



SwimBETTER

TECHNICAL ERROR INDEX

12 measurable freestyle errors identified in eo SwimBETTER data

VERSION 2 – JUNE 2026

ABOUT THIS GUIDE

We've developed this guide to help coaches and athletes:

- Quickly spot patterns in the **eo** SwimBETTER data and understand what they mean.
- Distinguish strengths from technique issues.
- Interpret **eo** SwimBETTER charts correctly.
- Identify the vast majority of issues quickly and easily.

Errors are listed in order of importance and frequency.

IMPORTANT

1. Fix the dominant error first.
2. Do not attempt to correct multiple faults simultaneously.
3. Confirm improvements by checking your data after making a change.
4. Slow it down. Don't try and make changes at race pace. Once improved, slowly pick up the tempo and ensure that the changes hold at higher pace.

TERMINOLOGY

TERM	MEANING
Pitch	Hand angling up or down at the fingertips
Roll	Hand rotating or directing force laterally
Yaw	Hand slipping sideways

FORCE & POWER

All metrics in this index are referenced in Force (Newtons). If preferred, you can switch your **eo** SwimBETTER Platform settings to view data in Power (Watts) at: swimbetter.eolab.com. The same principles for reviewing and interpreting data apply whether you are viewing charts in Force or Power.

TOTAL FORCE IMBALANCE (bilateral asymmetry)

WHAT YOU'LL SEE

- Visible in Stroke Rate & Force chart
- Clear left / right discrepancy in total force output
- Imbalance in single lap, or persistent across multiple laps

WHAT IT MEANS

One side of the stroke is producing less total force than the other.

This may reflect:

- Breathing bias
- Strength imbalance
- Timing discrepancy

KEY DISTINCTION

Total force imbalance does not automatically mean propulsive imbalance.

Always check Propulsive % before concluding a strength issue.

WHY IT MATTERS

Over distance, asymmetry:

- Increases metabolic cost
- Disrupts rhythm
- Impacts repeatability
- May cause or exacerbate injury

COACHING PRIORITY

Before intervening, determine whether the imbalance is:

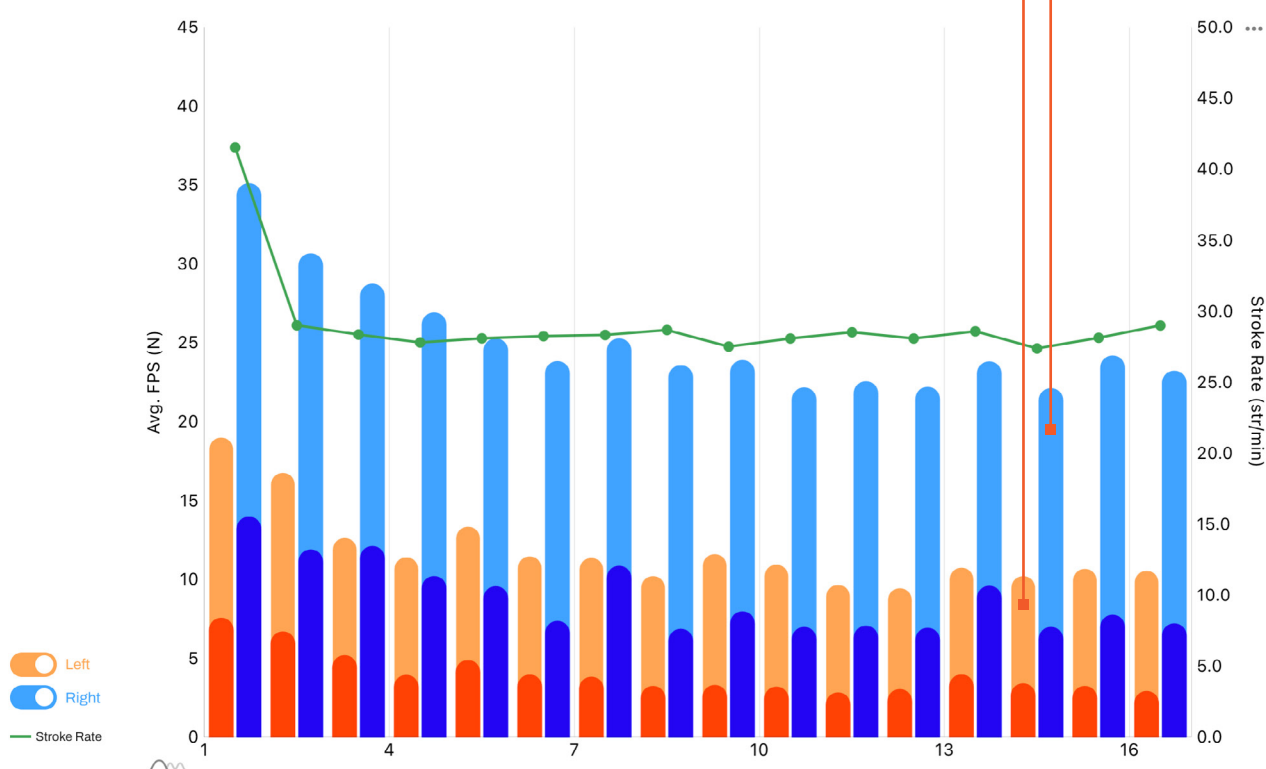
- Strength-based
- Direction-based
- Timing-based

Correct the cause – not the symptom. A snorkel can come in very handy in diagnosis. Don't worry if imbalance is minor (<10%)

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CHART: Stroke Rate & Force

Left & Right Total Force Imbalance



PROPULSIVE IMBALANCE

WHAT YOU'LL SEE

- Similar left / right total force
- Different propulsive force % contribution

WHAT IT MEANS

- Both hands may be producing similar force, but one is using it more effectively
- One hand directs more force into downward or lateral vectors
- This is typically a direction-of-force issue

KEY DISTINCTION

This is a directional issue, not a strength issue.

