

Josh Gordonson  
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Prof. Raman

## On Contradictions in the Labyrinths of Time

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In Jorge Luis Borges' short story, "The Garden of Forking Paths", the two theories concerning the nature of temporal existence seemingly contradict each other. Dr. Yu Tsun, the narrator of the story, provides soon-to-be wrongdoers with console based on the deterministic nature of their future. That is, the future is already decided, so there is no reason to toil over the ethics of their proposed actions. Later, Dr. Stephen Albert reveals the nature of the universe as seen from the eyes of Yu Tsun's ancestor, Ts'ui Pen. Albert's interpretation of Ts'ui Pen's work predicts the existence of multiple 'presents' that traverse every possible time line, forking and merging at every possible intersection of time and space-state contained within the set of time lines. The implication of Ts'ui Pen's universe is absolute freedom of choice through time within the realm of the possible, since every node in space-state is connected to every possible time line. The contradiction between Dr. Tsun and his ancestor's models of the universe lies in the disparity on free will. However, additional analysis allows Dr. Tsun's predetermined world to fit within his ancestor's universe in perfect [maze] harmony.

In taking a closer look at the way that Albert and Ts'ui Pen describe their notion of the universe, the deterministic nature of said universe can be proven compatible with that of Yu Tsun's. In the story, Albert claims that Ts'ui Pen's magnum opus - his book and labyrinth - are one in the same. Albert's argument is sourced from three clues that Ts'ui Pen left behind: his plan to create a truly infinite labyrinth, a letter, and his *Garden of Forking Paths*. With these clues, which arguably amount to a sufficient quantity of evidence, Albert convinces Yu Tsun of his ancestor's epiphany – the reality of an all-encompassing set of possible existences that persists in time and space-state. In terms of evidence, although Yu Tsun is satisfied with the two clues and the nature of Ts'ui Pen's book, there are several instances where the 'universe of forking paths' is invoked in the short story. Yu Tsun's quick adoption of Ts'ui Pen's universe, along with the

additional support for Ts'ui Pen's theory found elsewhere, provides a sound argument that the universe of forking paths is the dominating theory in Borges' short story. However, an intuitive understanding of how these models represent the universe, particularly with respect to the role of the 'present', is necessary to see the similarities between the flexible (Ts'ui Pen) and rigid (Yu Tsun) models. If each 'present' represents one possible space-state of the universe, then motion along a particular time line would allow that space-state to evolve in ways that are familiar to everyone (you exist on one of these time lines in one present, with everything else in the universe). Finally, using the rigid model as a building block, the flexible model is easily constructed using the properties of superposition.

In the description of his research, Albert reveals that he began his search with two leads, “One: the curious legend that Ts'ui Pen had planned to create a labyrinth which would be strictly infinite. The other: a fragment of a letter I discovered.” (Borges 25) The first lead sends Albert on a mental quest to determine how a truly infinite labyrinth could be constructed. The issue at hand is clear – any physical labyrinth has some maximum number of paths, which establishes a finite number of ways to navigate it. Even braided mazes, where paths intersect and loop each other (one could imagine walking in a loop for eternity), are not infinitely complex, as they can be mapped and defeated with some effort. In order to accomplish a physically infinite labyrinth, Ts'ui Pen would have to create a labyrinth of infinite paths either by extending the labyrinth indefinitely, or have an indefinite number infinitesimally small paths in a finite space. In finding the prospect of physical labyrinths implausible, Albert turns to textual labyrinths. The cognitive nature of textual interpretation is easily able to embody the concept of an infinity, as demonstrated by Albert's cyclic book, “... I had questioned myself about the ways in which a book can be infinite. I could think of nothing other than a cyclic volume, a circular one.”

(Borges 25) Conceptual recursion provides Ts'ui Pen with an attainable way to produce an infinite text, similar in effort and effect to creating an infinite loop within a labyrinth. Although, a circular book is still not an infinite labyrinth, since it too can be mapped and thus defeated. On the same vein of recursion, Albert eventually dreams up a cyclic story where, on every pass, the text is altered (added to or modified). In this situation, the text grows without bound, allowing for a truly infinite text. However, it's not until Albert reads Ts'ui Pen's letter that he realizes how an infinite text can, too, function as a labyrinth.

