An Asymmetry in the Multiverse "Escape" from the Paradoxes of Time Travel

Selmer Bringsjord

AHR?

Nov 4 2019

R A I R

Rensselaer AI and Reasoning Lab

R&D enabled by:

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(between Grandfather & Looping "Proust")

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Gödels' Great Theorems

(forthcoming OUP)

by Selmer Bringsjord

- Introduction ("The Wager")
- Brief Preliminaries (e.g. the propositional calculus)
- The Completeness Theorem
- The First Incompleteness Theorem
- The Second Incompleteness Theorem
- The Speedup Theorem
- The Continuum-Hypothesis Theorem
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- Gödel's "God Theorem"
- Could a Machine Match Gödel's Genius?

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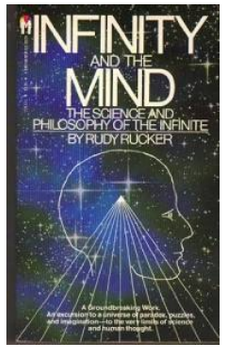
Grandfather Paradox ...

"This state of affairs seems to imply an absurdity. For it enables one e.g., to travel into the near past of those places where he has himself lived. There he would find a person who would be himself at some earlier period of his life. Now he could do something to this person which, by his memory, he knows has not happened to him."

–Kurt Gödel



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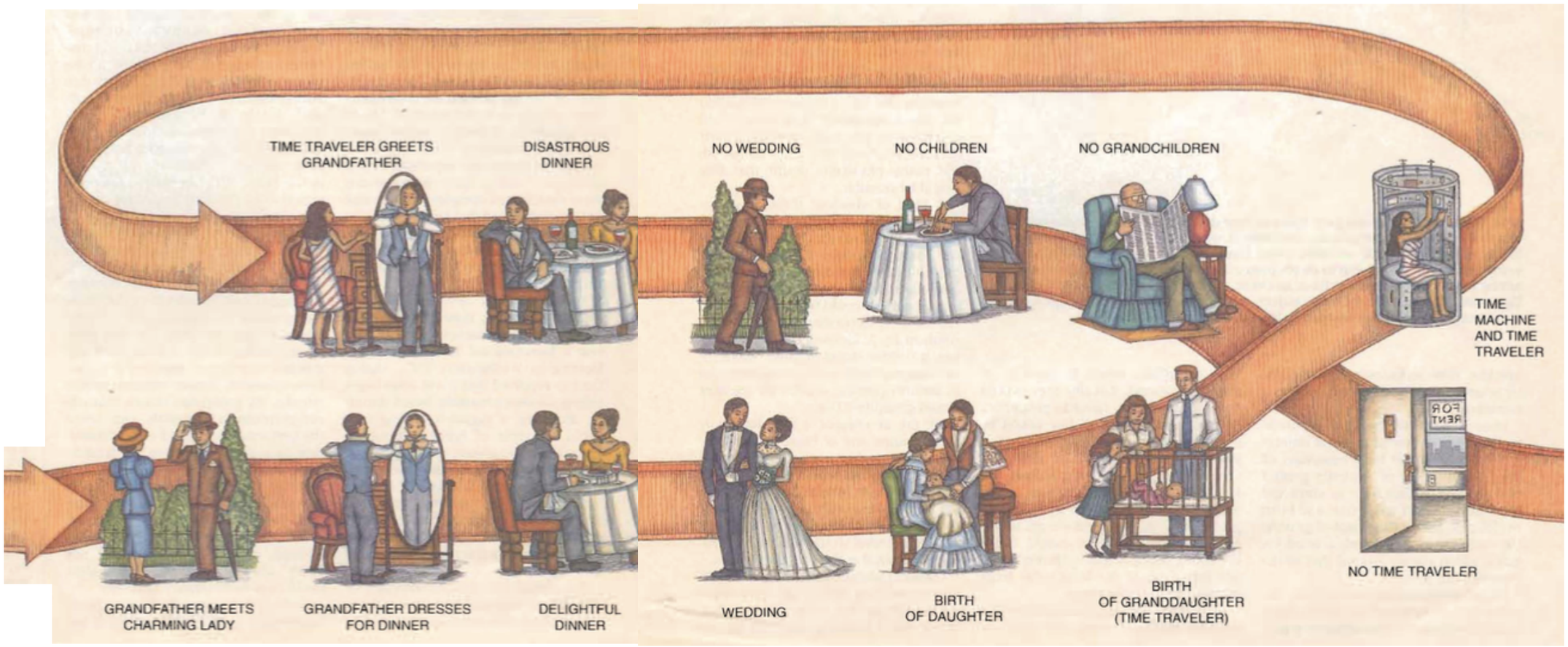
Story for The Grandfather Paradox



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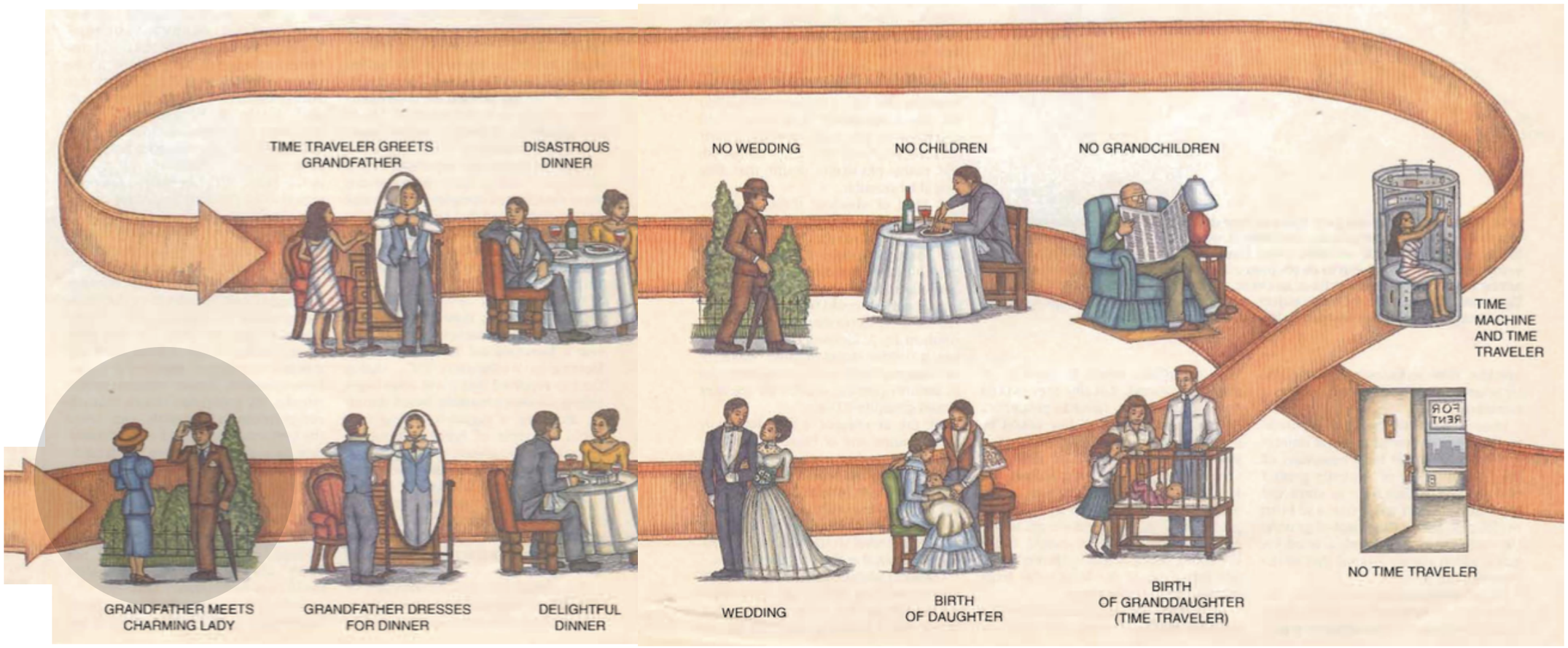

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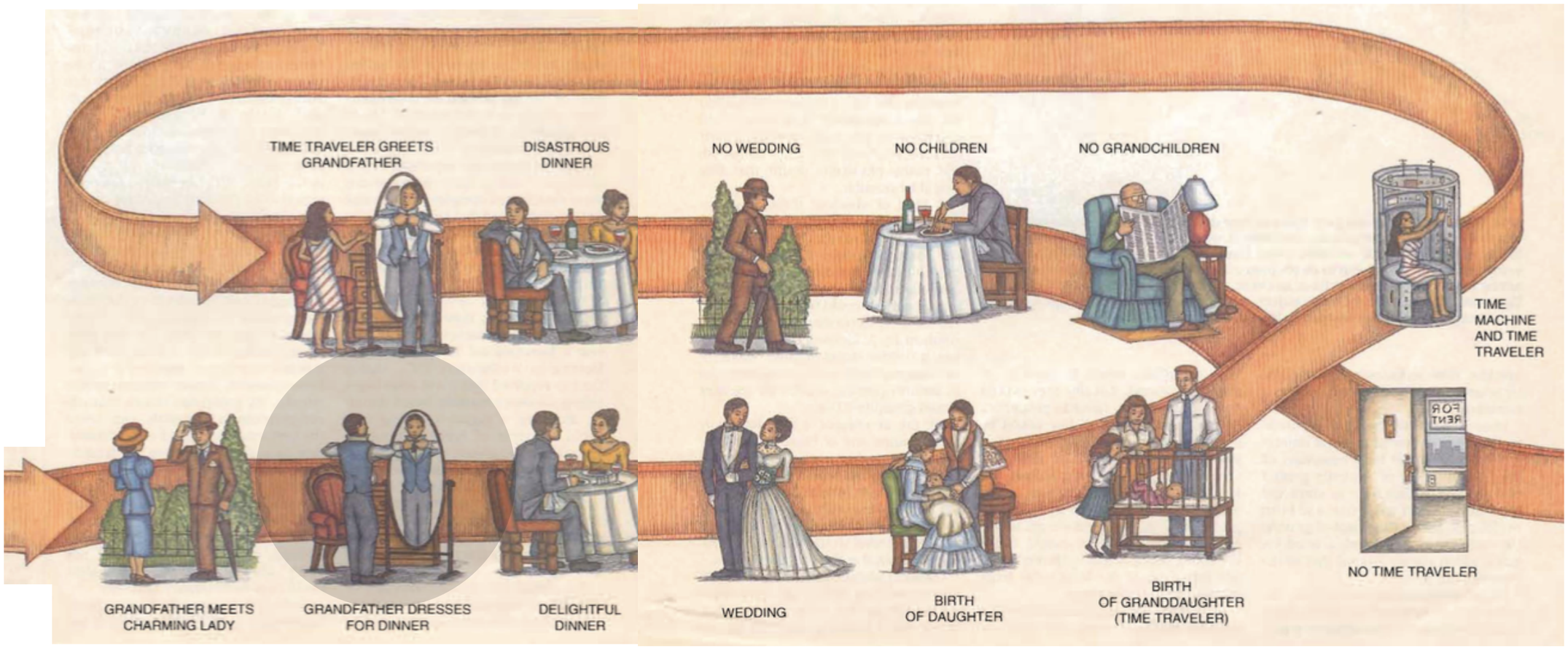

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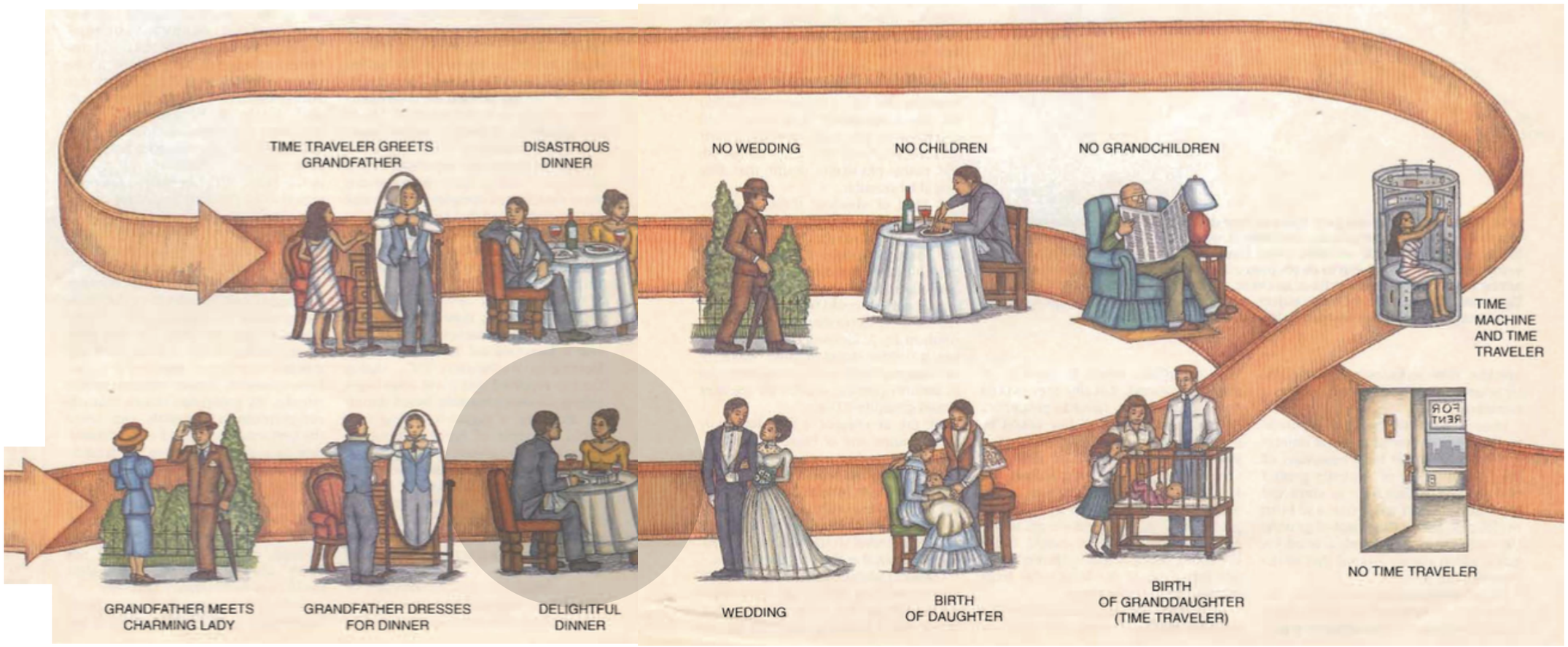

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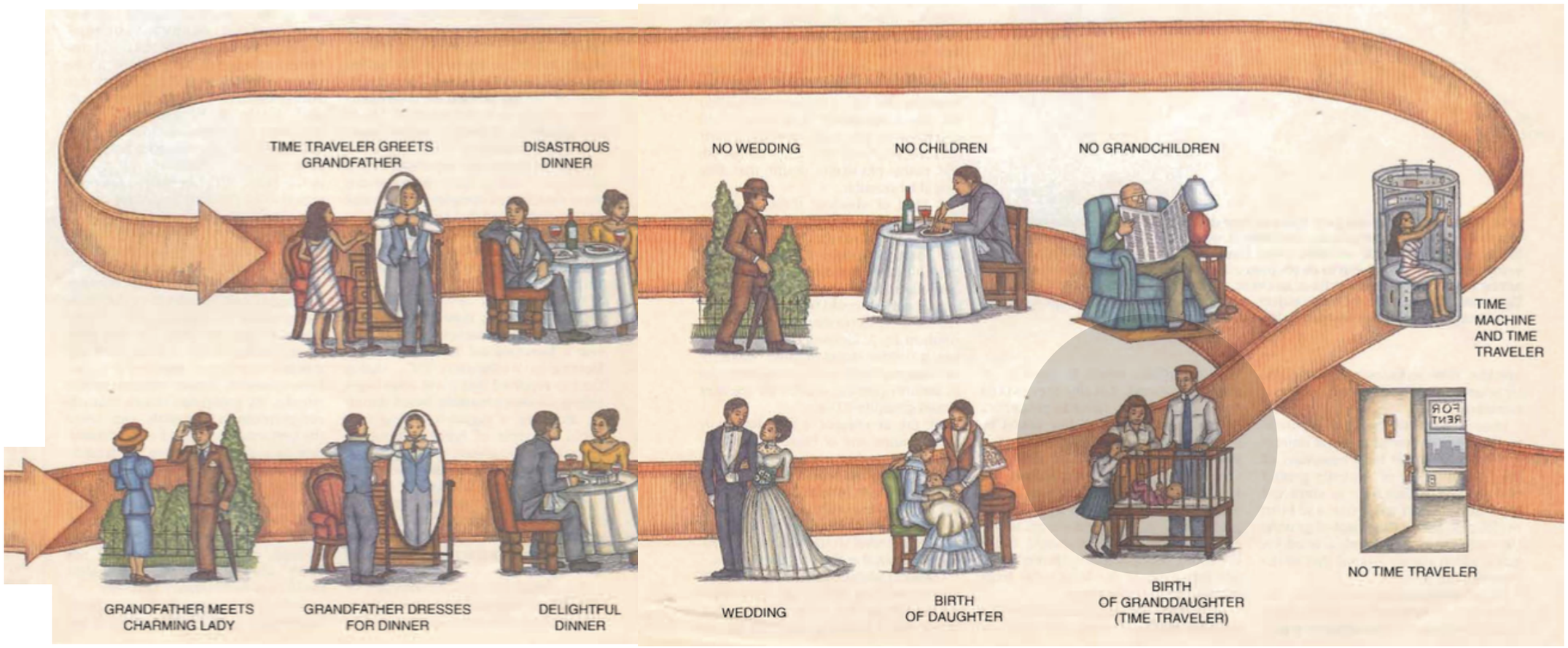

