its secrets'),<sup>74</sup> he does so as a reader of the *DRN*, guaranteeing infinite empire to the Aeneadae ironically on Lucretian authority:<sup>75</sup> *his ego nec metas rerum nec tempora pono: | imperium sine fine dedi* (*Aen.* 1.278-9 'For them I set no limits, spatial or temporal: I have granted empire without end').<sup>76</sup>

The role of Lucretius' second proem in setting up this false closure might be taken to recommend 1.926-50 as the 'correct' setting for these lines in the poem. However, it might also be said that their repetition as a preface to Book 4 only reinforces the way in which they can masquerade as an epilogue to Book 1.<sup>77</sup> In this case the minor variations in the passages will conspire in their closural and apertural functions: at 1.949-50 *dum perspicis omnem |*

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<sup>73</sup> *OLD* s.v. 6. The allusion is suggested by Bailey 1947: 762 ad loc; Brown 1984: 191 ad loc.; Morenval 2017: 261. On the use of this image at *DRN* 1.144 see Kennedy in this volume (p. 000).

<sup>74</sup> Here I adopt Mynors' punctuation and the translation of Fairclough/Goold 1999: 281. For Virgil's book-roll image see also Conington 1875 ad loc., and most subsequent commentaries; Austin 1971: 102 ad loc. concurs, but reminds the reader that Jupiter is also 'turning things over' in the mind (*OLD* s.v. 6b).

<sup>75</sup> In a different vein, cf. the Lucretian-sounding Horace at *Sat.* 1.3.111-12 *iura inventa metu iniusti fateare necessest | tempora si fastosque velis evolvere mundi* ('you have to admit that laws were invented through fear of injustice – if you should wish to unroll the calendar of world history') at the end of what can be read as a unitary mega-diatribespanning the first three satires (see Gowers 2012: 16, 122 ad *Sat.* 1.2.1).

<sup>76</sup> Hardie 2009: 167, 173-9 locates in *imperium sine fine* a meditation on the nature of things, culminating in the quasi-Lucretian spear-throw by which Aeneas brings Turnus to his knees and the epic to its debatable close (*Aen.* 12.919-26). See further Rimell 2015: 28-80, esp. 28-65. Cf. n.33 above.

<sup>77</sup> One could alternatively take the lines, with those from 1.921, as prefatory without much weakening the closural and apertural signals from 1.952.

*naturam rerum qua constet compta figura*, the four words that follow the caesura in 950 look back over the cohesion of the universe and poem; the variation at 4.24-5 *dum percipis omnem* | *naturam rerum ac persentis utilitatem* (‘while you comprehend the whole Nature of Things and perceive its utility’) looks ahead to a book on sense-perception and epistemology.<sup>78</sup> The repetition, therefore, contributes to Lucretius’ exploitation of the material text at the end of Book 1. If the never-ending poem really is of a piece with the universe it describes, such repetition should not surprise us either: in an infinite universe of infinite *elementa*, anything that can happen once is guaranteed to happen again. *Nil novi sub sole*.

Repetition, again as Eco points out, is also one of the strategies deployed by the list as a means of conveying infinity, suggestive as it is of an inexhaustible reserve of material.<sup>79</sup> In the context of the *seriatim* arguments for infinity at the end of *DRN* 1, repetition is witnessed at the level of individual words (1.998-1001, 1008-11):<sup>80</sup>

Postremo ante oculos res rem finire videtur;  
aer dissaepit collis atque aera montes,  
terra mare et contra mare terras terminat omnis;            1000  
omne quidem vero nihil est quod finiat extra.  
...  
Ipsa modum porro sibi rerum summa parare  
ne possit, natura tenet, quae corpus inani  
et quod inane autem est finiri corpore cogit,            1010

<sup>78</sup> Kyriakidis 2006 relates the repetition *cum variatione* to Lucretius’ position on the impossibility of *metathesis*.

<sup>79</sup> Eco 2009: 137 and *passim*. The didactic technique of repetition is made explicit at Epicurus, *Ep. Hdt.* 35-6, 83, *Ep. Pyth.* 84-5, 116. On different forms of repetition in Lucretius see Bailey 1947: 144-65; Dionigi 1988: 75-88; Buglass 2015. For the rationale see Clay 1983: 176-85; Schiesaro 1994: 98-100.

<sup>80</sup> Noted by Deutsch 1939: 44, 53.

ut sic alternis infinita omnia reddat.

Lastly, before our eyes thing is seen to limit thing: the air separates the hills and the mountains the air, the land ends the sea and conversely the sea all lands; but there is in fact nothing that limits the universe on the outside. ... The very sum of things, furthermore, is kept from setting a limit for itself by nature, which compels body to be limited by void, and what is void again by body, so that alternately in this way it renders everything infinite.

Lucretius' use of formal devices to reflect the world around the text features in these lines in the figure of polyptoton: the repetition of inflections of the same word represents a universe of infinite extension in which one thing cannot but be bounded by another, matter by void and void by matter, and so on *ad infinitum*.

