Quantum-Mediated Memory Reconstruction: A Generative Image Pipeline Using Circuit Collapse and Prompt Mutation

Paloma Daniele

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`https://the-botanist.vercel.app/`

Abstract

This report accompanies *The Botanist*, an interactive algorithmic artwork that explores the transformation of personal memory through quantum-inspired computation and generative image synthesis. The work takes the form of a browser-based web application in which the user submits a written memory and receives, in return, a single generated image: a rendering not of the memory itself, but of its altered form after passing through a simulated quantum circuit.

The project begins from a personal and clinical observation—that memory, particularly under the conditions of dementia, does not erase but *substitutes*, filling retrieval gaps with plausible but altered content. Contemporary cognitive neuroscience describes this behaviour not as a pathology unique to dementia, but as an amplified case of the brain's ordinary reconstructive machinery, in which every act of recall is also an act of revision. *The Botanist* implements this logic computationally. The algorithm encodes each character of the input as a rotation angle and applies it to a qubit in a simulated quantum circuit built on IBM's Qiskit Aer framework; Hadamard, RY, and CX gates establish superposition, bias, and entanglement; a single measurement collapses the state into a deterministic bitstring. That bitstring drives a word mutation pass—replacing words with synonyms and injecting modifiers—producing a semantically adjacent but perceptually altered prompt, which is rendered by a latent diffusion model as the final image.

The accompanying report situates this system within a tradition of data-driven and cognitive art practice, drawing direct precedents from Matt Komo's documentary *A Forgotten Life*, Refik Anadol's *Melting Memories* and *Quantum Memories*, and the impressionist painting of Claude Monet. The philosophical frame is the Many-Worlds Interpretation of quantum mechanics: the generated image is understood not as an illustration of the memory submitted, but as the branch into which that memory collapsed.

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1 Introduction

In Summer 2025, my grandmother was admitted to a care home specialising in the treatment of dementia. I watched someone whose memory had shaped my own begin to lose access to hers: first

names, then places, then the thread of narrative itself. Memories she had told me a hundred times began to arrive in altered forms—if they arrived at all. This project began from said observation. I wanted to work with memory not as a subject to be depicted, but as a material to be processed, specifically, with its instability: the way it bends, substitutes, forgets, and reconstructs. Before deciding what to make, I needed to understand what was actually happening in her brain; and by extension: in every brain.

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2 The Memory

Memory can be interrogated from two directions at once. Philosophers ask what it means for a memory to belong to a person and what happens when that belonging begins to thin. Neuroscientists ask what memory is at the level of neural mechanism and what happens when that mechanism starts to fail. The two interrogations converge on the same question from different angles—how an altered memory is still a memory—and the project takes both perspectives seriously. This chapter lays out the scientific ground first and then the philosophical one.

2.1 The Scientific Perspective

What is actually happening in the brain when a memory is retrieved, and what specifically goes wrong when that retrieval begins to fail?

2.1.1 How a Memory Is Formed

Memory formation proceeds through four neural stages. In encoding, sensory input is bound into an associative trace by the hippocampus,[4] and the trace is implemented at the cellular level as long-term potentiation, a durable strengthening of synapses between co-firing neurons.[5] In consolidation, which occurs over hours to days and often during sleep, the hippocampus replays the experience and transfers the trace to cortical long-term storage, actively restructuring it in the process—details fade, patterns generalise.[6] In storage, the fully consolidated memory is distributed across cortical networks as an engram: a configuration of synaptic weights rather than a localised record.[7] In retrieval, recall re-activates a configuration similar to but never identical with the original; each recall is itself a re-firing, which slightly alters the trace. This is the mechanism underlying what Schacter and colleagues have called reconstructive memory.[8] Each of the four stages is a distinct site of failure.

2.1.2 How Dementia Alters Memory

Alzheimer's disease damages encoding and retrieval through hippocampal degeneration: the accumulation of amyloid-β plaques, the loss of synaptic connections, and a sharp decline in adult hippocampal neurogenesis.[9] Recent work suggests amyloid and inflammation converge on a single molecular receptor that triggers neurons to prune their own connections.[10] The biological substrate degrades in a pattern functionally analogous to a neural network losing connections—not silence, but fluent inaccuracy.

