

1 The Introduction of Infinities

Looking back on his life's work in *Ecce Homo*, Friedrich Nietzsche lavishes extraordinary praise on *Thus Spoke Zarathustra*. He says, "Among my writings my *Zarathustra* stands to my mind by itself. With that I have given mankind the greatest present that has ever been made to it so far" (EH "Pref" 4). He later describes the "fundamental conception of this work, the idea of the eternal recurrence, this highest formula of affirmation that is at all attainable" (EH "Books" Z:1). The eternal recurrence is so significant because it could give our worldly existence infinite value.

Suppose our lives eternally recur, meaning that we have lived an infinity of identical lives in the past, and will live an infinity more in the future. This can easily give infinite positive or negative value to anyone's total existence over eternity. If your life is good overall, living it infinite times is infinitely good. If your life is bad overall, living it infinite times is infinitely bad. In Nietzsche's search for value in the world after the death of God, these infinities of value – both positive and negative – are a tremendous discovery.

There is considerable scholarly debate about whether Nietzsche is really telling us that the universe is structured so that our lives will eternally recur. Alexander Nehamas (1985) argues that the eternal recurrence "has little if anything to do with the nature of the universe" (6).¹ Recent scholarship largely joins Nehamas in taking the eternal recurrence not to be a cosmological hypothesis, but a way to investigate evaluative questions.

Nehamas offers two widely shared reasons to deny that Nietzsche offers a cosmological hypothesis. First, Nietzsche doesn't directly assert that everything will eternally recur anywhere in the published works. In *Zarathustra* such assertions occur only in dreams, visions, and speeches by talking animals. Its protagonist Zarathustra never confidently asserts that the eternal recurrence will happen, except perhaps in a whisper unheard by readers. Outside *Zarathustra*, the most explicit published discussion of the eternal recurrence is in *Gay Science* 341, where a demon proclaims it in a thought-experiment. There and elsewhere, Nietzsche focuses on the psychological health of those who can happily accept the eternal recurrence, rather than the arguments for it. His clearest cosmological arguments for the eternal recurrence are in *Will to Power* 1066 / KSA 11:38[12], which as an unpublished note may not represent his settled views.

¹ Sharing Nehamas' doubts are Soll (1973), Strong (1975), Higgins (1987), Magnus (1978), Clark (1990), Solomon (2003), Welshon (2004), Anderson (2005), Reginster (2006), Leiter (2019), and Huddleston (2022).

Second, Nietzsche's cosmological arguments for eternal recurrence are unsound. While many empirical objections are available, perhaps the most straightforward arises from astronomical evidence suggesting a perpetually expanding universe.² An irreversible and eternal expansion prevents any return to previous states. Many interpreters therefore join Nehamas in not committing Nietzsche to the idea that the universe will recur eternally, perhaps regarding this interpretation as charitable.

Scholars downplaying the cosmology might be surprised to discover historians of statistical mechanics describing the eternal recurrence as a predecessor to Henri Poincaré's (1890) recurrence theorem. Juliano Neves (2019) notes that two assumptions Nietzsche suggests in KSA 11:38[12] – finite and conserved forces, and infinite time – enable Poincaré to show that nearly all states of the universe will recur. He writes that "Nietzsche works in the same direction as Poincaré" (191), and notes that Nietzsche's insight preceded Poincaré's theorem. In his scientific biography of Poincaré, Ferdinand Verhulst (2012) treats Nietzsche as a predecessor and quotes the demon of GS 341. Stephen Brush (1976) spends three pages discussing Nietzsche in his two-volume history of the kinetic theory of gases. He writes, "The suggestion that eternal recurrence might be proved as a theorem of physics, rather than as a religious or philosophical doctrine, seems to have occurred at about the same time to the German philosopher Friedrich Nietzsche and the French physicist Henri Poincaré" (628).³

Brush treats "Nietzsche's effort as a qualitative anticipation of Poincaré's theorem" (629). Both proceed from the same two premises and conclude that present arrangements must eternally recur. While they make different assumptions about determinism and other issues, these assumptions aren't necessary for our lives to recur an infinite number of times. Brush therefore distinguishes Nietzsche and Poincaré from predecessors who suggested recurrence without a similar argument.⁴

Even if more recent evidence makes the eternal recurrence extremely unlikely, Poincaré's theorem shows that the evidence of the late 1800s left it plausible enough for genuine scientific consideration. As Nietzsche's idea of the eternal recurrence anticipates an important scientific discovery, interpretive charity can't oppose treating it as a scientific hypothesis and may favor doing so. This suggests regarding Nietzsche's cosmological discussions as essential to the idea, as Lawrence Hatab (2005), Paul Loeb (2010), and Robin Small (2010) have rightly done.⁵

² Frieman, Turner, and Huterer (2008).

