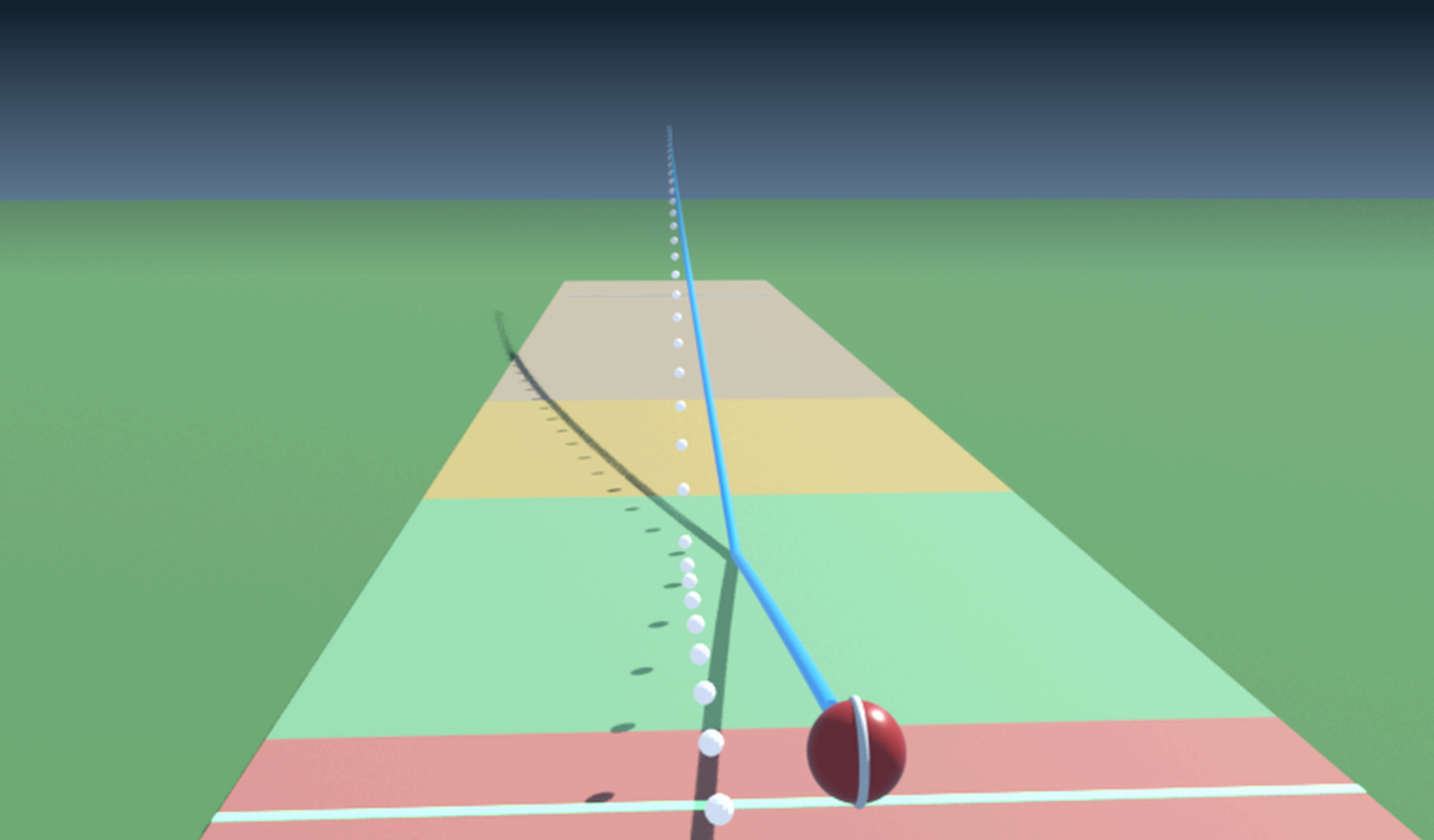
Thinking in Systems
NOT CODE

FIELD NOTE · CRICKET

Bowled by a Late Swinger

I got out to a ball that pitched on middle and hit off stump. What could I have done differently? Let me check with some simulations.

Ankit Naik · Thinking in Systems · August 2026



THE 60-SECOND VERSION

If you read nothing else

- **The finding.** Length hardly changes how much an outswinger moves. Full, good or short, it swings the same **0.38 m**. What length changes is how much of that movement lands after the bounce. That's probably why it looks late.
- **Why it matters.** There's no variable to guess at. You read a starting line and add a fixed offset.
- **The mechanism.** The sideways force is aerodynamic, set by pace and seam angle. It doesn't know where the ball bounced.
- **Do this.** Meet it further out. Guard outside the crease, or stride to the pitch. Either one halves the movement that arrives after you've committed.