2.1.3 Substitution, Not Erasure

The most revealing feature of dementia, for this project's purposes, is not what is lost but what replaces it. Patients rarely go silent; their memory becomes generative. Three clinical mechanisms are well-documented. Semantic paraphasia is the substitution of a semantically related but incorrect word for the intended one, such as *aunt* for *sister*, or *the thing you write with* for *pen*.[11] Confabulation is the unintentional fabrication of memories or statements to fill retrieval gaps, with the speaker fully believing the account is accurate; the brain, unable to reconstruct the original, produces something coherent from what remains.[12] Déjà vécu is the sense that a novel experience has already been lived; patients report specific, detailed recollections of events that never occurred.[13] These three mechanisms share a common structure: the healthy reconstructive process, amplified. Dementia does not introduce distortion; it reveals it.

2.2 The Philosophical Perspective

The philosophy of personal identity has debated for three centuries what a person is when their memories change, and three thinkers frame the shape of that debate for this project.

2.2.1 Locke and the Memory Thread

John Locke (1632–1704), the English philosopher who founded modern empiricism, proposed in his *Essay Concerning Human Understanding* the first formal philosophical account of personal identity: that the self is constituted by the continuity of memory. You are the same person today as you were yesterday because you remember being that person, and the self, on Locke's account, is a thread stitched together by recollection.[1] His position is relevant here because it gives us a precise philosophical vocabulary for describing what dementia does. If identity is memory, then the dissolution of memory is not merely a medical condition—it is, quite literally, the unravelling of the self.

2.2.2 Parfit and Psychological Continuity

Derek Parfit (1942–2017), the British philosopher whose *Reasons and Persons* (1984) reshaped analytic moral philosophy, weakened Locke's position in a useful way. He argued that identity is not a matter of strict continuity but of psychological continuity—overlapping chains of memory, intention, and personality that connect one moment of a life to the next.[2] Identity, for Parfit, is a matter of degree. His framework is relevant to this project because it is what most people implicitly hold: that minor memory drift is survivable, that we are not undone by forgetting a conversation, that the overlap between who we were yesterday and who we are today is sufficient. The question then becomes where the overlap becomes too thin—the sorites problem applied to a life.

2.2.3 Ricoeur and the Narrative Self

Paul Ricoeur (1913–2005), the French hermeneutic philosopher whose *Oneself as Another* (1992) is his major treatment of selfhood, proposed a more fluid answer still: identity is narrative, and a person is not a collection of facts but a story they tell about themselves, continually revised.[3] Revision, for Ricoeur, is essential rather than threatening. His position is relevant because it is the most forgiving of the three, and because it specifies the exact failure mode of dementia: not the loss of facts but the breakdown of narrative itself. A story can tolerate revision. It cannot tolerate incoherence. When a person can no longer connect their past to their present in a legible narrative, what remains is not a self in any meaningful sense.

2.2.4 Where "Yours" Ends

Dementia presses on all three accounts at once. It does not delete memories cleanly; it keeps them and alters them. The speaker continues to speak. The question of when the memory is no longer hers—and when she is no longer herself—becomes a version of the sorites problem, since no single substitution breaks the thread, but many of them, accumulated, do. *The Botanist* stages this question in a single interaction: the user submits a memory and receives an image that is not a rendering of what they wrote but of its altered form. Whether the returned image is still theirs, or belongs to the branch into which their memory was collapsed, is a live question the artefact deliberately does not answer.

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3 The Concept

I wanted to build a mechanism that does to a memory what memory does to itself. You type a memory into a text field. The machine substitutes some words, leaves others alone, and produces an image. The image is not a picture of what you wrote. It is a picture of the altered version—the thing your memory might become after years of re-telling, under the pressure of dementia, or simply

after a lot of time. I wanted the artwork to have three components: an algorithm, a web interface for the user to navigate through, and a generated image at the end.

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4 The Inspiration

Three artists shaped the direction of this work, each engaging the phenomenon described above from a different angle. Matt Komo approached memory loss emotionally, as witness. Refik Anadol approached it technically, as data. Claude Monet—encountered far earlier, and revisited recently—provided the stylistic register: a visual language of perception rather than reproduction. Together, these three reference points form the conceptual armature of *The Botanist*.

4.1 Matt Komo

Matt Komo is an American filmmaker and director whose work often balances commercial polish with autobiographical intimacy. For this project, he matters not only because of the subject he documents, but because of the position from which he documents it: as a grandson trying to preserve a relationship while it is actively being altered by dementia.

4.1.1 *A Forgotten Life*

A Forgotten Life is a short-subject documentary directed, written, produced, and edited by Matt Komo. The film is an intimate portrait of Komo's grandfather Joe, whose Alzheimer's disease had progressed severely over the preceding years. Komo paused his commercial directing career in July 2019—after his grandfather suffered a fall—and spent the next two and a half years making the film independently, driven by the conviction that "if I didn't take advantage of this little window of time I had left with him, I'd regret it for the rest of my life."