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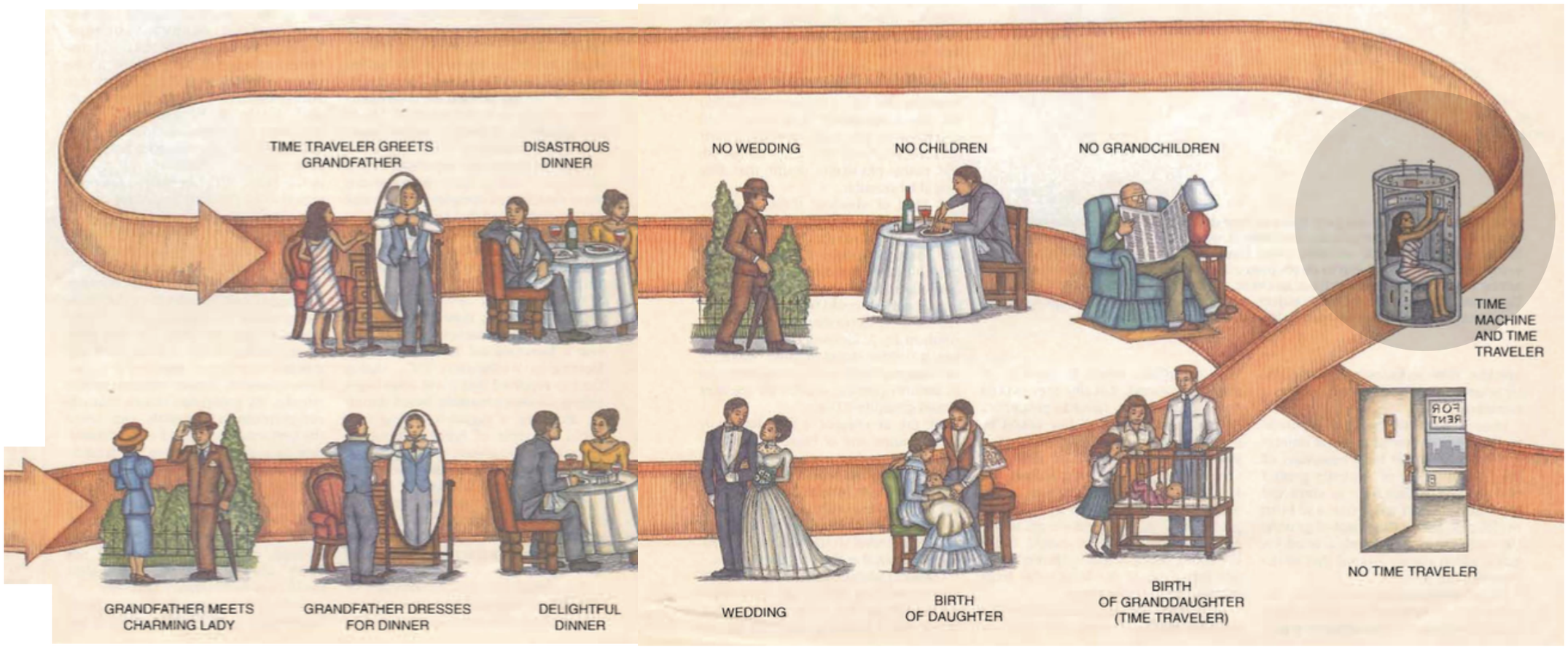

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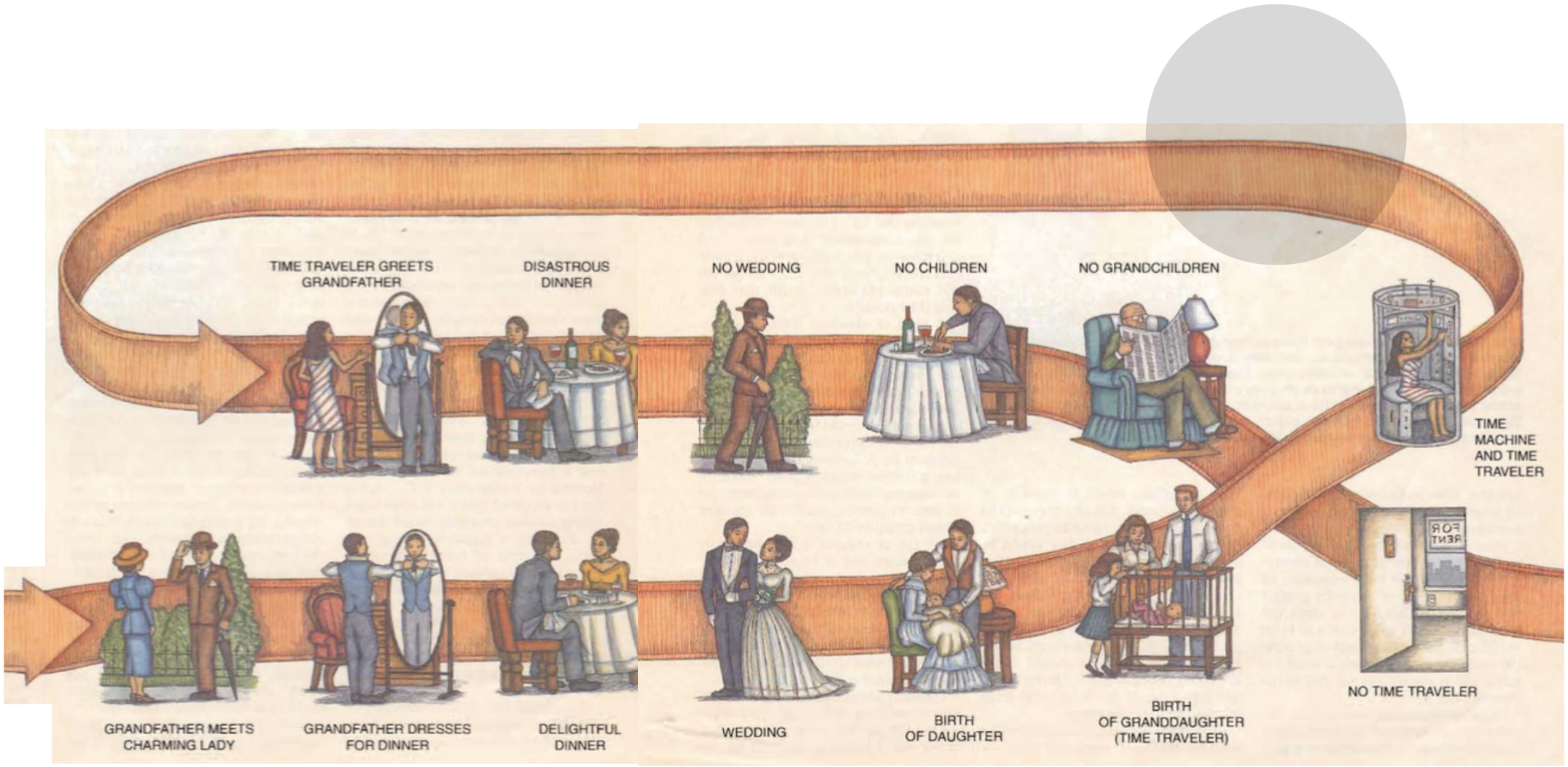

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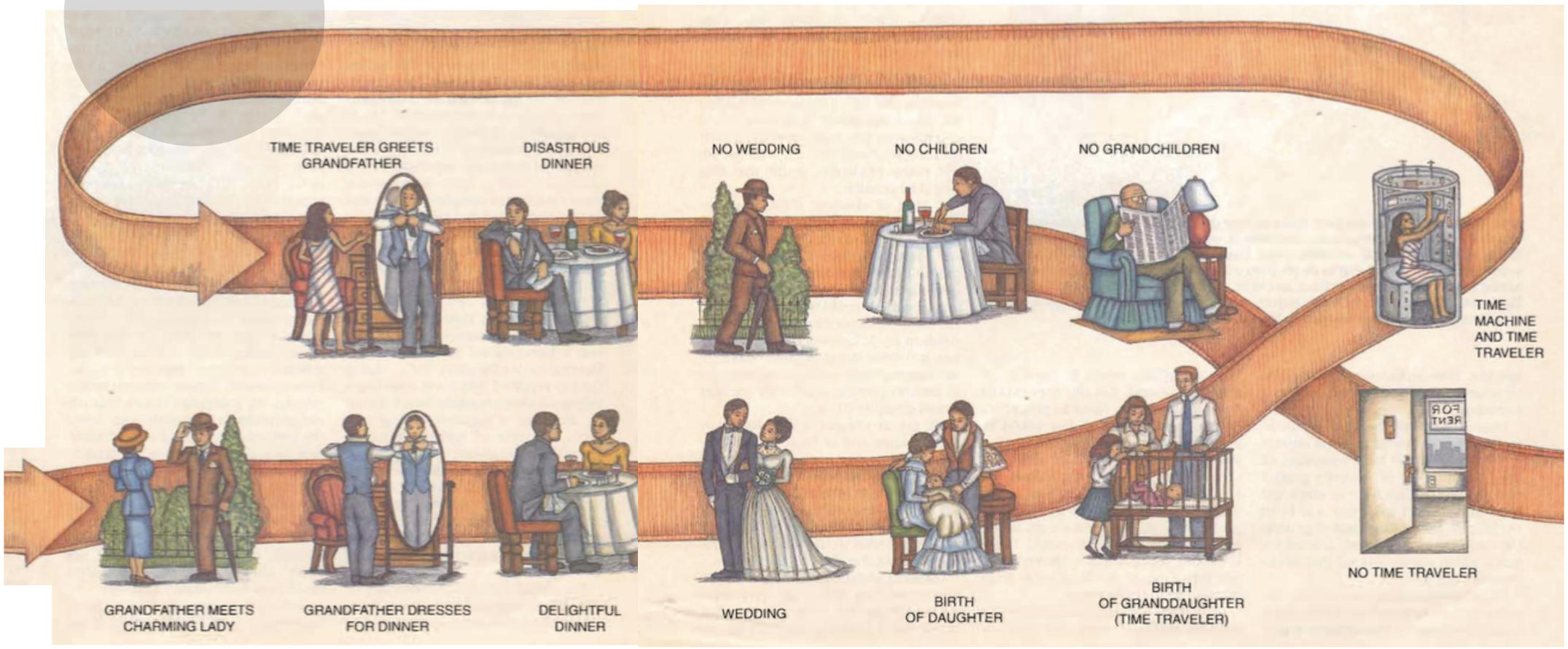

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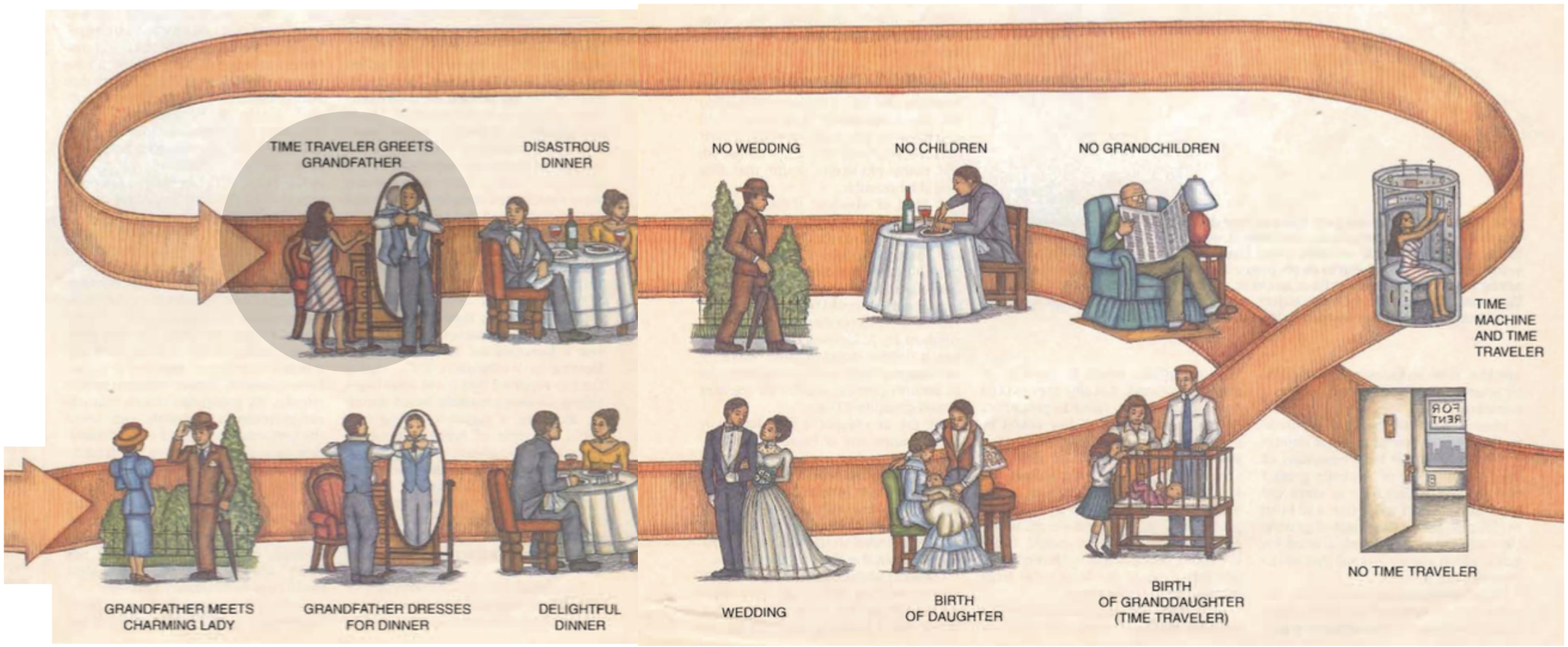

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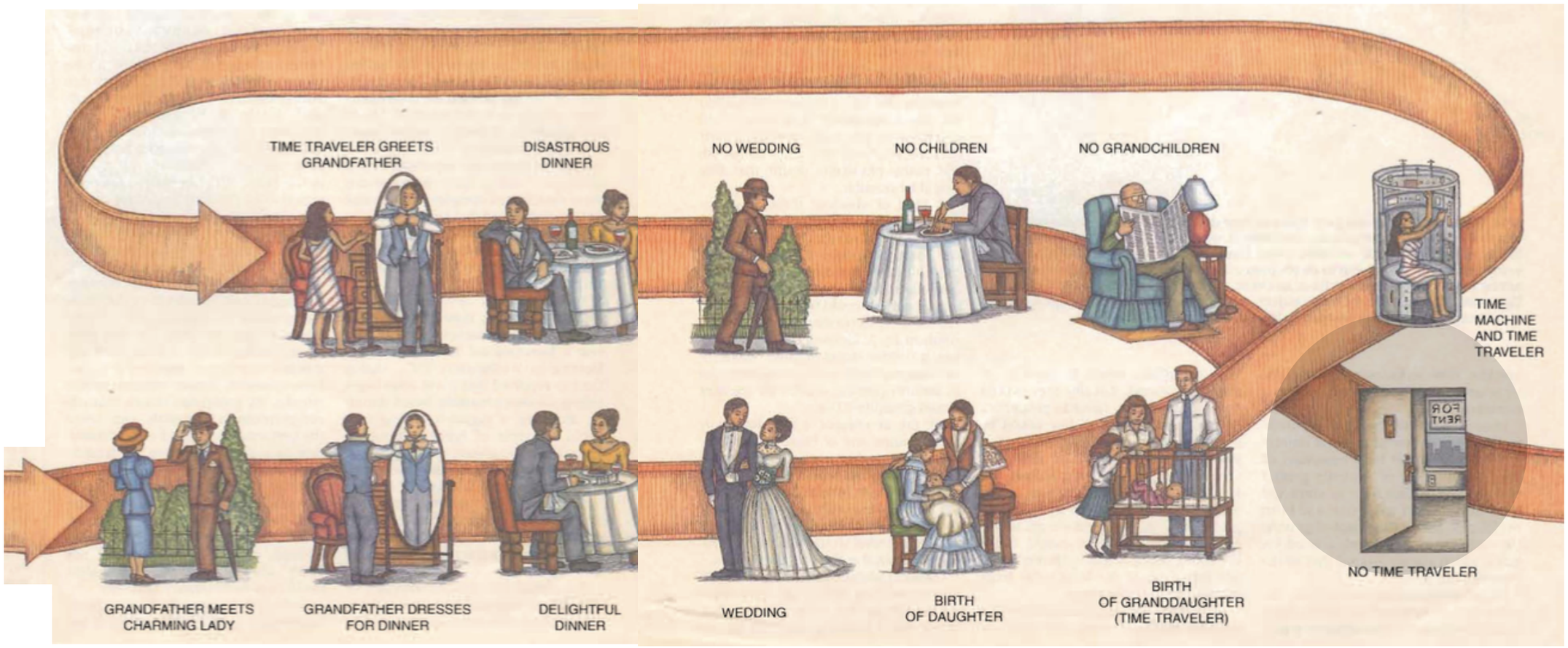