0.38 m
Sideways movement, the same at every length

96 mm
The ball that bowled me: middle to off stump, after pitching

2×
Extra late movement if you play back instead of at the pitch

SO WHAT

Don't try to guess *how much* it'll swing. Read where it starts, allow a ball and a half towards off, and meet it early. The movement that beats you is the part arriving after your bat is already committed.

CHAPTER 1

01 Swing is independent of length

I had a wrong assumption: I neglected the movement after the ball pitches.

LENGTH	PITCHES FROM STUMPS	TOTAL SWING	MOVES AFTER PITCHING	TIME TO READ IT
Overpitched	2.0 m	**+0.39 m**	+74 mm	81 ms
Good length	4.8 m	**+0.38 m**	+165 mm	191 ms
Short	8.0 m	**+0.38 m**	+261 mm	324 ms

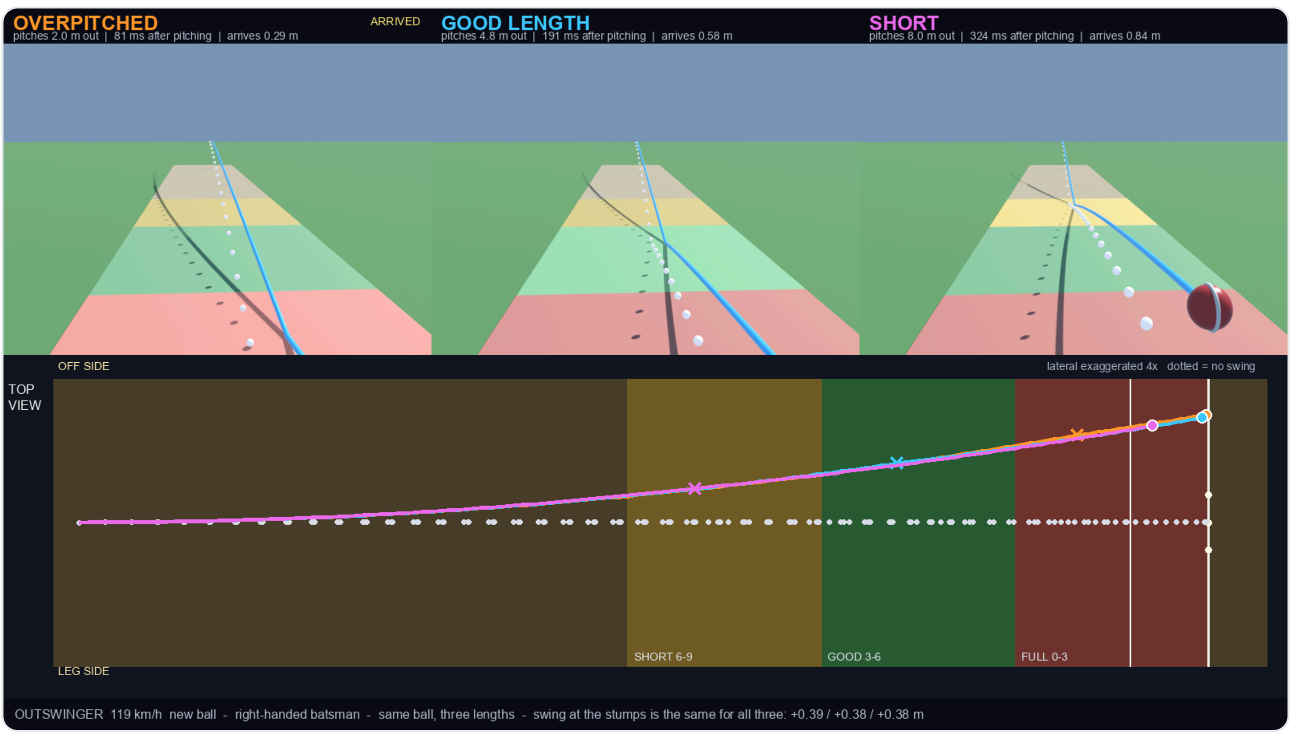


Figure 1. The short ball is airborne 304 ms against 496 ms for a full one, and still swings the same 0.38 m. Look at the plan view: the three paths sit almost on top of each other, and only the crosses where they pitch separate. What length changes is *when* the movement happens. Off a short ball, 261 mm of it lands after the bounce. Off a full one, 74 mm.