The documentary opens with the question: "Where does a memory go when it dies?" From there, it traces Joe's life—his upbringing, his meeting with his wife Violet, the long arc of their marriage, and the slow disintegration of his memory under Alzheimer's. The structure is organised around three components of a memorable moment: the event itself, the feeling attached to it, and the life that forms around its recollection. What gives the film its force is that it never treats memory loss as abstraction. It remains grounded in the daily texture of a family trying to stay in contact with someone who is still physically present but increasingly inaccessible.

For this project, *A Forgotten Life* provided the emotional threshold. Its central question—where

a memory goes when it fades or dies—became the point of departure for *The Botanist*. Komo's film does not answer that question analytically; it dwells inside it. That refusal of resolution was important. It suggested that memory loss could be approached not only as a medical condition to be explained, but as an experiential and emotional reality to be given form.

4.2 Refik Anadol

Refik Anadol has been one of my favorite artists for as long as I can remember. He's a Turkish-American media artist and director based in Los Angeles. His core idea is simple and radical: data has an aesthetic, and it can be made to feel. He collects massive datasets (archives, sounds, brainwaves, nature imagery), trains custom AI models on them, and then visualises the results as fluid, living sculptures—projected onto buildings, displayed on giant LED walls, or installed in museums. He calls the AI his "thinking brush" and the data his "pigment." His studio of extasciitilde30 people has processed over 4 billion images and trained 300+ AI models since 2016.

4.2.1 Melting Memories

Melting Memories (2018) made the invisible architecture of recollection visible. Working with neuroscientists at UCSF, Anadol fitted subjects with EEG headsets and asked them to focus on a specific childhood memory. The resulting brainwave data—beta and theta frequencies—was processed mathematically and rendered as morphing, cloud-like forms on a large LED wall. In the terms established in the previous section, the piece proposes that *reconstruction itself has a shape*: that the physiological process of remembering can be externalised as image. This is the core technical proposition that *The Botanist* inherits.

Figure 1: Reference images from *Melting Memories*.

4.2.2 Quantum Memories

Quantum Memories (2020) extended the same question to a cosmic register. Anadol fed over 200 million photographs of nature, combined with Google's quantum computing research data, into a generative adversarial network. The key element was *quantum noise*—the random, irreducible fluctuations that occur at the subatomic level. In classical computing, randomness is simulated; in quantum computing, it is real, generated by the unpredictable behaviour of particles. Anadol used this as a generative seed, feeding genuine quantum randomness into his models to produce what he termed "noise-generated datasets." The resulting images carry a quality of uncertainty that is not aesthetic pretence—it is encoded in their mathematical substrate.

Figure 2: Reference image from *Quantum Memories*.

The philosophical frame of *Quantum Memories* was the Many-Worlds Interpretation of quantum mechanics, which holds that every quantum measurement spawns a parallel reality. Anadol's implicit question was: *what does nature look like in a parallel world, as imagined by a machine that has learned from ours?*

These two works together define the technical vocabulary of the present project. *Melting Memories* established the proposition that memory is externalisable as image. *Quantum Memories* introduced the use of quantum computation as a creative, non-deterministic engine—and the Many-Worlds Interpretation as a philosophical frame for understanding the output not as a correct answer, but as a branch. *The Botanist* draws from both.

4.3 Claude Monet

Claude Monet has been a reference point for me since childhood. A recent visit to the National Gallery in London made me want to use his artwork as a stylistic point of reference. One painting in particular, however, carries the weight of this project more than any other in his body of work—and it does so not on its own, but in pair with a second painting made eleven years later.

