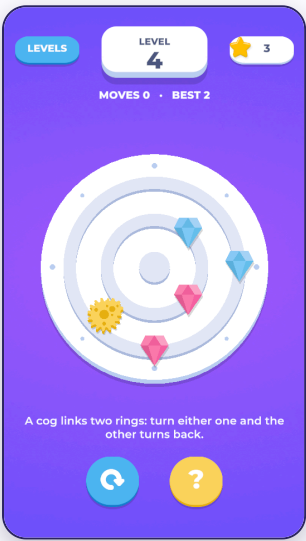


Clockwork

Turn the rings until a spoke lines up in one colour and it clears. Cogs link the rings, so every move is a small chain reaction to read ahead.

AT A GLANCE	
Genre	Hyper-casual rotation puzzle; market references: Rotate Rings, Colorwood Sort, Pencil Sort
Platforms	Portrait phones (Android) and the browser; Unity 6, URP
Controls	Tap a ring to turn it one notch; drag to turn it further, either way
Session	A level is a handful of moves; there is no timer and no fail
Content	40 levels in 4 chapters of 10
Status	Playable prototype 0.3.0: web build and Android APK



Level 4: the first cog



Level 14: a chain of three cogs



A win: stars by moves

The core loop

- **Look:** which spokes are one move from a single colour?
- **Turn:** a ring, and through its cogs, its neighbours.
- **Clear:** a full one-colour spoke pops; clears in a row earn praise.
- **Win:** stars for the fewest moves, then the next level.

Who it is for

Players of sorting and rotation puzzles who want a few calm minutes and a small "aha". The cog is the hook: in the ring puzzles I studied, rings turn one at a time, so a linked turn is new, yet it reads at once because it looks like a real cog.

Design pillars

- **Readable in one look.** Every rule is drawn: a cog is a meshing pair of wheels, a lock is a padlock.
- **One new idea per chapter,** brought in on a level the player will win.
- **No fail.** Mastery shows in stars, not in lives.
- **Every level proven.** A solver checks each one and sets its par.

RULES

Rings, spokes, cogs and padlocks

The board

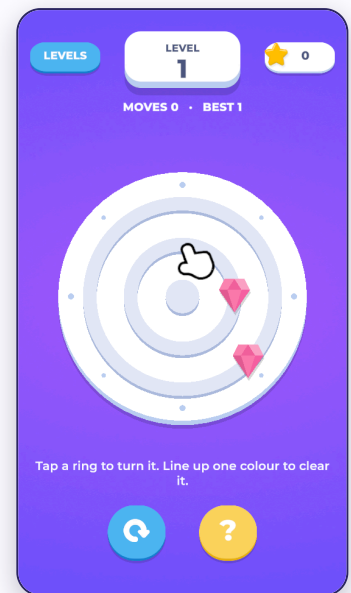
Two to four **rings** sit inside each other, each with 8 (or 12) **notches**. Some notches hold a gem. A **spoke** is the same notch on every ring, a line from the centre outwards.

A move

A tap turns a ring one notch clockwise. A drag turns it a notch every time the finger passes half a notch, either way, and a fast flick commits every notch it covers. Every notch is one move.

Clearing and winning

After every move, each spoke whose notches are all filled with one colour clears. Clear every gem to win. Spokes only count when full, so a half-built spoke is safe to leave.



Level 1: two rings, one red spoke to line up

Cogs: both ways, at 2:1

A **cog** links two neighbouring rings, drawn as a small wheel on the inner ring meshing with a big one on the outer. Turning the **outer** ring one notch turns the inner ring **two** notches the other way; turning the **inner** ring one notch turns the outer ring one notch the other way. Cogs chain: a turn passes along every cog.

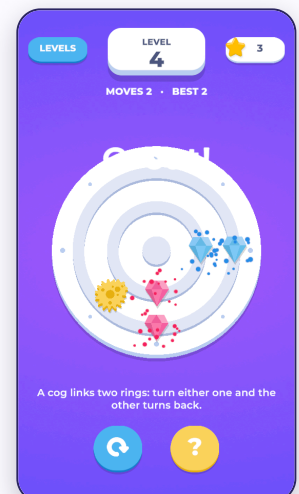
Why 2:1, both ways. Two-way at 1:1 made a geared pair behave as one ring, which took freedom away and capped how hard a level could be. One-way kept both rings free, but in the first playtest it read as broken: turning the driven ring moved nothing. Two-way at 2:1 always moves both rings and still keeps them two free rings.