WHY IT MATTERS

The swimmer may feel balanced, but forward propulsion differs significantly.

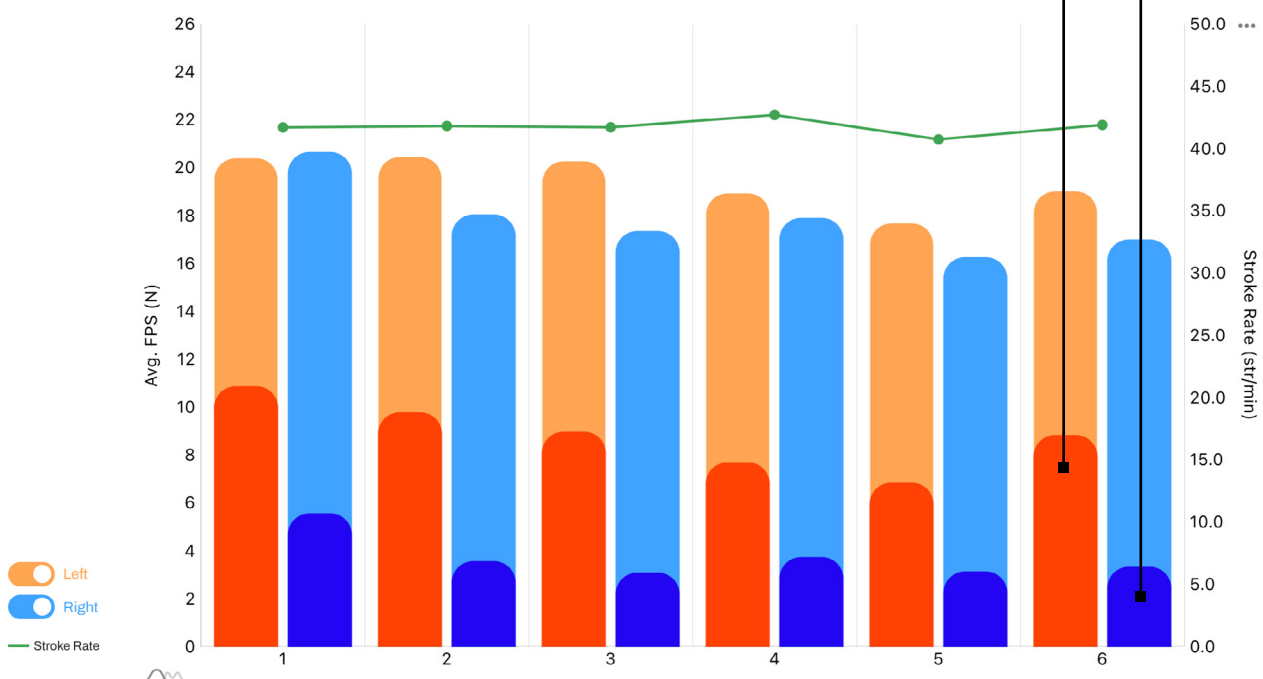
COACHING PRIORITY

Slow it down and work on improving force direction first, then work on increasing effort.

[LEARN MORE](#)

Left & Right Propulsive Force Imbalance

CHART: Stroke Rate & Force



EXCESSIVE DOWNWARD FORCE

WHAT YOU'LL SEE

- Elevated downward force %
- Reduced propulsive contribution

WHAT IT MEANS

The swimmer is pressing down rather than back. This may indicate dropped elbow patterns, although not always.

Common causes:

- Poor hand pitch at catch
- Early vertical forearm not achieved, especially in distance swimmers
- Overemphasis on downward pressure, robbing propulsion
- Possible poor breathing technique, with athlete leaning on opposite arm when taking a breath.

WHY IT MATTERS

Energy and effort is wasted pushing downwards.