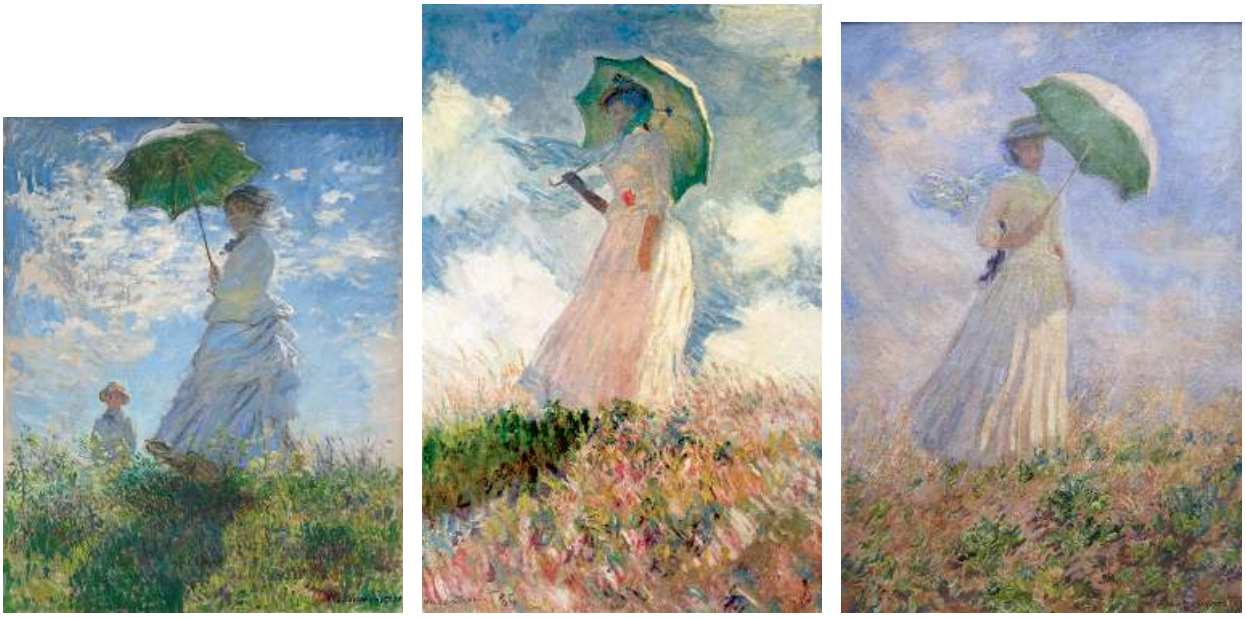

Figure 3: Claude Monet's *Woman with a Parasol—Madame Monet and Her Son* (1875), *Woman with a Parasol, Facing Left* (1886), and *Woman with a Parasol, Facing Right* (1886).

4.3.1 Woman with a Parasol (1875)

Woman with a Parasol—Madame Monet and Her Son, painted in 1875, shows Monet's wife Camille and their young son Jean on a windy summer afternoon in Argenteuil, where the family was then living. At 100 by 81 centimetres, it is Monet's largest figure work of the 1870s. The composition is deliberately informal: Monet intended the scene to feel spontaneous, a casual family outing rather than a posed portrait, and he painted it outdoors—an atypical method for figure painting at the time, when portraits were almost always produced in studios. The brushwork is quick, the light mobile, the figures caught mid-stride as if their walk had been briefly interrupted so the painter could capture them. It was one of eighteen works Monet exhibited at the second Impressionist exhibition in 1876, and has since become one of the most recognisable images in Impressionism.

What matters for this project is the specificity of what the painting captures. The figure at its centre is *Camille*—a particular woman, on a particular afternoon, rendered with enough detail that her face and posture are individual rather than generic. This is the memory at the moment it is being formed: not yet a memory, but an experience, being recorded with the precision that only the present allows.

4.3.2 Woman with a Parasol, Facing Left (1886)

Camille Monet died in 1879 at the age of thirty-two. Seven years later, long after Monet had remarried Alice Hoschedé and moved with her and her children to Giverny, he returned to this

exact composition. He painted not one but two reworkings—a woman in a white dress, parasol in hand, standing on a hillside against a clouded sky. One version faces left; the other faces right. Both were painted in 1886, and the model for both was Suzanne Hoschedé, Alice's daughter, who by then had become Monet's favoured figure model.

On the canvas, however, Suzanne's features are deliberately dissolved. Where the 1875 painting captured Camille's face with legibility and specificity, the 1886 paintings render their model's face as almost abstract—blurred, partial, anonymous. Art historians have long read these paintings as Monet's attempt to paint Camille *from memory*, eleven years after the original work and seven years after her death, using Suzanne as the armature onto which an earlier image could be projected.

The left-facing version is especially important because it registers memory as drift rather than replica. The pose is recognisably inherited from the 1875 canvas, but the person within it is no longer securely identifiable. The body remains, the colour harmony remains, the wind and atmosphere remain, yet the face has slipped into softness. This is precisely the condition that matters for *The Botanist*: not total loss, but partial persistence. Enough survives for recognition; enough has changed that what returns is no longer the original.

4.3.3 Woman with a Parasol, Facing Right (1886)

The right-facing version pushes this logic further. If the left-facing painting already suggests recollection in motion, the right-facing one feels even more like a variation produced by the instability of recall. The figure turns, the orientation shifts, and the image seems to test what can be altered while the memory remains recognisable as the same scene. Monet is not repeating himself mechanically; he is iterating, as memory iterates, through nearby possibilities.

