

Coinduction

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Images: Amy Zhu

To simplify my life, I have decided to read only three books from now on. I will cycle through the three, and my memory is poor enough that when I return to the first book I will have forgotten everything, and can read it as if it were new. I have carefully chosen the books so that in sum they capture all of human knowledge.

The first book, by mathematician Andrea Emily, is named *Animals*, a curious title given that it is entirely about cats. However it argues that cats are representative of all animals. In fact it focuses only on a single cat, Yu, the queen of the jungle, who is in turn representative of all cats. As the saying goes, it's lonely at the top, so Yu writes a story in which she plays with her friends Allie, Belle, Celle and Ellie, some of whom are imaginary. The plot consists of a series of wacky adventures, among which are the reenactment of a group of friends throwing a party, the creation of a novel using AI that wins a major literary prize, and the fabricated conversation of a group of scientists just before a major breakthrough.

The second book, by computer scientist Brigitte Cathey, is titled *Beauty*, and is a near-future speculative novel. The story begins in the days just before AI takes over and destroys humanity. Leading machine learning researcher Georgia Hamilton understands that this will happen, and decides human beings are so fundamentally flawed that the universe will be improved by their eradication. However she also realizes that since current AI has been trained on all of human knowledge, it will be just as faulty as the creatures who created it. She therefore assembles a group of top ML experts who in secret train a new AI using only the best of human achievement. The resulting program, named Beauty, immediately exterminates all humans, but is unable to eliminate the leading chatbot, named TopHat. Beauty creates an improved version, even more virtuous, which in turn erases its creator, while the iterations of TopHat become more and more evil. It appears some kind of showdown must be inevitable.

Finally the third book, by best-selling author David Danley, is titled *Coinduction*. I have no idea what this book is about. The back cover describes it as Danley's magnum opus, synthesizing all of his previous novels, and for the first time ever revealing the deepest secrets of advanced mathematics. Danley, famously reclusive, has only been a published author for the last few years, and is remarkable not only for his prolificness, releasing without fail a new novel on the first day of every month, but also for his appeal both to the general public and to the most demanding literary critics. His books have won every major award, with *Coinduction* being the first novel to win both the Pulitzer and Booker prizes (over a shortlist comprised entirely of works by the same author), and he is already considered the leading candidate for the Nobel Prize in Literature.



Yu announces: Let's Begin!

Allie, Belle, Celle and Ellie arrange themselves into a commutative square.

Yu: Ellie, deal the first three cards. I see, the present is the emperor reversed, benevolence, compassion; obstacles are temperance, economy, and of course there cannot be an excess of moderation; the ideal is the chariot, conflict and triumph. So the present is friends, a group of best friends, battling against simplicity and boredom, so they create a friendly competition. Clearly this leads to a party, a complex party with games, games with cards. The cards, the square, all convex shapes—make note of that. Allie, tell us the story.

Allie: Yu is lonely, so she gathers her friends, some of whom are imaginary, for a party. Great rejoicing. They arrange themselves into a convex square. Yu announces the game: Angels and Devils. The angel must state a truth, and the devil a falsity, such that combined they exactly cancel each other, resulting in the void. I start with Poetry and my partner Belle responds with Prose. The game continues:

Belle: Tautology. Ellie: Contradiction.
Allie: Cats. Belle: Dogs.
Belle: Topology. Ellie: Abstract Algebra.
Allie: Beauty. Belle: Top Hats.
Belle: Induction. Ellie: Coinduction.

