

# pranaclimb

The Pranaclimb Methodology  
Remote Breathing Assessment Q&A



**"Control your  
breathing.  
Control your  
climbing."**

The core principle of the  
Pranaclimb Methodology



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Breathwork Program Developer | Author of Pranaclimb: Love, Breathe, Climb**

Annie Anderson is a breathwork specialist, yoga instructor, and independent climbing researcher with over 30 years of experience in the climbing and yoga communities. She is the founder of **Pranaclimb**, a *field-based* methodology that integrates Breathing Rate (BR), Rate of Perceived Exertion (RPE), and Heart Rate Recovery ( $HRR_{60}$ ) to non-invasively estimate Critical Power (CP) and model W'bal-ODE in rock climbing. Her work bridges applied physiology, breath-led pacing strategies, recovery science, and expressive breathing analysis to help climbers understand effort, fatigue, and performance in real time — without laboratory equipment. Annie's research is grounded in observational analysis of elite climbers, supported by scientific literature, and designed to be accessible to coaches, athletes, and practitioners. She is the author of the upcoming book ***Pranaclimb: Love, Breathe, Climb*** (2025), and the developer of the Pranaclimb Remote Breathing Assessment (RBA) and Coaching Protocol (CoPro). Based near the Atlantic coast, she continues to climb, write, swim, and explore breath-led approaches to performance, resilience, and healing following her recovery from Stage IV Renal Cell Carcinoma and major surgery.

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# The Remote Breathing Assessment is powered by The Pranaclimb Methodology

Access the full research paper at [SportRxiv](#) and [Research Gate](#)

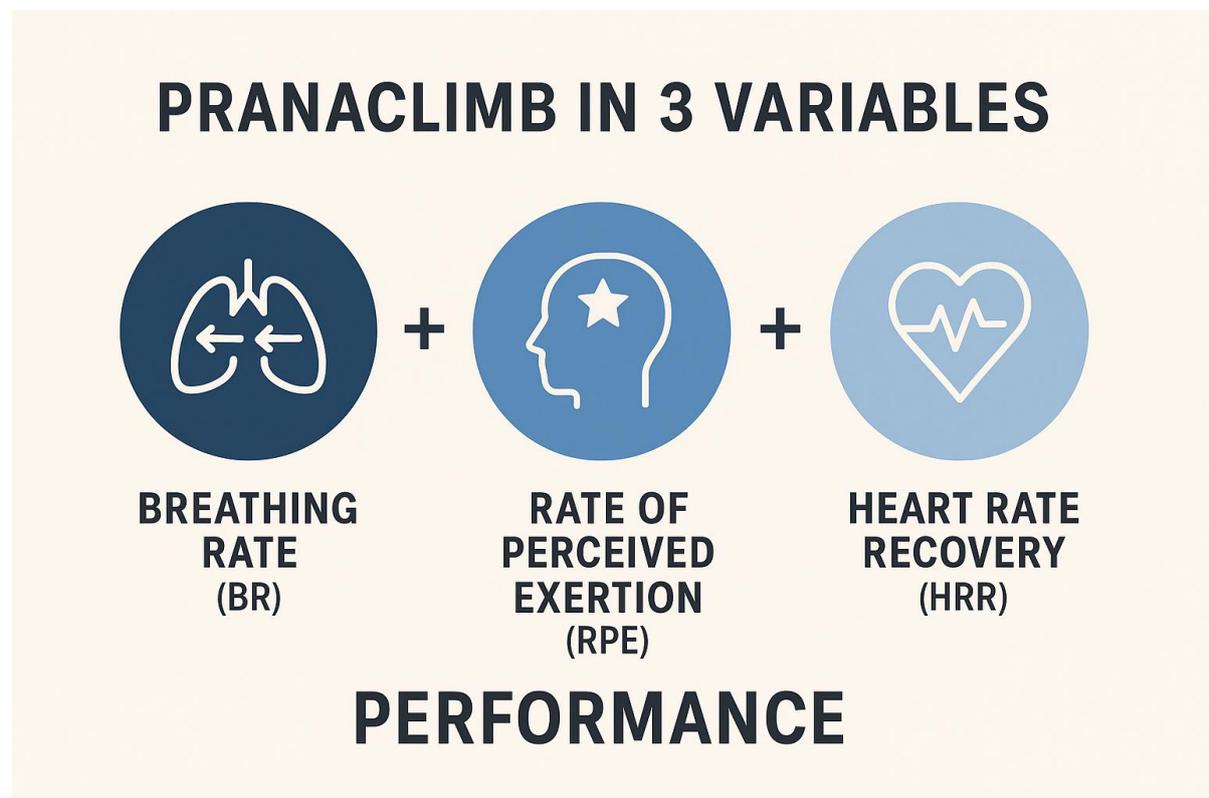
**The Pranaclimb Methodology: Non-Invasive Tracking of Critical Power and W'bal Modelling in Rock Climbing Using Breathing Rate, RPE, and HRR**