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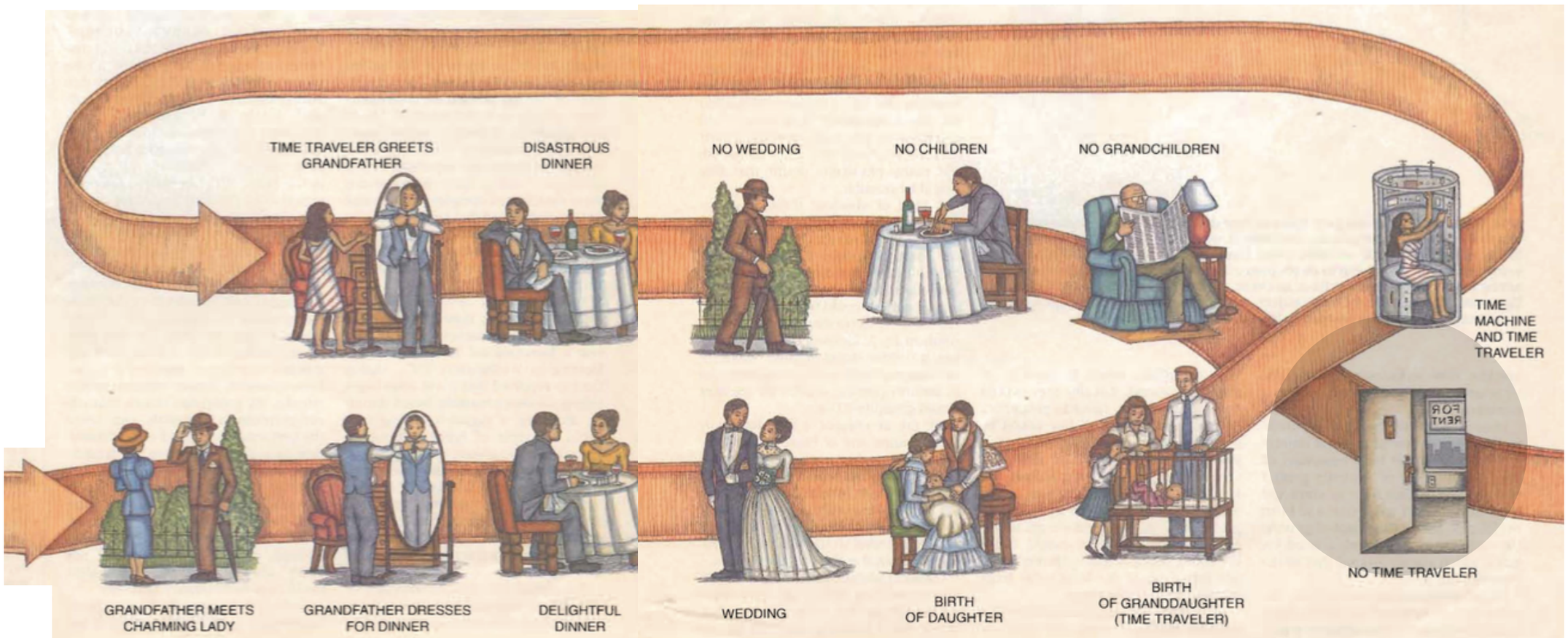

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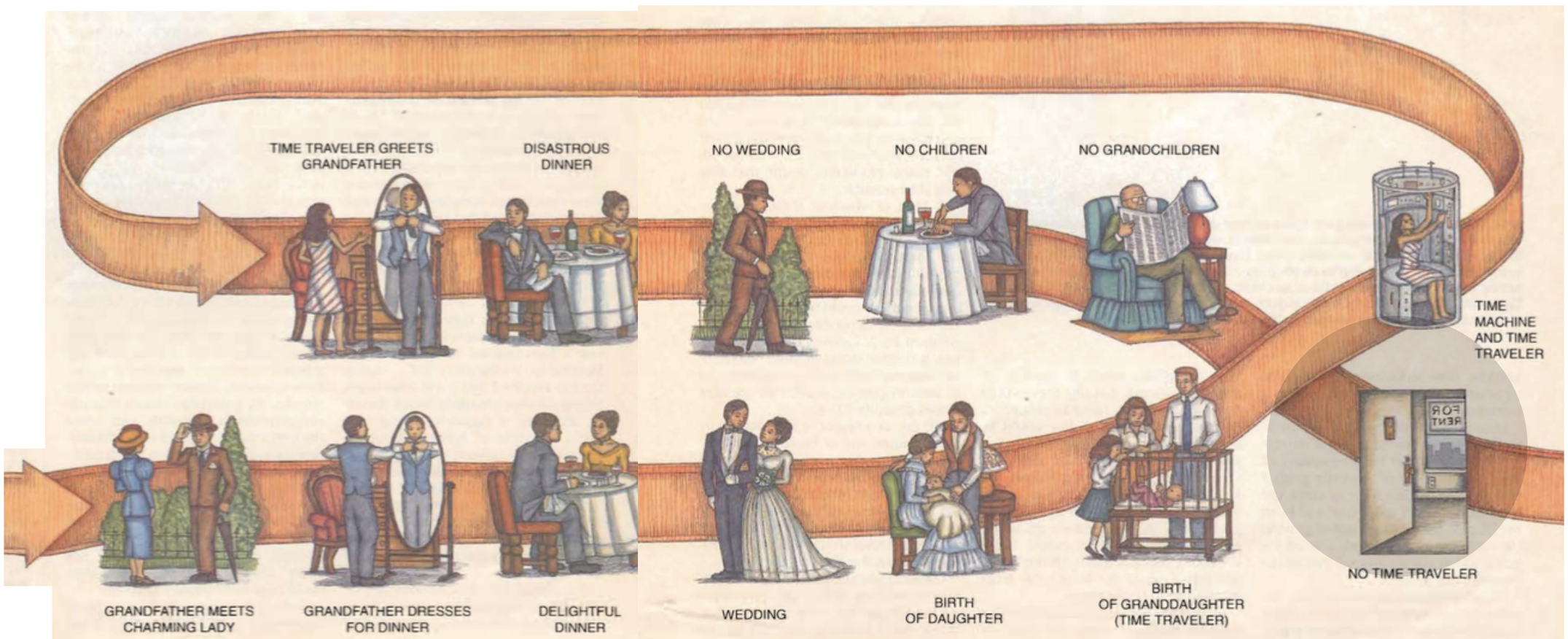
Story for The Grandfather Paradox

"jumping" macroscopic backwards time travel



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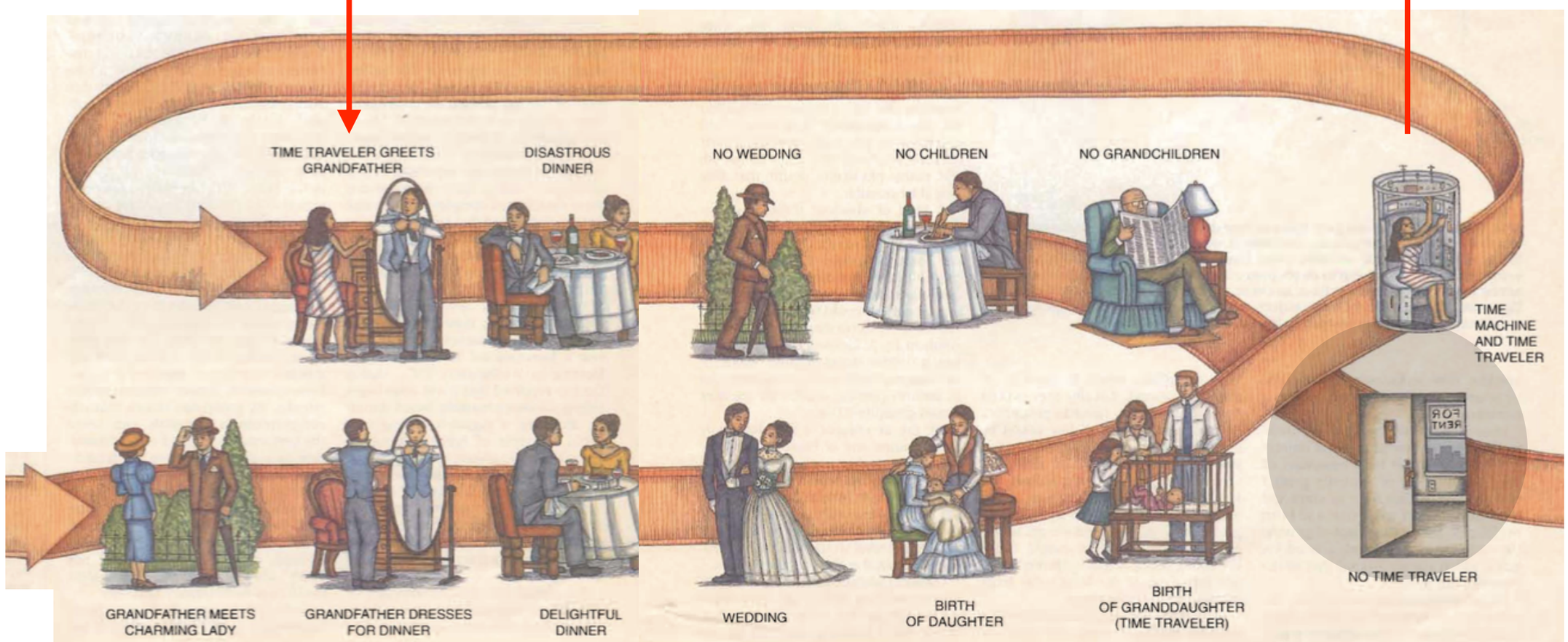

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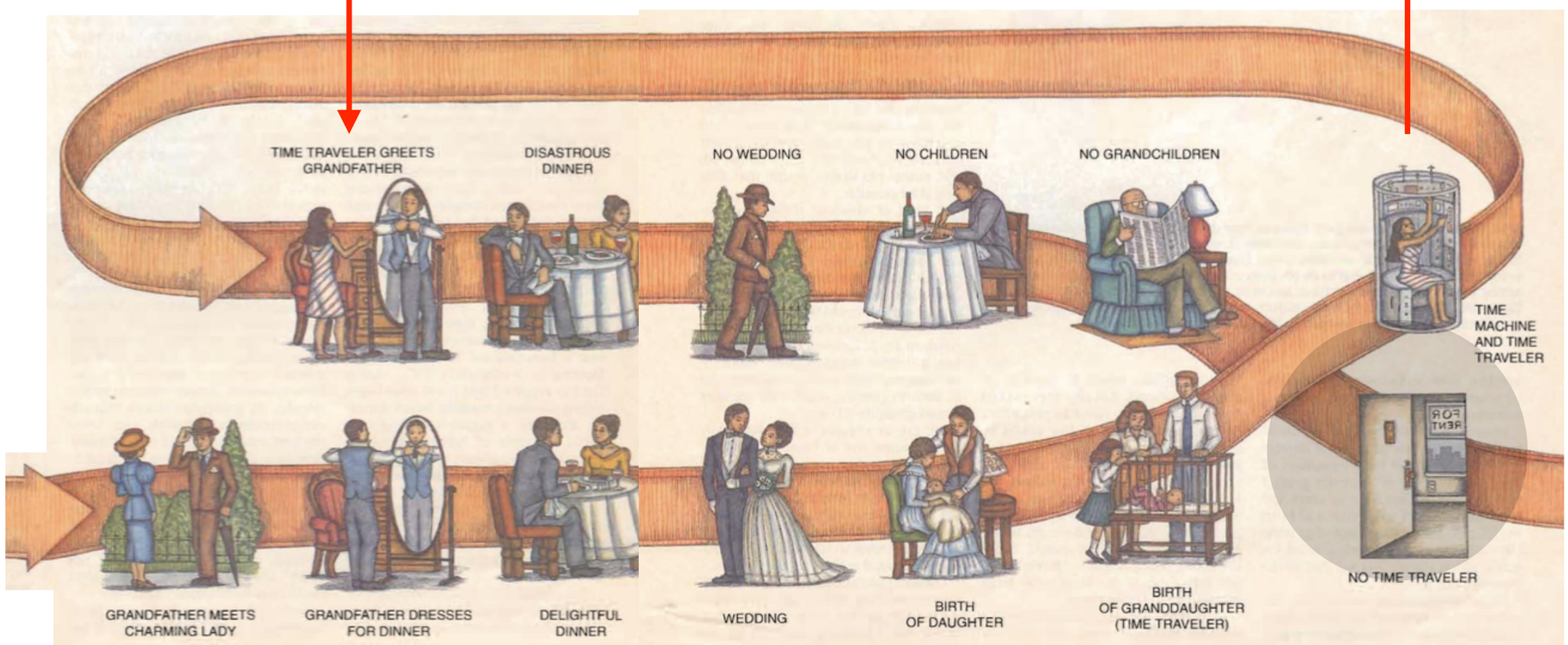

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4. It's a contradiction and hence impossible that an existent thing *x* never exists, so it's impossible that existent Sonia never exists.

5. Hence, "jumping" macroscopic backwards time travel *isn't* possible. (*modus tollens* given that a contradiction is false)

The “Multiverse Escape”

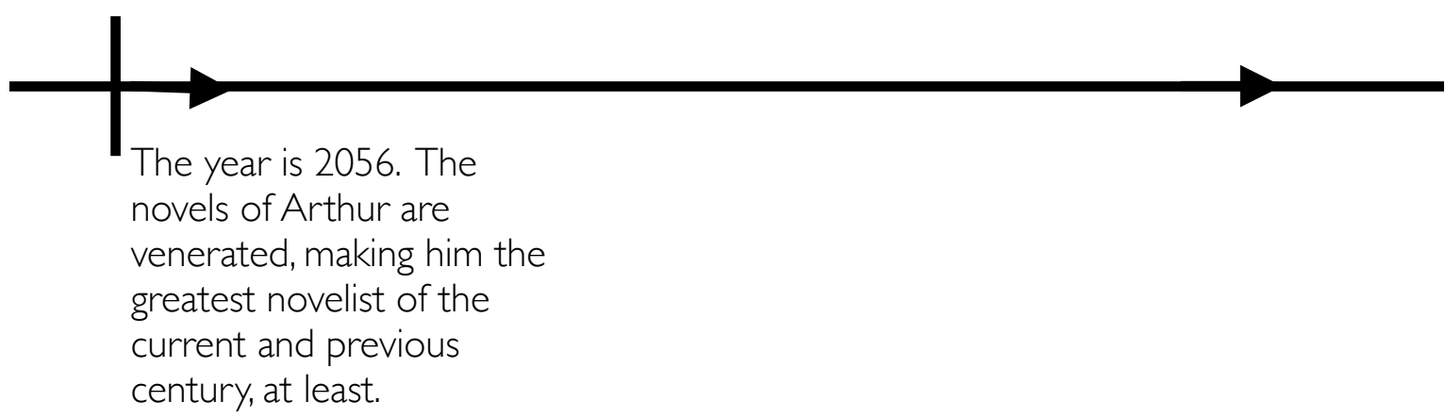
So does Sonia prevent her own birth or not? That depends on which universe one is referring to. In the universe she leaves, the one she was born in, her grandfather did marry her grandmother because, in that universe, he received no visit from Sonia. In the other universe, the one whose past Sonia travels to, her grandfather does not marry that particular woman, and Sonia is never born. (Deutsch & Lockwood 1994, p. 73)

Looping “Proust” …

“The Discovery of Morniel Mathaway”

https://www.you-books.com/book/W-Tenn/The-Discovery-of-Morniel-Mathaway

The Paradox of Proust



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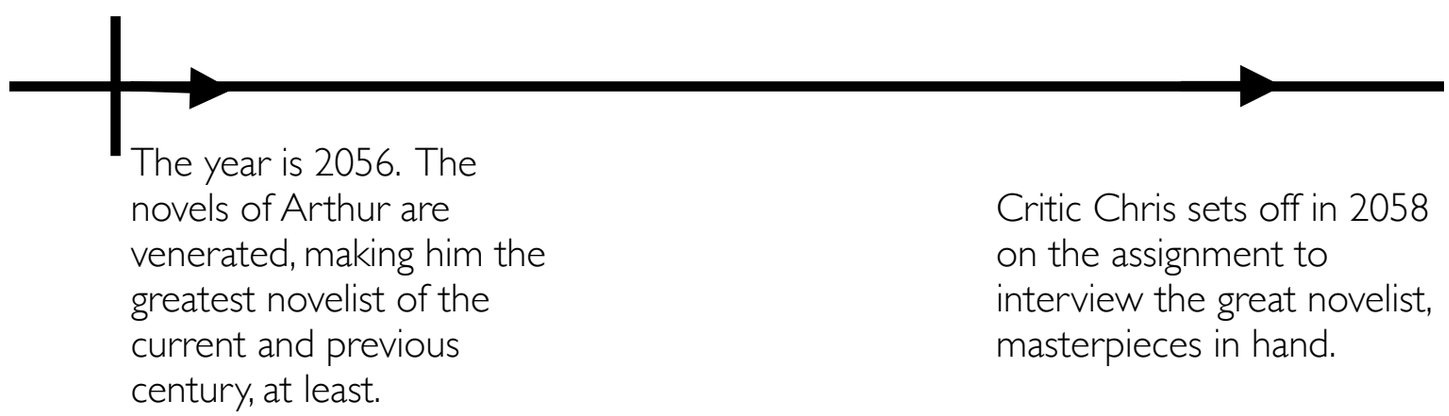

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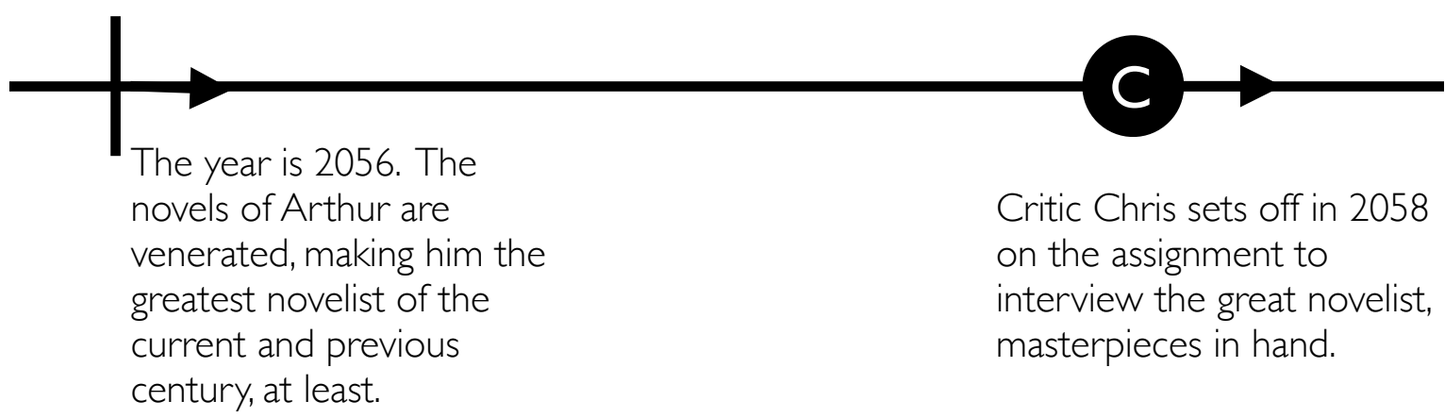