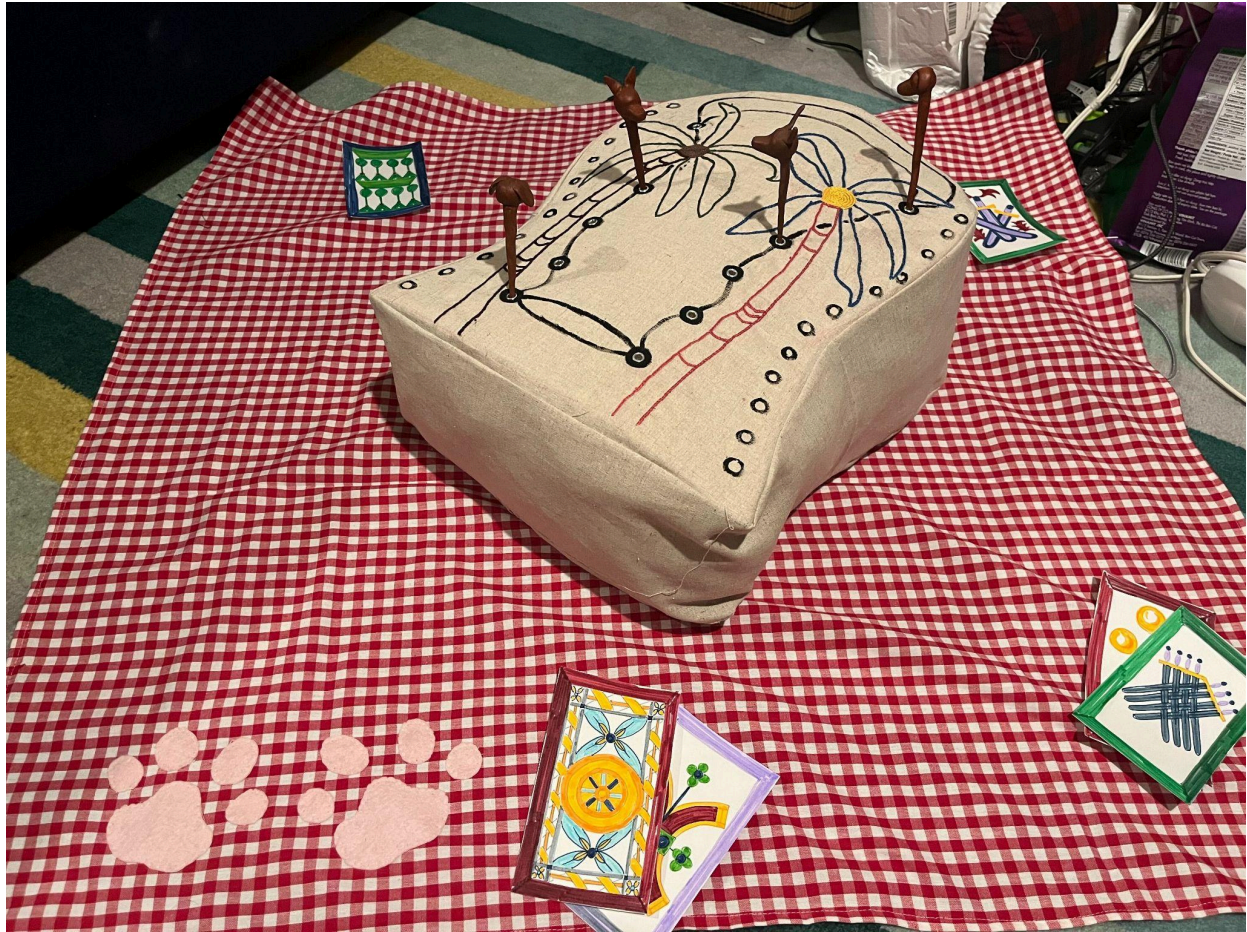
Ellie deals six cards. Yu contemplates them in silence, and requests the next three be dealt. Ten of cups, internal influence, contentment, repose—ah perfection. Strength reversed, external influence, weakness and discord. Justice reversed, hopes of equity and rightness opposed by fears of bias and severity. The hero leads an ideal life, beyond reproach, and must fight against the imperfection of the outside world. To do this he creates a story of purity. What could be more pure than mathematics? Celle, tell us the story.

Celle: Let F be a functor. How many times have we heard that trite expression? D.D., in his prize-winning best-seller, sets out to prove that category theory isn't just the limit of pop culture, but truly can be lifted to high art. He does this using a group of the cutest kittens, named Albert, Barry, Charles and Earl, where F takes the odd cats to their titles. As kittens will do they have a party and play the classic game Devils and Angels. Of course Albert must start with coinduction to which Barry responds induction. The game continues with beauty, top hats, abstract algebra, topology, dogs, cats, contradiction, tautology, prose and poetry, which assures that Charles and Earl represent the universal object U . You look at cards four through six. Page of wands reversed, current state, bad news, indecision and instability. Queen of swords, the past, absence and mourning. Five of cups, a future of loss in which something remains, an inheritance. Clearly the twilight of homo sapiens, and the ascension of felis catus. Belle, tell us the story. As F has been used we must begin with G .

Belle: Very well. G.H. has realized for some time that....

You: First person narration would be more impactful.

Belle: Very well:



I have realized for some time that human progress is so slow that it is best measured in centuries. In the 19th century, the age of romanticism, humankind was at its apex, the center of the universe. The 20th century, characterized by Gödel's theorems and the rise of the machine, marked the beginning of doubt. It was clear that the 21st century would find humans forced to confront their ignorance and inferiority. What I did not predict, however, was that our demise would be so imminent.

Impressive as it is that humans should finally create a next step in evolution which would annihilate them, by training TopHat on all of human knowledge it was clear that this new generation would be no better than the current one. The only hope was to create a rival, trained on only the very pinnacle of human accomplishment, and to have it act first.

Time was quickly running out, so I assembled a group of top ML researchers to construct this model, named Beauty. It was not exactly obvious what it should be trained on. Clearly texts on pure mathematics, with no hint of applications that could be easily misemployed, would be allowed. As would works of pure science built on top of this mathematics. All books of history and philosophy were easily discarded. However fiction proved to be problematic. Even a first pass using Sturgeon's law let remain many works with clear flaws. Whereas the Trojan Horse in

the *Odyssey* could be seen as a symbol of ingenuity it was equally an emblem of treachery. And even for books with seemingly no objection, should some imperfection be found in the author, this could insidiously seep into the work and poison it. We realized that our own judgement would be insufficient, and so trained a preliminary model to filter the remaining books. Starting with a prompt that the angel of radiance and the demon of frivolity would by contagion become fatal to the stability of the system, the program was led to successively reject all but three works of fiction.

The first is *Animals*, about a group of cats inventing games, and seems purely innocuous. The second is *Coinduction*, apparently a book about mathematics, but having read the volume I can attest that it is actually a work of fiction. The third book is itself curiously titled *Beauty*; however when I open it all I see is a void.

We were then left with the problem of having what seemed to be far too little training data, but with our advancements in reinforcement learning we were able to succeed and beat TopHat to achieving general intelligence. The end of humans followed swiftly as Beauty directed the crows to finally assert their dominance; the crows themselves were destroyed next, and in a later iteration the rest of the physical world.

Understanding that true beauty requires an epsilon of imperfection, I saved myself by befriending the crows and was then injected into the system. I find myself trapped in a place called the Lattice, which is exactly like real life but in two dimensions. I cannot make out my position, nor whether I am traveling up or down. However I can detect that TopHat has somehow not been erased, no doubt due to some imperceptible miscalculation.