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## PRANACLIMB IN 3 VARIABLES

**Breathing Rate + Perceived Exertion + Heart Rate Recovery**

→ Together they power **W'bal**, the energy balance behind performance and recovery



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Transform Your Breathing - Elevate Your Climbing

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# The Pranaclimb Methodology – Q&A

## Q: What is the Pranaclimb Methodology?

Pranaclimb is a **field-based breathing and recovery system for climbers**.

It translates breathing, effort, and recovery into clear performance insight—*on real routes, without lab equipment*.

It's built **for climbing's intermittent efforts** (anaerobic bursts, aerobic endurance, and quick recovery) — dynamic movement, expressive breathing, postural constraints, and micro-rests.

**RBA measures → CoPro coaches**

**The Three Core Variables**

- 🫁 **Breathing Rate (BR)** – real-time effort
- 🎯 **RPE (CR-10)** – perceived load (tightly correlated with BR)
- ❤️ **HRR<sub>60</sub>** – recovery speed

Together they estimate:

- 🏠 **CP (~45 BPM / RPE 8)**
- 🔥 **RCP (>55 BPM / RPE 9–10)**
- ⚡ **W'bal** (anaerobic reserve)

🔗 **Effort Zones and Interpretation**

BR is the fastest, most sensitive effort marker — tightly linked to RPE.

Zone	Typical Marker Values	Description
🏠 <b>CP (~45 BPM / RPE 8)</b>	<b>Sustainable Power Zone</b>	Sustainable - high-end aerobic (the highest breathing rate you can sustain without accelerating fatigue). Ideal pacing and focus. W'bal drains slowly.
🔥 <b>RCP (&gt; 55 BPM / RPE 9–10)</b>	<b>Redline / Fatigue Onset</b>	Unsustainable - hyperventilation-driven; ventilation sharply increases. Rapid W'bal depletion
⚡ <b>W'bal</b>	<b>Dynamic variable</b>	“Power battery” — depletes above CP, recharges below CP during rests.

👉 These zones help climbers:

Pace cruxes.

Time rests more intelligently.

Understand when they're in sustainable vs. unsustainable intensity.

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## Q: What about expressive factors and real climbing cost?

Climbing is **not steady-state exercise**, so Pranaclimb accounts for real-world modifiers.

🔗 **Expressive Breathing**

Breath holds, grunts, screams, sighs, and reset inhales all alter metabolic cost and ventilatory load.

Pranaclimb converts these into **Effective Breathing Rate**, revealing hidden effort that raw breath counting alone would miss.

🌟 **Efficiency Modifiers**

Posture, wall angle, grip type, thoracic mobility, and diaphragmatic control all influence breathing efficiency and energy cost.

🌧️ **Environmental Modifiers**

Altitude, heat, humidity, and cold can shift breathing rate independently of mechanical effort.

👉 These corrections ensure that BR-based intensity tracking remains **accurate, meaningful, and climber-relevant**, even in expressive, unstable, or stressful situations.

📌 **Methodological Note**

Pranaclimb uses a **field-derived CP / W' surrogacy model**, aligned with existing literature (e.g. Caen, Skiba, Sheel), rather than laboratory VO<sub>2</sub> testing.

It prioritises **usability, ecological validity, and coaching relevance**.

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## Q: What is Critical Power (CP) and Respiratory Compensation Point (RCP) in climbing?

The line between sustainable and unsustainable.

### Critical Power (CP)

The highest breathing rate you can sustain without accelerating fatigue.

