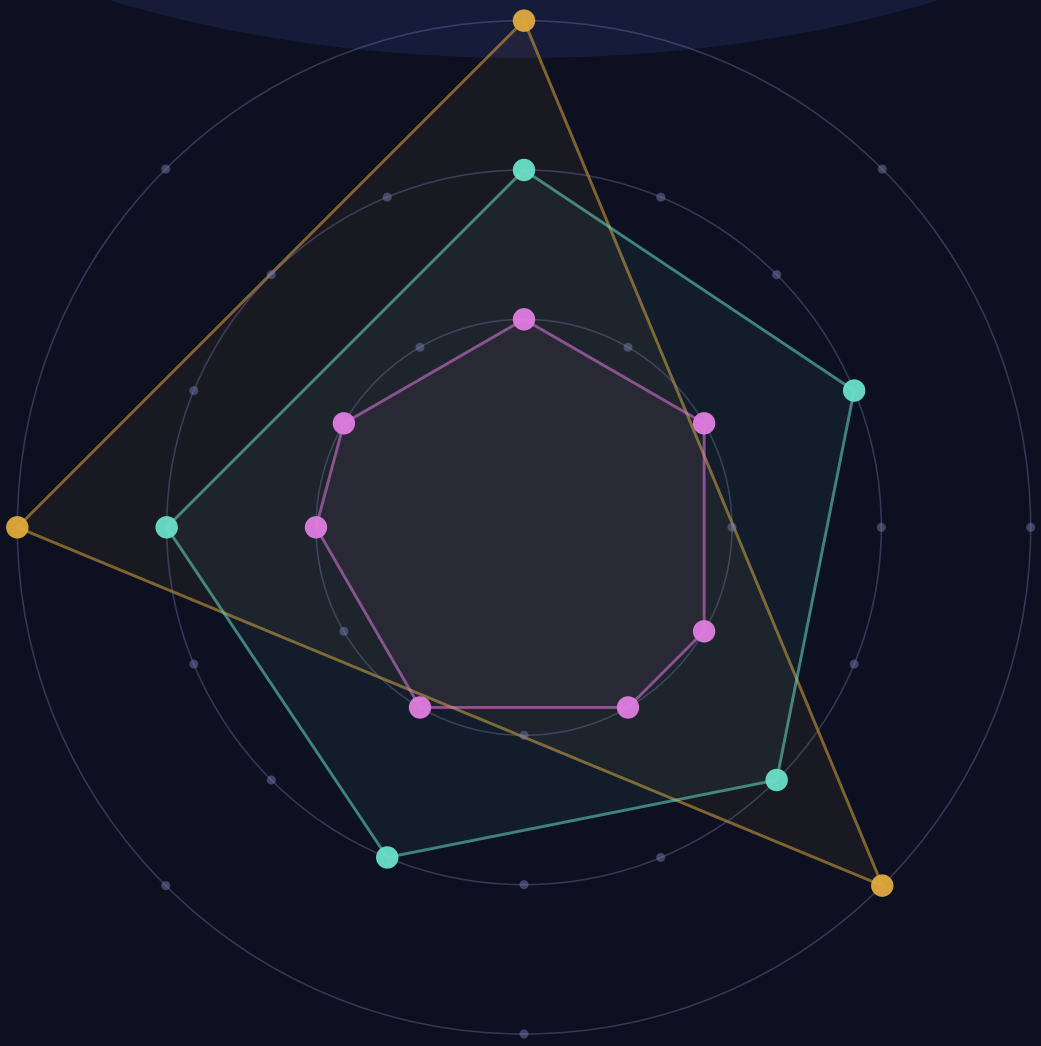

GROOVE IS GEOMETRY

Euclidean rhythms you can see, hear, and record

INSTRUCTION MANUAL

v3 · Browser synth · WAV export · MIDI out to Logic Pro

1 · What this is

Groove Is Geometry is a rhythm machine built on one idea: spread **k** hits as evenly as possible across **n** steps. That's Bjorklund's algorithm — originally written to time neutron pulses in particle accelerators. In 2004, computer scientist Godfried Toussaint noticed that this little piece of math accidentally generates most of the world's traditional rhythms. E(3,8) is the Cuban tresillo. E(5,8) is the cinquillo. E(5,16) is the bossa nova pulse. E(7,12) is a West African bell pattern.

The app runs three of these patterns at once as concentric rings, draws each one as a polygon inscribed in a circle, and plays them with a built-in synth engine. It can also export audio as a WAV file, or send MIDI straight into Logic Pro so the geometry plays your own instruments.

Why it grooves: perfect evenness — E(4,4) — is a metronome. The interesting patterns are *maximally even but not quite*, and the leftover asymmetry is exactly where the feel lives.

2 · Quick start

1. Open the HTML file in any modern browser (Chrome recommended for MIDI).
2. Tap **Play**. The playhead sweeps the circle; hits flash as they fire.
3. Drag the **tempo slider** (60–160 BPM).
4. Tap a **preset** (Tresillo stack, Bossa, Bembé bell, Aksak, Sparse night) to load a known groove.

iPhone note: if you see the rings moving but hear nothing, check the physical silent switch and volume rocker. The app includes a workaround that lets sound play even in silent mode, but the status line under the transport will report the audio engine's state either way — if something is blocked, it says so.