Ts'ui Pen's letter is the key to the *Garden of Forking Paths* and Ts'ui Pen's model of the universe, in that it creates context which suggests using time as another dimension. Albert focuses on the one sentence that Ts'ui Pen left behind, "I leave to the various futures (not to all) my garden of forking paths." (Borges 26), in order to determine the significance of the *Garden*. The parenthetical text, "(not to all)", is of particular interest, as it reveals Ts'ui Pen's notion of the multifaceted time line of the universe. In suggesting that there are various futures, some of which are without the *Garden of Forking Paths*, Ts'ui Pen is claiming that there are also various presents, and pasts that are unknown to the particular present in which one exists. That is, there are pasts, presents, and futures in which Ts'ui doesn't exist, let alone his extraordinarily chaotic book. With this notion, Albert sees that Ts'ui Pen's *Garden*, labyrinth, and book are all synonymous, "Almost instantly, I understood: 'the garden of forking paths' was the chaotic novel; the phrase 'the various futures (not to all)' suggested to me the forking in time, not in space." (Borges 26). The forking in time mentioned here is one representation of the countless time lines (ie. pasts, presents, and futures) that exist in Ts'ui Pen's 'flexible' model. Additionally, the forks in time evoked by the *Garden* suggest a novel structure that somewhat resembles a labyrinth.

Albert tests his hypothesis (the *Garden* 'grows' around the forking time lines that form its

structure) by re-reading the *Garden* while paying attention to time, and claims to successfully interpret the meaning of the novel. Through his investigation, he finds one particular fact to help prove his point: the omission of the word 'time' in the *Garden*. The clear intent to omit 'time' leads him to believe that, as in other riddles, the *Garden* omits the word because 'time' is the answer to the *Garden's* chaos. With this notion, he deduces that Ts'ui Pen attempts to show the world his model of the universe through the *Garden*, “*The Garden of Forking Paths* is an incomplete, but not false, image of the universe as Ts'ui Pen conceived it.” (Borges 28). Excerpts from the *Garden* explain what Albert means by this, as the *Garden's* structure weaves in and out of different realities, describing different means to the same end.

Since the *Garden* and Ts'ui Pen's flexible model are intertwined, the structure of the *Garden* provides insight into that of the flexible model and vice versa. There are various plausible forms that Ts'ui Pen could have used to structure the *Garden*. For example, one could imagine each chapter detailing the entirety of one 'present', the next chapter a different 'present'. In this case, each chapter would describe the entire time line of one version of the universe, making each chapter infinitely long. This corresponds to a universe of time lines that looked like the real numbers, where each integer represents the next time line, and all of the real numbers between two integers represents an infinite series of points in time. No two time lines intersect, because each time line is shifted in time by an eternity. Alternatively, Ts'ui Pen could have written each chapter to cover a finite amount of time in one 'present', the next chapter in another 'present', ad infinitum. Here, the book interleaves the time lines of each possible existence, creating the effect that each time line is occurring simultaneously when observed far enough away. This corresponds to a network of time lines that may intersect, since each time line may be time shifted from another time line by a finite amount of time. According to Albert, Ts'ui

Pen's universe was similar to the latter, "He believed in an infinite series of times, in a growing, dizzying net of divergent, convergent and parallel times." (Borges 28). This quote nearly rules out the former of the two structures that were discussed above, but does not necessarily suggest the latter. Since the novel was written on a finite number of pages, neither of the two structures mentioned above could perfectly fit the current *Garden*. Rather, since the *Garden* is unfinished (and its structure is never mentioned in the short story), its actual structure is indeterminable.