This matters conceptually because the two 1886 paintings do not behave like copies. They behave like branches. Each preserves the same structural memory trace—woman, parasol, hillside, sky—while allowing the details of posture, atmosphere, and emphasis to diverge. In that sense they offer a remarkably clear visual analogue for the logic of this project. *The Botanist* does not aim to reproduce an input memory faithfully; it generates a neighbouring version of it, one that still carries the outline of the original while departing from it in specific ways.

Placed beside the 1875 painting, the right-facing work therefore completes the arc from perception to reconstruction. The first canvas records an immediate encounter. The later pair record what happens after time, grief, substitution, and artistic reprocessing have intervened. The result is not error in any simple sense; it is transformation. That is why Monet belongs in this project: his paintings show that memory can remain emotionally true even when it is no longer visually exact.

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5 The Botanist

I used Midjourney to explore what the project would look like and how its pieces would fit together. The tool's moodboard feature—which lets you upload reference images as a style anchor—made it possible to test each of the artistic influences as an active lens rather than a passive citation. I built a Monet moodboard, then a Refik-inspired one, then several hybrid boards. Every prompt returned four images, and I kept the ones that felt right.

While exploring the visual register in Midjourney, a figure kept showing up. An older man, partially visible, surrounded by greenery and flowers. I had not prompted for him specifically, but he appeared across several moodboards and felt, unmistakably, like a botanist. Soft posture, slow hands, attention on living material. That is where the name came from.

Figure 4: First generation based on Monet's artwork.

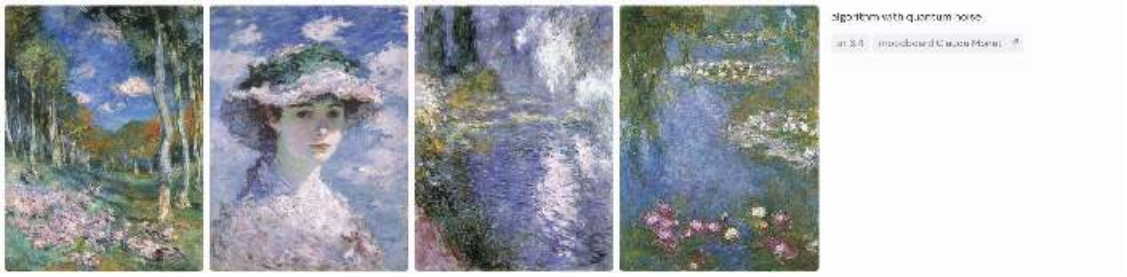

Figure 5: Quantum noise through Monet's lens.

Figure 6: Quantum noise through a botanical lens

Figure 7: Additional interface view of *The Botanist*.

Figure 8: Additional interface view of *The Botanist*.

Figure 9: Creating renders of what *The Botanist* looks like.

Figure 10: Exploring the world of the *The Botanist*.

5.1 Moodboards in Midjourney

A Midjourney moodboard is a collection of images the model treats as a stylistic field. They can be source material—paintings, photographs, existing artworks—but they can also be outputs from previous generations, uploaded back into the tool as references for the next. Rather than just adjusting the text of the prompt to steer the output, I adjusted the visual environment the model was generating inside of.

I built five moodboards over the course of the project. Each one was assembled from a different combination of sources, and each one biased every subsequent generation toward a different region of aesthetic space.

Figure 11: Moodboard development for *The Botanist*.

Moodboard 1—Claude Monet. The reference baseline. Roughly twenty of Monet's paintings—water lilies, Rouen Cathedral, Argenteuil sailboats, snow scenes, *Impression, Sunrise*—uploaded verbatim. This moodboard produced outputs that were close to unmodified Monet pastiche: faithful, painterly, stylistically indistinguishable from source material. Too faithful, in fact. The outputs looked like a very good forgery rather than a new thing.

Moodboard 2—Quantum Flowers. Ten of my own Midjourney outputs—dense floral compositions in saturated reds, oranges, blues, and purples, with a quality of movement and light that I had generated under the Monet moodboard but with prompts that pushed toward abstraction. By feeding my own outputs back into the model as a reference, I shifted the aesthetic away from pure Monet toward something slightly more electric. Generations under this moodboard retained the painterly quality but introduced higher contrast, denser saturation, and a quality of overgrown abundance.

Figure 12: Selected images from the Quantum Flowers moodboard.

Moodboard 3—Quantum Flowers II. A refinement of the previous one: six whiter, softer, airier images pulled from a later round of generations. The outputs under this moodboard stripped out the saturation of the previous round and introduced a delicate granularity to the surface, as if the image were being rendered on slightly degraded film.

