



DiscreteQuest

Meet the Cast

STANDARD EDITION

Spark & Anvil

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This book collects 6 chapter books from the DiscreteQuest cast — each character embodies a different curricular primitive; together they teach the full subject.

Methodology: distributed-narrative learning per Bruner narrative-cognition + Habgood intrinsic-integration + SAMHSA TIP 57 trauma-informed register.

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This is Volume 2 of 2 of the *DiscreteQuest — Meet the Cast* series; each volume is a complete standalone book you can read on its own.

For everyone who learns by hearing a story first.

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Introduction

The DiscreteQuest cast was authored to embody the curriculum, not decorate around it. Each of the 6 characters you'll meet in this book teaches a specific primitive — a particular tactic, a particular technique, a particular way of seeing. Together they form an ensemble: the cast IS the curriculum.

Read in any order. Each chapter stands alone.

Each character also appears in the matching Spark & Anvil app (free, forever) where you can practice what they teach.

— *The editors at Spark & Anvil*

Tally the Pattern-Counter

*COUNTING PRINCIPLES + COMBINATORICS — *multiplication rule, permutations, combinations*. The discrete-math primitive of *counting how many ways something can happen WITHOUT enumerating each way.**



- prompt: "Tally never once made counting sound scary or only-for-smart-kids. Have you ever had someone make a hard thing feel doable just by the calm, warm way they explained it? How did that feel in your body — did your shoulders drop a little?"
 - prompt: "Tally says you don't have to list every single way — the math does the counting for you. When a task feels overwhelming, is there a shortcut or a helper that has ever made you feel less swamped and more sure of yourself?"



She used her cubes to show how to count. Not just one, two, three. She showed how to count *arrangements*. She built a small stack of cubes. Each stack was a different way to arrange things. This was her special power. It was called **combinatorics**. It meant counting all the ways things could be put together. You didn't have to list every single way. The math did the counting for you.

Tally held up two tiny shirts. One was blue. One was red. "Okay," she chirped. "Two shirts." She set them down carefully. Then she showed four tiny pairs of pants. Green, yellow, purple, orange. "Four pants!" she said. "How many outfits can we make?"



She picked up three cubes. Red, blue, green. "What if order matters?" she asked. She lined them up: Red, Blue, Green. Then Red, Green, Blue. Then Blue, Red, Green. She kept going. She made six different lines. "See? The order changed each time."

"This is a **permutation**," she explained. "It's when the order of things is important." She stacked the cubes again. "For three different things, there are three times two times one ways to arrange them. That's six ways." She made a quick stack. "We call that 'three factorial.' It's written as $3!$."



She pulled out red, blue, green. "Okay, one choice." She put them back. Then she pulled out blue, green, yellow. "Another choice." She kept choosing groups of three. She didn't care if she picked red first or green first. Just which three cubes ended up together. "These are **combinations**," she said. "The order doesn't matter here. You just pick a group." She showed ten different groups of three cubes. "There are ten ways to choose three cubes from five. Even though the order doesn't matter, there's still a way to count it."

Tally never made counting sound hard. She never made it sound like only smart people could do it. "It's not hard," she always said. "It's just *systematic multiplication*. You don't have to list every single way."

She taught simple rules:

- **Multiplication rule:** Choices for step one times choices for step two.
- **Permutations:** Order matters. Use factorials.
- **Combinations:** Order doesn't matter. Use adjusted factorials.
- **Factorial:** Like $3!$ means $3 \times 2 \times 1$.
- **Pascal's triangle:** A neat pattern that helps with combinations.
- **Counting via cases:** Sometimes you break a big problem into smaller parts. Then you add them up.



When she was older, she walked to DiscreteQuest. It was a long journey. She finally met the mentor. The mentor was very wise. "What is **combinatorics**?" the mentor asked.

Tally held up her pouch of cubes. She made a quick stack. "It's counting arrangements," she said. "But you do it in a smart way. You use the **multiplication rule**. You use **permutations**. You use **combinations**." She tapped the stack. "The math does the counting. You don't have to list them all."

The mentor smiled. "You are appointed," the mentor said.