Additional support for the flexible model is found in a few instances where characters seem to repeat themselves in a way that the flexible model explains. In one example, Dr. Albert's statement about Ts'ui Pen's decision to write a book and build a labyrinth is strangely stated in a way that could be interpreted with the flexible model, "Ts'ui Pen must have once said: *I am withdrawing to write a book*. And another time: *I am withdrawing to construct a labyrinth*." (Borges 25). Albert continues to comment on the synonymous nature of the book and the maze, "Everyone imagined two works; to no one did it occur that the book and the maze were one in the same thing." (Borges 25), which makes it seem as if the former two statements were actually one in the same, just distorted by Ts'ui Pen's labyrinth of time. The slight disagreement in the two statements, much like the tale of the two armies, fits nicely within the *Garden*, as well. Another instance is the repeated scene where Dr. Albert retrieves Ts'ui Pen's letter. In the first scene, Albert initiates retrieving the letter, and Yu Tsun has not yet learned of the flexible model, and so he is unaware of the multiplicities of his existence in the universe. The second time around, Yu Tsun understands the nature of his existence, and so he knows that he may be able to merge the time line of his existence with that of the recent past. In this understanding and navigation of his ancestor's labyrinth, he is able to re-invoke Albert's retrieval of the letter, to Albert's demise. Lastly, the story is being told through the words of Yu Tsun, who has already

experienced this portion of his life. However, there is no reason for Yu Tsun to record the past as it had happened, since he knows that every possible past that could have led him to this point would be a plausible past to record. However, from the reference point in which the story is the present, Yu Tsun tells the story from the future. Thus, in order for the story to be told, the story version of Yu Tsun is required to take the path that would bring him to that point in the future, otherwise the story would not exist. Although the latter of these two is a weak argument, the recursion found in both these examples is characteristic of the flexible model, and the *Garden*.

An intuitive notion for the general form of Yu Tsun and Ts'ui Pen's models will aid their analysis. There are two components to each model: the present and the time line. The present, also referred to as 'now', can be thought of as an infinitesimally small point sphere in which experience and perception occur. Since only matter is able to 'experience' or 'perceive', any collection of matter may be encapsulated by the present, which guides that matter along its time line. The time line is a linear track through time that allows the present to traverse space and time in a manner that obeys the laws of nature (Time lines must obey the laws of nature, or otherwise determine the laws of nature, as time and space should always agree to prevent the creation of discontinuities in space-time). There are two major variables that a given model can adjust: the matter encapsulated within the present and the structure and quantity of the time line(s).

The two models presented in the short story, Yu Tsun's rigid model and Ts'ui Pen's flexible model, share the common set of 'components', yet differ in their structure. Towards the beginning of his story, Yu Tsun makes several comments on time frame, his subjective point of view, and the deterministic nature of time lines. After learning of Runeberg's death, and his assassin, Yu Tsun reflects on his situation,

“It seemed incredible to me that that day without premonitions or symbols should be the one of my inexorable death ... was I—now—going to die? Then I reflected that everything happens to a man precisely, precisely *now*.” (Borges 20)

In his reflection, Yu Tsun realizes that 'now' is the point in time when all experience occurs. It is a singular instance during which the state of the universe is frozen, allowed to propagate for another instant, then frozen again. Instead of worry about when he was going to die, Yu Tsun envisions himself as a point (the point 'now') on his own time line, following his line every which way it will go, “Centuries of centuries and only in the present do things happen; countless men in the air ... and all that really is happening is happening to me” (Borges 20). For Yu Tsun, the present, or the now, encompasses only himself. Two pages later, after Yu Tsun has thwarted Madden's efforts (if only just for forty minutes), he reflects on his first 'victory' and the ethics of his plan. Empowered by his luck, yet disgusted by the atrocity that he will soon inflict on his victim, Yu Tsun offers those in his position some reassurance, “The author of an atrocious undertaking ought to imagine that he has already accomplished it, ought to impose upon himself a future as irrevocable as the past.” (Borges 22). Yu Tsun's words of comfort suggest that the time lines in the rigid model are fixed. A representation of the universe based on the rigid model would have a time line for each body of interest, perhaps even each particle, on which the present encapsulates said particle. The time lines could not intersect, as such an intersection implies two particles or chunks of matter existing, experiencing, and occupying the same space. Even if the time lines did intersect, the significance of such an intersection – two particles becoming one, then splitting again – is nil, since both of those particles exist within the same universe.