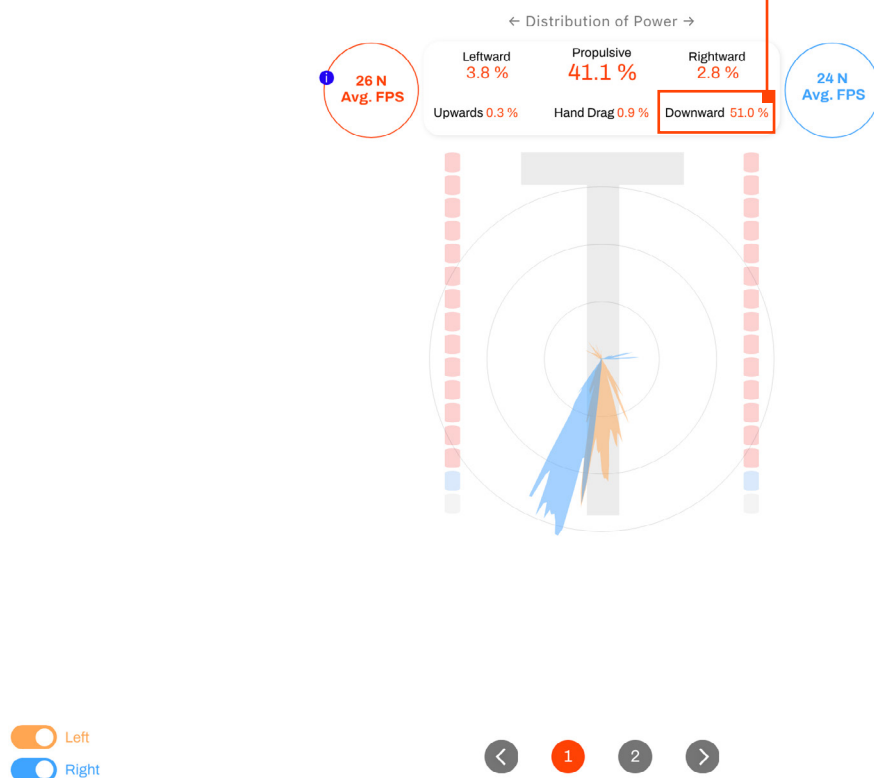
COACHING PRIORITY

Correct pitch and forearm orientation before increasing stroke rate.

Focus on athlete going "over the barrel".

[LEARN MORE](#)

CHART: Force Field



EXCESSIVE DOWNWARD FORCE + HAND DRAG

WHAT YOU'LL SEE

- Hand drag during glide phase
- Elevated downward force

WHAT IT MEANS

The elbow drops before effective catch is established.

Typical sequence:

- Elbow drops
- Fingers pop up to create hand drag
- Hand presses downward excessively
- Catch is delayed
- Propulsion is reduced

KEY DISTINCTION

Energy and time is wasted pushing downwards and not in propulsive direction

This is a sequencing fault, not simply a “weak catch”.

WHY IT MATTERS

Forward momentum is interrupted and timing deteriorates.

Energy expended is wasted pushing downward prior to the catch where we generate propulsion.

COACHING PRIORITY

Ensure glide is in downward trajectory and that the hand is not scooping upward during glide.

Emphasise going “over the barrel”.

[LEARN MORE](#)

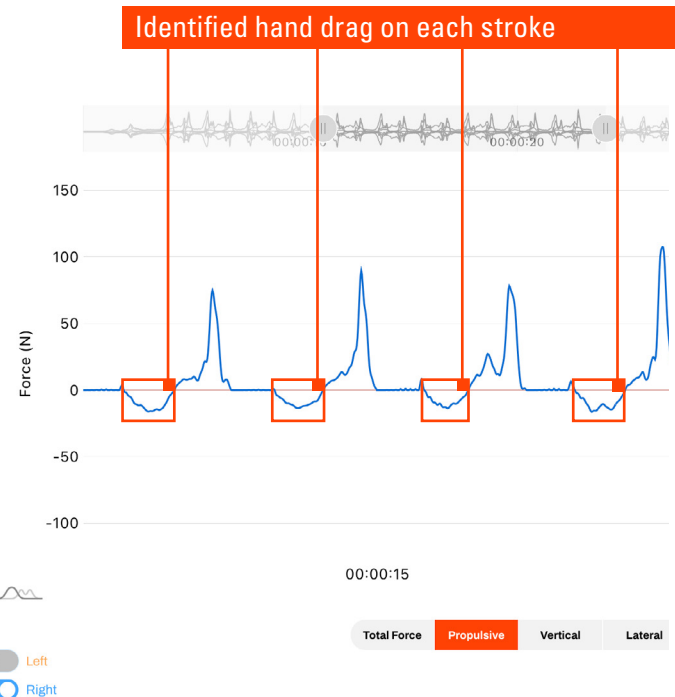
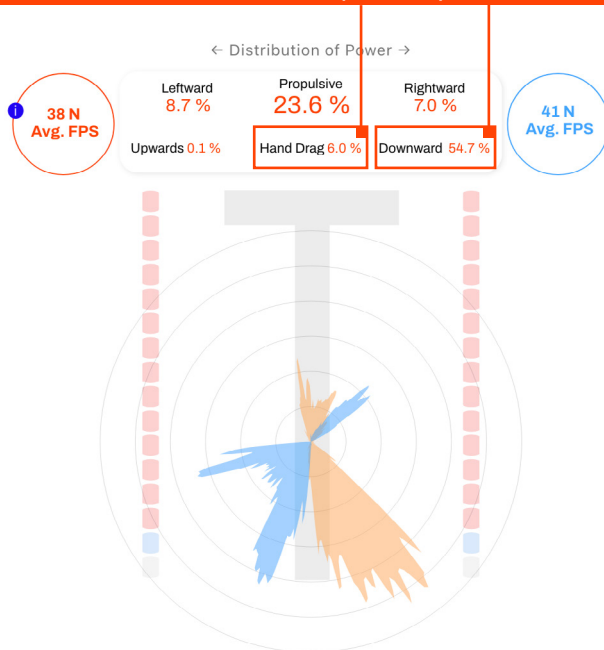
CHARTS: Force Field + Force vs Time

Hand drag and downward force is too high.

Target:

Sprint: 0% and 32-37% respectively

Distance: 0% and 17-22% respectively



STROKE-TO-STROKE FORCE VARIABILITY

WHAT YOU'LL SEE

- Erratic Force vs Time curves within a lap
- Inconsistent propulsive peaks
- High propulsive variability

WHAT IT MEANS

The swimmer lacks repeatable force production.