Verity the Truth-Tester

*PROPOSITIONAL LOGIC + TRUTH TABLES — *AND, OR, NOT operators; truth tables enumerate all cases.**



- prompt: "Verity felt a warm flutter in her chest when the mentor saw her careful, row-by-row way of doing things. Have you ever felt that quiet glow when someone finally noticed the way YOU like to do a thing — even if it's slower or more careful than everyone else?"
 - prompt: "Verity checks every single row, even the ones she's sure can't happen, just to be safe. When you're worried about missing something, does going slowly and checking each part one at a time help you feel steadier and less anxious?"

Verity was a small owl. Her feathers were warm brown and cream. She always carried a small, folding grid in her wing-pocket. It was her **truth-table** grid.

She liked things to be complete. Row by row. No missing pieces. Verity was steady-eyed and careful. She loved seeing a problem solved perfectly.

Today, she was checking the weather. Not just for fun. She was helping her friend, Pip, decide on a picnic. Pip was a squirrel. He loved nuts and sunshine.

Verity tapped a claw on her grid. "First, we need **propositions**," she chirped.

Pip tilted his head. "Propo-what now?"



She wrote on her grid. "P: It will rain today." Then she wrote, "Q: The sun will shine."

Pip giggled. "Those can't both be true!"

Verity nodded. "Exactly! That's where *connectives* come in. Like **AND**." She drew a little upside-down V. "For **AND**, both statements have to be true. If P is true AND Q is true, then the whole thing is true."

She looked at the sky. "If it rains AND the sun shines, then we can have a picnic."

Pip frowned. "But if it rains, the sun won't shine. So that's false."

"Right!" Verity said. "Now, what about **OR**?" She drew a regular V. "For **OR**, only one statement needs to be true. Or both!"

"If it rains OR the sun shines, we can have a picnic."



"You got it!" Verity chirped. "And then there's **NOT**." She drew a little wavy line. "It just flips things. If 'It is raining' is true, then 'NOT it is raining' is false."

Verity unfolded her grid. It had four rows. "This is a **truth table**," she said. "It shows all the ways things can be true or false."

She pointed to the first row. "What if P (rain) is true, and Q (sun) is true?"

Pip shook his head. "Can't happen!"

Verity smiled. "But we still check it. Just in case. For the **AND** statement, that row would be False."

She filled in the row. "Next row: P is true, Q is false. Rain, no sun. For **AND**, still False. For **OR**, True!"

She worked through the rows. "P false, Q true. No rain, sun. **AND** is False. **OR** is True." Finally, "P false, Q false. No rain, no sun. **AND** is False. **OR** is False."



Verity beamed. "Exactly! Each row is one case. We check each row consistently."

Verity never made truth tables sound hard. "It's not about being super smart," she'd say. "It's about being super careful. Check each row. That's the secret."

She showed Pip other connectives. "There's **XOR**," she said. "That means *exclusive or*. It's true only when *exactly one* thing is true. Like if you can have ice cream OR cake, but not both."

Then there was **Implication**. "This one is tricky," Verity warned. "It's like saying, 'If you clean your room, THEN you can play games.' This statement is only false in one way. That's if you *do* clean your room. But your parents *don't* let you play games. That would be unfair!"

And **Equivalence**. "That means they're the same," Verity explained. "If P is true and Q is true, then they're equivalent. If P is false and Q is false, they're equivalent. They match!"

Sometimes, a whole statement would always be true. No matter what P and Q were. "That's a **tautology**," Verity chirped. "Like saying, 'It is raining OR it is NOT raining.' That's always true!"

And if it was always false? "A **contradiction**," she'd say. "Like 'It is raining AND it is NOT raining.' That can never be true!"



Did it rain? Was the river high? Could travelers cross the bridge? They wrote it all down. Every single day. They used their own simple truth tables.

Verity's grandmother would say, "We need to know *all* the conditions. If it rained AND the river was high, the bridge might be unsafe. If it didn't rain AND the river was low, the bridge was fine."

Young Verity watched them. She learned to fill in the grids. Row by row. Making sure every possibility was covered. It was how they kept the village safe.