Moodboard 4—Monet | Quantum Noise. These were the first generations where the figure and the world began to cohere; the portrait in particular felt, at the time, like I had accidentally summoned the Botanist himself. This moodboard became a bridge—from pure Monet, through my own floral abstractions, to a configuration where the character and the substrate began to occupy the same image.

Moodboard 5—The Botanist. This was the moodboard I returned to most often in the later phases of the project. Outputs produced under it had the quality I had been searching for since the first round: soft, painterly, populated without being portrait-forward, quietly unstable at the surface.

Figure 13: Selected images from the Monet | Quantum Noise moodboard.

Figure 14: Selected generations produced under the *The Botanist* moodboard.

6 The Algorithm

The preceding sections establish the conceptual ground: memory is reconstructive; dementia amplifies substitution rather than erasure; three artists have engaged this phenomenon emotionally, technically, and stylistically. This section describes how those ideas translated into a specific set of technical choices. Each decision is justified by a direct reference—either to the clinical science of memory alteration, or to one of the three artistic precedents. The goal was to build a system whose architecture was not arbitrary, but in which every layer corresponded to something in the frame established above.

6.1 Why a Quantum Circuit

The most consequential early decision was to use quantum computation as the engine of the mutation, rather than a classical pseudo-random process. This choice came directly from Anadol's *Quantum Memories*.

In classical computing, randomness is simulated. A pseudo-random number generator produces outputs that look random but are, in fact, deterministic functions of a hidden seed. For most applications this is sufficient. For this project it was not. The claim being made—that a memory, once altered, is still a memory; that reconstruction is a real process with its own shape—required that the alteration itself be real, in some substantive sense, rather than a cosmetic scrambling.

Quantum measurement offered that property. In a quantum circuit, the outcome of a measurement is not chosen from a pre-existing list; it is drawn from a genuinely probabilistic distribution rooted in the physics of subatomic particles. Anadol's use of quantum noise in *Quantum Memories* made this argument implicitly: the uncertainty in those images is not styled, it is encoded. Adopting the same logic meant that the quantum circuit in *The Botanist* is not metaphorical. The randomness it introduces is not a simulation of uncertainty—it is an instance of it.

A second, related justification comes from the clinical frame. Section 2 described memory recall as a reconstructive process prone to substitution and drift. A system intended to model reconstruction should itself be reconstructive in its mechanics. Classical determinism, no matter how elaborate, cannot produce the kind of genuinely contingent output that a single act of remembering produces. A quantum measurement can.

6.2 Encoding Memory into the Circuit

Having committed to a quantum circuit, the next question was how to encode a written memory into the state of that circuit. The chosen encoding is straightforward: each character of the input is converted to its ASCII value and mapped to a rotation angle, $\theta = \text{ASCII}(c)/128 \times \pi$, which is then applied to a corresponding qubit via an RY gate. A preceding Hadamard gate places each qubit in superposition; CX gates entangle adjacent qubits before measurement.

Each step of this construction corresponds to a specific element in the cognitive frame:

- The Hadamard gate establishes the precondition for reconstruction—a state of superposition in which the qubit is neither 0 nor 1. This mirrors the ambiguity of a memory about to be recalled.
- The RY rotation encodes the semantic content. The angle is determined by the input itself; the circuit becomes, in a literal sense, biased by the memory. This is the closest analogue to encoding.
- The CX entanglement links adjacent qubits, so that the state of one qubit becomes dependent on its neighbour. This mirrors the phenomenon of spreading activation in semantic memory networks, where the retrieval of one concept influences the retrieval of another.
- The measurement collapses the entangled, biased superposition into a single bitstring. This is the moment of recall.

The circuit is run for a single shot. This is important: *The Botanist* is not a statistical system. It does not sample the distribution of possible outcomes and average over them. It commits to one outcome, once, and treats that outcome as the recalled memory. This mirrors the way a person remembers: a single reconstruction, drawn from many possible reconstructions, delivered as if it were the memory.

6.3 Mutation as the Locus of Alteration

The bitstring produced by the measurement is not the output of the system. It is an intermediate signal that drives the next and most conceptually important step: word-level mutation.

The choice to mutate at the level of individual words—rather than at the level of characters, sentences, or image features—was deliberate. The clinical literature reviewed in Section 2 identifies the word as the primary unit of semantic substitution in dementia. Semantic paraphasia operates word by word (*aunt* for *sister*; *pen* for *the thing you write with*). Confabulation, similarly, manifests as the insertion of descriptors and claims at the level of natural language. It would have been possible to introduce entropy at the pixel level, or to alter the input character by character—but neither of these operations would have matched the grain of the phenomenon being modelled. The unit of alteration in memory is semantic; the unit of alteration in this system had to be semantic as well.