CHAPTER 2

02 Read the line, not the movement

If the movement's fixed, the only thing left to read is where the ball started. So I changed the release angle and kept everything else the same.

RELEASED	PITCHES	REACHES THE STUMPS	SWING
−3.0°	0.45 m outside leg	0.49 m down the leg side	+0.38 m
−1.0°	on middle	**off stump**	+0.38 m
+1.5°	0.55 m outside off	0.82 m outside off, to slip	+0.38 m

- The release angle slides the whole line sideways. The swing stays put.
- The middle row is the ball that bowled me, aimed a degree inside the stumps.
- So the movement is an offset you can learn or predict.

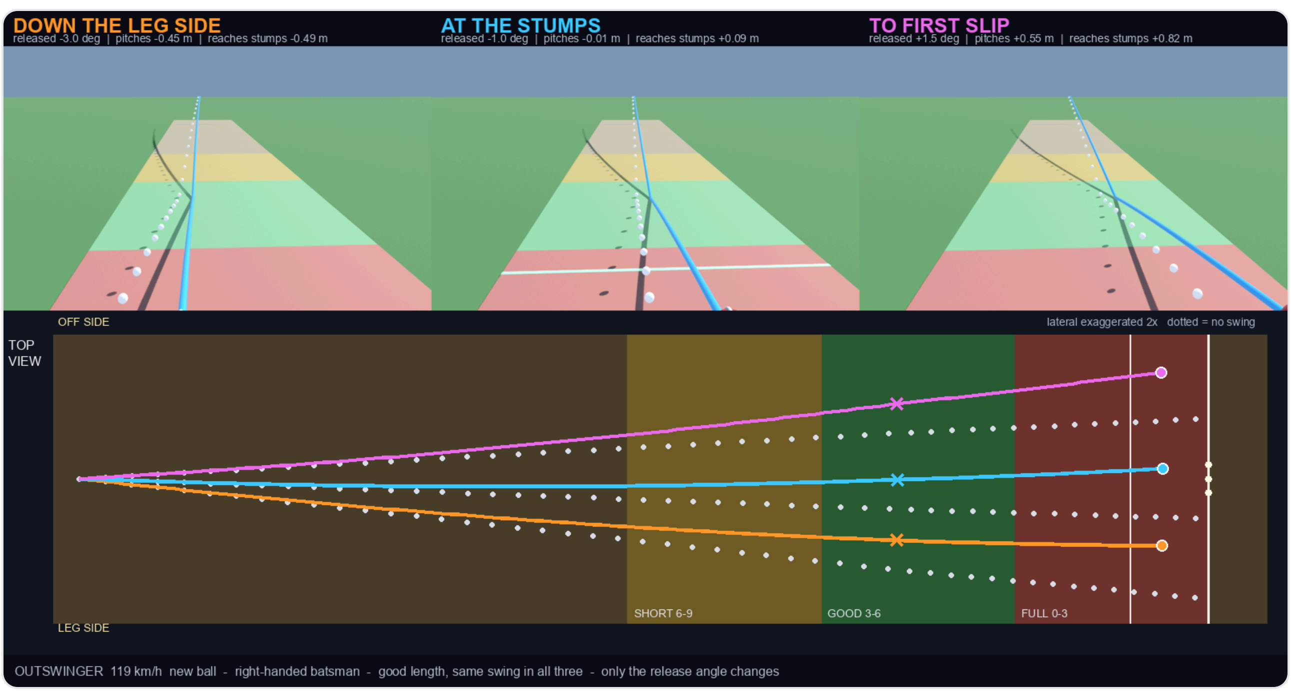


Figure 2. Three aims, three parallel curves. Each dotted line is that same ball with the swing switched off, and every solid path sits the same distance from its own twin.

CHAPTER 3

03 Where to meet it

The further the ball travels, the more it has drifted. What matters is how much drift is still to come once my bat is committed.

MEET THE BALL	AT	MOVEMENT TO COVER	ARRIVES AFTER YOU COMMIT
At its pitch	405 ms	215 mm	**51 mm**
2.5 m down the pitch	495 ms	287 mm	79 mm
At the crease	546 ms	334 mm	92 mm
Back, at the stumps	592 ms	379 mm	**102 mm**

- Standing deep buys me about **97 ms** more to watch it.
- It also doubles the late movement: 51 mm becomes 102 mm. A cricket ball is 71 mm in diameter, so that's the middle of the bat against an edge.