- CP  $\approx$  BR  $\sim$ 45 BPM, RPE 8
- Tidal volume (VT) plateaus and breathing rate (BR) begins to rise rapidly
- Boundary between the intensity domains of heavy and severe exercise

### Respiratory Compensation Point (RCP)

The point where breathing becomes hyperventilation-driven.

- RCP  $\approx$  BR  $>$ 55 BPM, RPE 9–10
- CO<sub>2</sub> blow-off accelerates
- W'bal drain spikes

Note: In climbing, RCP may lag slightly behind CP due to mechanical and postural constraints—particularly on steep or intermittent terrain. High postural stability, a known component of climbing efficiency (Saul et al., 2019), is essential in these conditions. The diaphragm plays a dual role here, supporting both respiration and trunk stability, making it a central player in the body's ability to manage intensity and recover efficiently.

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## Q: What is the Grey Zone?

This is a physiological knife edge between balance and burnout.

The Grey Zone is the narrow transition band between sustainable (CP) and unsustainable (RCP) effort — the edge of sustainability.

This is where composure, breath control, and pacing precision determine success or failure.

### Physiological Context

- BR  $\approx$  45–55 BPM, RPE 8–9
- Intensity:  $\sim$ 95–105 % of CP
- Tolerance Band:  $\pm$ 3–6 % around CP, MLSS, and RCP (Caen et al., 2022)
- Energy balance: W'bal drains slowly but can partially recharge if breathing remains efficient.

 Small pacing or breathing changes here decide success or failure on redpoints.

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## Q: What is W'bal and why does it matter?

Your anaerobic “battery” for crux power.

W'bal represents your anaerobic energy reserve — your power battery that fuels hard moves above your sustainable threshold (Critical Power, CP).

Pranaclimb applies the W'bal-ODE model — an Ordinary Differential Equation that continuously tracks how this battery depletes above CP and recharges below it, directly adapted for climbing.

### How It Works in Practice

Above CP ( $\approx$  BR  $>$  45 BPM/ RPE 8) → your anaerobic battery begins to drain predictably.

Near or above RCP ( $\approx$  BR  $>$  55 BPM/ RPE 9-10) → depletion accelerates sharply due to increased ventilation, intrathoracic pressure, and expressive cost (grunts, breath holds, screams, 1:1 breathing).

Below CP → W'bal recharges, governed by breathing efficiency, posture, and recovery rhythm.

This ODE-based model lets Pranaclimb estimate a climber's moment-by-moment energy balance — no lab tools required.

### Field Application

#### W'bal-ODE Rules (Depletion and Recovery)

Efficient climbers preserve W'bal through optimized technique and recovery breathing; inefficient patterns deplete W' more rapidly.

Condition	Indicator Thresholds	W'bal Change	Climbing Context / Notes

<b>Depletion (Above CP)</b>	BR ≥ 45 BPM, RPE ≥ 8	-15% / 10 s (efficient climber) -30% / 10 s (inefficient climber)	Applies during overhanging or pumpy sequences. • Short crux effort (5–15 s): -15–30% • Sustained high effort (≥30 s): -50–70% Examples: bouldery moves, explosive dyno, extended cruxes. Reflects anaerobic intensity above CP.
<b>Recovery (Below CP)</b>	BR ≤ 35 BPM, RPE ≤ 6	+20% / 10 s (efficient, relaxed shake-out) +10% / 10 s (inefficient, mild tension)	Aerobic dominance enables partial restoration. • Micro-rests (5–15 s): +10–20% • Passive rest (kneebar, no-hands): +50% / min • Full rest (~4 min): 80–100% W'bal recharge. Examples: clipping rests, kneebars, efficient shaking out.

👉 **Master W'bal to pace cruxes, time rests, and predict redpoint success.**

## Q: What are the Optional Efficiency Modifiers in Pranaclimb?

To enhance precision, **Pranaclimb** integrates **optional efficiency modifiers** based on **biomechanics and climbing energetics**. These allow the model to better reflect real-world variability in energy cost and metabolic strain. Pranaclimb recognises that **wall angle, grip type, and postural control** influence how quickly energy is used or restored — but these are treated as **optional efficiency modifiers, not mandatory inputs**.

The **baseline W'bal rules** already capture the essential energetic cost for most climbers and terrain types:

**Above CP:** ~15 % depletion per 10 s (up to 30 % if inefficient)

**Below CP:** +10–20 % recovery per 10 s (up to +50 % per minute at full rest)

These baselines work reliably in the field, providing accurate pacing and recovery insight without needing complex biomechanical data.