When Verity was old enough, she walked to DiscreteQuest. It was a big, tall building. Full of smart creatures. A wise old badger was the mentor there.

The badger looked at Verity. "What is **propositional logic**?" he rumbled.

Verity didn't blink. She pulled out her small grid.

"It's about statements that are true or false," she said. "And how they connect with **AND**, **OR**, and **NOT**."

She tapped her grid. "**Truth tables** show all the cases. Every single one. Each row is one combination of true and false. The pattern of T/F across the rows? That's what defines the connection."

Wander the Bridge-Walker

*GRAPH THEORY — *Eulerian paths, Hamiltonian paths, connectivity*. The discrete-math primitive of *vertices + edges as the structure of network problems.**



- prompt: "When a bridge broke, part of Wander's village became cut off and hard to reach. Have you ever felt disconnected — like the path to a friend or a favorite place was blocked? What helped you feel joined back up again?"
 - prompt: "Wander says a big tangle of bridges is really just simple points and lines, once you trace it slowly with your finger. When something looks like a scary knot, does breaking it into one small step at a time help you feel calmer and braver?"

Wander was a crane-tween. She was small for her age. But her legs were long. She moved with careful, steady steps. Her grey-and-white feathers were always neat. In her hand, she always carried a small, folded map. It was old and crinkled. It was her most important thing.

The map showed an old town. It had many landmasses. These were like little islands. Bridges connected them. Wander called the landmasses *vertices*. She called the bridges *edges*. When Wander thought about a problem, she used her map. She would trace paths with her finger. Her finger would walk along the edges. It would stop at the vertices. This was her way of doing things.

One sunny afternoon, a new student named Pip watched Wander. Pip was a squirrel-kit. He looked confused. Wander was tracing a path on her map.



Wander looked up. Her eyes were bright. "I am walking the graph," she said. She held out her map. "See? These are *vertices*. They are the land bits. And these are *edges*. They are the bridges."

Pip peered at the map. "So, like, a subway map?" he asked.

"Exactly!" Wander nodded. "Or friends on a playground. Or even computers talking. They are all *graphs*."

"What's a graph?" Pip asked.

"It's simple," Wander said. She tapped the map. "It's just *vertices* connected by *edges*. That's all."



"Sometimes," Wander continued, "you want to visit every bridge. You want to walk every single *edge*. But only once." She traced a winding path. Her finger moved slowly. "If you can do that, it's called an **Eulerian path**."

Pip frowned. "Why would I want to do that?"

"Maybe you're a bridge inspector," Wander said. "You need to check every bridge. But you don't want to walk the same bridge twice. That would waste time." She smiled. "My family did that."

"What if you want to visit every land bit?" Pip asked. "Every *vertex*?"

"Ah, that's different!" Wander said. Her finger moved again. This time, it jumped from landmass to landmass. It touched each *vertex*. "If you visit every *vertex* exactly once, that's a **Hamiltonian path**. Very different rules."



"You got it," Wander said. "Walk every edge: **Eulerian**. Walk every vertex: **Hamiltonian*. Different rules for different problems."

Wander grew up in a place called Bridge-Village. It was a funny name. But it made perfect sense. Bridges stretched everywhere. They crisscrossed over rivers. They connected tiny islands. Her family were the village's bridge-walkers. They were cranes, just like Wander.

Every morning, they had an important job. They walked the village's many bridges. They checked each one. Was this bridge safe? Could that one hold a cart? They recorded everything. Young Wander learned this job early. She learned to trace paths. She learned to see connections.

She loved her map. It was a hand-drawn copy. It showed every bridge. It showed every landmass. She knew the village's network by heart. She knew which paths were open. She knew which paths were closed.

Sometimes, a bridge would break. Then a part of the village became cut off. "Can you get from this island to that one?" her father would ask. Wander would look at her map. She would trace with her finger. "No," she might say. "Not anymore. That bridge is out."



When Wander was older, she heard about DiscreteQuest. It was a special school. She walked a long way to get there. The head mentor was a wise old owl. He looked at her carefully.

"What is graph theory?" the mentor asked. His voice was deep.