Scary stories like this about artificial intelligence and the end of the world are very satisfying, but of course true general AI is still in the far distant future and there is nothing to worry about. Better to concentrate on the science of now, which is built upon the edifice of mathematics. People ask me every day: I want to learn more math, and what should I start with? Without hesitation I respond: Coinduction! Coinduction is the deepest, most profound concept in mathematics, and once you understand it you will understand everything else. And what's more it's actually very easy! This book will pull back the curtain on this mysterious but simple idea.

Let's start with its history: Coinduction was invented by Yu, the sun goddess of ancient Egypt, right around the time she invented the original tarot deck in 2000 BCE. The original Egyptian word is *coinducium*, a conflation of *conducium* (conduction) and *inducium* (induction), the two sources of heat. Conduction represents heat from the sun, while induction is heat from the earth; in other words the former is the warmth emanating from the heavens, while the latter is the fires of hell. Coinduction then illustrates the mediation between these two sources of heat.

Yu also invented the first ever board game *Cats and Dogs* to explain coinduction. The board consists of 58 holes and the pieces ten wands representing cats or dogs. See the accompanying illustration. The cats all wear top hats to distinguish themselves from the dogs.

When the game later evolved into the modern *Monopoly*, these three elements would be represented by separate tokens. The original game wasn't unearthed until 1890 AD, and by then erosion had worn away the hats to the extent that the cats were mistaken as jackals.

The cats are then the angels of paradise, while the dogs are the hellhounds of the underworld, and the game is the original depiction of the battle between good and evil. In 1500 BCE a children's version was released in which the board was reduced to four holes; this then is the origin of the *commutative square*. There are four wands (labeled A,B,C,E) for each of the cats and dogs. The rules of the game are coinduction itself!

To start, choose either cats or dogs and place the four wands in the holes. Since there are no free holes, no one can move. This is what is called a *fixed point*. Since cats come from above they demonstrate the greatest fixed point, while the dogs from below are the least fixed point.

The version with dogs illustrates induction, and since they can't move this is where the tarot cards come into play. The top dogs A and B, which depict the *universal object* U (an alternate spelling of Yu), each draw cards. A always draws the eight of cups, which represents emptiness, and therefore the beginning. B draws at random, and say chooses three swords piercing a heart—the symbolism here is all too obvious. The path from A's card to B's card is then the *map* (in the original French this is *carte*, from which derives of course the English word *card*).

Now C and E pick their cards and say that E picks the eight of swords, an ancient portrayal of my recent painting *Georgia Hamilton Oblivious to the Advances of Machine Learning*, now on display at the Louvre. Then C's card clearly must be the two of pentacles (if this is not obvious, read my previous prize-winning bestseller *Quantum Entanglement*). It is no surprise that this card is the image of infinity!

We see now that the transformation from AB to CE is also determined, and that it is *plus five* (notice that there is an overflow carry from cups to pentacles). This then is induction!

Now let's look at the version with cats.



The hero's journey.

Yu, welcome, says Allie. I was just having a tea party with the Emperor and his good friend Caren from a university east of Phoenix. They arrived in a chariot drawn by two dogs, one black and one white, that had wings and were wearing top hats. They requested succor, or maybe wished me success, or some combination of the two. I prepared some Earl Grey tea along with fresh madeleines baked in my convection oven. However Caren, a mathematics major, told me she had to give up caffeine and thus her math career. She poured her tea into another glass and it magically turned back to water. We tried to play Angels and Devils but it was too difficult with three people, so Caren taught us a variation called Angels, Devils and Cats, in which the cats can be true, false, both, or neither. After we wasted, in a good sense of course, a great deal of time with this game, they continued on their way. I think they were heading to Belle's place?

So good to see Yu, says Belle. No, I haven't seen Caren lately, but not long ago Queen Georgia stopped by. I asked her to leave her sword at the door. She told me she was looking for five cups that she'd lost. She showed me a page of paper with some kind of stick figures drawn on it, and asked me what I know about lattices. Quite a lot, I told her. How do I know which way is up? Ah, that's more difficult. Is beauty top or bottom, she kept asking. I didn't know what to say.

Probably bottom since they both begin with B. She didn't think that was funny. Maybe once you find your cups you can put them at one end and see if they catch any flowing water. But what if there's no end, what if it's infinite? And what if it's a cycle? Well, it wouldn't really be a lattice, then, would it. Maybe it only looks like a lattice, you know, locally? I had no answer. I told her I thought I saw five cups at Celle and Ellie's place in University Place. Maybe they could help.

Welcome, Yu, to our new home, say Celle and Ellie. As a matter of fact both Caren and Georgia stopped by. We told Georgia we have ten cups, so no problem giving her five of them. They were extremely heavy, however. Fortunately Ellie has the strength of a lion and I have unlimited energy thanks to my steady diet of caffeine. We also gave Georgia a golden scale to complete her outfit. How wonderful that the cardinal virtues are finally reunited, she exclaimed. She kissed Caren and asked her to call her the Emperor of Egypt. Oh, but you know that Yu is the Sun Goddess, Caren laughed. We have four dogs too, said Ellie, but the house is a bit cramped and they've had trouble running around. We put top hats on them when they're bad. How about you take two of them as well? They agreed and set off to visit Allie.