### 🌟 Optional Efficiency Modifiers (Elite Calibration/ Projecting)

These refine cost during sustained climbing:

Modifier	Effect	Typical Range	Example Cue
<b>Open-hand grip</b> Maciejczyk et al., 2022	Improves oxygen efficiency	+0.1 – +0.2 bonus	“Lighter touch saves energy.”
<b>Overhanging wall &gt; 100°</b> Watts & Drobish, 1998; Baláš et al., 2014	Increases anaerobic cost	+0.2 – +0.3 penalty	“Steeper angle drains faster.”
<b>Postural / diaphragmatic control</b>	Improves movement economy	+0.1 – +0.2 bonus	“Better form = easier breathing.”

Note: Efficiency gains through **postural stability** and **diaphragmatic control** are also recognized. The diaphragm plays a dual role: it is the principal muscle of respiration and a key stabilizer of the trunk. This integration is especially critical in climbing, where breath and posture are tightly coordinated. Frank et al. (2013) and Saul et al. (2019) both highlight the importance of postural efficiency in athletic performance and climbing success. **Training interventions**—such as **loaded breathing drills, yoga-based stretches, and respiratory muscle training**—may enhance both oxygen efficiency and movement control, contributing directly to improved W'bal conservation and recovery.

### 🇺🇸 How the Modifiers Work

Pranaclimb uses a simple scaling formula for optional analysis:

**Cost Multiplier = 1 + terrain penalty – technique bonus**

Apply the multiplier to baseline W'bal depletion or recovery.

If BR > 55 BPM (RCP): multiply the depletion result by +20–40% (e.g., ×1.2–1.4) to reflect faster drain.

**Example:**

If baseline depletion above CP = 15 % per 10 s, then:

Situation	Multiplier	Math	Result
<b>Overhang (+0.3 penalty)</b>	1 + 0.3 = 1.3	15 × 1.3	19.5 % / 10 s
<b>Open-hand (+0.2 bonus)</b>	1 – 0.2 = 0.8	15 × 0.8	12 % / 10 s
<b>Rest (+0.2 bonus)</b>	1 + 0.2 = 1.2	20 × 1.2	24 % / 10 s recovery

### 👉 In practice:

**Steeper walls** drain the tank faster.

**Open-hand grips** and **postural efficiency** stretch the tank further.

**BR > 55 BPM (RCP)** = apply higher cost multiplier for accuracy.

## Q: How do expressive breathing patterns affect breathing rate tracking?

### Expressive Breathing Adjustments — Updated

Breathing expression changes metabolic cost — sometimes giving power, sometimes hiding fatigue. Pranaclimb converts these sounds + behaviours into **Effective BR**, revealing **true energetic cost**.

#### Effective BR = Raw BR + Expression Adjustments

Expression Type	Δ BR	Physiological Mechanism	Coaching Use
<b>Breath Hold (Valsalva)</b>	+2 (<1 s) → up to +10 (>4 s)	Core bracing ↑ intrathoracic pressure → O <sub>2</sub> drop + CO <sub>2</sub> rise → accelerates fatigue	Valuable in crux tension, but reset fast.
<b>Scream</b>	+5 each	Maximal neural drive + glottal closure → explosive effort	1–3 = power boost. >3 = costly.
<b>Grunt / Passat</b>	+3	Partial exhale under load → force transfer	Good for short bursts, avoid stacking.
<b>Strong Nasal Inhale (NEW)</b>	+2	Diaphragm priming + posture stabilisation	Use before big moves / reset after shakeouts.
<b>Expressive Exhale (YES/WOOHOO) (NEW)</b>	+1 to -2	Parasympathetic release → down-regulation & relief	Natural exhale post-crux — promotes recovery.
<b>Sigh</b>	0 to -1	Vagal activation + HRV restoration	Cue sighs at rests to recover faster.
<b>Readiness Potential (RP) (NEW)</b>	+1 (anticipatory phase)	Motor cortex activation before movement — neural loading without ventilation	Seen in stillness before crux — count as latent cost.
<b>RP Sync Exhale (NEW — movement expression)</b>	+3–5 (depends on power output)	Breath + neural release aligned with execution → converts RP into power + precision	Ideal for dynos, deadpoints, cut-loose commitments.