Two mutation operations are implemented, and they correspond directly to the two most prominent clinical mechanisms:

- Synonym replacement maps to semantic paraphasia. A word is swapped for a neighbour in the semantic network—related, but not identical.
- Modifier injection maps to confabulation. A descriptor that was not in the original input is inserted to expand the sentence—fluent, plausible, and not quite true.

Each bit in the measurement outcome is used to determine whether the corresponding word undergoes mutation (bit = 1) or is preserved (bit = 0). The system therefore implements partial alteration: some words survive intact, others drift. This, too, matches the clinical picture. Dementia does not replace every word at once; it replaces some, at unpredictable intervals, while leaving others untouched.

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7 The Architecture

The previous chapter described the algorithm. This chapter describes the infrastructure that runs it. The stack is split across two cloud providers and several model APIs. The application itself is intentionally simple.

Figure 15: Landing page of *The Botanist*.

The app is a Next.js 16 web application written in TypeScript, deployed on Vercel. Styling is Tailwind CSS with a small number of shadcn/ui components (button, textarea, badge, sheet). The backend is thin: two API routes—`/api/transform` and `/api/generate`—that handle the two stages of the pipeline. Nothing a user submits is persisted. Everything happens inside a single request-response cycle and disappears when the tab closes.

The landing page is the app itself, and shows a portrait of the Botanist, the project title and description, and a single text field. When a user submits a memory, the screen transitions through an animated sequence showing each step of the quantum circuit before the image appears alongside the original and mutated prompts and a small table tracing each word's transformation.

The application has two halves that talk to each other through the Next.js API. When the user submits a memory, the frontend makes a POST request to `/api/transform` with the prompt. That endpoint encodes the text, runs the quantum circuit, measures it, and applies the word-mutation pass. It returns the mutated prompt, the bitstring, and a per-word trace—which word was replaced, what it was replaced with, which qubit drove the change.

Figure 16: Step-by-step animation state shown during transformation.

At the same time, the frontend kicks off the step animation: six rows that fill in one by one over roughly two seconds each. The animation has to complete before the results are shown. That delay is deliberate. *The Botanist* works slowly, and the interface should not hurry him.

When both the API call and the animation finish, the frontend makes a second request to `/api/generate` with the mutated prompt. That endpoint calls Replicate with the Dreamshaper XL Turbo model and polls until the image is ready. The URL comes back and the image appears.

The final system went through many versions. The first version used Google's nano-banana-2. I switched to `lucataco/dreamshaper-xl-turbo`, a fine-tuned Stable Diffusion XL variant that hits the softer, Impressionist-adjacent surface the project needed. Originally I wanted to fine-tune my own model through ComfyUI and deploy it as an API endpoint, but unfortunately ran out of time.