3 · The rings

Each ring is one voice with its own pattern, written as **E(k,n)**: k hits distributed across n steps. One full rotation of the circle equals one bar, so rings with different step counts create polyrhythms automatically — a 12-step ring against a 16-step ring lines up only once per bar.

Ring	Voice	Default	Character
Low (gold)	Kick — pitched sine drop	E(3,8)	The foundation; the tresillo lives here
Mid (teal)	Snare/rim — filtered noise burst	E(5,16)	The conversation layer
High (magenta)	Tick — short triangle blip	E(7,12)	The bell; density and shimmer

Per-ring controls

Control	What it does
k – / +	Fewer or more hits. Raising k densifies; k = n fills every step.
n – / +	Fewer or more steps in the ring (2–24). Changing n reshapes the whole polygon.
■	Rotates the pattern one step. Same shape, different downbeat — this is how a tresillo becomes the 'other side' of a

Reading the picture: big dots are hits, small dots are rests, and the colored polygon connects the hits. Even-sided shapes sound square; lopsided shapes swing. When a pattern refuses to close into a regular polygon, that refusal is the groove.

4 · Export WAV

Export WAV renders two bars of the current pattern offline — at full quality, independent of what your speakers are doing — and downloads a 16-bit / 44.1 kHz stereo file named after the pattern and tempo (e.g. *groove-E3-8_E5-16_E7-12-104bpm.wav*). Drag it into a Logic audio track and it loops cleanly, because the render length is derived from the same clock that plays it.

5 · MIDI into Logic Pro

MIDI mode is where this becomes an instrument: instead of the built-in synth, the geometry plays **your** drum kits and instruments inside Logic, and you can record the output as editable MIDI regions.

One-time Mac setup (about 2 minutes)

1. Open **Audio MIDI Setup** (Applications → Utilities).
2. Menu bar: **Window** → **Show MIDI Studio**.
3. Double-click **IAC Driver** and check **"Device is online."** This is macOS's built-in virtual MIDI cable.
4. Open the app in **Chrome**. Safari does not support Web MIDI.

Connecting

1. In the app, tap **MIDI** and grant access when the browser asks.
2. Choose the **IAC bus** from the Output dropdown.
3. In Logic, create a **software instrument track** with any kit — Drum Machine Designer, a Drummer kit, anything. Logic listens to all MIDI inputs by default, so no routing is needed.
4. Press **Play** in the app. Your Logic kit is now playing the geometry.

MIDI panel reference

Setting	Default	Notes
Output	—	Pick the IAC bus. '— internal synth only —' disconnects MIDI.
Channel	10	The General MIDI drum channel; most kits expect it.
Low note	36 (C1)	GM kick. Maps to Drum Machine Designer's kick pad.
Mid note	38 (D1)	GM snare.
High note	42 (F#1)	GM closed hi-hat.
Built-in synth	On	Turn Off once Logic is sounding, so you don't hear both.

Recording the pattern

Record-enable the instrument track, hit record in Logic, then Play in the app. You'll capture the pattern as a MIDI region you can edit, quantize (it already is — the math *is* the quantize), and reassign to any instrument. MIDI events are timestamp-scheduled against the same clock as the audio engine, so timing stays tight; stopping playback sends all-notes-off so nothing hangs.

Try this: set the three ring notes to pitched values instead of drums — say 48 / 55 / 60 — and point them at a Rhodes, a pluck, or a marimba. Euclidean patterns as melodic arpeggios is a second instrument hiding in the same geometry.

6 · Pattern field guide

Pattern	Known as	Heard in
E(3,8)	Tresillo	Cuban music, New Orleans second line, half of pop radio
E(5,8)	Cinquillo	Danzón, habanera, early jazz
E(5,16)	Bossa pulse	Brazilian bossa nova
E(7,12)	Bembé bell	West African bell patterns; same geometry as the major scale
E(2,5)	Aksak	Greek and Balkan rhythms; Take Five lives near here
E(7,16)	Samba necklace	Brazilian samba
E(5,12)	Venda pattern	South African clapping music

Every combination of k and n is somebody's groove, somewhere. The status line under the presets identifies famous patterns automatically as you dial them in.

7 · Troubleshooting

Symptom	Fix
Rings move, no sound (iPhone)	Check the physical silent switch and volume. Tap Play again — the status line reports the a
Status says 'audio blocked'	Tap Play a second time; browsers require a user gesture to start audio.
'Web MIDI not supported'	You're in Safari or on iOS. Use Chrome on the Mac.
'No MIDI outputs found'	IAC Driver isn't online — see the one-time setup in section 5.
Logic hears nothing	Confirm the track is record-enabled/monitoring, and the IAC bus is selected in the app's Ou
Hearing doubled drums	Both the built-in synth and Logic are sounding. Set Built-in synth to Off in the MIDI panel.
Hung note in Logic	Press Stop in the app (sends all-notes-off), or Logic's MIDI panic.

Built for fun. Single HTML file, no dependencies, no accounts, nothing tracked — just Bjorklund's algorithm, the Web Audio API, and the oldest discovery in music: the remainder is where the feel is.