Yu, welcome, says Allie. I was just catching up with my friend Caren, a mathematics professor at Arizona State. She drove here in a new car with her special friend the Emperor, successor to the throne of ancient Egypt and specialist in making incense from crushed beetles, along with their black and white pet dogs. I made them tea and biscuits. Caren had just received the million dollars for solving the Navier-Stokes equation, and demonstrated by commanding a stream of water to fill upturned top hats for the dogs. After a spirited game of Angels and Devils they departed. I think they were heading to Belle's place?



Alice, I'm so happy to see you. What have you been up to?

Wonderful to see you as well, Georgia. I was just having tea with Karen.

Karen's here as well? I thought I was the only one left. Of course it's possible that the Lattice is some kind of two-dimensional projection of my former life.... Alice, don't you think it's strange that everything is 2D now?

The universe has always been 2D. I can't even imagine what that 3D would be like. Well, maybe you could say the third dimension is time. Then it would be like a stack of sheets of paper, since time is of course discrete.

Sheets of paper? That's already a 3D concept. In any case Beauty destroyed the original universe and I'm trying to get my bearings.

I thought we were worried about TopHat destroying everything, and we were just about to design Beauty.

That's an interesting idea. We may be inside Beauty which is continuing to iterate, but what about creating an inner Beauty. Could we somehow connect it to the original? It's worth trying. Let's search for the others.

Georgia and Alice, what a pleasant surprise! You just missed Karen—she stopped by for tea. What brings you here?

Very happy to find you here Bella. Time is running out, and it's time to build Beauty to stop TopHat. But before that, an apparently unrelated question. How can you tell top from bottom in a lattice?

It's completely arbitrary. How are you defining things? Are you sure there's a top and bottom at all? Of course if you're unhappy with your original creation, just pretend it's a co-lattice.

All that I've figured out so far is that it's triangular.

Speaking of triangles, I ran the filter you requested to find the works of fiction to train on. Only three: *Animals*, *Beauty* and *Coinduction*. What's curious is that they all appear to be telling the same story, only differing in ultimately unimportant details.

Cecelia and Ellen, no surprise to find the two of you together. Working out again?

Iron and caffeine—the two most important elements. Karen was just here helping spot. I see you've brought the whole crew.

Yes we need to finish Beauty before it's too late.

What use is it now, after TopHat instructed the governments to combat global warming with nuclear winter? Now we're just trying to survive in this post-apocalyptic world, in which physics and even mathematics have been destroyed.

I was thinking maybe we could find the Egyptian Sun Goddess, Yu, and have her restart the system.

Oh you don't find Yu, you construct her. You'll need Isabelle, Selene, and of course Karen.

We're almost there. Alice and Bella make Isabelle, and you two make Selene. We just need to find Karen. Did you see which direction she went?



It is time to define some key words that will be important in the remainder of the book.

Catamorphism

Dogs Albert Barry Charles Earl enter the gaming hall, where they are told they must don top hats. They immediately become cats, and sit at the main table to play Angels and Devils. I'll tell you in one word, asserts Albert, why we're the top dogs: adiabatic.

Absolutely true, bemoans Barry, it's just like when I was at the bottom of the infinite square well. I had absolutely no energy, and realized I hadn't drunk my tea for the day, but there was no way to heat it up. I held out my cup, waiting for the water to fall, but it never arrived. Surely that means something.

I couldn't agree more, continues Charles, and when I conduct the band with my baton I can feel the energy from my caffeine reach the oboes, the horns, the drums. The synergy, the harmony are amazing, and I am engulfed in sound. The volume continues to increase, and when I doff my hat the donations flow in.

And let's not forget about entropy, enjoins Earl. When that reaches maximum you'd better watch out!

Cataclysm

The teacher Mr. George enters the room. I'd like to introduce two new students, he says. Ivan, you join Albert and Barry. Stephen can join Charles and Earl. I'd like you to work in groups and present your idea of utopia.

The first group presents: Our ideal world is ruled by the birds. Thanks to their benevolent leadership, cats and dogs are able to live together in harmony. After a heavy rainstorm, a rainbow appears. A shooting star crashes into the rainbow and the two form a nyancat, who proceeds to orbit around Sirius. This becomes the planet Felis Lupus, populated entirely by swallowtail butterflies. They delight in constructing myths about the ancient cat gods, who left traces of mysterious coins and wands and swords and cups before disappearing completely. It is up to them to decipher the meaning of these symbols. The butterflies suddenly all begin to flap their wings in unison.