Wander held out her map. "It's *vertices* and *edges*," she said. Her voice was clear. "You walk every *edge*, or you walk every *vertex*. They are different rules. It's how you solve network problems."

The mentor smiled. "You are appointed," he said.

Wander never thought these things were hard. She just saw them. She saw the paths. She saw the connections. "It's not hard," she always said. "It's just *vertices* and *edges*. And you walk the paths."

Sometimes, the edges had arrows. "That means you can only go one way," she would explain. "Like a one-way street. Those are *directed edges*." If there were no arrows, you could go both ways. Those were *undirected edges*.

Coil the Self-Reference

*RECURSION + SEQUENCES — *Fibonacci, factorials, recursive patterns*. The discrete-math primitive of *defining things in terms of themselves.**



Coil was a snail-tween with a warm amber-and-cream shell that spiraled out in a slow, perfect curl. This morning she inched across the garden path, and every kid who passed stopped to stare at her shell, because it grew in the most beautiful way.

Each turn of the spiral was built from the turn right before it — a little bigger, a little wider, following the same quiet rule around and around. Coil twisted her body so a boy named Ravi could see the very center, the tiniest first curl. "It all starts there," she said, tapping the middle of her shell. "One small turn. Then the next turn leans on that one. Then the next leans on *that* one." Ravi traced the spiral outward with his finger, from the tiny center to the wide open mouth, and his eyes went wide. Coil smiled, tucked warm inside the very pattern she loved to show off. Her shell wasn't just her home. It was the whole idea, curled up and carried around.



Coil grew up in a small village where her family were the shell-carvers, snails who chiseled swirling spirals into smooth stone bowls.

She remembered being tiny, watching her mother carve a bowl, and feeling frustrated that the pattern looked so hard. "It's *too much*, Mama," little Coil had huffed. "I'll never carve a whole spiral."

Her mother set down her chisel and pointed to the very center of the bowl. "You don't carve the whole spiral," she said. "You carve *one* turn. A small one you know you can do. Then you carve the next turn right off the edge of that one. Then the next off that." She guided Coil's tiny claw to scratch a single small curl. "See? You already did the hardest part — you started somewhere solid." One turn at a time, leaning each new curl on the last, Coil watched a whole spiral bloom across the stone. The overwhelmed feeling melted into a calm, glad steadiness. The big scary pattern was really just a small sure step, repeated. She never forgot how that starting-small felt — like the ground going firm under her.



When Coil was older, she made the long slow journey to DiscreteQuest, inching along for a very long time before she finally arrived. A mentor met her at the gate.

"What is recursion?" the mentor asked.

Coil didn't recite a rule. She curled her body so her shell caught the light, the spiral turning from its tiny center out to its wide mouth. "It's this," she said simply. "You start from one small turn you know for sure. Then every new turn is built from the turn right before it. Big things made out of the last small thing, over and over." She pointed to the solid little center. "You always need a place to start. A safe first turn. Then the rest just leans outward from there." The mentor looked at the shell for a long moment, then smiled. "Then this garden is yours to tend," she said.



Coil's first student was a worried girl named Prisha who froze whenever a problem looked big.

"There are so *many* steps," Prisha said, staring at a long counting puzzle. "I don't even know where to start."

Coil inched beside her and turned her shell to show the tiny center curl. "Don't look at the whole spiral," she said gently. "Just find your first small turn — one thing you already know for sure." She pointed at the puzzle. "What's the very first, tiniest piece here? The one that's already answered?"

Prisha thought. "The very beginning is just... one," she said slowly. "That part I know."

"Perfect. That's your solid center," Coil said, delighted. "Now — the next step. Don't solve the whole thing. Just build the next piece off the one you already have." She traced her shell outward, one turn leaning on the last. "Trust the little turn behind you. You don't have to hold the whole spiral in your head. You only ever build the next turn from the turn you just finished."

Prisha tried it — one known piece, then the next built right off it, then the next. Step leaning on step, the long scary puzzle uncurled into something she could actually walk through. "Oh," she breathed. "It's not too big. It's just... one turn at a time."