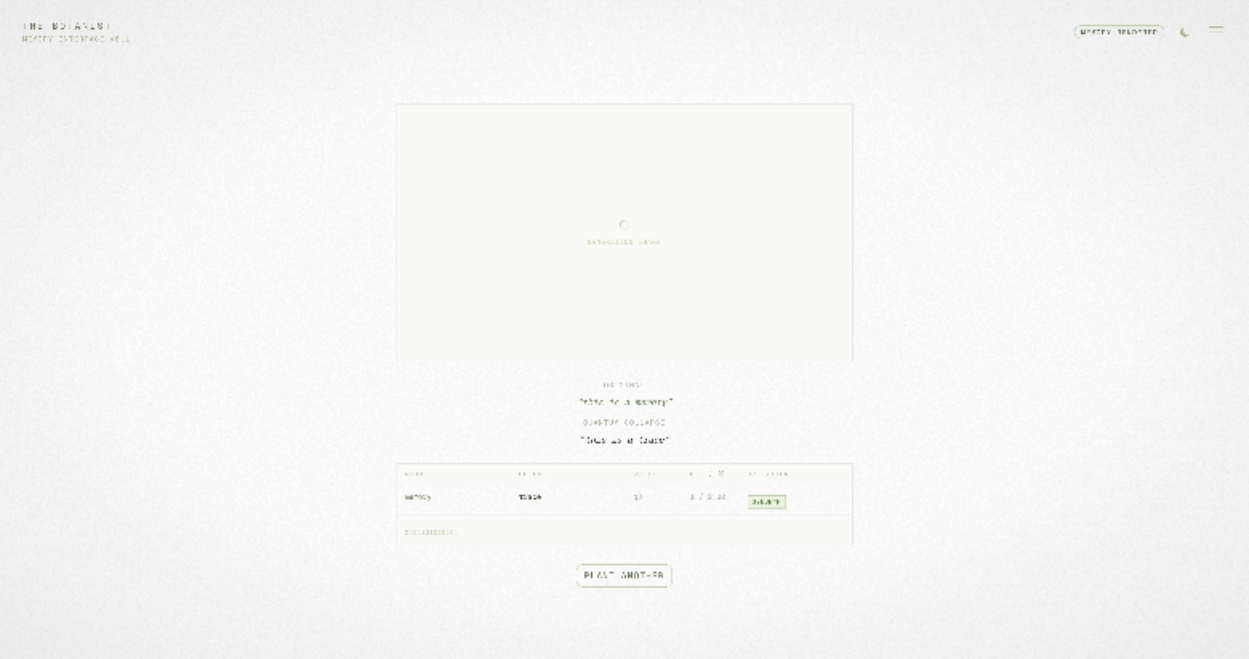

Figure 17: The `/api/generate` stage of the pipeline interface.

8 Disclaimer

AI Tool Disclosure

In accordance with the PHKI FS26 requirement to specify which tools were used, their purpose, and how each was applied, the following disclosures are made. Table 1 lists every AI tool that played a role in producing either the artefact or this report.

Summary

The tools above played three distinct roles across the project. At the *research* layer, Midjourney structured the pre-production visual exploration—the moodboard feedback loop, the character study of the Botanist, and the four-image-grid observation that ended up shaping how the final system handles branching. At the *production* layer, Replicate with Dreamshaper XL Turbo renders every image a user sees, while IBM Qiskit Aer runs the quantum circuit at the centre of the algorithm. At the *delivery* layer, Claude Code drove the iterative implementation of the Next.js web application, Claude (Anthropic) generated the mutation dictionaries and collaborated on the drafting of this report, and Prism structured and compiled the final LaTeX document.

Across all three layers, the pattern was the same: I specified the direction, the model proposed candidates, and I curated. No component of the artefact or the report was submitted without human review. The project is not made *with* AI in the weak sense of prompt submission. It is

Tool	Purpose	How It Was Applied
Midjourney	Visual exploration	Six sequential moodboards, approximately 300 generations total, used to explore the character of the Botanist and the stylistic register of the final output. No Midjourney outputs appear in the production artefact.
Replicate with Dreamshaper XL Turbo	Production image generation	Every image a user receives is generated here. Called via HTTP API with the mutated prompt as input. Parameters: 768×1152, 6 inference steps, guidance scale 2.0, DPM++ SDE Karras scheduler.
IBM Qiskit Aer	Quantum circuit simulation	Simulates the 16-qubit circuit at the centre of the algorithm: Hadamard gates, RY rotations, CX entanglement, and a single-shot measurement producing the bitstring that drives mutation.
Claude (Anthropic)	Dictionary generation and report drafting	Generated the synonym and modifier dictionaries consumed by the word-mutation layer through iterative conversation (I specified register and grain; the model proposed candidates; I curated). Collaborated on drafting this report under the same pattern; no paragraph was submitted without human review.
Claude Code	Application development	Used throughout the build of the Next.js web application. Drove iterative implementation of the frontend (landing, Process, Algorithm, Memories, About pages), the two API routes (`/api/transform` and `/api/generate`), the UI component set, the styling system, and the Vercel deployment configuration. I specified intent and reviewed every change.
Prism	LaTeX paper formatting	Used to draft, structure, and compile this report. Assisted with LaTeX syntax, figure placement, table formatting, citation structure, and layout iterations. All prose was authored and reviewed by me.

Table 1: AI tools used in the production of *The Botanist*, their purpose, and how each was applied.

made *through* AI—the tools are distributed across every stage of research, production, and delivery, and human agency is located in the iteration between us rather than in any single act.

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9 Conclusion

The project treats memory as a material with known failure modes and renders those modes as an image. It does not simulate dementia and it is not a clinical tool. What it does is stage, in a single interaction, the condition that dementia makes visible at the edge of a life: memories are always partly reconstructed, partly substituted, partly not ours. The question of where *ours* ends is not a medical one. It is an existential one, and the artefact is designed to sit with it rather than answer

it. The artwork offers a new perspective where the instability of human perception, memory, and identity is made legible.

My grandmother cannot use the artefact described in this report, and that limitation is part of the work. *The Botanist* is for those whose memories are still accessible - a rehearsal, at the scale of a single click, for what the rest of a long life will do anyway.

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10 Citations

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