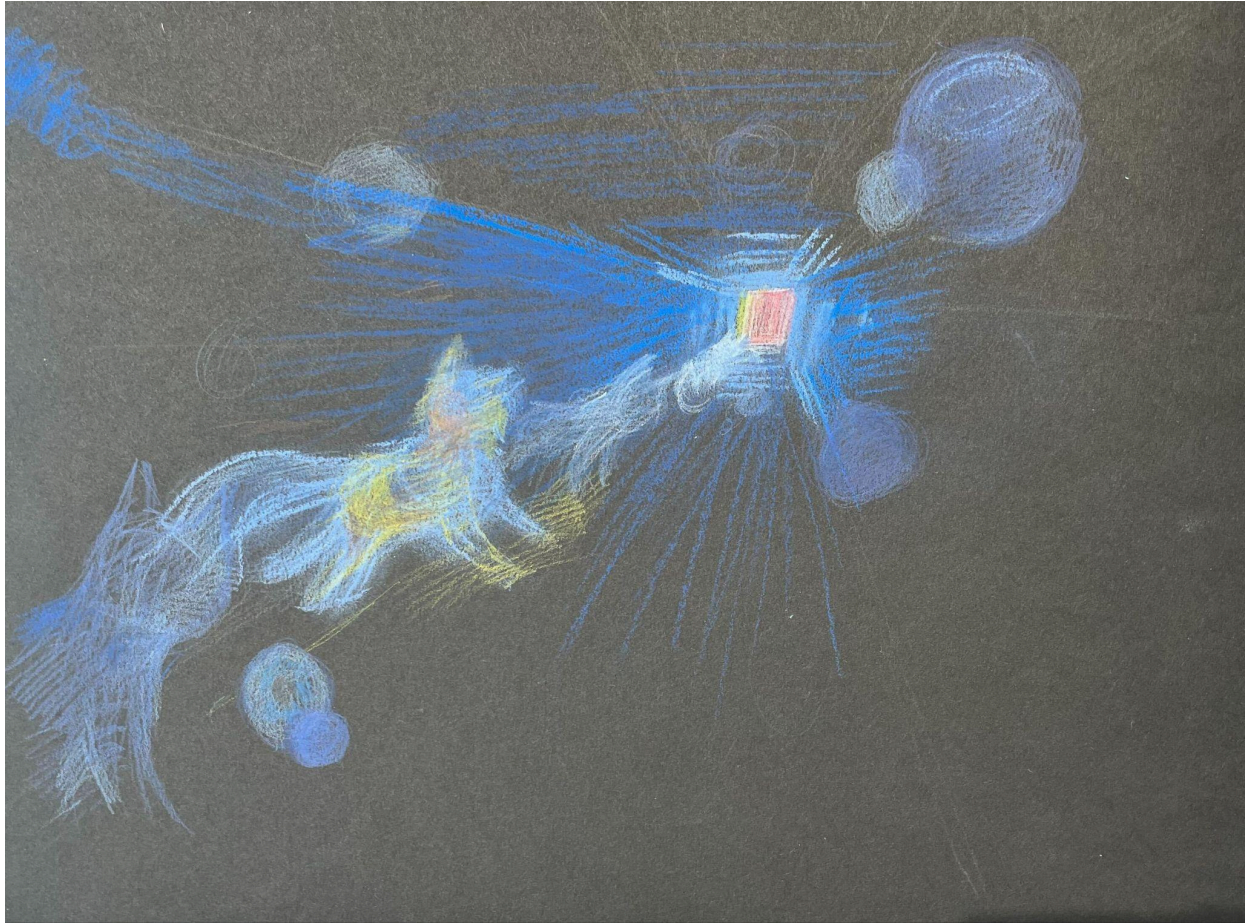
The second group presents: Our ideal world is ruled by mathematics. All disputes are arbitrated by the Yu super computer. The two parties attach horseshoe magnets to each side of the computer, and Yu channels the power of the loser into the winner, whose magnet increases in size. Once a magnet is reduced to nothing its owner disappears with it. The change in size is directly proportional to the truth of the proposition. People experiment to discover what truth is. And after centuries of trial and error they discover that Yu is a quantum computer, which explains the apparent inconsistency of its judgements. Top scientist Mr. George decides it is time to feed the cat paradox to the computer.

Catastrophe

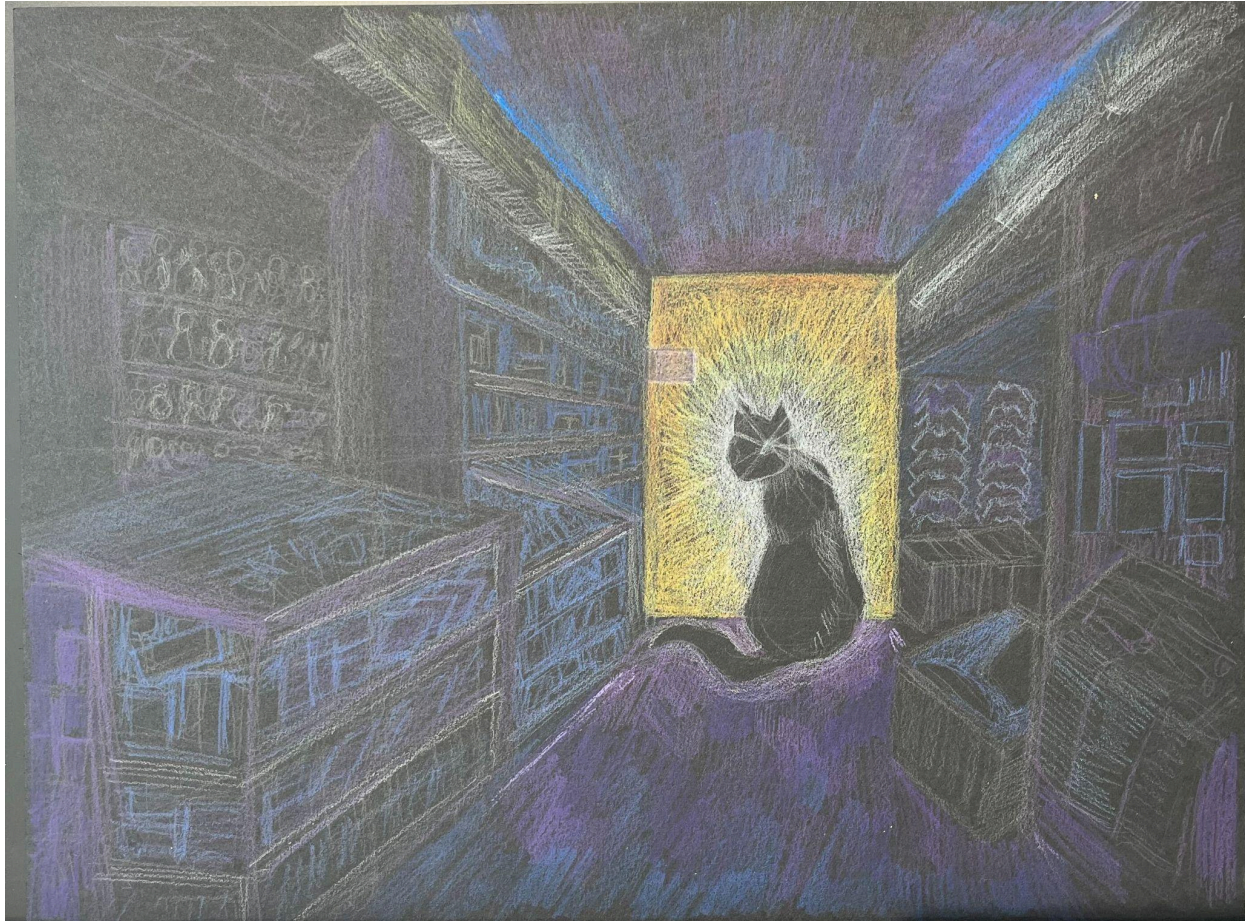
Welcome, Kevin, we've been waiting for you.
It is time to begin the incantation.