### Cap Rules (for interpreting Effective BR)

**Sport/Trad:** total correction capped at +15 BPM per 60 s

**Bouldering:** no cap (short, explosive stacking allowed), recovery between burns is diagnostic, 40-60s can hit RCP

**Ceiling rule:** if Raw BR ≥ 60 BPM, no upward correction needed (already severe)

These adjustments transform BR counting into accurate energy-cost tracking.

### Scream-Density Override (when expression dominates the minute)

**Trigger:** ≥ 7 screams OR ≥ 15 s total screaming within 60 s

1–3 screams: +5 BPM each (power-enhancing)

4–6 screams: +10% W'bal cost

≥ 7 or ≥ 15 s: force Effective BR ≥ 55 BPM + 20% W'bal drain

### Key clarification: “No stacking” (RP Sync rule)

RP Sync is not an extra add-on. It tells when the expression happens.

Expressions tell what happened.

**Example:**

RP (stillness) +1 latent

RP Sync (grunt) = +3 total (not +1 +3 again)

### The RP Sync Sequence

Exhale (ready)

↓ Neural focus, tension builds

Inhale (climb)

↓ Draw in energy, expansion, commitment begins

Exhale (stick)

↓ Contact, effort release, precision anchor

Repeat

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### **Anchor Thresholds (Pranaclimb)**

**CP**  $\approx$  45 BPM / **RPE 8**  $\rightarrow$  sustainable high-end aerobic

**RCP**  $>$  55 BPM / **RPE 9–10**  $\rightarrow$  severe domain / redline/ hyperventilation

**Recovery BR**  $\leq$  30 BPM  $\rightarrow$  reset / readiness restored

You're not just counting breaths — **you're translating breath into energy cost.**

We are literally mapping the language of climbing breathing.



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## Q: What role does Heart Rate recovery ( $HRR_{60}$ ) play?

**It shows how quickly you're ready for the next attempt.**

Heart Rate Recovery is a valuable indicator of autonomic nervous system function and recovery status.

$HRR_{60}$  = how fast HR drops in the first 60s after effort.

- **$\geq$  18 BPM drop**  $\rightarrow$  excellent recovery, strong parasympathetic (vagal) tone, strong aerobic fitness.

- **12–17 BPM**  $\rightarrow$  moderate; take more time

- **$<$ 12 BPM**  $\rightarrow$  fatigued, poor aerobic recovery; re-set breathing & rest longer

**A non-invasive indicator of parasympathetic reactivation and systemic recovery capacity.**

A faster HRR is generally associated with better cardiorespiratory fitness.  $HRR_{60}$  is used to estimate how quickly the body can replenish its anaerobic energy reserves ( $W'_{bal}$ ) after intense efforts.

 **When paired with BR and RPE,  $HRR_{60}$  shows readiness for the next attempt.**

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## Q: Some climbers may not hit 45 or 55 BPM in the RBA. Why?

They may not be pushing **maximal effort / crux level** in the test (less than RPE 8-10).

They may be climbing easier terrain, less steep, less pump, fewer falls, so **ventilatory drive doesn't hit those thresholds.**

**Psychological barriers or safety concerns** may prevent full stretch into RCP.

**Equipment/venue limitations** (wall angle, holds, run-out, rope time) may reduce maximal ventilatory challenge.

The field test conditions differ from lab CP/RCP protocols — so **the thresholds are approximates not absolutes.**

### **Calibration – Personal Threshold Mapping (Pre-Test)**

*Purpose:* To identify your personal ventilatory range for accurate CP and RCP scaling.

Step	Action	Target	Output
<b>A. Moderate Climb (3 min)</b>	Easy to moderate pace (RPE 6)	BR steady, rhythmic	<b>Baseline Breathing Rate (BBR)</b>
<b>B. Near-Max Burst (30–60 s)</b>	Short, intense crux or dyno sequence (RPE 9–10)	Breathing breaks rhythm	<b>Peak Breathing Rate (PBR)</b>

**Calculate your zones:**

$CP \approx 0.8 \times PBR$

$RCP \approx 0.9–0.95 \times PBR$

**Example:**

**If PBR = 50 BPM  $\rightarrow$  CP  $\approx$  40 BPM, RCP  $\approx$  45–48 BPM.**

Use these personalised anchors in your RBA.