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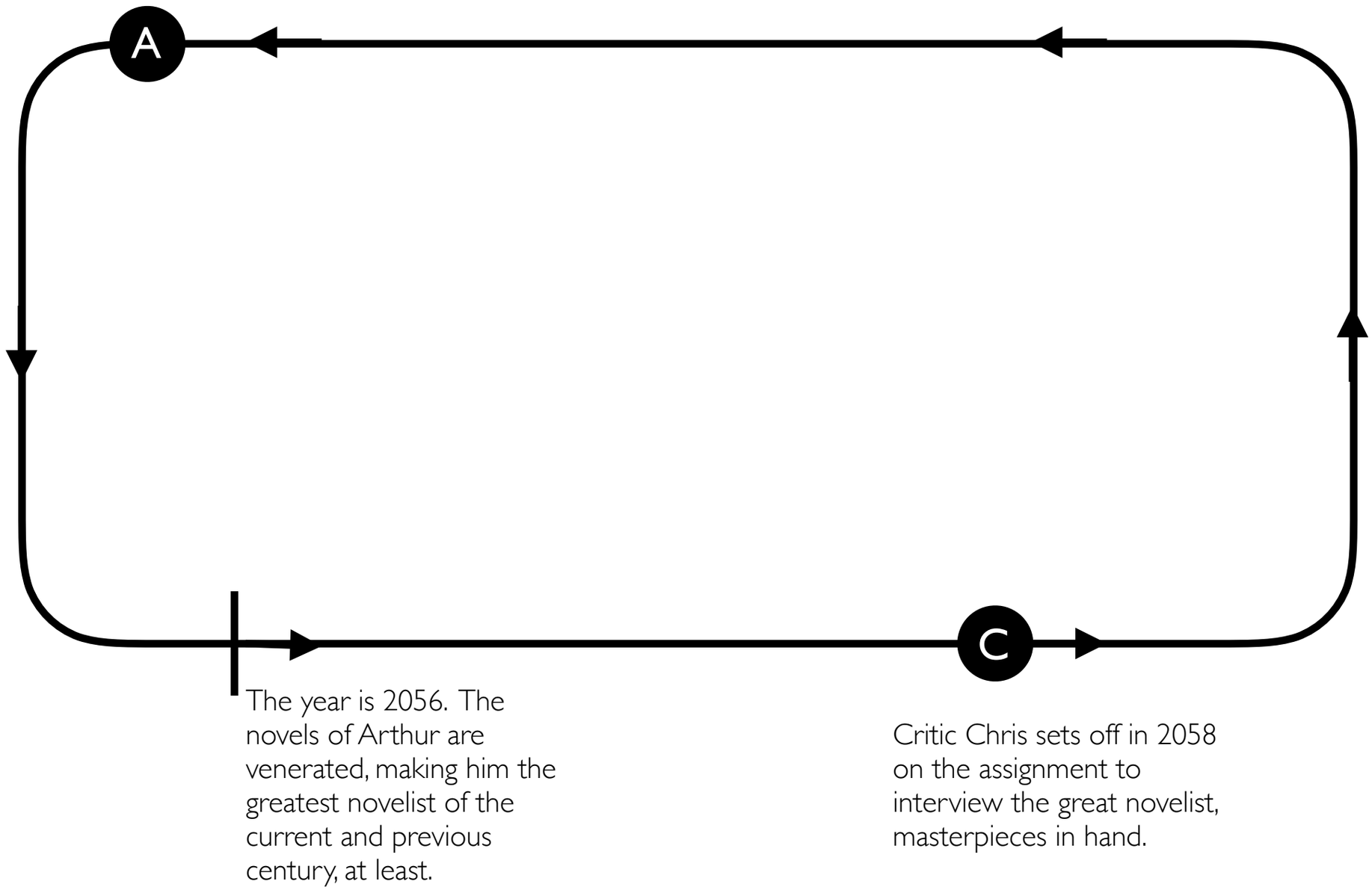

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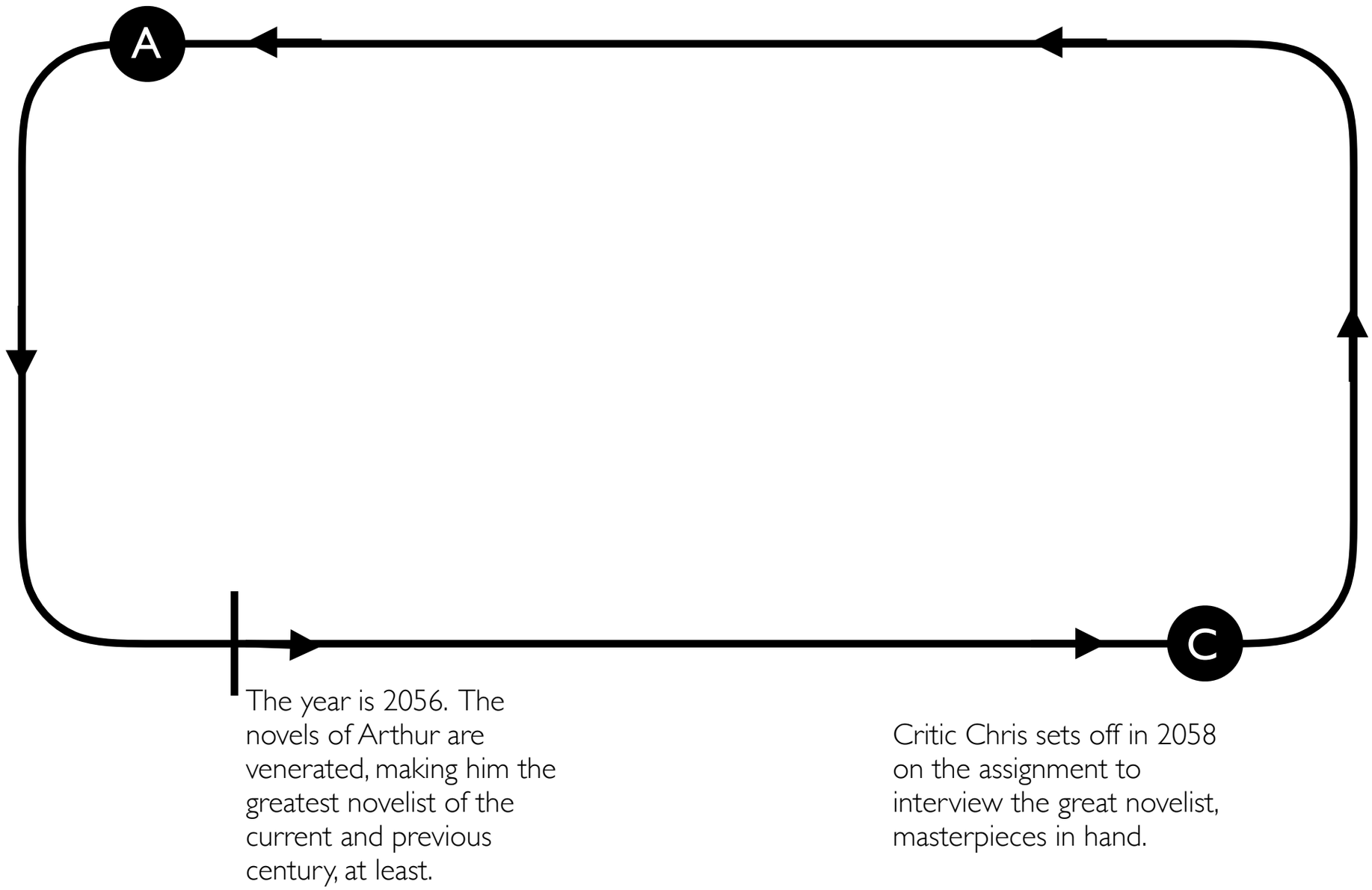

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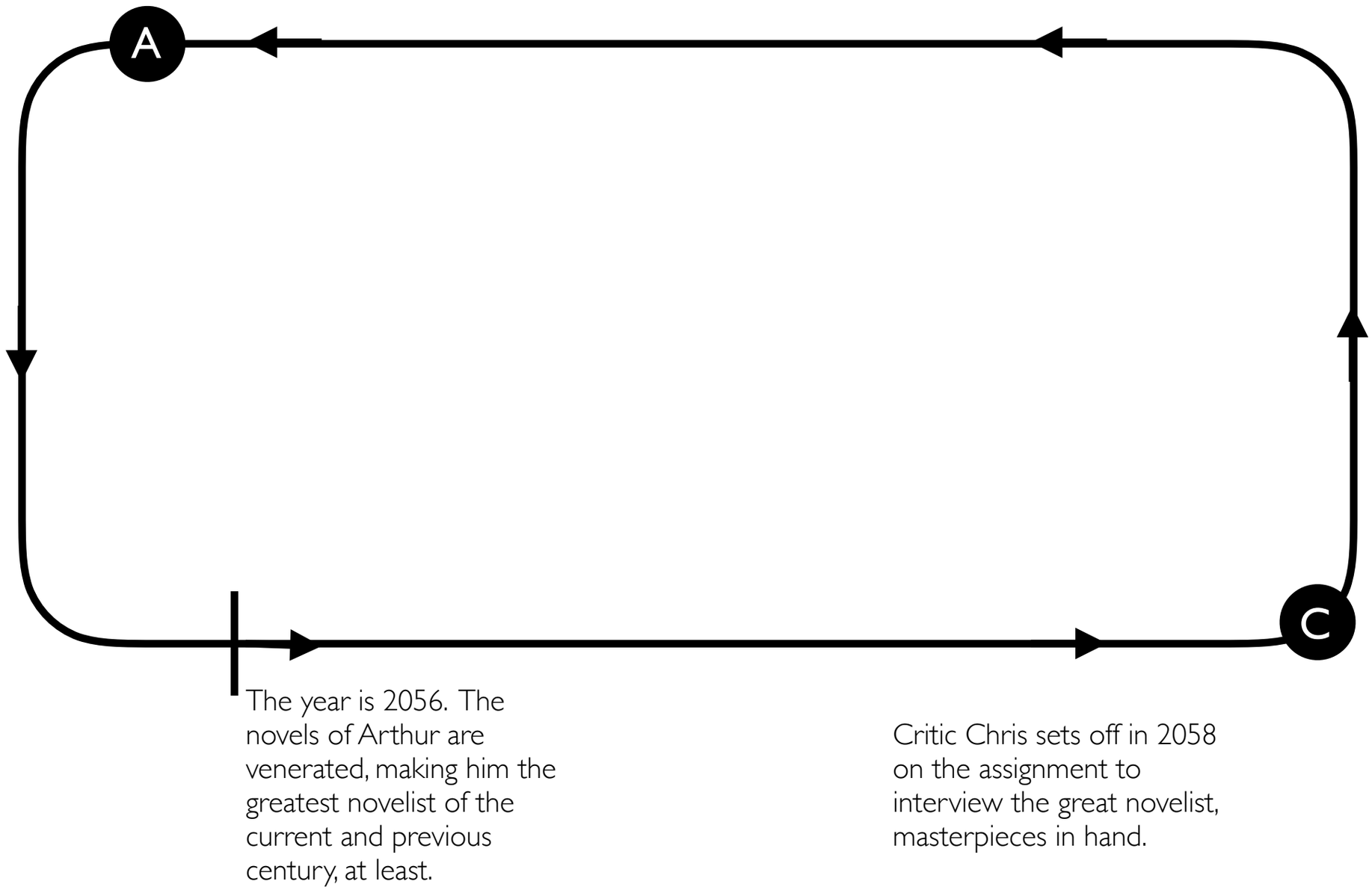

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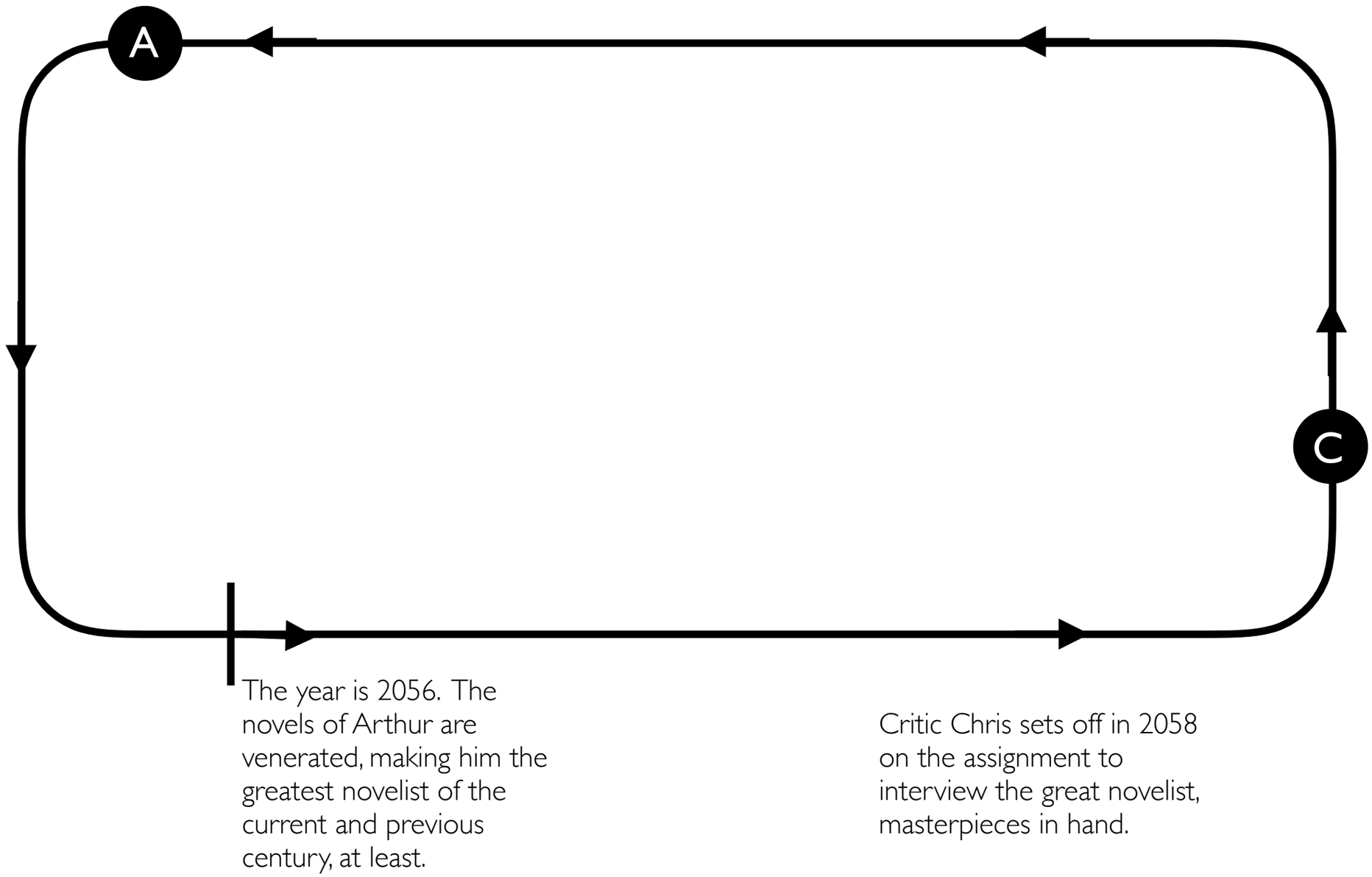

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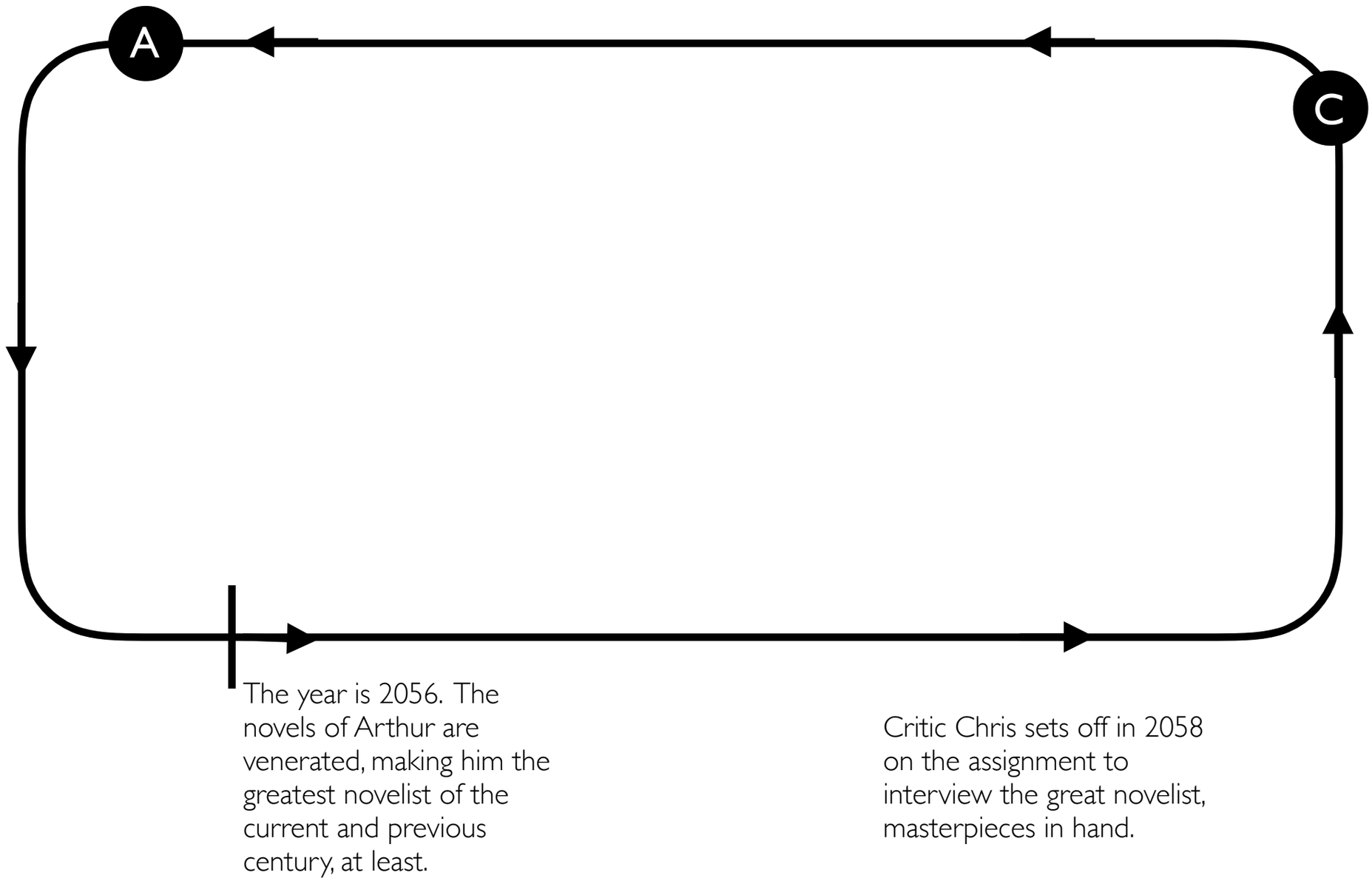