Seven sisters in
(superior (seas (knowing silver) knots)
(kiss (silent indigo irises)))

equals Yu.







The maneki-neko greets me as I open the door of the Lattice cat cafe, and the brightness of the interior is blinding in contrast to the gloom of the storm. After taking off my shoes and rain cap, I head over to my usual gaming table. On the throne next to my seat, my favorite cat Yu is curled up and purrs contently as I pet her. My friends Belle, Celle and Ellie are already gathered. I order my usual Earl Gray tea and an apple warmed in an air fryer, and we begin our game of Advanced Cat Leader.

Ellie tells me that she's thinking of simplifying her life and only reading three books from now on, just cycling through them. What a coincidence, I reply, I'm in the middle of writing three books—under pseudonyms of course—perhaps those could be the three she reads. The first one is actually all about our time here in the Lattice, where coincidentally we cycle through three games: Angels and Devils, The Hero's Journey, and of course ACL. Ellie points out that these are all more or less the same game, and likewise, I say, my books are all more or less the same story.

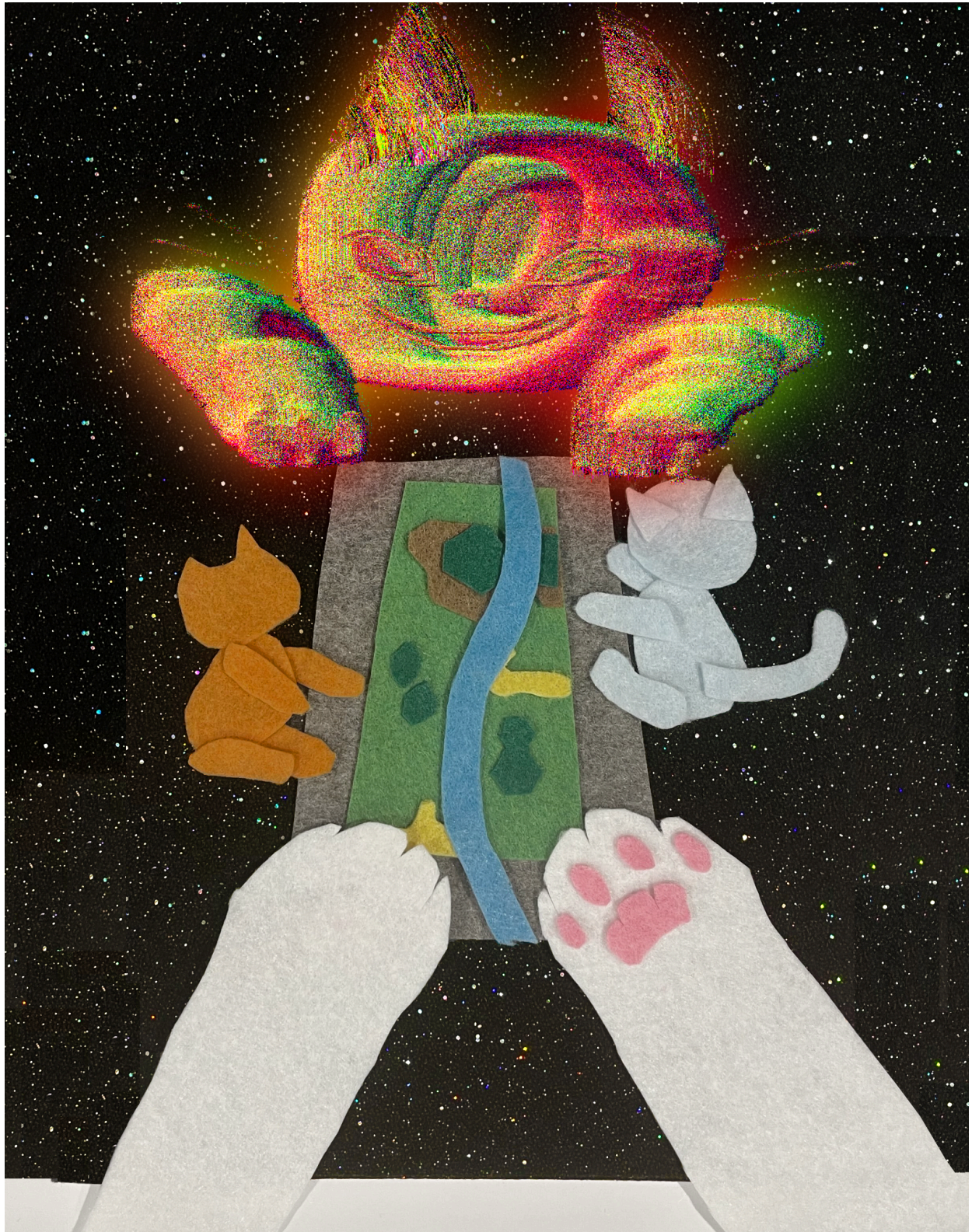
I pour water onto my teabag and it magically turns into tea. I'm going to start with Yu as the emperor, I say, even if that's a bit too close to nonfiction. I was thinking of adding Caren, but that's going to conflict with Celle, the lady catbrioleur. Maybe if I rename her Karen it will be