Padlocks

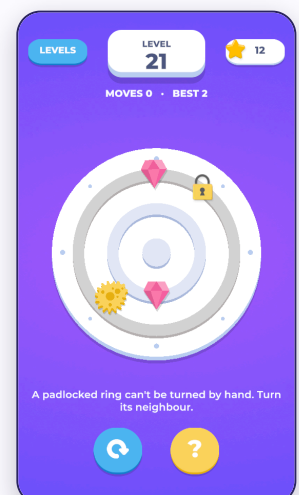
A **padlocked** ring can't be turned by hand: a tap wiggles it, its padlock jumps and no move is counted. It turns only through a cog, so the player has to plan the neighbour's turn.

Stars, hints, restart

Each level's **par** is the fewest moves that win it, found by the solver. Three stars at par, two within two moves of it, one otherwise. The hint button shows the solver's next move from where the player is; restart is free.



A cog pair, mid-turn



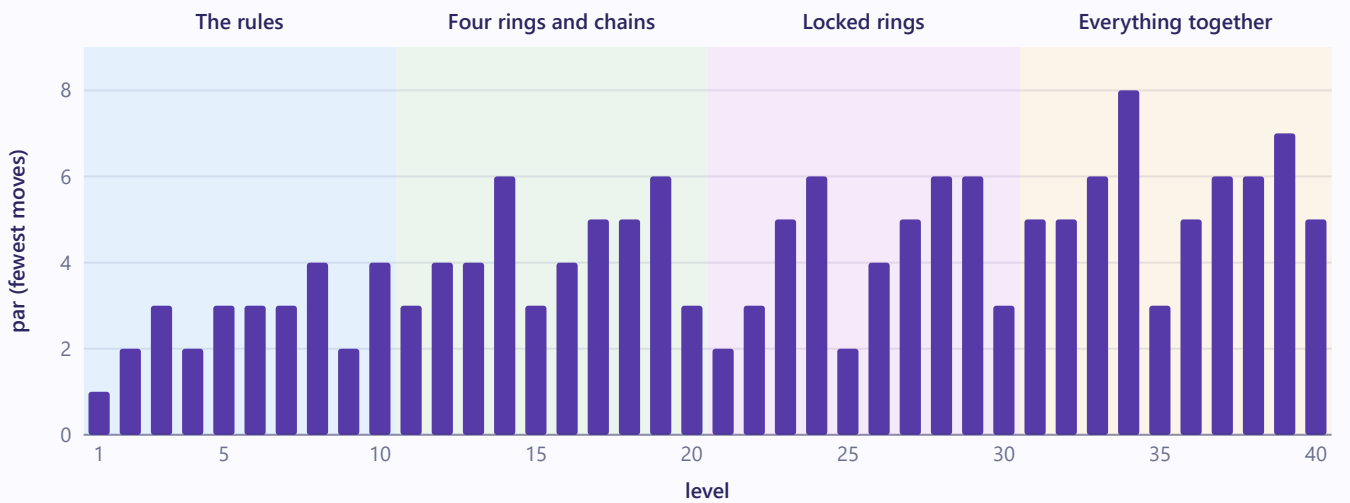
A padlocked ring refuses a turn

Four chapters, one new idea each

Each chapter brings in one idea on an easy level, then builds on it. Within each chapter the difficulty climbs in a sawtooth: it rises for a few levels, peaks, then drops for a breather before the next climb.

CHAPTER	NEW IDEA	RINGS	NOTCHES	WITH COGS	PADLOCKED	PAR
1. The rules	Turning, clearing, the first cog, the 2:1 ratio	2–3	8	6/10	0/10	1–4
2. Four rings and chains	Chained cogs, a fourth ring	3–4	8	10/10	0/10	3–6
3. Locked rings	Padlocks, 12-notch rings	2–4	8 / 12	10/10	8/10	2–6
4. Everything together	Every idea combined	3–4	8 / 12	10/10	7/10	3–8

The difficulty curve: par per level



Par is a stand-in for difficulty, not a measure of it: colours, rings and cogs also make a level harder to read. Breathers (low bars after a peak) give the player a quick win: levels 15, 20, 25, 30 and 35.

Teaching without a tutorial

A new idea gets a one-line tip on the level where it first appears, and level 1 shows a hand pointing at the ring. Nothing else interrupts play.