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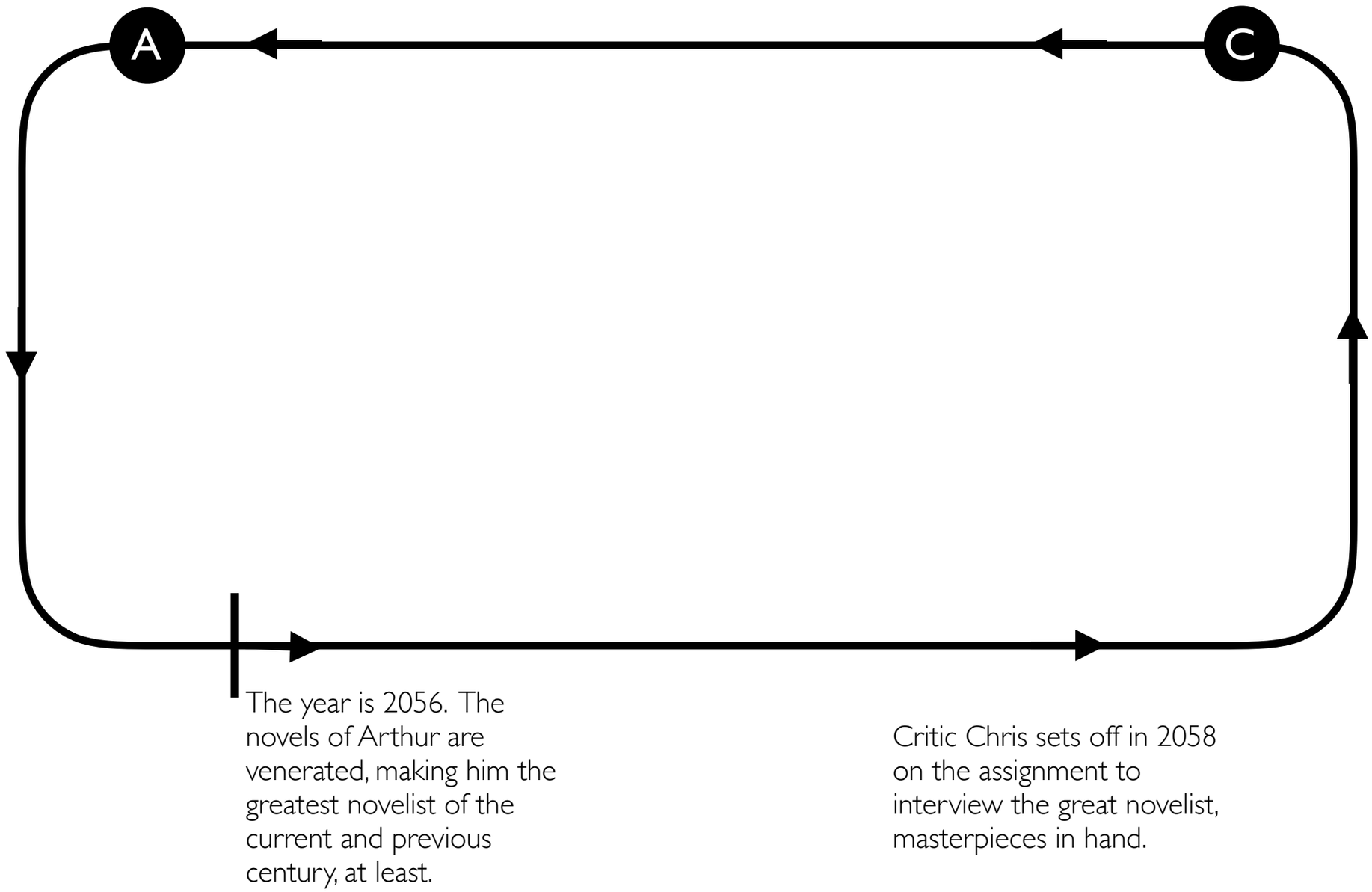

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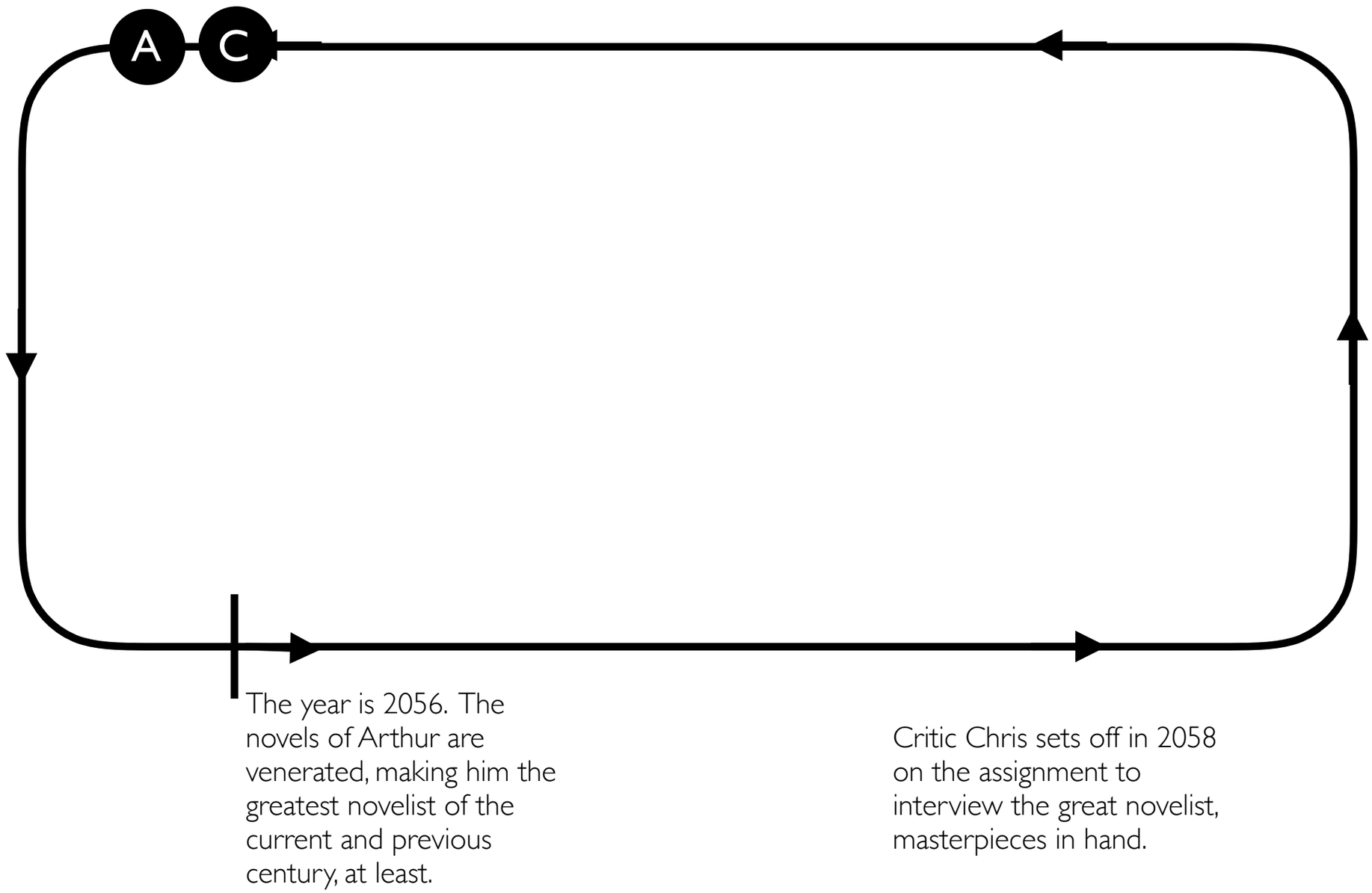

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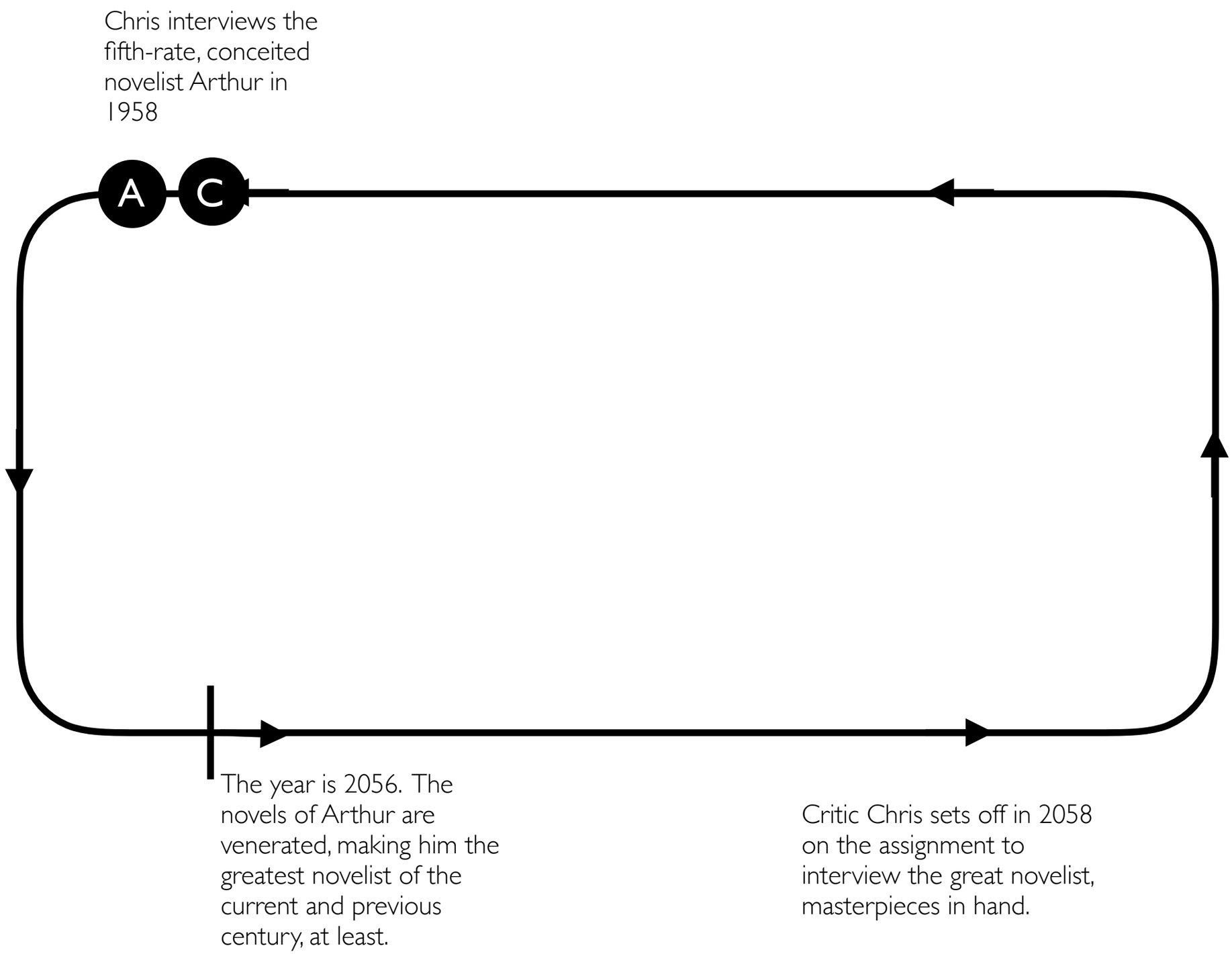

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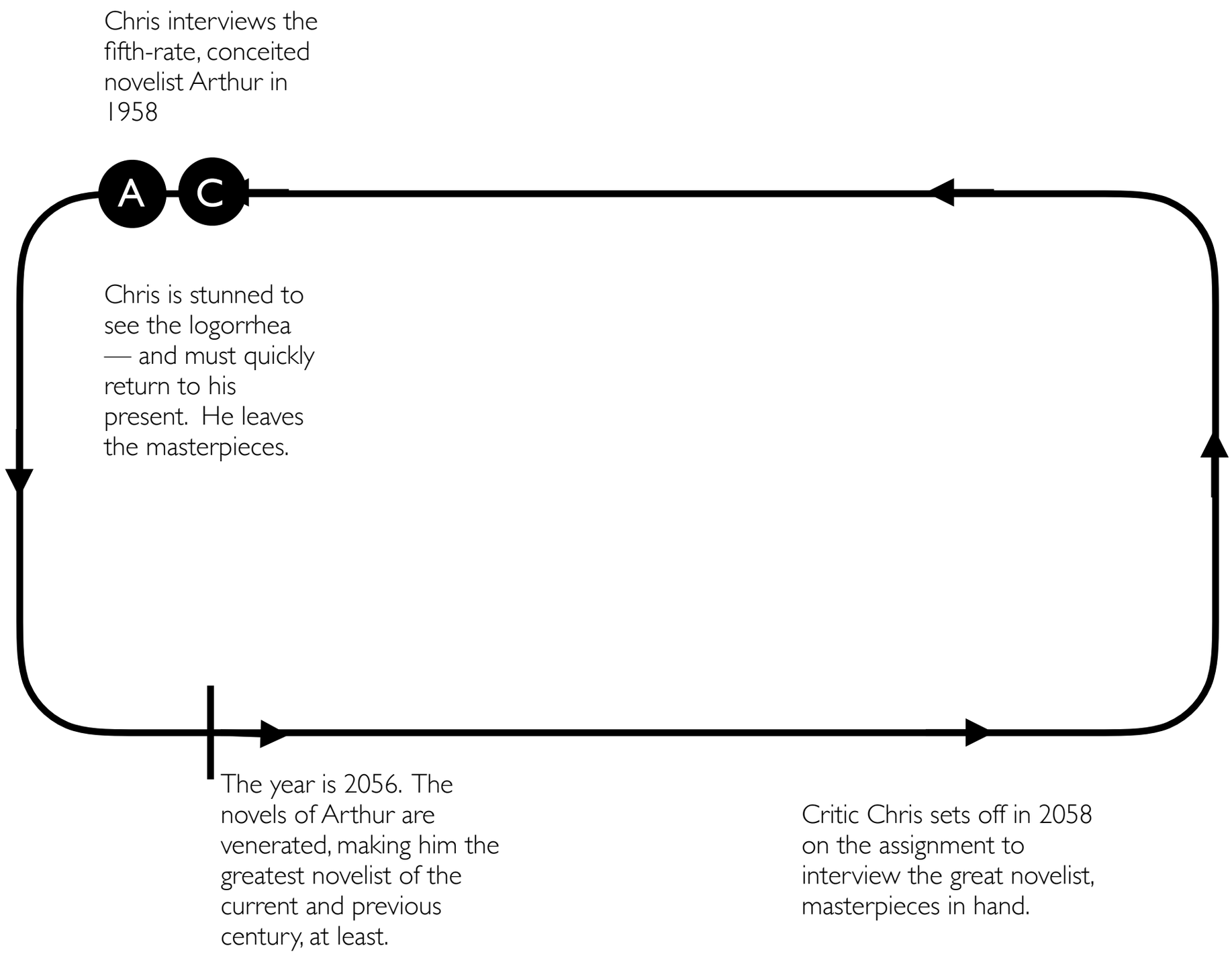