³ Brush refers to Pfeffer (1965). D'Iorio (2014) recognizes the connection to Poincaré.

⁴ Jenkins (2012) discusses Nietzsche's relation to Heraclitus and the Stoics. Mollison (2021) emphasizes differences between them.

⁵ Also Danto (1965), Kaufmann (1968), Zuboff (1973), Krueger (1978), and Meyer (2022).

Nietzsche's early published presentations of the eternal recurrence in *The Gay Science* and *Zarathustra*, written in the first half of the 1880s, occur in hypothetical scenarios or fiction. This makes sense if Nietzsche wrote them with genuine uncertainty about whether the eternal recurrence would happen in our world. A credence intermediate between belief and disbelief is natural toward scientific hypotheses strongly suggested by some considerations, and requiring further plausible but hard-to-verify assumptions. Uncertainty likely prevented Nietzsche from discussing the eternal recurrence more fully in print. He didn't want to present it explicitly and publicly as a factual thesis without a stronger argument, and he realized that he couldn't make the argument himself. That would require Poincaré's scientific talents, and eventually the mathematical talents of Constantin Carathéodory (1919), who finalized a proof of the recurrence theorem using measure theory.

Nietzsche knew that proving a recurrence theorem as Poincaré and Carathéodory did was beyond his abilities. He instead chose a reasonable alternative for an extraordinarily creative person. He wrote science fiction in which talking animals proclaim the eternal recurrence.⁶

Science fiction often envisions scientific possibilities to consider their consequences for life. *Star Trek* envisions how space travel might let us encounter alien societies. William Gibson's *Neuromancer* envisions how the internet might transform our society. *Bill and Ted's Excellent Adventure* envisions how time travel might permit comical interactions with historical figures. GS 341 and *Zarathustra* envision how the eternal recurrence might affect the value of our existence, and how we might feel about it. GS 341 describes intense emotions toward the eternal recurrence, which *Zarathustra* dramatizes.

Nietzsche's uncertainty about the eternal recurrence makes *Zarathustra* especially good for discussing it. The physical laws in *Zarathustra* resemble ours but may differ slightly. Its world has flying men, fire hounds living in volcanoes, and animals that talk. If eternal recurrence doesn't happen in our universe due to endless cosmic expansion or some other empirical contingency, it might still happen in the fictional universe of *Zarathustra*.

Nietzsche's confidence in the eternal recurrence might have increased by the end of his career. The unpublished note KSA 11:38[12], published in 1888, uses the same two premises as Poincaré in a clear and nonfictional argument for recurrence. Nietzsche occasionally remarks positively on eternal recurrence in his works of 1888. Thomas Brobjer (2023) finds evidence from Nietzsche's notes that he planned to defend this cosmology explicitly in a future masterwork.

⁶ Nietzsche likely regarded acceptance of the eternal recurrence as pragmatically beneficial overall, even if it turned out to be false. See Soll (1973), Magnus (1978), and Clark (1990).

While Nietzsche clearly retained interest in the eternal recurrence and sharpened his thoughts about a cosmological argument for it, it's less clear how he thought about it in the late 1880s than in the early 1880s. Unpublished notes, unrealized plans, and passing mentions are weaker evidence about Nietzsche's confident and considered views than extended published discussions. This Element therefore focuses mainly on discussions in the early published works – *Gay Science* and especially *Zarathustra*. KSA 11:38[12] however deserves close consideration, as his most straightforward argument for the eternal recurrence. Also deserving attention is KSA 11:11[141], his first unpublished note about it. Written on the first day the eternal recurrence occurred to him, this note shows that he immediately recognized the infinities of value it would generate.