LEVEL	THE ONE-LINE TIP
1	Tap a ring to turn it. Line up one colour to clear it.
4	A cog links two rings: turn either one and the other turns back.
5	The small wheel turns twice as far: the inner ring moves two notches.
11	Cogs chain: one turn can move every ring.
21	A padlocked ring can't be turned by hand. Turn its neighbour.
26	Twelve notches: smaller steps, more to line up.

How the levels are made and proven

1 • The spec: what I decide

Each level is one line in the level plan: its name, the number of rings and notches, the colours, where the cogs and padlocks go, and the range its par must fall in. That range is where the sawtooth is designed.

2 • The generator lays it out

It places each colour's gems in a solved line, then scrambles the rings using only moves the player could make (never a padlocked ring by hand), so every layout can be solved. It keeps a layout only if:

- its par falls inside the range,
- no spoke is already complete at the start,
- its cogs change the solution (the same board without cogs has a different par).

3 • The solver proves it

A breadth-first search over every reachable board finds the fewest moves, which becomes the par. The same solver runs in the game to give hints.

The level file

Levels are plain text, readable and editable by hand. Level 4, inner ring first:

```
=== 4 | The First Cog | par 2
gears 01
ring . b . r . . . .
ring . . b . r . . .
```

Tests that guard the design

- Every level's par equals what the solver finds.
- Every geared level plays differently without its cogs (padlocks kept).
- No level starts with a spoke already complete.
- A cog turns both ways at 2:1, a geared pair stays two free rings, cogs chain, and a padlocked ring refuses a hand turn.
- A playthrough wins levels in the real scene with the solver's moves and saves screenshots.

What the tests caught. Cogs that were decoration on four of the first ten levels (the same par with or without them), and a spike level with two padlocks that could never need more than 4 moves: locks take freedom away, so a hard level with locks needs three free rings.

What players found, and what changed

Bots prove that levels can be solved; only people show whether the rules read and whether it is fun. Each finding below came from playing a build, and each changed the game.

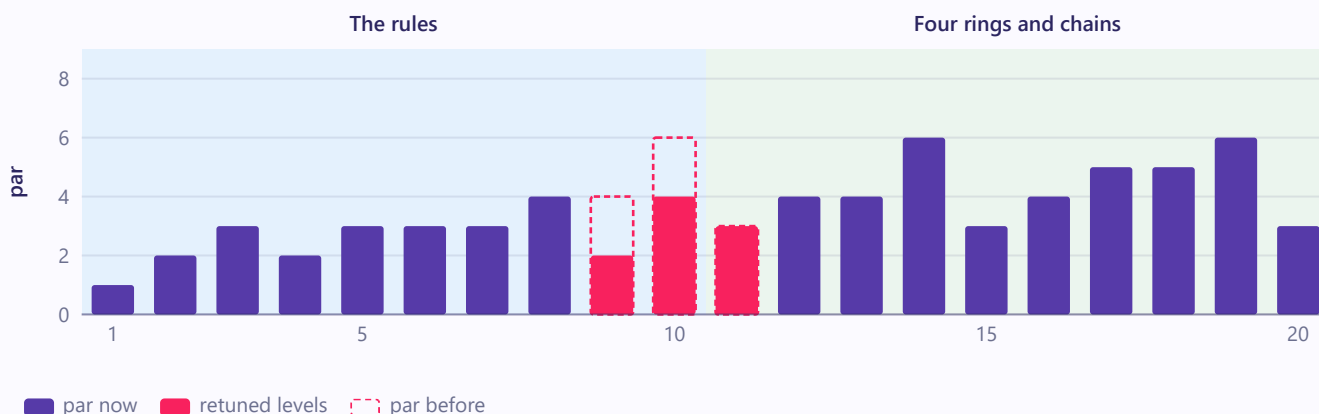
1 • "The gear mechanic doesn't work"

In the first play, four levels in, the player turned the ring a cog *drives* and nothing else moved. The rule worked as written (one way only), but real cogs turn both ways, so it read as a bug.

Change: cogs work both ways at 2:1, drawn as a meshing pair that spins at that ratio; every ring a move turns swells, so the link is seen. All 40 levels were laid out again under the new rule.