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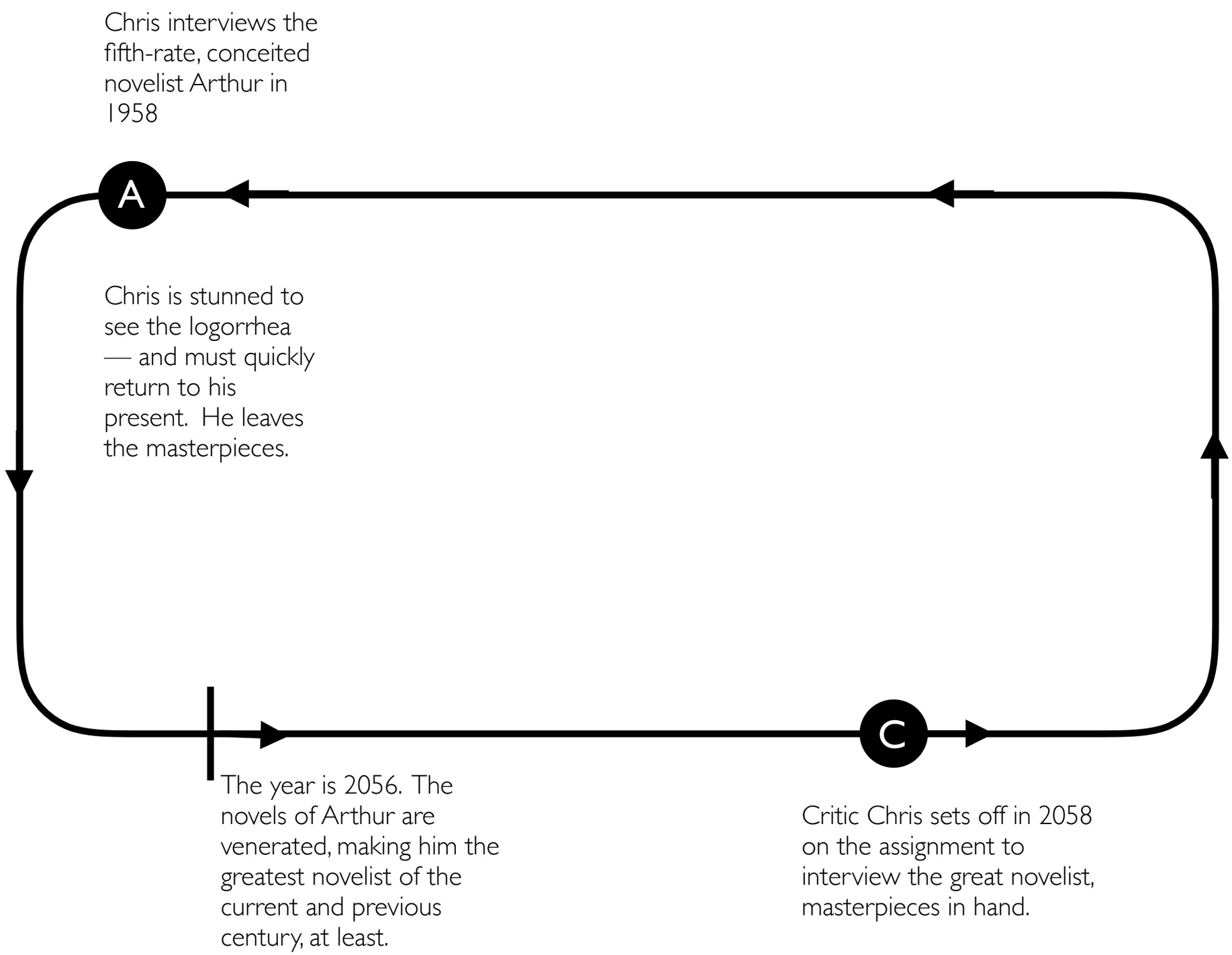

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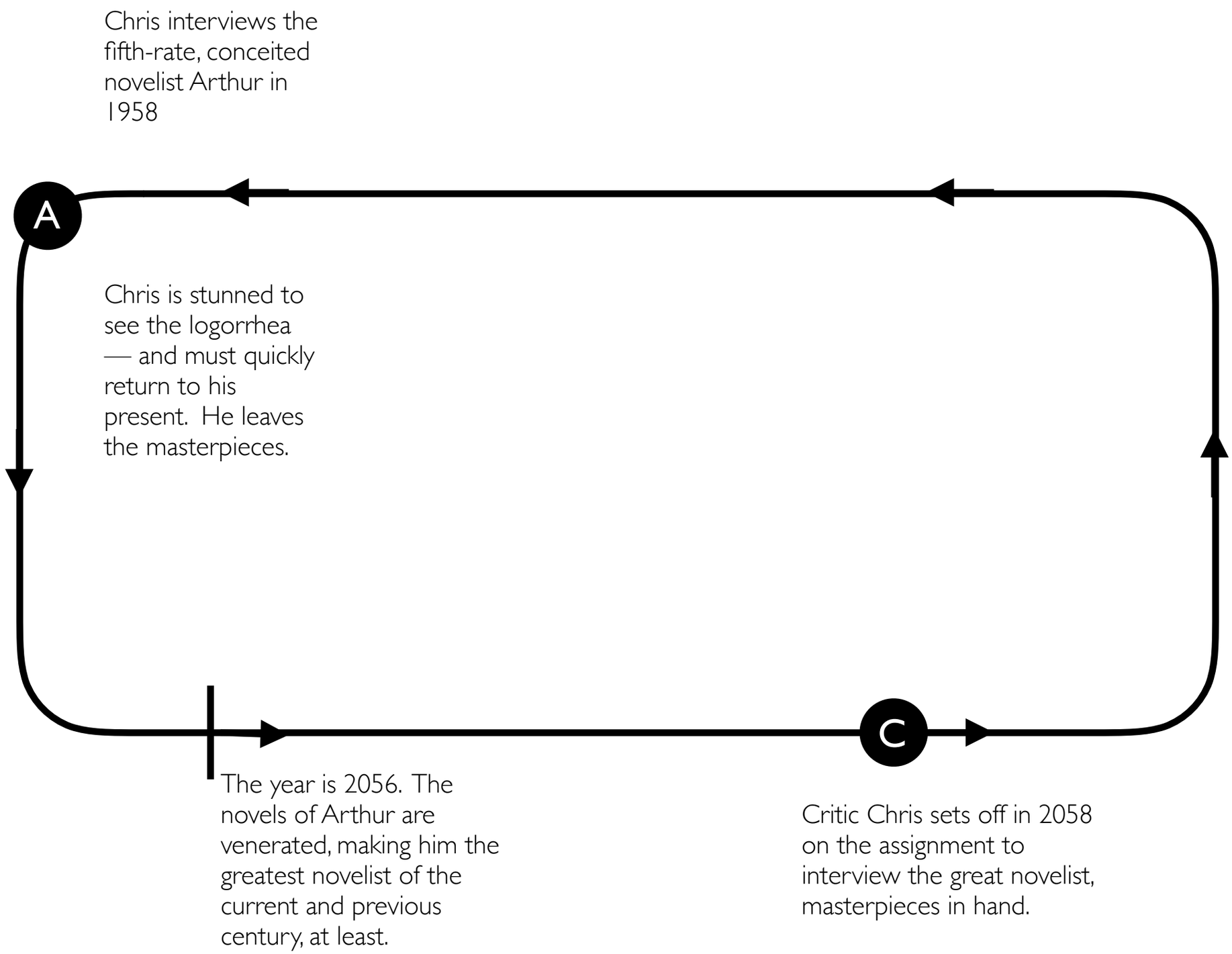

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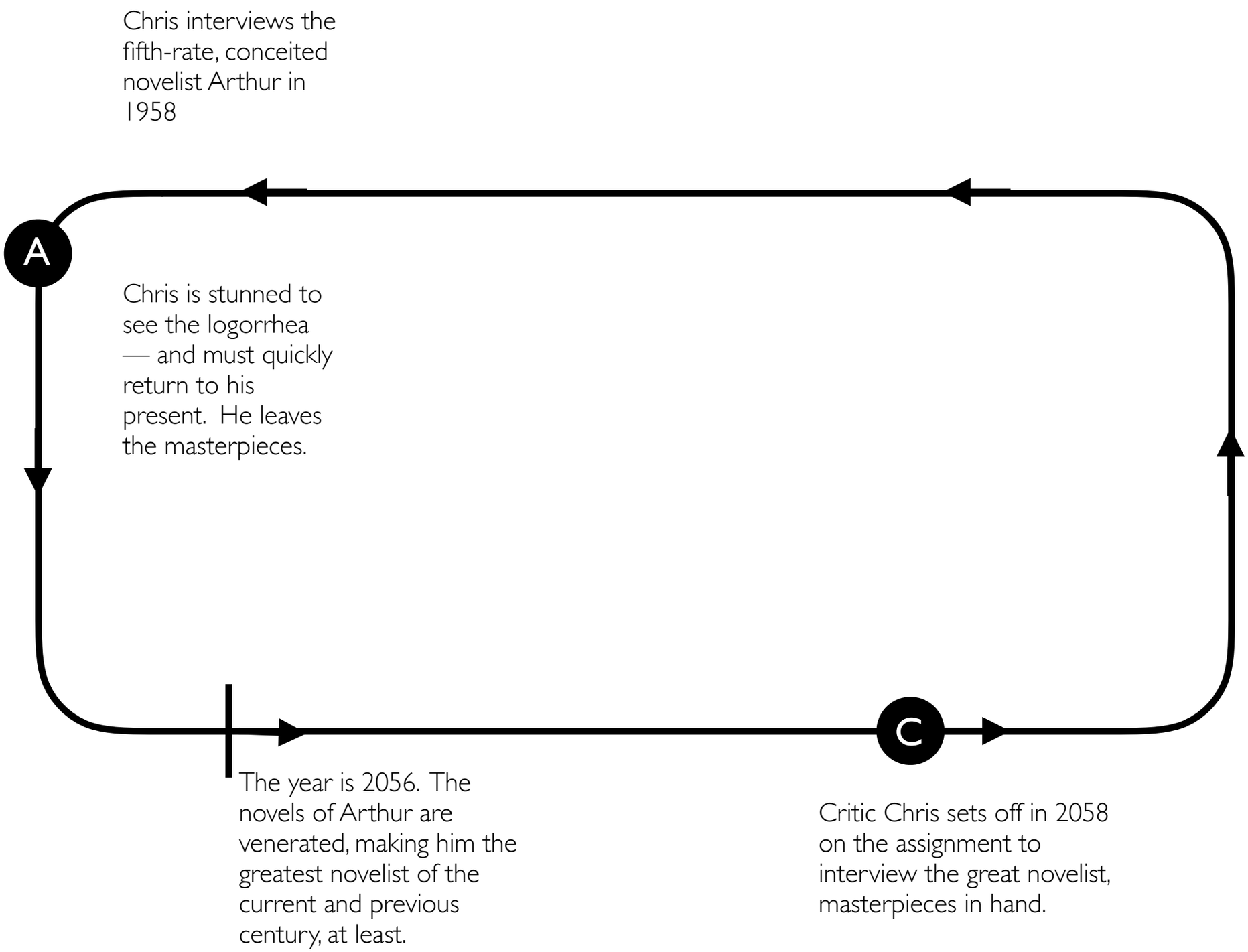

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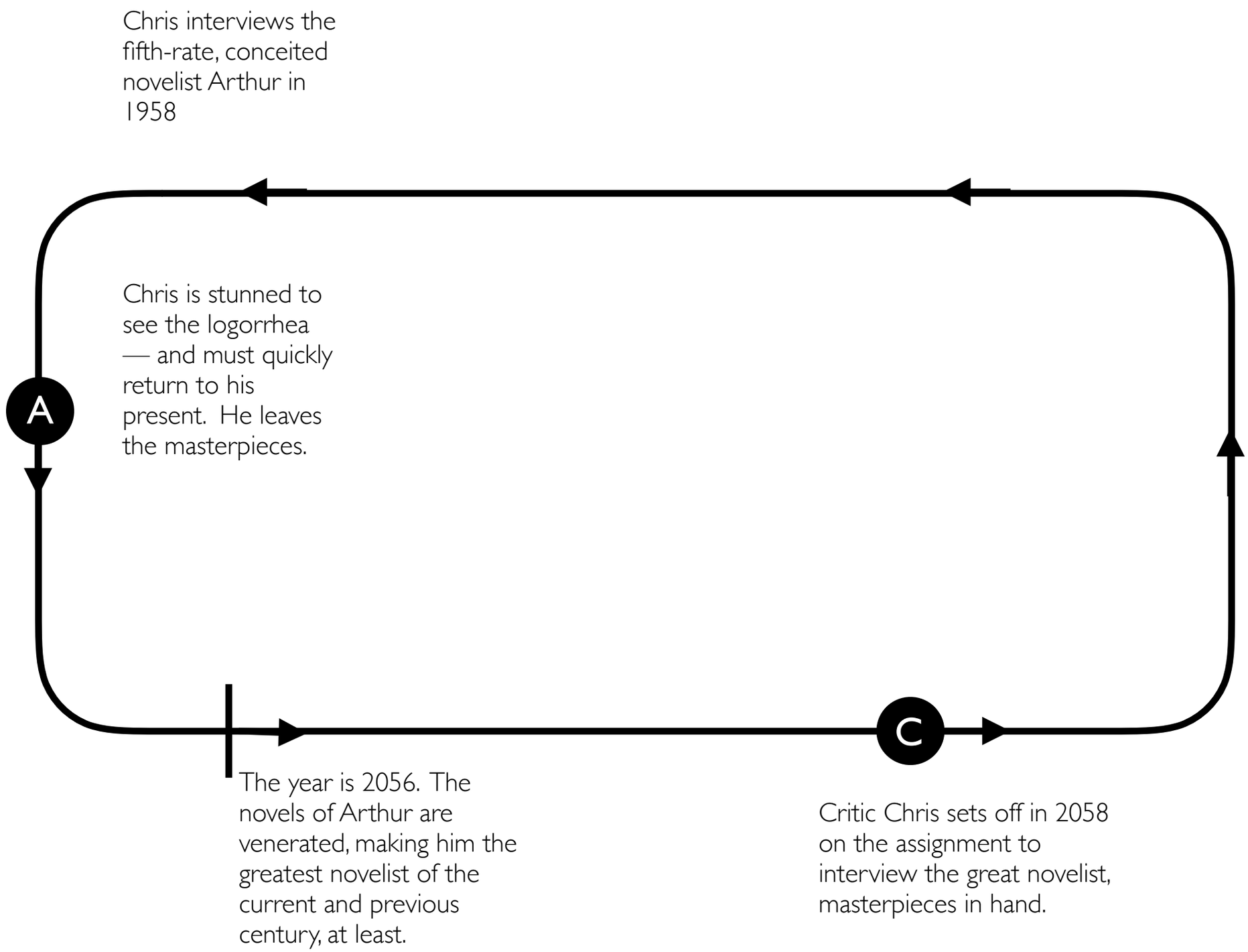

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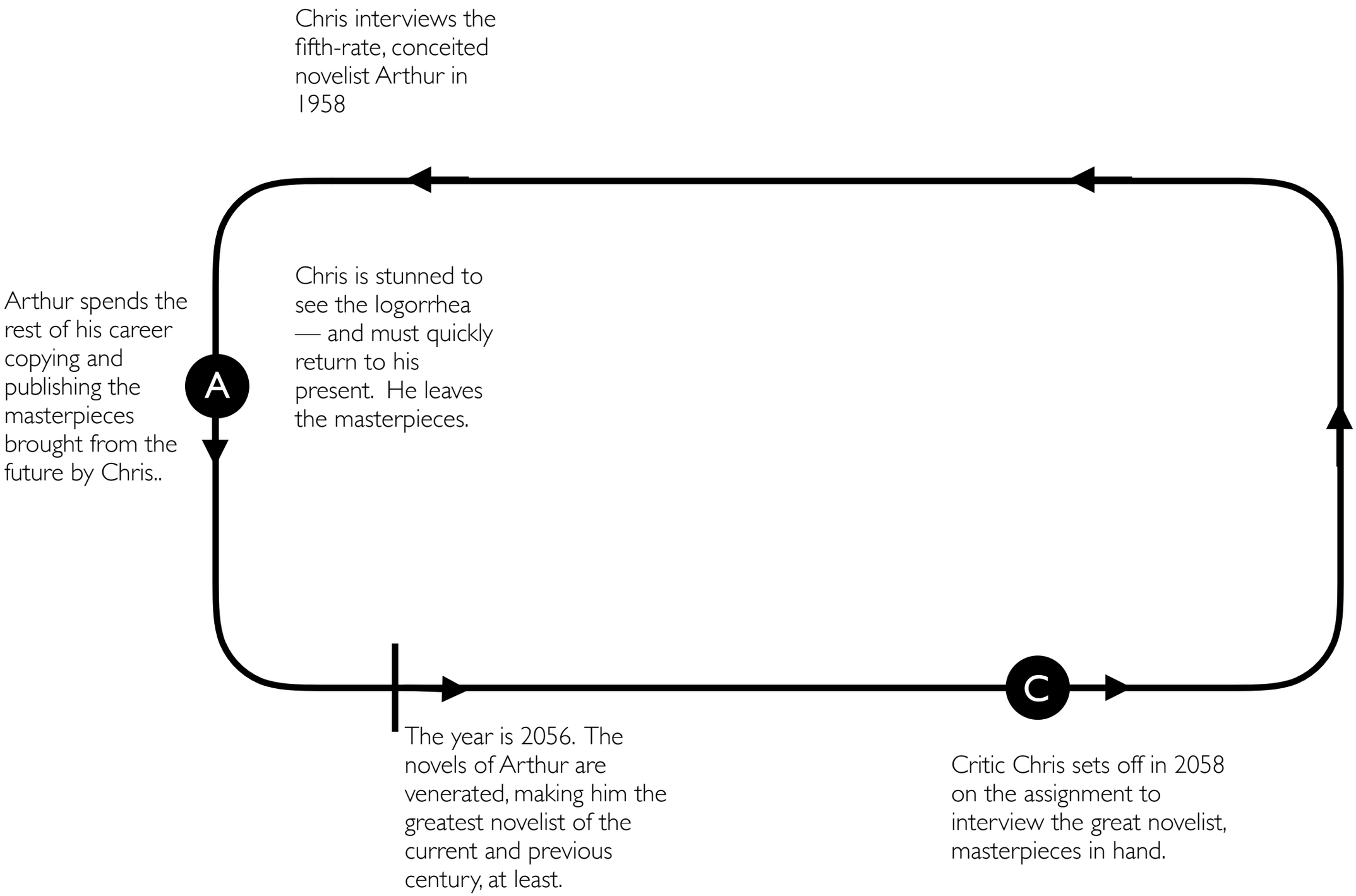