Common causes:

- Over-rotation during breathing (poor breathing technique)
- Trunk instability
- Fatigue breakdown

KEY DISTINCTION

When variability is extreme, individual stroke analysis becomes unreliable – assess macro trends by focussing on the Force Field chart.

WHY IT MATTERS

Speed relies on repeatable force application with optimal technique.

COACHING PRIORITY

Stabilise trunk mechanics and breathing rhythm before refining micro timing.

Look at using a snorkel to see if it improves.

[LEARN MORE](#)

In these events, acknowledge the fact that we have a swimmer with poor technique and focus on the basics via only Stroke Rate & Force, Force Field and Consistency charts.

CHART: Force vs Time



HAND POSITION INCONSISTENCY (stroke repeatability)

WHAT YOU'LL SEE

- Inconsistent hand path positions stroke-to-stroke
- Elevated variance on Consistency chart

WHAT IT MEANS

Indicates the swimmer is struggling to repeat the same movement pattern from stroke to stroke.

WHY IT MATTERS

A technically strong stroke only becomes valuable when it can be repeated consistently.

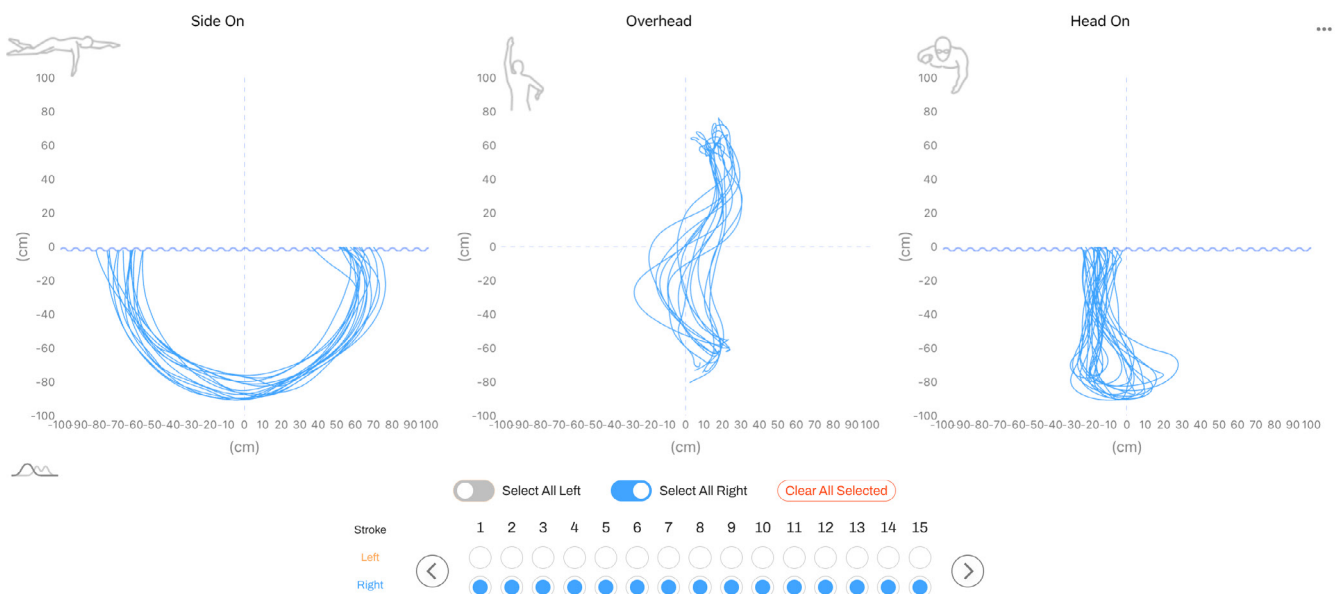
COACHING PRIORITY

Reduce stroke rate temporarily and reinforce motor consistency. Once improved, start to build tempo back up.

Use a snorkel to diagnose if cause is a poor breathing technique.

[LEARN MORE](#)

CHART: Consistency



HAND PATH ASYMMETRY

WHAT YOU'LL SEE

- Different spatial paths left vs right
- Depth discrepancy (side view)
- Inward / outward variation (overhead view)

WHAT IT MEANS

The swimmer has a different hand path on each side.

Often linked to:

- Poor breathing technique
- Excessive head lift
- Trunk over-rotation
- Possible poor flexibility / mobility issue in extreme cases

WHY IT MATTERS

Asymmetric paths create inconsistent propulsion and rotational imbalance.