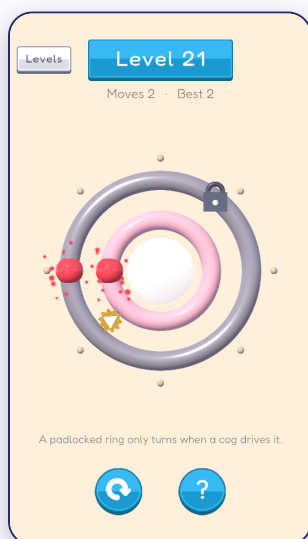
2 • "From level 9 it feels a bit too difficult"

Level 9 brought in chained cogs *and* asked for as many moves as level 8; level 10 then added a fourth ring and a fifth colour at par 6, the steepest step so far, inside the chapter meant to teach the rules.

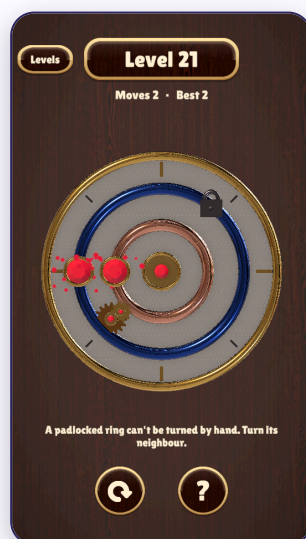


Change: a new rule now arrives on an easy level. Level 9 is a gentle one-cog level (par 2), level 10 ends the chapter on three rings (par 4, was 6), and chained cogs open chapter 2 at par 3 with their own tip.

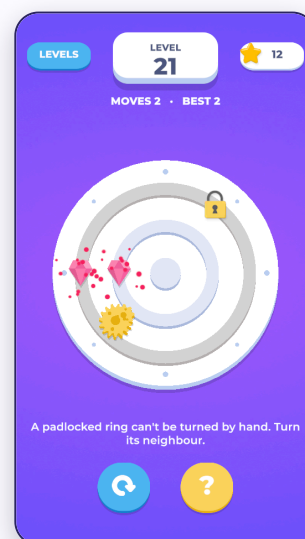
3 • The art, three times



1 · Candy tubes: no depth, stock buttons



2 · Watchmaker's bench: raw, unpolished



3 · Built on a professional free kit

Candy tubes drawn in code had no depth; a realistic watchmaker look made in code read as raw. The lesson: polish comes from an artist's hand, so the game was rebuilt on a hand-made free kit, with its colours, layers and type carried into every shape.

Juice, art, monetisation and the roadmap

Game feel

- The touched ring swells; every ring a cog turns swells with it.
- A refused turn wiggles the padlocked ring and its padlock jumps.
- Clears pop in the gem's colour; "Nice! / Great! / Brilliant!" for clears in a row, and the clear sound climbs with the streak.
- A win rains confetti and the stars pop in one by one.
- Buttons sink under the finger.

Art and audio

Built on the **Mini Casual UI Kit by Butabi**: its purple gradient, white cards with a pale blue frame, and shapes in three layers (a light face, a darker base below it, a soft shadow). Rings, gems and cogs are flat meshes in that recipe, so they stay sharp on any screen. Type is Montserrat; interface sounds are Kenney's.

Built with

Unity 6 (URP). The rules live in a pure C# library with no engine code, mirrored in a Python tool that generates and checks the levels. Built with an AI coding assistant (Claude): I set the rules, the chapter plan, the par ranges and the tuning, playtested every build and decided each change.

Monetisation (a plan, not built)

The prototype has no ads or purchases. As a hyper-casual release it would follow the genre:

- **Interstitials** between levels, never mid-level, and not in the first chapter.
- **Rewarded hint**: after a free hint per level, more hints for a rewarded ad.
- **Remove ads** as a single purchase.

What to measure first

- Day-1 retention and the level where players stop: does the curve hold?
- Moves over par and hints per level: which levels are walls?
- The first cog levels (4–5): do players get the 2:1 rule unaided?

Roadmap

- Playtests with first-time players using the playtest kit; retune from what they show.
- A visual level editor in Unity on top of the generator and solver.
- More chapters: one-way "ratchet" cogs, rings that hold two colours, timed challenge levels.
- A daily puzzle from the generator, with a shared par.

Credits

Art: Mini Casual UI Kit by Butabi (hegybirog.itch.io/mini-casual-kit). Sounds and pointer: Kenney (kenney.nl, CC0). Font: Montserrat (SIL Open Font License).