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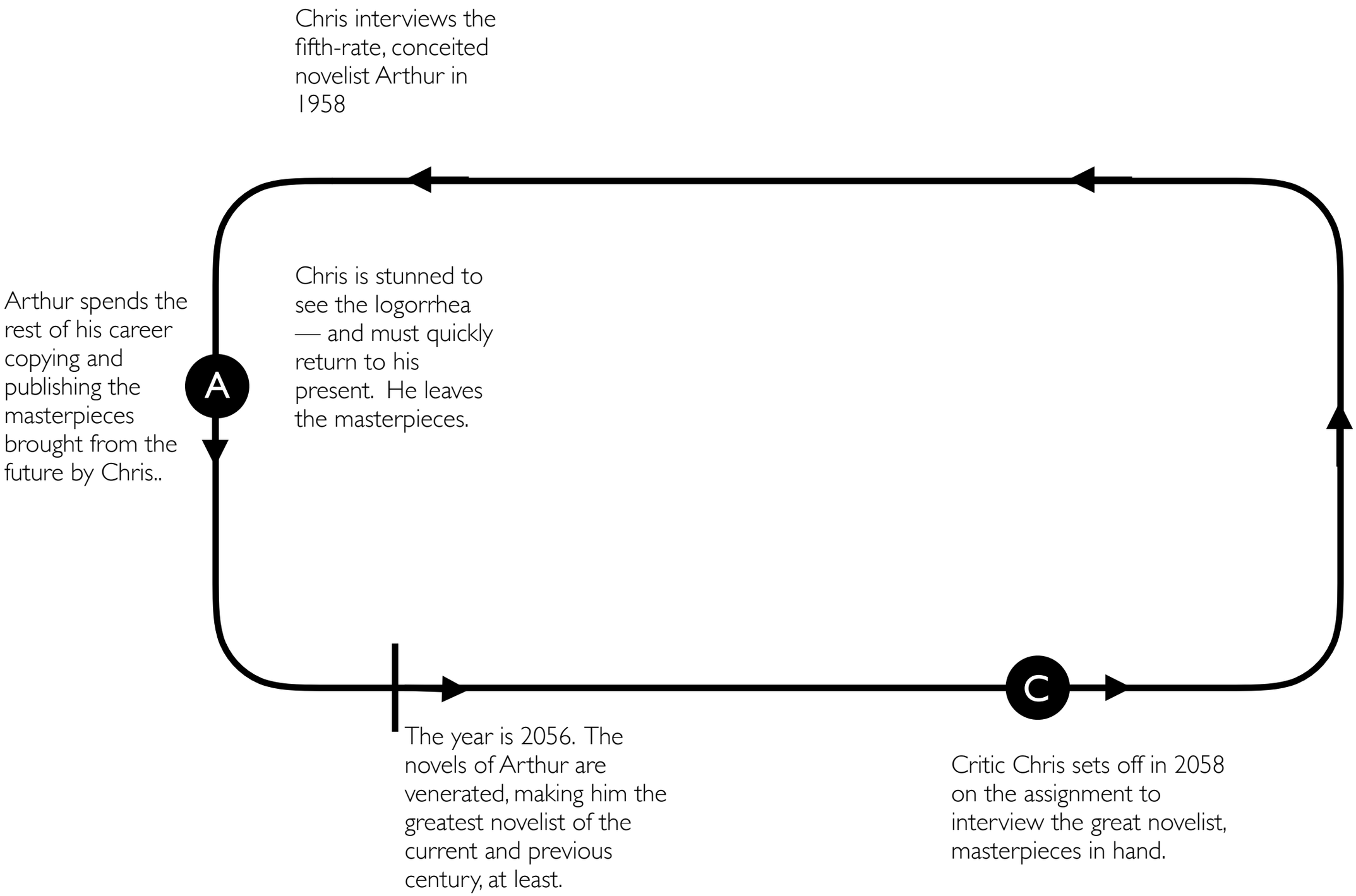

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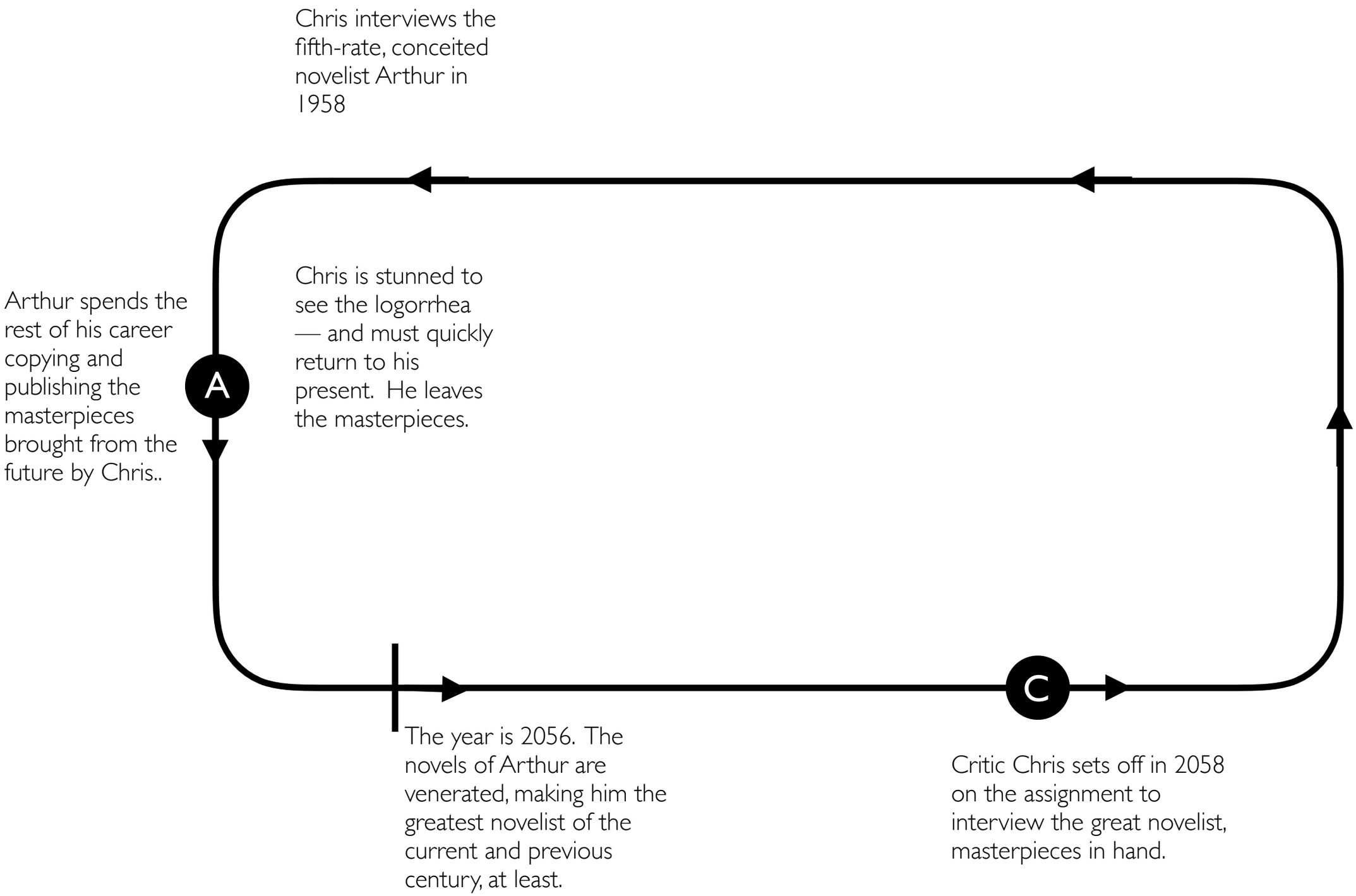

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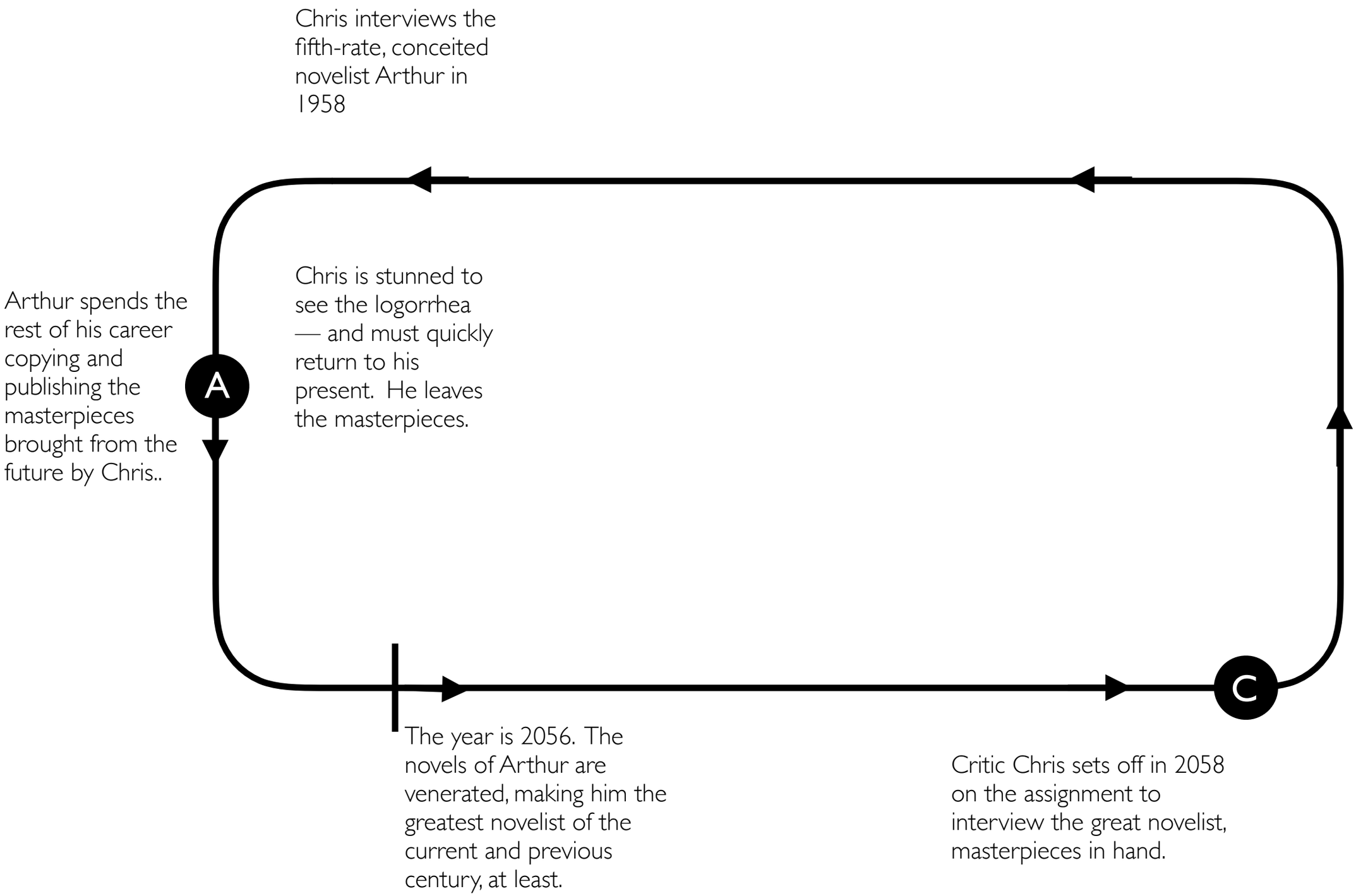

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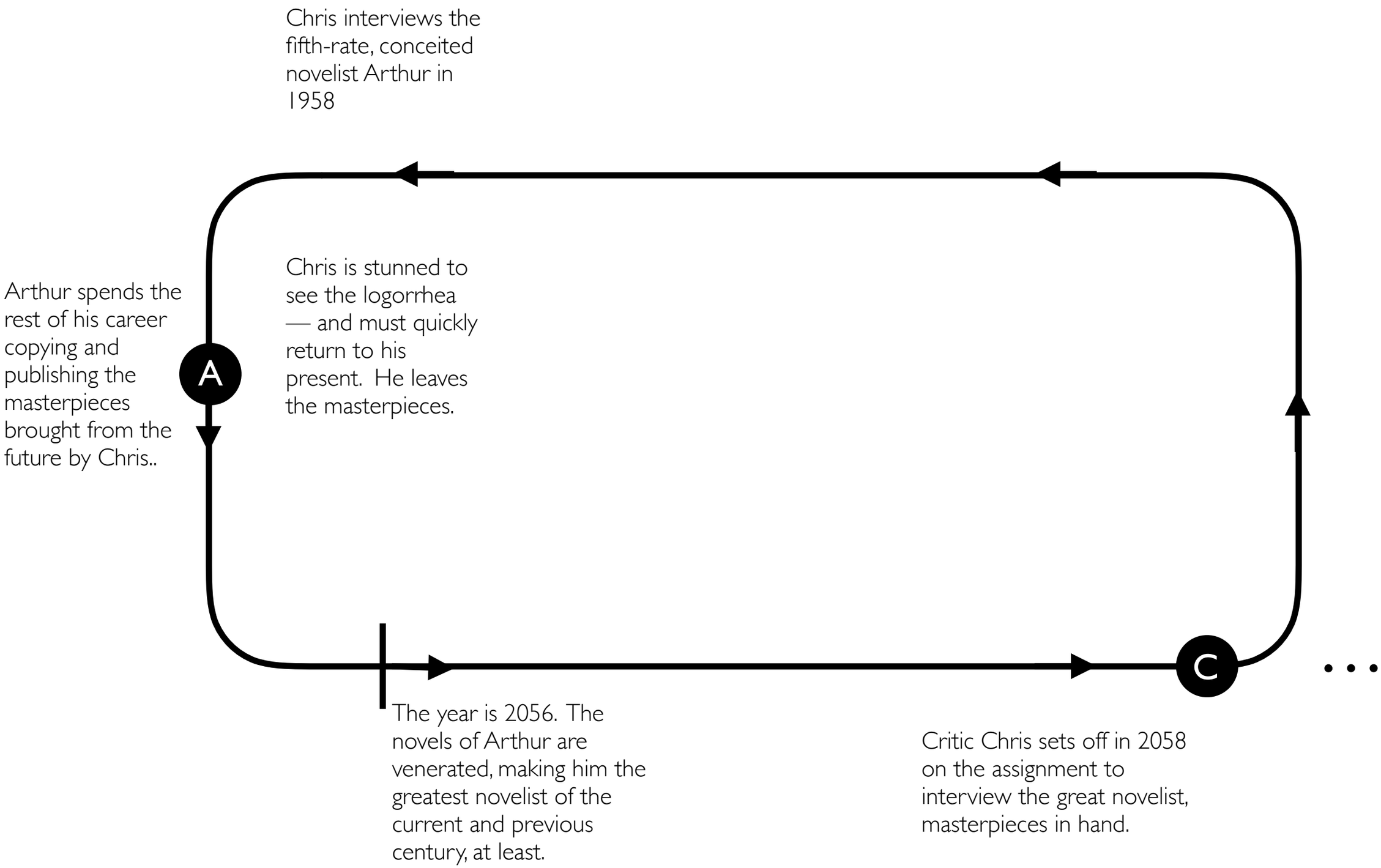

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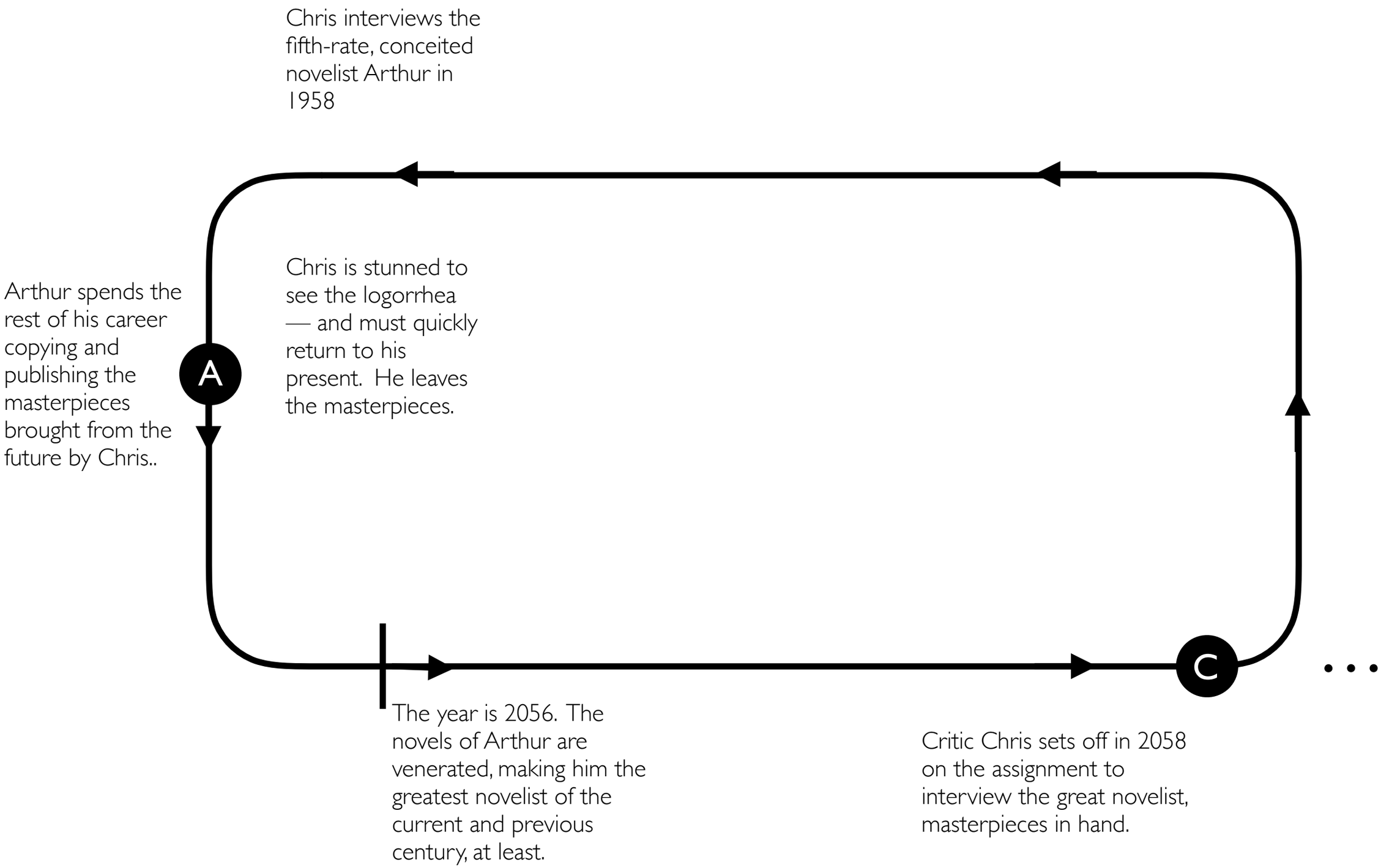