COACHING PRIORITY

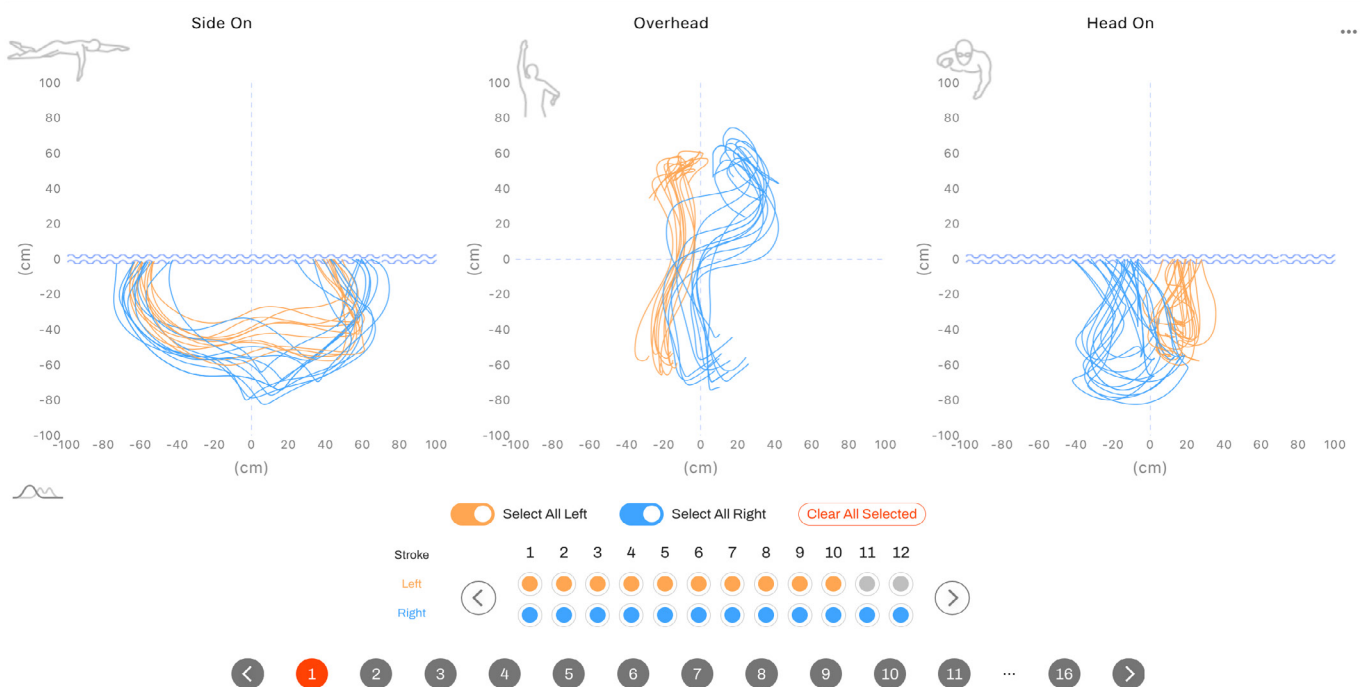
Stabilise head and trunk alignment before altering hand mechanics.

Use a snorkel to diagnose if cause is a poor breathing technique.

[LEARN MORE](#)

If not breathing related, consider seeking advice from PT or physio to establish if the cause is flexibility, mobility or strength issues.

CHART: Consistency



MID-STROKE PROPULSION LOSS (Double peaks)

WHAT YOU'LL SEE

- Double-peaked propulsive curve
- Noticeable mid-stroke propulsive force drop, shown as a valley

WHAT IT MEANS

Interruption in continuous propulsive force application.

Common causes:

- Excessive hand roll during inward sweep, usually occurring at outer edge of hand path immediately before moving inwards
- Reduced hand velocity
- Combination of both

WHY IT MATTERS

Decrease in propulsion reduces speed.

COACHING PRIORITY

Maintain trunk stability and preserve hand velocity through mid-pull.

Reduce hand rotation degree at point where hand transitions from pushing out / back to moving inwards towards the centre line.

LEARN MORE

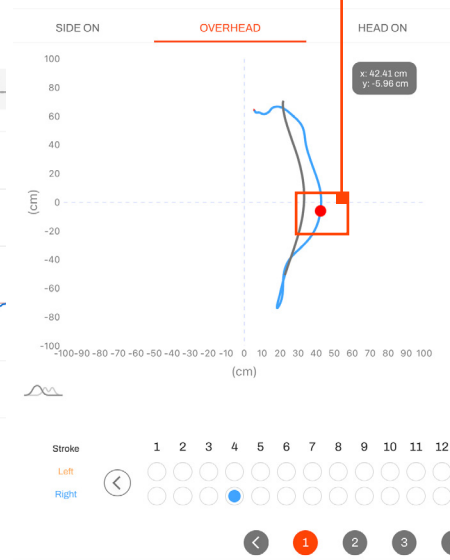
Lateral force (light blue line) drops below "0" indicating the hand is rolling in. Propulsion (dark blue line) drops at the same time along with a small drop in hand speed (green line).

CHART: Force vs Time + Stroke Rate & Force

Double peaks in propulsive force.



Where the hand is in the stroke path when the roll happens.



EXCESSIVE LATERAL FORCE

WHAT YOU'LL SEE

- More force being pushed sideways (laterally) instead of backwards in the Force Field chart

WHAT IT MEANS

Force is being directed sideways instead of backward.

May result from:

- Overly sweeping hand path with hand angled out / in
- Hand not facing fully towards feet when pulling back in that direction.