Scholarly discussion of the eternal recurrence often categorizes some interpretations as cosmological, and others as broadly evaluative including attitudinal or normative interpretations suggesting evaluations of attitudes and actions. As Bevis McNeil (2020) notes, these categories are not exclusive. They offer right answers to different questions. Cosmological interpretations are right about what the eternal recurrence is. Evaluative interpretations are right about why Nietzsche is interested in it. Nietzsche defines the eternal recurrence as a cosmological doctrine, writing “The doctrine of the ‘eternal recurrence’ – that is, of the unconditional and infinitely repeated circular course of all things” (EH “Books” BT:3). This doctrine interests Nietzsche because of its evaluative significance for our attitudes, our actions, and our existence. The climax of *Zarathustra* doesn't involve a proof that the universe will eternally recur, but rather a song expressing love of life, with each of seven verses ending “*For I love you, O eternity!*” (Z IV: “Seven Seals”).

The next two sections respectively address the evaluative significance of the eternal recurrence and the cosmological arguments for it. Section 2 discusses early statements of the eternal recurrence, especially from the demon of GS 341. Nietzsche describes the intense emotions we might feel upon seeing the infinities of value it introduces. Section 3 compares the argument for recurrence in KSA 11:38[12] with Poincaré's theorem. Both proceed from similar assumptions and raise issues related to the second law of thermodynamics, though Nietzsche's well-ordered cycles of recurrence require an additional deterministic assumption. These two sections respectively discuss Nietzsche's earliest (1881–1882) and latest (1888) writings about the eternal recurrence.

The last ten sections tell the story of the eternal recurrence in *Zarathustra*. Its hero is initially overwhelmed by the infinite negative value introduced by the eternal recurrence. But after going into solitude and reflecting on life,

Zarathustra joyously accepts the eternal recurrence for its infinity of positive value.

Zarathustra only comes to grasp the idea of the eternal recurrence slowly, and initially reacts to it with very negative emotions. Section 4 begins by discussing “The Soothsayer,” where a soothsayer’s dark prophecy of eternally meaningless life gives Zarathustra a symbolic dream about the eternal recurrence that he doesn’t understand. He dreams of observing the vast lifeless periods in the cycle of recurrence as a night watchman in death’s castle, until a coffin bursts open and life emerges again. Section 5 describes how the idea first emerges into Zarathustra’s conscious thought in “On Redemption,” as he concludes a speech about how bad events in the past frustrate the will. He is shocked into speechlessness as he realizes that all bad events will recur eternally. Section 6 describes Zarathustra’s struggle to even speak of the resulting infinite negative value in “The stillest hour” and the sections surrounding it. Commanded by a mysterious voice, he journeys home toward the solitude of his mountain cave to gather the emotional strength to confront the idea.

Eventually, Zarathustra finds the courage to face the abysmal thought of infinite negative value. Section 7 considers his first public statement about the eternal recurrence in “The Vision and the Riddle,” which describes a vision in which he and a malicious dwarf consider how the infinite line of time will continue after passing through the gateway of the moment. He then has a vision of how he will overcome his horror at infinite negative value, symbolized by a shepherd biting the head off a snake that has crawled into his mouth. Section 8 describes Zarathustra’s emotional struggle with this abysmal thought in “The Convalescent,” which leaves him bedridden for a week. His animals proclaim the eternal recurrence as he recovers.

As Zarathustra recognizes infinite positive value introduced by the eternal recurrence, *Zarathustra* becomes a love story between its protagonist and Life. Section 9 discusses “The Other Dancing Song,” where Zarathustra dances with Life. At the end Life is sad that he will soon leave her, and he whispers into her ear that he will return. Section 10 discusses the song concluding this section, “Once More,” which describes the vast magnitudes of time, woe, and joy in the cosmology of recurrence. Section 11 discusses “The Seven Seals,” where Zarathustra sings seven verses about why he loves his life so much and wants it to eternally recur. Each verse concludes by expressing his wish to marry Eternity, whose maiden name is Life.

The rest of the Element describes how Zarathustra invites nine “higher men” to his cave, and teaches them to wish for recurrence. Section 12 discusses the first of these higher men, the soothsayer with the dark prophecy of eternally

meaningless life. Many others arrive, wishing to live with Zarathustra, though he offers them only dinner and a night's stay. Section 13 discusses "The Ass Festival," where the higher men worship a donkey, and offer a convincing naturalistic defense of doing so. As the night ends, the soothsayer and perhaps the donkey dance with drunken joy, and the higher men express a wish for recurrence by singing "Once More."