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E.g., (599 w)

But I had seen first one and then another of the rooms in which I had slept during my life, and in the end I would revisit them all in the long course of my waking dream: rooms in winter, where on going to bed I would at once bury my head in a nest, built up out of the most diverse materials, the corner of my pillow, the top of my blankets, a piece of a shawl, the edge of my bed, and a copy of an evening paper, all of which things I would contrive, with the infinite patience of birds building their nests, to cement into one whole; rooms where, in a keen frost, I would feel the satisfaction of being shut in from the outer world (like the sea-swallow which builds at the end of a dark tunnel and is kept warm by the surrounding earth), and where, the fire keeping in all night, I would sleep wrapped up, as it were, in a great cloak of snug and savoury air, shot with the glow of the logs which would break out again in flame: in a sort of alcove without walls, a cave of warmth dug out of the heart of the room itself, a zone of heat whose boundaries were constantly shifting and altering in temperature as gusts of air ran across them to strike freshly upon my face, from the corners of the room, or from parts near the window or far from the fireplace which had therefore remained cold — or rooms in summer, where I would delight to feel myself a part of the warm evening, where the moonlight striking upon the half-opened shutters would throw down to the foot of my bed its enchanted ladder; where I would fall asleep, as it might be in the open air, like a titmouse which the breeze keeps poised in the focus of a sunbeam — or sometimes the Louis XVI room, so cheerful that I could never feel really unhappy, even on my first night in it: that room where the slender columns which lightly supported its ceiling would part, ever so gracefully, to indicate where the bed was and to keep it separate; sometimes again that little room with the high ceiling, hollowed in the form of a pyramid out of two separate storeys, and partly walled with mahogany, in which from the first moment my mind was drugged by the unfamiliar scent of flowering grasses, convinced of the hostility of the violet curtains and of the insolent indifference of a clock that chattered on at the top of its voice as though I were not there; while a strange and pitiless mirror with square feet, which stood across one corner of the room, cleared for itself a site I had not looked to find tenanted in the quiet surroundings of my normal field of vision: that room in which my mind, forcing itself for hours on end to leave its moorings, to elongate itself upwards so as to take on the exact shape of the room, and to reach to the summit of that monstrous funnel, had passed so many anxious nights while my body lay stretched out in bed, my eyes staring upwards, my ears straining, my nostrils sniffing uneasily, and my heart beating; until custom had changed the colour of the curtains, made the clock keep quiet, brought an expression of pity to the cruel, slanting face of the glass, disguised or even completely dispelled the scent of flowering grasses, and distinctly reduced the apparent loftiness of the ceiling.

PP “Disproof” of Backwards Time Travel

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4. Contradiction!
5. Hence, backwards time travel in the form of CTCs *isn't* possible.

The “Multiverse Escape” Again?

In the art critic, story quantum mechanics allows events, from the participants' perspective, to occur much as Dummett describes. The universe that the critic comes from must have been one in which the artist did, eventually, learn to paint well. In that universe, the pictures were produced by creative effort, and the reproductions were later taken to the past of another universe. There the paintings were indeed plagiarized—if one can be said to plagiarize the work of another version of oneself—and the painter did get “something for nothing.” But there is no paradox, because now the existence of the pictures were caused by genuine creative effort, albeit in another universe. (Deutsch & Lockwood 1994, p. 74)

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Says who? From where? This is *ad hoc*.

{ 21 }

An Insoluble Problem

In a paper published in 1986, Michael Dummett envisages the following situation.[1] A fifth-rate but conceited artist living the 20th century is visited by a time traveler from the 21st century, an art critic who is impressed by those of the artist's works that have survived and have given him the reputation of being one of the greatest painters of his time. When the critic sees the works, he is disappointed by their quality, and realizes that the artist has yet to create the magnificent paintings that subsequently made him famous. The critic produces a portfolio of reproductions of the later works, but shortly after has to depart at short notice, being permitted for some reason to remain only for a limited time in the past. The artist manages to conceal the portfolio, and spends the rest of his life meticulously copying on canvas the reproductions left behind. These copies form the basis of his subsequent artistic renown.

Is there a problem here? Yes. The whole subject of time travel is rife with problems. As Kurt Gödel showed in 1949, there exist solutions to Einstein's equations of general relativity that permit the existence of closed timelike loops, along which time travelers could, in theory, travel.[2] It goes without saying that such travel cannot, without contradiction, permit the occurrence of events that would negate the very possibility of the voyage itself. For instance, a traveler who visits the past could not kill his or her own grandmother. On this see Lewis (1976). However, barring such limitations, time travel is physically possible. The critic does not *change* the past in any way, though he may be said to *influence* it (Horwich, p. 116). Nothing prevents the art critic from visiting the artist, nor the artist from copying the works that make him famous. The puzzle lies not in this, but in finding where artistic creativity enters the equation.

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[1] See Dummett (1986), p. 155. I am indebted to Friedel Weinert for drawing my attention to

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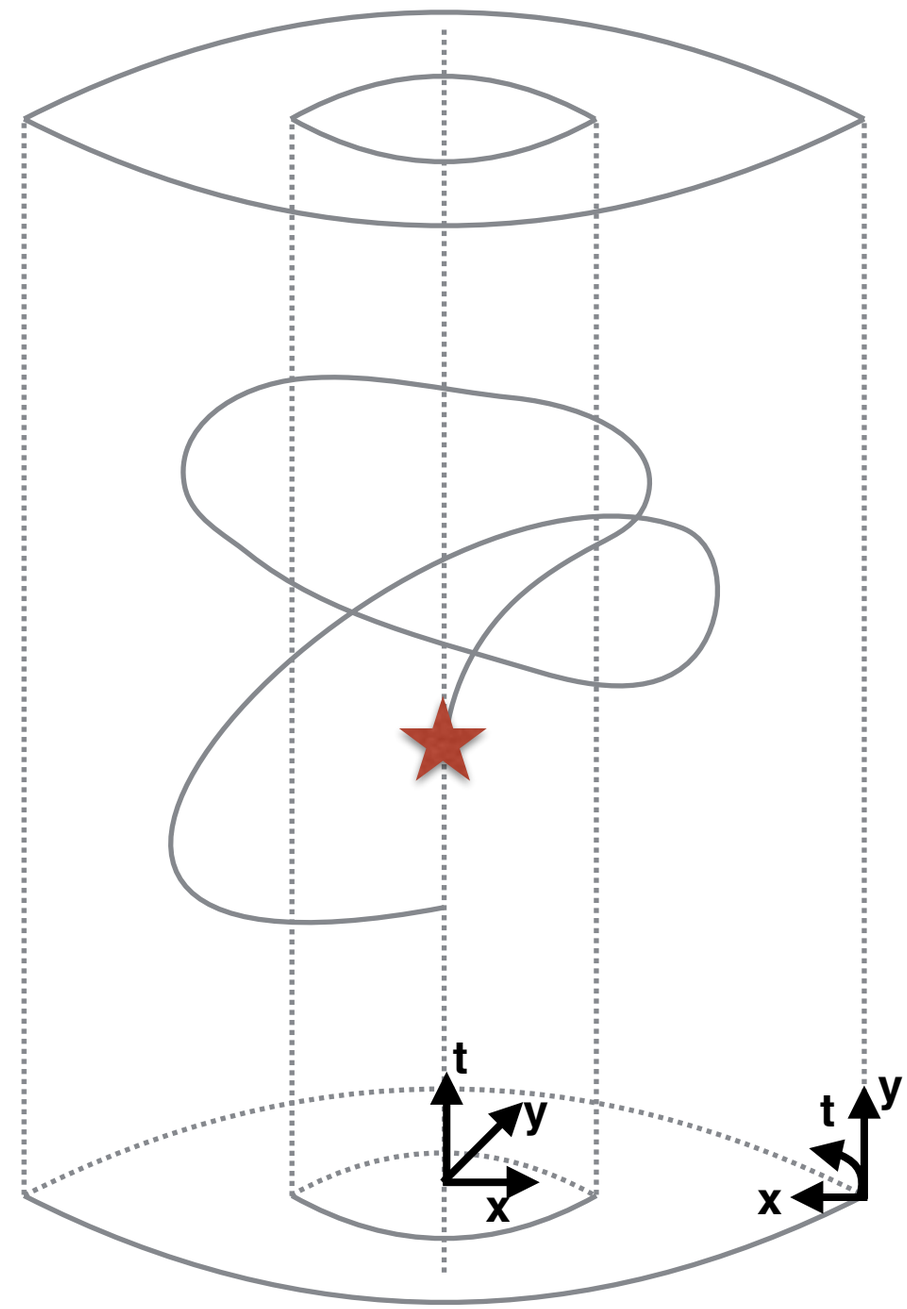

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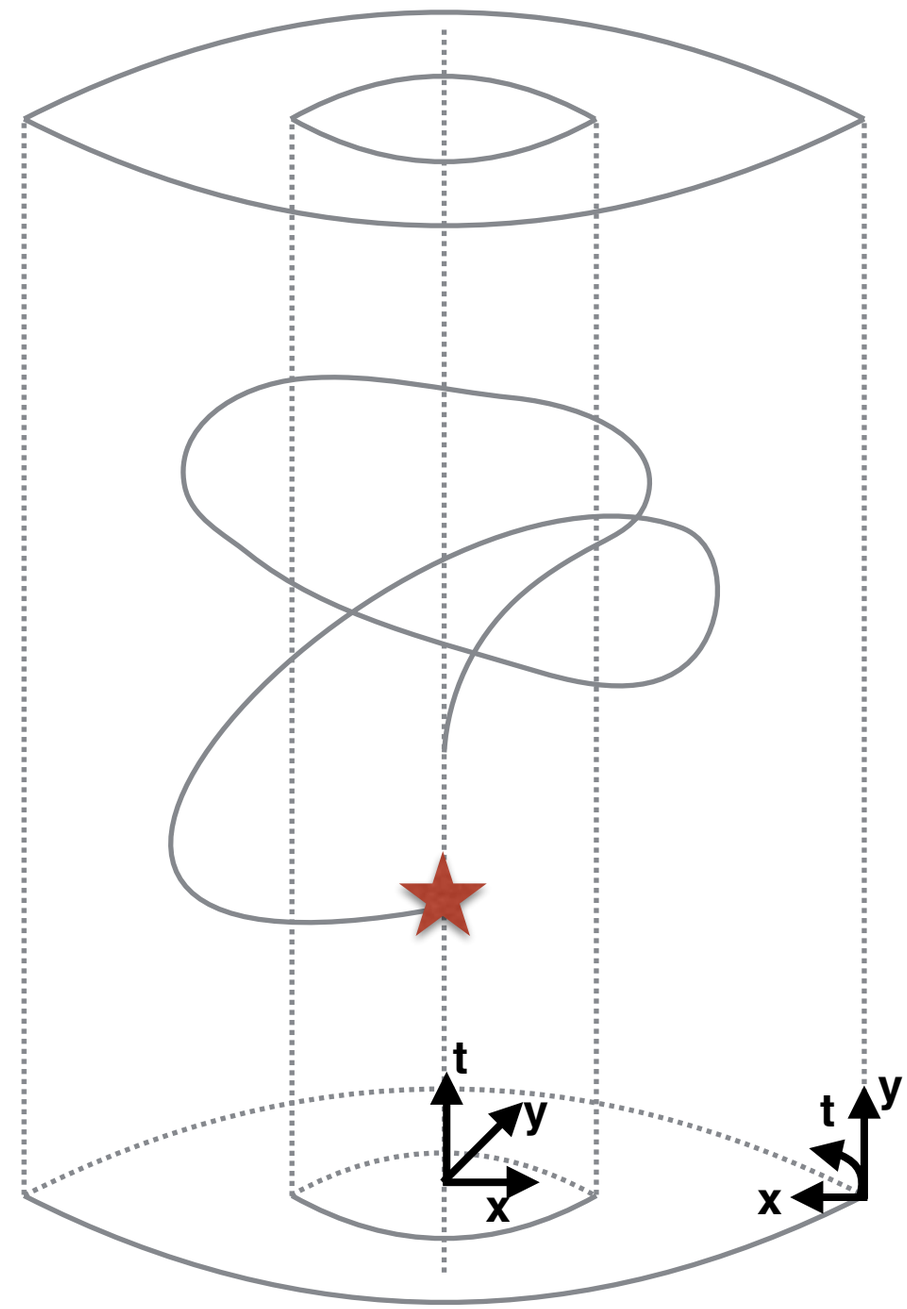

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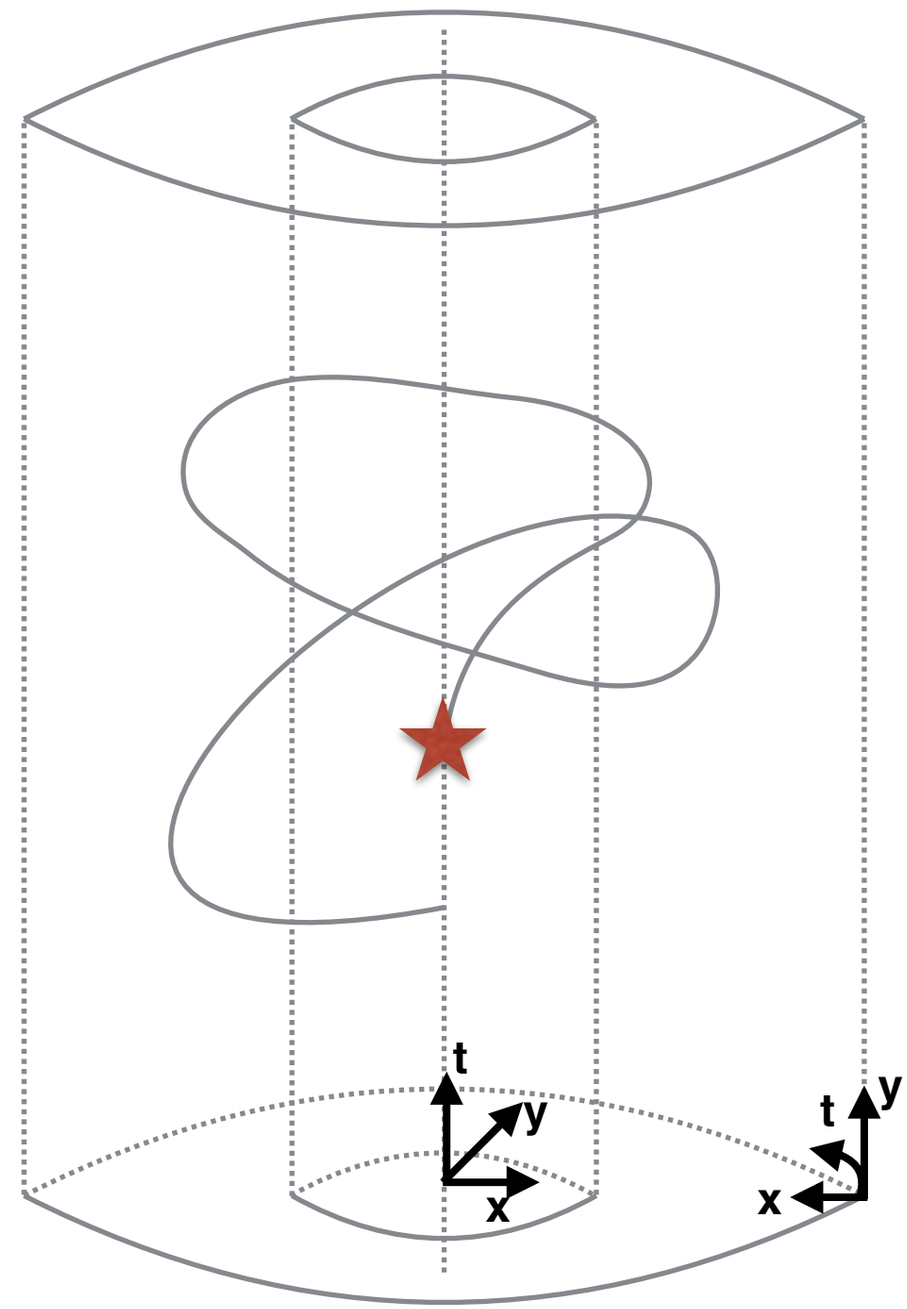

Gödelian Time Travel

$$R_{\mu\nu} - \tfrac{1}{2} R\, g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

- Inner cylinder: vertical time axis
- Outer cylinder: circular time axis; wraps around the inner cylinder
- In Gödel's best-known actual solution, the transition between the two cylinders is gradual.
- At every instant, the world-line of the particle (red star) is oriented toward the future (remains within local light-cones).