Can also be as a result of:

- Palm misalignment despite a seemingly straight pull

WHY IT MATTERS

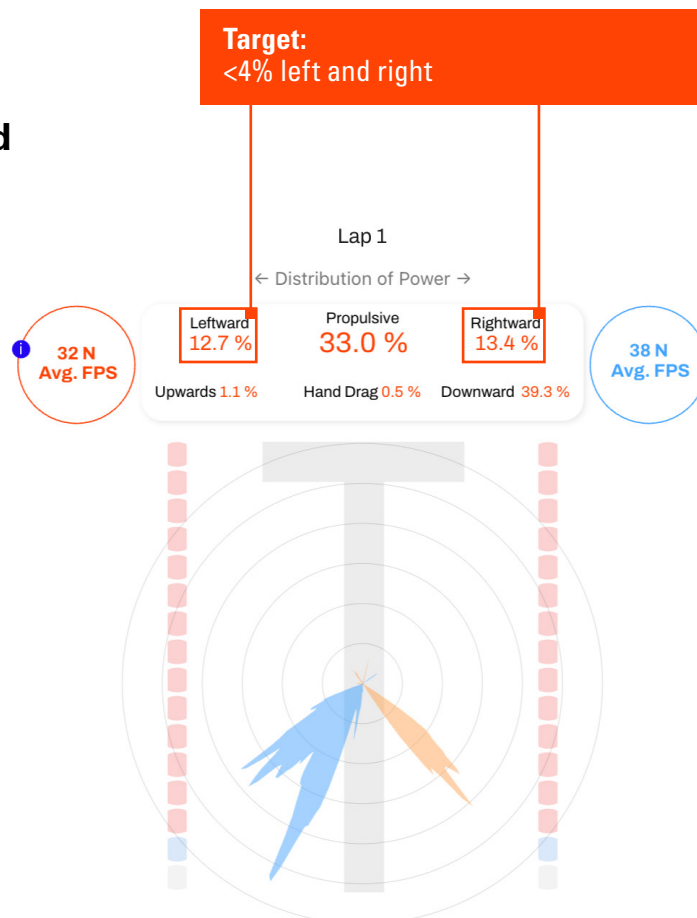
Lateral force increases energy cost and does not contribute to forward propulsion.

COACHING PRIORITY

Correct yaw and palm orientation before increasing stroke tempo.

[LEARN MORE](#)

CHART: Force Field



BROKEN WRIST AT CATCH

(pitch fault)

WHAT YOU'LL SEE

- Maximum downward force coinciding with maximum propulsion
- Persistent downward hand pitch through the pull phase

WHAT IT MEANS

The hand remains angled downward beyond the catch phase.

Ideal sequencing:

- Downward force peaks earlier
- Propulsion peaks once hand is vertical

WHY IT MATTERS

Broken wrist pitch reduces effective propulsive surface area.

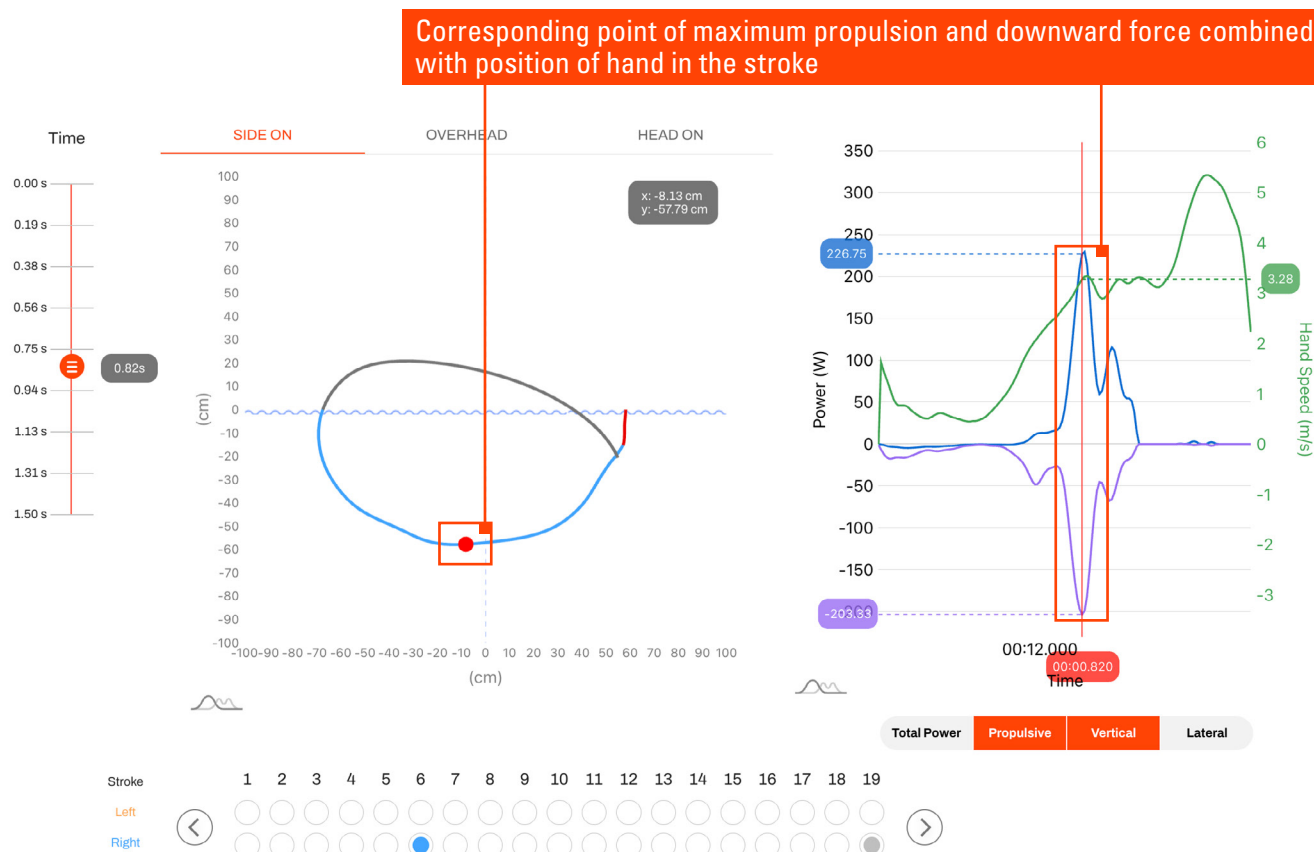
Particularly critical in distance swimmers.