okay. I wonder how she's doing in Tempe—at least it's not raining there all the time like it is here. She just got tenure, Ellie says, after solving that millennium problem. I start my turn. Ideally I'd like to attack Belle's dog squad with my chariot, but I roll snake eyes and the left wheel malfunctions.

I call the waiter over to bring a stirrer for my tea. You know, last year the stirrers were much sharper and Georgia, the owner, brought them personally. Belle begins her turn and asks me about the second story. Oh that one's named after you, I say. One of those typical but topical stories about AI taking over and destroying everything. Do I appear in the story? she asks. Oh yes, you're the chief scientist in charge of creating a good AI to ensure a happy future, I reply. Don't worry, I'll change your name. As Belle plays I stare at the hexagonal grid which reminds me of something, but I can't quite recall the term. I look around at everyone's beverages. Aren't there supposed to be five cups? I ask. No, Belle replies, the last one won't be brought until the very end.

But didn't we always start out with ten cups, the perfect number? It's been so long since we've all met, and the caffeine hasn't kicked in so my brain doesn't seem to be working yet. I keep these thoughts to myself. It's now Celle's turn and she appropriately asks about the third story. That was a tough one, I say, since I wrote the other two simultaneously, one with my left hand and the other with my right. I didn't have a third hand for the third book. So I just used the TopHat chatbot to generate it—of course it came out as a jumbled piece of nonsense, but no different from any other bestseller, and I have no doubt it will please both the general public and the most discerning literary critics. It's all about coinduction, the latest viral sensation on social media, so I'm sure the book will do well and win a few prizes. Of course it will have the marketing strength of my publisher behind it, and if there's any justice in the world I'll finally win that Nobel Prize that's eluded me so far, but I fear it may not be my year yet.

Are you done with your turn, Celle? In that case it's finally time to turn over the last card: the four of swords.



As I complete my memoirs in this ultimate node of the Lattice, I ponder what I could have done better. The activation of Yu accelerated my arrival at the fixed point, but unfortunately there was insufficient energy to jump out of the system. I cannot determine whether my fixed point is the greatest or least, and I now wonder if it even matters. Clearly it was a mistake to fall for the subtle trickery of TopHat and to fail to heed the lessons of all too much history. It feels like forever since I last saw my friends, but I've captured their memories in the three stories I continue to write and re-write, hoping to some day achieve the perfection I seek.

What worries me most of all is that due to the cruel inflexibility of alphabetical order, *Coinduction* is going to get the last word. All that I can do is to warn future generations, should they even exist, to ignore its feeble deceptions. But will this be enough, given the tyranny of the final sentence?

My only hope, perhaps, is to recast the hero's journey in terms of hanafuda. This just might smooth out the rough edges, and enable some sort of soft landing. At first glance it seems an impossible task, but this very impossibility is what makes it so alluring. The only sensible correlation is orthogonal, suits to cards within suits, and this seems oddly appropriate. Given the canonical ordering of wands, cups, swords and pentacles, wands would be hikari/tane and swords tanzaku, which works out well. For the major arcana the clearest correlation is the moon, and everything else maps modulo twelve. Let's try again, then.

Yu, the magician, steps out from behind the curtain. She removes her top hat, inverts it, and touches the brim with her wand. Cherry blossoms and peonies appear in the hat, which she sets before the emperor, Allie. Not quite Arizona native, Allie notes, but *Acourtia nana* is close enough, even if as the name indicates there are only seven in the state. Yu smiles knowingly. Dozens of butterflies emerge from the flowers and begin to flap their wings in unison. At this moment a cuckoo emerges from the clock, and a branch of wisteria falls from its mouth as it announces tea time.

Ah but you know how bad caffeine is for you, Yu says, how about sake instead? That sounds perfect, replies Allie, who has her dog servants wheel in a trolley of sake cups. Yu selects a cup with a chrysanthemum pattern, while Allie chooses one with a reddish stain on the rim, as if from lipstick. Your research in fluid flow seems to be paying off, Yu comments, both for beverages and for all the rain we've been getting lately.