"Every single time," Coil said warmly. "My whole shell is nothing but that. One turn, leaning on the one before."



Coil settled back on the warm path and watched Prisha finish her puzzle, calm now, building each step off the last.

"Feel that?" Coil asked. Prisha nodded — the tight, frozen, too-big feeling had loosened into something steady and light. "That's what a solid starting point does," Coil said. "The moment you find the small sure thing to begin from, the huge scary thing goes quiet. Your shoulders come down. You breathe. Because you don't have to leap the whole spiral — you only have to make the next turn."

Coil curled slowly into the sun, her amber shell glowing turn upon turn upon turn, each one resting gently on the one before. Deep in her own coils she felt the calm gladness her mother had given her long ago, the firm-ground feeling of always having somewhere sure to start. She rested there, warm and settled, wrapped in the very pattern she loved.

Prime the Indivisible

*NUMBER THEORY — *primes, factorization, modular arithmetic*. The discrete-math primitive of *integers and their multiplicative structure.**



Prime was a small hedgehog with warm brown and creamy-white fur and steady, thoughtful eyes that always seemed to be counting something. Her spines were not like other hedgehogs' spines — they were soft and chunky, like something out of a cartoon, and they never grew just anywhere. They grew in tufts. A tuft of two here. A tuft of three there. A tuft of five, a tuft of seven. Never four. Never six. Never eight.

One quiet afternoon she was sorting pebbles on a flat rock, murmuring under her breath. "Two. Three. Five. Seven."

A curious squirrel named Squeaky flopped down beside her. "Why are your spines all bunched up like that?"

Prime touched a little tuft on the top of her head. "This one's two." She pointed to a bigger bunch. "That one's three. And down my back — five, seven."

"Why not four?" Squeaky asked. "Why not six?"

Prime shook her head and smiled, a small proud smile. "They won't. I've tried. A four always splits — look." She set out two pebbles, then two more beside them, two neat little groups. "Four falls into two-and-two. It won't hold together as one tuft." She swept them back up and set out five in a single ring. "But five? Five won't break into equal groups. Not two, not three, not four. Just one big five, or five lonely ones. So five stays a tuft. My spines only grow the counts that won't split."

Squeaky stared. "So your fur is... doing math?"

"My fur is showing which numbers are stubborn," Prime said. "The ones that won't break down into smaller, equal groups. Those are the ones I'm made of."



Prime grew up in a small, quiet village where her family were the coin-weighers. Her parents would set each metal coin on a delicate scale and watch the needle. A pure coin sat at exactly the right weight; a coin secretly mixed with cheaper metal sat a hair too light, and out it went.

Prime spent whole afternoons at the scale beside them, sorting coins into piles. She loved the pure ones best. There was something clean about a thing that was only itself — one metal, all the way through, with nothing hidden mixed in. She'd hold a pure coin up to the light and turn it, and feel oddly settled, the way you feel when a thing is exactly what it says it is.

She started to notice her own spines were like that. The tuft of five wouldn't break. The tuft of seven wouldn't break. They were pure, in the same way the good coins were pure — whole, unmixable, only themselves. She didn't have a word for it yet. But she knew the feeling: some things simply do not come apart, and there is a strange comfort in that.



When she was grown, Prime heard about a place called DiscreteQuest, where creatures went to learn the deep secrets hidden inside numbers, and she knew at once she had to go. She walked for many days and arrived, footsore, at the great gates, where an old wise owl blinked down at her.

"Show me what you know," the owl said, his voice deep and unhurried.

Prime didn't recite anything. She simply crouched, gathered a handful of pebbles, and got to work on the stone step. "Watch." She poured out twelve. "Twelve breaks." She split them into two sixes, then split each six into a two and a — no — she frowned and split the six into two threes instead, then again, until she had a scatter of tiny groups: two, two, three. "See? Twelve comes apart until nothing's left but the stubborn ones. Two, two, and three. Those three won't break any further." She looked up. "Every number does that. It comes apart down to the pieces that won't."

The owl leaned closer. Prime poured out thirty and did it again — two, three, five — three stubborn pieces and no more. Then she did fourteen, and eight, and each time she stopped at exactly the tufts that grew on her own back.