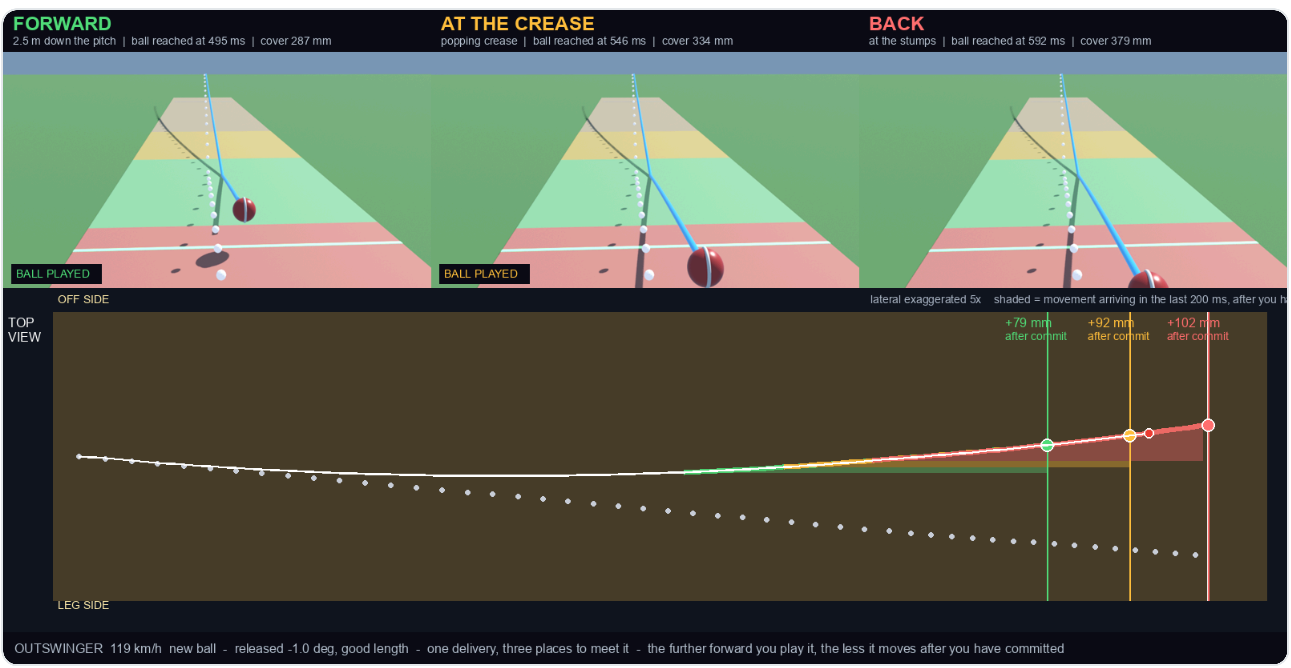


Figure 3. Each panel freezes when the ball reaches that point. The shaded wedges are the movement still to come.

THE TAKEAWAY

Judge the line.
Meet it early.

I went looking for a way to predict the swing and found there's nothing to predict. It's the same 0.38 m almost every ball. What varies is where the bowler aimed it, and how much of the drift is still ahead of me when I commit.

- Read the release and the pitch, then allow about a ball and a half to the off side.
- Meet it as close to its pitch as possible: guard outside the crease, a full stride, or both. That halves the late movement.
- Don't play across it. The ball is already going the other way.
- Stop saying it swung late. It swung the whole way.

More field notes at systemsnotcode.com →

Method & limits

The numbers here come from one configuration: a new ball at 119 km/h, seam angled 20°, released 2.2 m up. Read the limits before you trust the conclusions.

- **Movement off the seam at the bounce is not modelled.** The ball is a smooth sphere, so the pitch gives bounce and friction but can't catch a raised seam. That effect *does* depend on length, and it's the one thing that could undercut Chapter 1.
- **Aerodynamic swing only:** drag, a seam-driven side force, and a Magnus force from backspin.
- **Surface state is a single number**, set here to a new ball. Reverse swing exists in the model but is switched off for this study.
- **The model only says *where* the ball is met, not how you get there.** Taking guard outside the crease and striding to the pitch reach the same point. It says nothing about what standing out costs: being stumped, or handing the bowler a different length.
- **The side-force coefficients are semi-empirical:** picked to reproduce the magnitudes people observe, not fitted to actual data.

HOW IT WAS BUILT

1. Ball flight and bounce as a Modelica model: multibody dynamics with a contact model for the pitch, solved in Wolfram System Modeler.
2. Aerodynamics as a custom component: drag, seam side force, Magnus lift, fed by the ball's own velocity and spin.
3. Trajectories exported and rendered in Blender, driven headlessly from the simulated data.
4. The dotted line in every figure is the same delivery with the side force set to zero.