Of course, Book 1 must come to an end somewhere, and when it does we find it still repeating itself on this microtextual level (1.1114-17):

Haec sic pernosces parva perductus opella;  
namque alid ex alio clarescet, nec tibi caeca  
nox iter eripiet quin ultima naturai  
pervideas: ita res accendent lumina rebus.

These matters you will work out, then, led on with just a little effort: for one point will become clear from another, and blinding night will not steal your road to seeing the farthest reaches of nature. So things shed light on things.

In this closural *epiphonema*,<sup>81</sup> polyptoton conveys the domino-effect of deductive argumentation, but the idea also links in with the preceding discussion of the seriatim concatenation of matter and void. The goal, says Lucretius, is the *ultima naturai*, but since we now know those *ultima* can never actually be apprehended (or comprehended?), we might wonder if it is not the journey that is more important. In a way that this passage brings to mind, Immanuel Kant held that we cannot ultimately know anything, much less the infinite, since knowledge is always contingent on other knowledge, such that discursive thought is itself an infinite regress<sup>82</sup> – an idea sometimes compared to Derrida’s concept of *différance*, whereby meaning is endlessly deferred through the semantic web, as every term takes its meaning from another term, and so on *ad infinitum*. As Don Fowler observed in his discussion of the rather Ovidian lack of segmentation in the *DRN*, this tendency may be witnessed in Lucretius’ complex etymologising, through which ‘[t]he words of the poem are as subject to dissemination and deferral as any others’.<sup>83</sup> This presents what may be a rather perplexing state of affairs for a poem that aims to elucidate a philosophy that – according to the first rule of its *Canon* – demands precision of expression, and that had evolved its own terminology, precisely to avoid the infinite regress of meaning (*Ep. Hdt.* 37-8):<sup>84</sup>

Πρῶτον μὲν οὖν τὰ ὑποτεταγμένα τοῖς φθόγγοις, ὧ Ἡρόδοτε, δεῖ εἰληφέναι, ὅπως ἂν τὰ  
δοξαζόμενα ἢ ζητούμενα ἢ ἀπορούμενα ἔχωμεν εἰς ταῦτα ἀναγαγόντες ἐπικρίνειν, καὶ  
μὴ ἄκριτα πάντα ἡμῖν <ἦ> εἰς ἄπειρον ἀποδεικνύουσιν ἢ κενοὺς φθόγγους ἔχωμεν·  
ἀνάγκη γὰρ τὸ πρῶτον ἐννόημα καθ’ ἕκαστον φθόγγον βλέπεσθαι καὶ μὴθὲν

<sup>81</sup> See P. Fowler 1997, esp. 120-23 (= 2007: 209-14) on these lines, their closural signals, and their connection to *DRN* 1.407-9 and 5.1454-7. See also Kennedy in this volume (p. 000).

<sup>82</sup> For Kant’s (explicitly acknowledged) relationship to Lucretius see Baker 2007: 284-5 with further bibliography; Adler 2012. Moore 2001: 84-95, esp. 86-7, locates Kant in the history of thought about infinity.

<sup>83</sup> Fowler 1995: 16. Cf. Morenval 2017: 284-5.

<sup>84</sup> On this passage and Epicurus’ first rule of inquiry see Asmis 1984: 19-34.

ἀποδείξεως προσδεῖσθαι, εἴπερ ἔξομεν τὸ ζητούμενον ἢ ἀπορούμενον καὶ δοξαζόμενον  
ἐφ' ὃ ἀνάξομεν.

First of all, Herodotus, one must grasp the underlying meaning of words, so that by reference to these we can evaluate opinions, inquiries or conundrums, and lest all things go unevaluated for us in our attempt to prove them *ad infinitum*, or we end up with an empty vocabulary. For the primary concept in respect of each word must be scrutinized and need no further proof, if at any rate we are to have something to which to refer the inquiry or conundrum and opinion.

Whereas Epicurus here warns against language that risks to spin out εἰς ἄπειρον, Lucretius by contrast embraces the inevitable deferral of meaning precisely when seeking to explain the fundamentally inexplicable concept of infinity. For the *DRN* as a translation, this *différance* is inevitable, but its poetic form went further in a way that was not inevitable.<sup>85</sup> Scholarly discussion of Lucretius' contravention of Epicurus' strictures against poetry has tended to emphasize how poetic language elucidates, enhances, and makes more appealing the *obscura reperta* of Epicureanism; but it might also be said that poetry's suggestiveness and elusiveness open a window onto the infinite. It seems no coincidence, therefore, that Lucretius makes his apologia for his choice of poetry as a medium for philosophy at precisely this juncture in the text. Not only do the physical properties of the Roman book-roll enable Lucretius to represent the nature of things as *omne immensum*, as we have seen, but the very language of poetry, right down to the letter, is capable of conveying the implications and consequences of infinity, and of communicating to mortal minds the sense of sublime detachment that will make them, as Ovid recognized in his reading of Lucretius, immortal.

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<sup>85</sup> So also Morenval 2017: 285-7.