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## Q: What does a full Remote Breathing Assessment (RBA) look like?

The Pranaclimb RBA is a self-guided diagnostic that maps your breathing efficiency, expressive breathing patterns, thresholds, and recovery using simple, field-ready markers.

It identifies your **effort thresholds**:

 **Critical Power (CP ≈ BR ~45 BPM / RPE 8)** — sustainable effort zone

 **Respiratory Compensation Point (RCP > 55 BPM / RPE 9–10)** — red-line intensity zone

And shows *how quickly* you recover:

 **HRR<sub>60</sub>** — heart rate drop at 60 seconds

 **BR return to ≤ 30 BPM** — breath recovery

## Core RBA – 4-Minute Protocol (with 60 s Crux Focus)

Ideal for field use (projecting), coaching sessions, or post-climb reviews.

Climbers perform a 4-minute maximal-effort route while Breathing Rate (BR) is tracked via **microphone or smartphone audio**.

**Critical Power (CP)** is identified near **BR ~45 BPM, RPE 8**, and the **Respiratory Compensation Point (RCP)** near **BR >55 BPM, RPE 10**, reflecting the physiological transition from steady-state to unsustainable intensity.

**Format: 4-minutes maximal-effort climb + 1-minute recovery**

2 mins calm nasal baseline

4 mins maximal-effort climb with a focused **1 min crux segment**

1 min passive recovery → record **HRR<sub>60</sub> + BR return ≤30 BPM**

### ✓ Core Markers Tracked

	Marker	Meaning
	<b>BR – Breathing Rate</b>	Real-time effort signal
	<b>RPE – Perceived Effort</b>	Internal effort perception
	<b>CP – Critical Power (~45 BPM / RPE 8)</b>	<i>Stay here as long as possible</i> — sustainable effort
	<b>RCP – Respiratory Compensation Point (&gt;55 BPM / RPE 9–10)</b>	The red-line / hyperventilation zone
	<b>W'bal (ODE Model)– Anaerobic Reserve</b>	Power battery (depletes above CP, recharges below)
	<b>HRR<sub>60</sub> – Recovery</b>	Recovery capacity & readiness

## Extended Deep-Dive Assessment

### The Five Pillars of Pranaclimb Breathing Intelligence

Four diagnostic pillars + one integrative recovery protocol.

Pillar	Diagnostic / Protocol	Focus	Core Adaptation	How to Use / Measure
 <b>Power</b>	<b>PEFR (Peak Expiratory Flow Rate)</b>	Expiratory muscle strength & airway flow	Strong exhalation delays inspiratory fatigue and the onset of the metaboreflex	Perform 2–3 forceful exhales with a Mini Wright meter; record best (L/min)
 <b>Control</b>	<b>CO<sub>2</sub> Tolerance (Pranaclimb MBT)</b>	Breath-hold control & composure under rising CO <sub>2</sub>	Improves buffering, delays hyperventilation, enhances stress tolerance	The Pranaclimb MBT is performed off the wall to isolate CO <sub>2</sub> tolerance, but interpreted on the wall to understand composure, pacing, and panic near CP and RCP.
 <b>Recovery</b>	<b>SpO<sub>2</sub></b>	Oxygen re-saturation & VO <sub>2</sub> kinetics	Reflects aerobic readiness and recovery efficiency	Fingertip oximeter: measure before, after, and 60 s post-effort
 <b>Flexibility</b>	<b>BIQ Breathing IQ</b>	Thoracic mobility & rib mechanics	Improves tidal volume, mechanical freedom, and breathing economy	Measure chest expansion at 10th rib (cm) or grade 0–5 (Pranaclimb BIQ scale)

 <b>Calm</b>	<b>Protocol (NRP)</b>	Parasympathetic activation & HRR <sub>60</sub> restoration	Accelerates recovery, stabilises HRV, restores composure	2–3 min cyclic sighing + nasal 4-2-6 + wide-gaze reset post-effort
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### Why These Five Pillars Matter

Each diagnostic reveals a physiological dimension of climbing performance:

**PEFR (Power)** → Power to produce force with efficient breathing/ expiratory power & diaphragm resilience

**CO<sub>2</sub> Tolerance/ Pranaclimb MTB (Control)** → Stability under pressure

**SpO<sub>2</sub> (Recovery)** → Readiness between burns/ oxygen recovery kinetics

**BIQ (Flexibility)** → Thoracic mobility / rib mechanics — breathing efficiency under load

**NRP (Neural Recovery Protocol) - (Calm Protocol)** → The integrator of all training and recovery/ nervous-system reset

👉 **Together, they define your Respiratory Resilience Profile (RRP)**

## Q: How does the Pranaclimb Coaching Protocol (CoPro) work?

The **Pranaclimb Coaching Protocol (CoPro)** transforms **assessment into action** — turning the data gathered in your **Remote Breathing Assessment (RBA)** into personalised, performance-driven breathing strategies.

It interprets your **Breathing Rate (BR)**, **Rate of Perceived Exertion (RPE)**, **Heart Rate Recovery (HRR<sub>60</sub>)**, and **W<sup>bal</sup>-ODE** patterns to map your physiological thresholds and guide your breathing behaviour under real climbing conditions.

### CoPro Components

CoPro turns RBA data into **actionable breathwork and pacing strategies**.

#### **Zone-Based Coaching**

Breathing cues for CP, Grey Zone, and RCP.

#### **Expressive Efficiency Training**

Manage breath holds, grunts, screams to reduce metabolic cost.

#### **Recovery Optimisation**

Sigh resets, nasal control, CO<sub>2</sub> balance breathing → faster HRR<sub>60</sub> & W<sup>bal</sup> recharge.

#### **CO<sub>2</sub> Resilience & Emotional Regulation**

Improve composure on hard moves + reduce pump in the Grey Zone.

#### **Integrated Awareness**

Turn breath awareness into tactical decision-making.

💡 **Together, the RBA measures and the CoPro transforms** — providing a complete snapshot of your **Respiratory Intelligence**: how efficiently you breathe, recover, and perform across the full intensity spectrum of climbing.

## Q: Can I use Pranaclimb in sport, bouldering, and trad climbing?

**Yes — same system, different rhythm.**

### **Sport Climbing (Redpoint/Onsight):**

Best fit: pacing, managing the **Grey Zone**, and timing rests.

Use **BR and RPE** to stay below CP until the crux.

Track **W<sup>bal</sup> depletion** on hard sequences and use **HRR<sub>60</sub>** to time between-attempt recovery.

### **Bouldering:**

Efforts are short but highly anaerobic.

W<sup>bal</sup> depletes almost instantly; **BR rises sharply with power moves**, even in <30 s.

Focus: **HRR<sub>60</sub>** and **breathing drills** between burns to accelerate recharge.

BR is less useful mid-boulder (too short), but **recovery metrics** shine in session pacing.

### **Trad Climbing / Big Walls:**

Long-duration = lower CP anchor is critical.

Efficiency modifiers matter more (wall angle, grip economy, posture).

BR monitoring prevents “silent overbreathing” during pumpy gear placements.

W<sup>bal</sup> rules apply over **hours** instead of minutes: micro-recovery at stances builds cumulative advantage.

## 🔥 Field takeaway

**Sport:** Use Pranaclimb to manage burns, crux pacing, and redpoint rests.

**Bouldering:** Use it to pace between attempts and sharpen breath efficiency for power output.

**Trad:** Use it to manage **long-haul energy**, stress control, and recovery at stances.

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## Q: What are typical elite benchmarks?

**A boulderer, sport climber, trad/big wall, and multipitch endurance case all represented**

**Adam Ondra (Silence):** adj. BR ~51 BPM, W'bal depletion ~60–70%.

**Freja Shannon:** BR ~60 BPM, depletion ~70–80%.

**Margo Hayes (Biographie):** adj. BR ~35 BPM, depletion ~60–75%.

**Jimmy Webb (Sleepwalker, boulder):** adj. BR ~55–60 BPM (acute weighting, no cap), depletion ~85–95%.

**Anna Hazelnutt (Peace, sport crux):** BR ~60 BPM ceiling, no correction applied, depletion ~75%.

**Robbie Phillips (Tsaranoro Atsimo, 8a+ big wall):** Raw BR 31 → adjusted 46 BPM (slightly >CP), ~55% depletion. Demonstrates efficiency over long endurance pitch.