COACHING PRIORITY

Correct wrist pitch to reflect fingers pointing straight down as much as possible showing the full face of the hand to the back of the pool.

[LEARN MORE](#)

CHART: Hand Path & Force



UPWARD FORCE AT END OF STROKE

WHAT YOU'LL SEE

- Upward force showing in Force Field. Target is 0%
- In the Force vs Time chart you will see the vertical force waveform above the x (zero) axis immediately prior to hand exiting the water

WHAT IT MEANS

- Hand is not vertically aligned at exit.
- Small values (<3-4%) are negligible.
- Higher values indicate wasted energy and reduced propulsion.

WHY IT MATTERS

Upward force robs the athlete of the last propulsive push prior to the hand exiting resulting in wasted effort for no benefit.

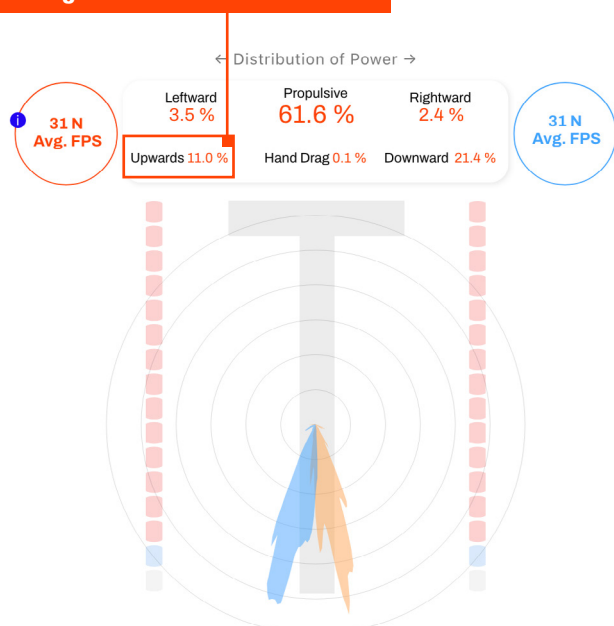
COACHING PRIORITY

Ensure vertical alignment before exit rather than shortening stroke.

[LEARN MORE](#)

CHARTS: Force Field + Force vs Time

Upward force is too high.
Target: 0%



Upward force at hand exit (in purple)



EMERGING SHOULDER DYSFUNCTION

(hand path consistency deterioration)

WHAT YOU'LL SEE

- Marked increase in stroke-to-stroke variability in one hand
- Visible increase in the spread of strokes in the Consistency chart
- Most evident in Overhead and Head On views
- Opposite hand remains comparatively stable

Typical progression – see examples on page 15:

- Pre-injury: Tight clustering and repeatable path
- Emerging injury: Noticeably wider dispersion and instability

WHAT IT MEANS

One hand is no longer producing repeatable movement patterns.

- The swimmer is compensating – consciously or unconsciously – during the stroke cycle
- This is often unilateral and progressive
- It's likely to be a way of unloading the injury.

KEY DISTINCTION

This is not simple technical inconsistency.

When deterioration is:

- Asymmetrical
- Increasing over sessions
- Unrelated to stroke rate or pace change

... it may indicate emerging shoulder dysfunction rather than skill breakdown.

COMMON CONTRIBUTING FACTORS

- Protective movement compensation
- Pain avoidance mechanics
- Reduced shoulder stability
- Fatigue-induced neuromuscular breakdown
- Early-state rotator cuff overload or impingement patterns

WHY IT MATTERS

Loss of repeatability increases joint stress and reduces propulsive efficiency.

When asymmetry progresses unchecked, risk of overload or acute injury increases.

This pattern may appear before the swimmer reports pain.

Loss of consistency across sessions may be indicative of a low-grade injury – seek medical advice

COACHING PRIORITY

If asymmetrical deterioration appears:

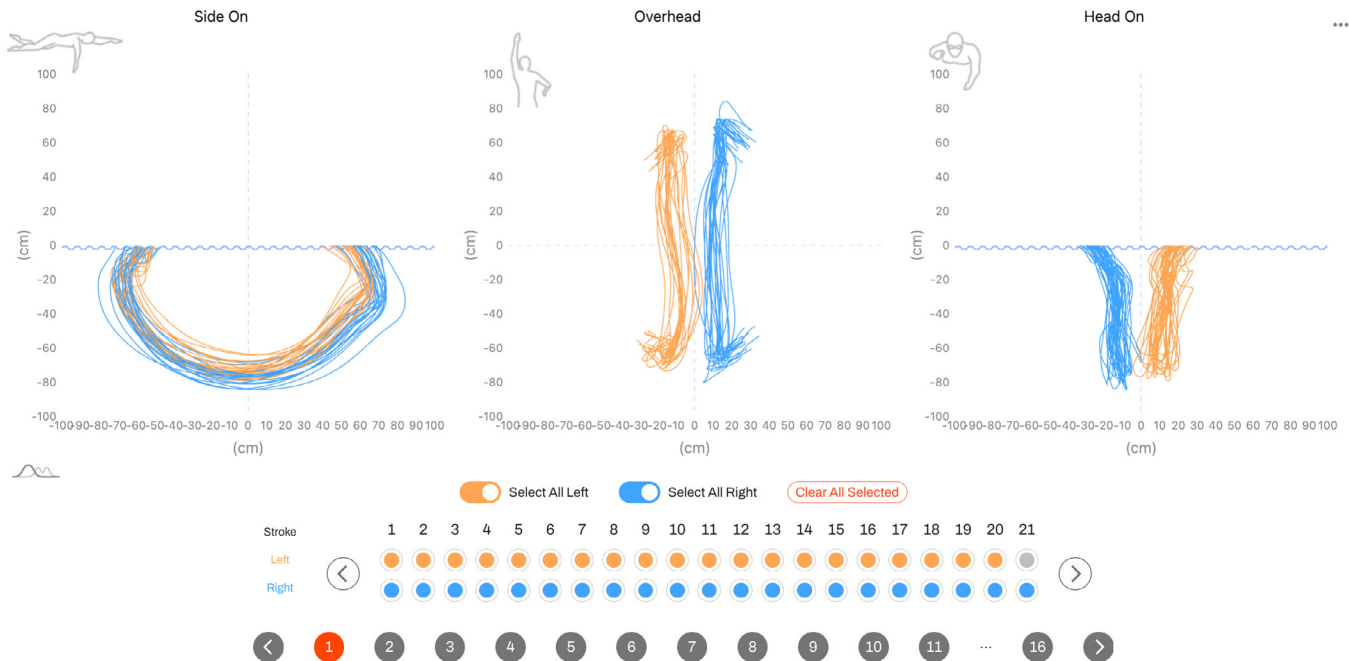
1. Confirm it is not pacing-related
2. Reduce load and stroke volume
3. Assess shoulder integrity – seek medical advice
4. Monitor consistency trends across sessions

Use **eo** SwimBETTER as an early warning and return-to-swim monitoring tool.

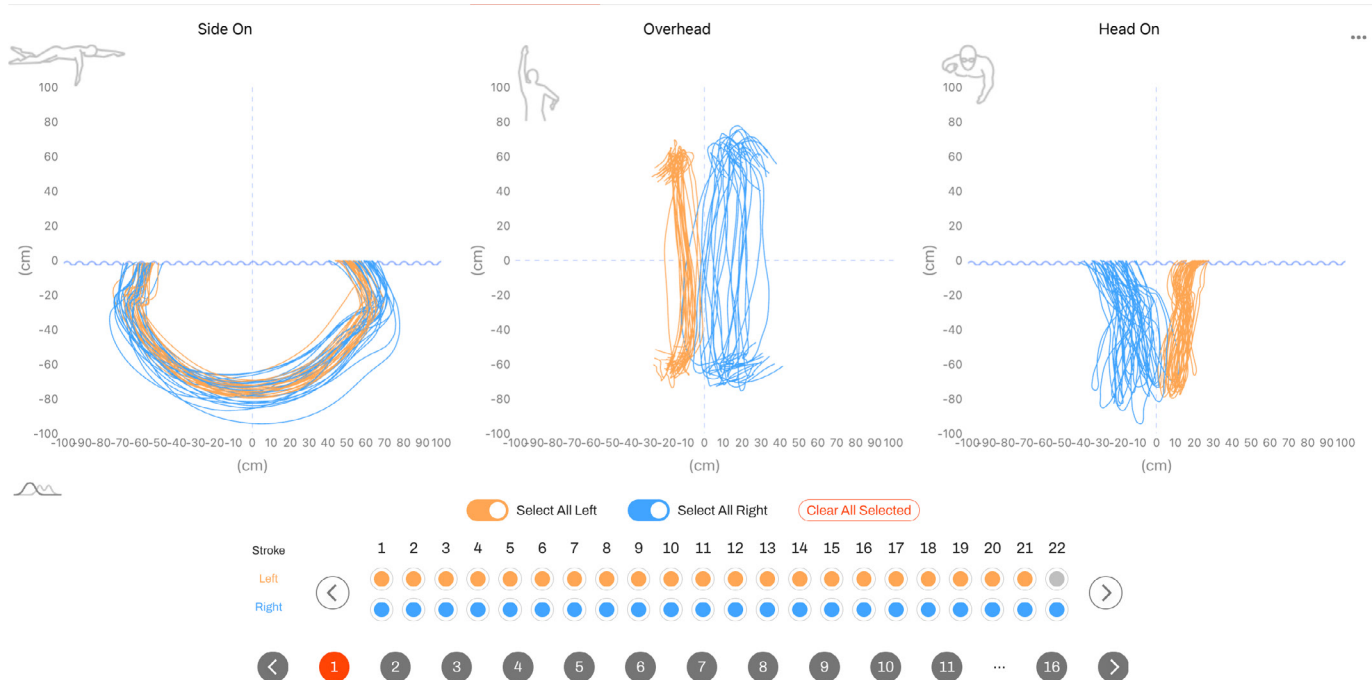
LEARN MORE

CHART: Consistency

PRE-INJURY: Tight clustering and repeatable paths on both left and right hands



EMERGING INJURY: Noticeably wider dispersion and instability shown in the right hand path – particularly visible in the Overhead and Head On views





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QUESTIONS?

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