Zarathustra tells the story of how a philosopher fell in love with Eternity. Poincaré, Carathéodory, and modern physics tell Eternity's side of the story. In explaining the science, and explicating the narrative and poetry of *Zarathustra*, this Element aims to tell as much of the whole story as it can.

2 *Gay Science* 341, "The Greatest Weight," Considers Infinite Value

The Gay Science, published in 1882, is Nietzsche's first book discussing eternal recurrence. He first alludes to it in a section titled "Let us beware" which warns against anthropomorphizing the universe: "The whole musical box repeats eternally its tune which may never be called a melody" (GS 109). His early unpublished notes on the eternal recurrence similarly emphasize that it doesn't aim at any value or result from any intention, sometimes using the same words: "Let us beware of attributing any kind of striving to this circuit" and that "rationality or irrationality are not predicates for the universe" (CWFN 6 (357), KSA 9:11[157]). Nietzsche rejects these anthropomorphisms for the same naturalistic reasons he rejects religion, writing that "The modern-scientific counterpart to faith in God is faith in the *universe as organism*: this disgusts me" (CWFN 6 (374), KSA 9:11[201]).

As Matthew Meyer (2022) describes, GS 109 confirms that Nietzsche thought of the eternal recurrence cosmologically from the beginning:

First, we can connect the title of GS 109 to at least three notes from this time in which this phrase is used, and, in these notes, Nietzsche formulates the eternal recurrence in cosmological terms (KSA 9:11[157], [201], [202]). Second, Paulo D'Iorio has shown that Nietzsche first encountered this phrase, "let us beware," in Eugen Dühring's *Course of Philosophy*, and Dühring uses the phrase in the context of discussing questions about the beginning of the cosmos (2014: 74). Taken together, it becomes clear that the first mention of the eternal recurrence in Nietzsche's work should be understood cosmologically. (113)

As we'll see, regarding the eternal recurrence as a cosmological doctrine allows us to better understand its evaluative significance.

Nietzsche's classic statement of the eternal recurrence, later in the same book, connects the cosmology to its evaluative significance:

Nietzsche on the Eternal Recurrence

7

What if some day or night a demon were to steal after you into your loneliest loneliness and say to you: “This life as you now live it and have lived it, you will have to live once more and innumerable times more; and there will be nothing new in it, but every pain and every joy and every thought and sigh and everything unutterably small or great in your life will have to return to you, in the same succession and sequence – even this spider and this moonlight between the trees, and even this moment and I myself. The eternal hourglass of existence is turned upside down again and again, and you with it, speck of dust!” (GS 341)

Nietzsche then asks how you would emotionally respond if you knew your life would recur eternally: “Would you not throw yourself down and gnash your teeth and curse the demon who spoke thus? Or have you once experienced a tremendous moment when you would have answered him: ‘You are a god and never have I heard anything more divine’” (GS 341).

Ivan Soll (1973) argues that “the prospect of the infinite repetition of the pleasure or pain of one’s present life entailed by the doctrine of eternal recurrence should actually be a matter of complete indifference” (339). Kathleen Higgins (1987) similarly asks why the eternal recurrence would justify such intense emotional responses: “What difference does the doctrine of eternal recurrence make? Even if the theory of time it proposes were true, nothing in our lives would be any different” (163). Aaron Ridley (1997) also writes, “The thought of Eternal recurrence, then, should be a matter of the deepest indifference. Why *care*?” (20). Indeed, the eternal recurrence is largely inconsequential for one’s current life. Perhaps it favors living a short but wonderful life rather than a longer life with less concentrated satisfactions. If you’re guaranteed an infinite amount of life, making it all wonderful rather than merely okay overall might be best. But Nietzsche doesn’t suggest living for a good time rather than a long time. He instead suggests that we might have intense positive or negative emotions.

Intense emotional responses make sense because the eternal recurrence infinitely multiplies the value of existence, adding infinite lives as good as the present one. If your life is good overall, that goodness is yours not just once, but infinite times over the course of eternity. If your life is bad overall, that badness too is infinitely repeated. Unless your life is exactly neutral in value, the eternal recurrence makes your total existence infinitely good or bad. Any value in life that can be summed over time becomes infinite – objective or subjective, moral or prudential, great or small. Many evaluative theories deliver this consequence. Utilitarians face an eternity with infinite net pleasure or infinite net displeasure, which they regard as infinitely good or bad.