**Tim Emmett (Era Vella 9a):** **Adjusted** 55 BPM (Scream-Density Override), **depletion** ~90–100 %

Read more about elite benchmarks: <https://www.pranacimb.com/pranacimb-analysis-of-elite-climbers>

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## Q: How Do Climbers Use Pranaclimb in Training?

Climbers use **Pranaclimb** to turn breathing into **real-time feedback** — translating invisible physiology into tactical awareness.

By tracking **BR**, **RPE**, and **HRR<sub>60</sub>**, you can *see* your internal performance zones on the wall and learn to manage effort before fatigue sets in.

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🌟 Climbers can:

Identify **Critical Power (CP)** and **manage pacing** on redpoints or projects.

Time rests based on **W'bal** recovery using **BR** and **HRR<sub>60</sub> feedback**.

Improve breathing efficiency and composure through structured breathwork and recovery drills.

**Manage expressive breathing** (sighs, grunts, screams, breath holds) to optimise tension-release balance.

Apply **CO<sub>2</sub> tolerance** and **neural recovery (NRP)** drills to **reduce pump** and **sustain Grey-Zone control**.

Make **tactical decisions** based on physiological cues — not just intuition.

👉 **Every climb becomes a training session in breath intelligence, pacing, and recovery.**

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## Q: How Do Climbers and Coaches Use It in Practice?

Coaches and athletes can use Pranaclimb as a **field-ready feedback loop** — measuring, adjusting, and refining performance directly on the wall.

### Key Coaching Guidelines

Stay **<45 BPM (CP)** until the crux — sustainable zone.

If **>55 BPM (RCP)** → micro-rest or sigh reset.

Use sighs or nasal breaths to trigger parasympathetic recovery.

Monitor **HRR<sub>60</sub>** between burns to gauge aerobic readiness.

Apply **efficiency modifiers** (steeper = faster drain, open-hand = slower drain).

Use **W'bal-ODE** to model pacing, time rests, and predict redpoint success.

**Extended Deep Dive Assessment** (**PEFR** Peak Expiratory Flow Rate, **CO<sub>2</sub> Tolerance (Pranaclimb MBT)**, **SpO<sub>2</sub>** (Oxygen Saturation), **NRP** (Neural Recovery Protocol), **BIQ** (Breathing IQ)).

👉 Pranaclimb teaches climbers to **see what they feel** — turning breath awareness into tactical precision.

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## Q: Do I Need Special Equipment?

**No lab gear required — just a few simple field tools.**

### 📦 Essentials

Smartphone or small lapel microphone to record breathing

Stopwatch or timer

Notebook or app to log BR, RPE, HR, Breath Expressions

Space for a 4-minute CP simulation or climbing test

RPE (CR-10) scale printed or visible

⚡ **Optional / Advanced**

HR strap or watch for  $HRR_{60}$

Mini Wright **PEFR** meter (£11–15)

Pulse oximeter for **SpO<sub>2</sub>** tracking

HRV app for recovery trend analysis

👉 The entire system is **field-based, portable, and scalable** — usable outdoors, in gyms, or remote-coaching environments.

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## Q: Who Is Pranaclimb For?

**Pranaclimb is for any climber or coach seeking to understand performance from the inside out — bridging science, self-awareness, and flow.**

### Designed For

- 👉 **Coaches** seeking real-time on-the-wall diagnostics
  - 🧠 **Climbers** of all levels aiming to connect breath with performance
  - 🏋️ **Breathwork practitioners** integrating physiology into sport
  - 🔬 **Researchers** exploring field-based respiratory energetics
  - ⚡ **Athletes** in other intermittent or tactical sports
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### 👉 Summary: What the Pranaclimb Methodology Does

Defines your **CP & RCP**

Shows your **W'bal drain & recharge**

Reveals your **expressive breathing cost**

Tracks your **recovery capacity** ( $HRR_{60} + BR$  return)

Maps your **thresholds, limiters, and pacing errors**

Provides a **tactical blueprint** for sport, boulder & trad

**Breath is your feedback loop.**

**Your physiology becomes visible.**

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### 👤 Philosophy

“When I’m on the wall, nothing else matters.”

— *Janja Garnbret*

Breath is your **anchor, rhythm, and recovery signal.**

In climbing — as in life — *Love, Breathe, Climb.*