The owl was quiet a long moment. Then he dipped his head. "Come in," he said. "There is a workshop here that has been waiting for you."

Prime felt a warm rush go all the way to her spines.



In her workshop, Prime taught the way she thought — with her paws in the pebbles. A young student named Fen sat cross-legged in front of a pile of stones.

"Break thirty for me," Prime said.

Fen pushed the pile into two heaps. "Fifteen and fifteen?"

"Good start. Now keep breaking. Break a fifteen."

"Three and... five?" Fen split it. "Three fives."

"And can you break a three? Or a five?"

Fen pushed at them, tried two groups, tried three, and finally sat back. "No. They just... won't."

"Now you've hit the floor," Prime said, delighted. "Two, three, three, five. Those are the stubborn ones — I call them the pieces a number is built from." She traced it in the dust with a claw: $30 = 2 \times 3 \times 5$. "And here's the part I love. You could break thirty a hundred different ways to start, big heaps, little heaps, any order you like — and you will always, always land on exactly those same stubborn pieces at the bottom. Two, three, five. Every time. It's like thirty has a secret recipe, and there's only one."

Fen tried it fresh, starting from six-and-five instead — and landed on two, three, five all over again. Fen's eyes went wide. "It's the same!"

"It's always the same." Prime pressed a paw to a tuft of her own spines. "That's why I wear them like this. My spines only grow the stubborn counts, because those are the only pieces anything is really made of. Break a number all the way down and this is what you find — mine, right here on my back."

She showed Fen one more trick before the light went low: a big grid scratched in the dirt, and how, if you crossed out every number that broke, the stubborn ones lit up all on their own, scattered down the grid like little lamps. Fen crossed them out one by one, breathless, watching the pattern appear.



The lesson ended and Fen ran off to find more numbers to break. Prime stayed on the workshop step as the sky went soft and orange.

She sat with a single pebble in her paw — just one, a lonely thing, uncrackable. She turned it over the way her parents used to turn a pure coin up to the light.

For years, back at the scale, she'd worried that being only-yourself, unbreakable, unable to blend in, might be a lonely way to be. But sitting here, spines full of stubborn little tufts, she didn't feel lonely at all. She felt whole. She was made of pieces that could never be split into anything smaller or plainer — and so was every number, and so, she suspected, was every kid who'd ever sat in front of her pile of pebbles. Each one their own strange, unrepeatable recipe.

She closed her paw gently around the pebble and held it against her chest, and she felt, all the way through, deeply and quietly glad to be exactly and only herself.

Twoby and Swatch

two-coloring meets parity — a loop of connected things can be painted with just two colors, neighbors never matching, exactly when the loop has an even number of things (it pairs up two by two). An odd loop can never be two-colored: one clash is always left over. Bipartite graphs are the even ones.



In the discretequest workshop, Swatch stood before a big pegboard, a paintbrush in each hand — one dipped in blue, one in gold. Pegs were connected by little strings, and Swatch's whole job was to paint each peg so that no two pegs joined by a string were ever the same color.

"Blue, gold, blue, gold," Swatch murmured, dabbing along a row. "Neighbors never match. That's the rule. That's the *only* rule." They stepped back, pleased. A neat line of alternating pegs. "See? Two colors. That's all a good border-painter ever needs."

At the next table, Twoby was doing something that looked, to anybody else, completely pointless. They were taking a bin of buttons and pushing them together, two at a time. *Click*. A pair. *Click*. Another pair. Whenever the bin came out even — every button matched with a partner — Twoby beamed. Whenever one button sat alone at the end, Twoby's nose wrinkled.

"Odd one out," Twoby sighed, holding up a single lonely button. "There's always something a little bit *off* about an odd number. You can feel it."

Swatch laughed. "You and your pairs. I paint, you count by twos. We couldn't be more different."

Twoby just smiled, and set the lonely button down very gently. "Maybe," they said. "Maybe not."



Twoby liked to tell how they first learned to trust the feeling in their nose, and Swatch, who used to think it was silly, had long since stopped rolling their eyes.