Ts'ui Pen's flexible model expands to another layer of abstraction, beyond the single universe, which subsequently creates meaning in each time line intersection. From Albert's description of Ts'ui Pen's model, it is apparent that each present encapsulates an entire version, or



space-state of a universe,

“He believed in an infinite series of times, in a growing, dizzying net of divergent, convergent, and parallel times. This network of times which approached one another, forked, broke off, or were unaware of one another for centuries, embraces *all* possibilities of time.” (Borges 28)

With each present holding the entire space-state of a universe, each universe propagates through time as natural law dictates. At nodes, the intersections of one or more time lines, the space-states of multiple universes converge to one space-state for at least an instant, then diverge in all possible ways away from that state (the divergences could plausibly be explained by the instability at each node contributing to the butterfly effect). At these nodes, everything about the intersecting presents, and the universes that they contain, is exactly the same. The immense reduction in entropy that is created as two or more universes become identical produces an inconceivable amount of significance at each node. The flexible model clearly provides a more useful way to look at the multitude of possible time lines as it abstracts away the task of tracking individual particles and allows for easy identification of significant events. However, the rigid model is still valid, creating the appearance of a contradiction in the short story.

To resolve the contradiction, a decomposition of the flexible model can be shown to produce the superposition of an infinite number of rigid models. Given that the flexible model contains a network of time lines that represent every possible present, every possible time line for any present must be traversed (by said present) within the model. This is self-evident, as the only way that every possible present can be included in the model requires the ability for every present to traverse its own time line. Now, if every possible time line is traversed, then each time line can be interpreted as a predetermined path, since the entirety of the time line already exists. This seems to contradict the notion of free will, but free will is simply relocated in determining which present one is in. In order to ignore free will, one simply doesn't ask which present they

are in. Each of the predetermined paths still intersects with other time lines, but does not merge or fork with them by any means. By constructing an entire universe out of a superposition of rigid models, where particles move parallel to one another on time lines that are fixed, it is clear that the two models in fact accommodate one another. Yu Tsun seems to acknowledge that the rigid model encompasses the flexible model towards the end, where he describes the swarm of other presents navigating the garden, then proceeds to kill Albert,

“It seemed to me that the humid garden that surrounded the house was infinitely saturated with invisible persons. Those persons were Albert and I, secret, busy and multiform in other dimensions of time. I raised my eyes and the tenuous nightmare dissolved. In the yellow and black garden there was only one man; but this man was as strong as a statue ... 'The future already exists,' I replied, 'but I am your friend. Could I see the letter again?' ” (Borges 28).

Yu Tsun, enlightened by the Ts'ui Pen's flexible model, begins to imagine the vast possibilities of the presents that he is not a part of. The imagined presents contain innumerable copies of Yu Tsun and Albert exploring the garden, as there must be presents in which those versions of the main characters exist. Though, quickly disturbed by the present that he and Captain Madden belong to, Yu Tsun realizes that the existence of every possible present does not change the present one is in. With that notion in mind, Yu Tsun consoles himself once more before carrying out the duty that brought him to Albert's house in the first place. The last few line in the short story give more evidence that Yu Tsun is aware of the uncountable universes in which he murders his friend in cold blood, “He does not know (no one can know) my innumerable contrition and weariness.” (Borges 29).

The apparent contradiction between Dr. Tsun and his ancestor, Ts'ui Pen's models of the universe springs from the contrast in how each model handles choice. A careful analysis of the short story confirms the validity of Dr. Albert's interpretation of Ts'ui Pen's flexible model. With the flexible model in hand and the development of Yu Tsun's rigid model, a deconstruction shows

how the two are compatible, proving that there is no contradiction on the question of free will in Borges' "The Garden of Forking Paths".