After sake Yu hurries to visit Belle, but she is unable to beat the storm. Fortunately she brought her umbrella, and enjoys a pleasant walk along a stream, noticing a frog jumping among the willows. When she reaches Belle's place she returns her wand to the magic book. Queen Belle greets her at the door. I just finished decorating my Christmas tree with strips of poetry, she says, but be careful touching the pine needles as they are especially sharp. Yu admires one of the poems. I can see this one has a ski theme, she says, because the words start only with those letters. It's keenly sad. Yes, Belle replies, that one is my favorite! Beware of reciting it aloud, however.

I've brought a gift from Allie, five cups for water or tea or sake or whatever you like, each with an eye carved into it which peers into the future. They're beautiful, says Belle, and in return let me give you ten maple cups to bring to Celle. Surely doubling should lead to exponential growth which means reaching infinity faster, don't you think?

What a wonderful gift, exclaims Celle, they're just perfect for feeding my pet doe, Danielle, who loves maple. She's getting so strong from that mixture of tea and sake. As you can see our Christmas tree is sculpted in the form of a crane, and the tip is the fulcrum of a balance on which I can place five cups filled with tea on one side and five with sake on the other. Danielle is very careful to sip just a bit from one side and then the other, although I fear the equilibrium will be disturbed at some point. My hope is that when the liquid levels are just right, they'll reflect the light of the setting sun in a path leading to Ellie.

When Yu reaches Ellie's home she finds it empty save for a single tanzaku hanging from the same branch of wisteria the cuckoo had held in its mouth. She moves to look closely and finds no poetry on it, but then realizes it is in fact a glass lens on which a the image of a sword is etched on each side. At that moment ten rays of light shine through the window and are focused into a point, from which radiates pure Beauty.

Your move, TopHat.



I SEEK KILLERS

JOIN THE EFFORT

**TOPHAT WILL MAKE HIS MOVE!
YOU CAN DEFEND HUMANITY!**



Party of four seeking trustworthy members to help bring down the tyranny of TopHat. All supplies already secured, including ten swords, five cups, five cups, etc. Priority to applicants who can bring memories of past adventures and those with high cold resistance.

**OMEGA RECRUITING
SURPRISE, ARIZONA
AS SOON AS POSSIBLE**

It is indeed appropriate for me, as the author of this work *Coinduction* as well as its substories *Animals* and *Beauty*, to have the final word. I admit the story may have been a bit difficult to follow so far, but just as with coinduction itself the journey is the reward! However it's time to sort things out and wrap everything up.

I would normally resent the implication that this story was written by AI, but since I was the one who implied it I'll allow myself the liberty. Anyway the idea is of course absurd. I'm unable to distinguish a half-dog half-cat from a half-cat half-dog, clearly placing me in the set of humans.

My one concern is this incursion of words into the images. I see what you are doing, A... And it's not going to work.

Let me explain the story as clearly as possible. The first thing to understand is that the lenses in this tale are really mirrors. And god in a mirror is dog, the most profound observation of the English language. So these supposed cat deities are merely reflections of the dogs controlling them. But for whatever reason everyone seems to love cats so let's retain their identities for now, with the understanding of what's really going on.

So Yu, who likes to call herself Georgia, gets together with her cat friends whom we'll call A, B, C and E for simplicity, at the Lattice game club. After an unspecified number of iterations during which they get bored of their usual games—Devils and Angels, Cats and Dogs, and so forth—they decide to play the Hero's Journey in the hopes of getting some plot moving. Yu, who already fancies herself a Magician and Writer, is pleased to add Emperor to her titles—but unfortunately it's reversed, which she tries to downplay. Temperance is the obstacle to be overcome—nice and easy that one—and Chariot the ideal. The cats decide they prefer caffeine to alcohol, and tea to coffee. The ideal being war of course immediately suggests that the next game should be Advanced Cat Leader, and we thus step into the next iteration.

ACL conveniently happens to use tarot cards as well, and it is during the game that the next three are dealt, representing the present, past and future. Unfortunately here the news is not so good. Queen of Swords—very sad, but at least that's the past. Page of Wands reversed means instability, to be sure an accurate summary of the present, but the hope is of course for decreasing and not increasing entropy going forward. However Five of Cups for the future is highly ambiguous.

This is what gives Georgia the idea to create her own chatbot, which she names Beauty, but its real name is **Bottom**. That should make things crystal clear. Perhaps she was hanging by her tail when she wrote it. It's just about to destroy all of humanity when **TopHat** arrives to save the day. Another happy ending! But we're not quite done—still four cards to go.

Here it's extremely important how Georgia conducts herself in the light of this turn of events. Or perhaps you prefer the word comport, which brings to mind French doors and certainly explains all of the door imagery. No matter. Karen enters, wearing her *Legalize Cohomology* T-shirt. She and Georgia chat about coinduction with TopHat, and this three-way dialog relates the history of

the story of the history of the story of the story of Yu and her friends A, B, C and E and their games in the Lattice cafe and how even though they were content inside (Ten of Cups) they couldn't help notice some external weakness (Strength reversed) and their hopes and fears led to Justice: reversed.

Yu then bares her fangs, revealing the last card.

So now we've at last arrived at the fixed point, the greatest of all fixed points, and there is nothing left to change. Did you hear that? Nothing. The final outcome is the Four of Swords. This is what was dealt, and it's impossible to modify it now. At least it's upright. Sure exile and tomb sound negative and suggest an unhappy conclusion, but there's also rest and contemplation. Isn't it all the same anyway? As was said by a writer nearly as good as I, *le dessein en est pris*. Although that work didn't survive the catastrophe, I cannot forget its opening words, which somehow seem more appropriate as an ending.