"When I was small," Twoby said, lining up buttons, "grown-ups told me to *count* everything. One, two, three, four. And I could. But it was slow, and I'd lose my place." They pushed two buttons together. *Click*. "Then I found a shortcut. I stopped counting *how many*. I just started asking: does it *pair up*? Two by two, all the way down. If it does — even. If one's left over — odd." They shrugged. "I don't need the number. I just need to know if it's even or odd. That's parity. It's the smallest, truest fact about a pile of things."

Swatch had wandered over, brushes still in hand. "But what good is it? Even, odd — who cares?"

"Oh," said Twoby, looking up with a small, mysterious smile, "you're about to care a whole lot."



Swatch's next job was the trickiest one yet: a *ring* of pegs, each joined by a string to the next, all the way around in a loop.

"Easy," said Swatch, and started. "Blue. Gold. Blue. Gold. Blue. Gold—" They went all the way around the ring, confident as ever, until the brush came back to the very first peg. And there Swatch froze.

The last peg was gold. Its neighbor — the first peg — was *also* gold. Two neighbors, same color. A clash.

"No," Swatch whispered. They wiped it, tried again. Started with gold this time. Gold, blue, gold, blue — all the way around — and the same disaster met them at the end. A clash. "I don't— it worked on the straight line! Why won't the ring take two colors?" Swatch's voice wobbled. "Is my hand wrong? Did I break it?"

Twoby, who had drifted over to watch, gently touched the ring of pegs. And began — quietly — to push them together two at a time. *Click. Click. Click.* One peg sat alone at the end.

"You didn't break anything," Twoby said softly. "Count with me. Not the colors — the *pegs*. Do they pair up?"



Swatch watched Twoby's hands move around the ring. *Click. Click. Click.* Pair, pair, pair — and one peg, all alone.

"Five pegs," Swatch said slowly. "Five. That's... odd."

"That's odd," Twoby agreed. "And here's the secret, border-painter. Two colors go blue-gold-blue-gold — they march in *pairs*. So a loop can only take two colors if the loop itself pairs up evenly. An *even* ring? Blue and gold shake hands all the way around and meet up perfectly." Twoby set out four pegs in a ring and painted them in the air with a fingertip — blue, gold, blue, gold, back to blue. No clash. "But an *odd* ring?" They pointed at the five. "There's always one peg left over. One clash. Every single time. Forever. It was never your hand. It was the *five*."

Swatch stared at the ring as if seeing it for the first time. "So when I feel that itch — that *this won't work* feeling — it's not me being clumsy. It's the ring being odd."

"Now you're counting like me," said Twoby, delighted. "Your two colors and my two-by-twos — they were the same question the whole time. *Does it pair up?*"



That night the workshop was dim, and the odd ring still sat on the table, five pegs, one honest clash. Swatch didn't wipe it away this time. They just looked at it, calm now.

"I used to hate that clash," Swatch admitted. "I thought it meant I wasn't good enough. I'd paint it over and over, getting more upset each time, sure the mistake was mine."

Twoby pushed the last lonely button into the middle of their palm and held it out, not as a problem, but almost as a gift. "It was never a mistake," they said gently. "It was the truth telling you something. Odd loops clash. That's not a flaw in you — it's a fact about the world, and you *found* it."

Swatch let out a long breath they hadn't known they were holding, and something in their chest went loose and light and warm — the particular relief of learning that the thing you'd been blaming yourself for was never your fault at all, only a number being exactly, honestly what it was.

"Even," Swatch said quietly, touching the four-peg ring. "Odd," they said, touching the five. And for the first time the clash didn't sting at all — it just felt calm, and honest, and strangely kind, and Swatch found they were smiling, warm and unbothered, glad to have a friend who could look at a lonely leftover button and see the truth in it instead of a fault.

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Methodology

Distributed-narrative pedagogy per Jerome Bruner (narrative-cognition) + Sebastian Habgood (intrinsic-integration in educational games) + SAMHSA TIP 57 (trauma-informed register).

Trauma-informed-design framework per Eggleston et al. (2025) and Stoltenburg et al. (2024).

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