Repetitions in Reserve (RIR)

- Subjective measure of "effort" during resistance training.

- Inversely corresponds to The Borg CR10 scale.
  - Rate of Perceived Exertion (RPE)
  - 1-10 scale

Ratings of Perceived Exertion	Repetitions in Reserve
10	0
9	1
8	2
7	3
6	4
5	5
4	>5 light effort
3	
2	
1	

But Why?

To get huge! Duh!

- Fatigue Management
  - Controlling fatigue may allow for greater training volumes and frequencies.
    - ↑ Frequency = ↑ volume over time.
    - ↑ Volume load within a session = ↑ training volume over time.

  - Avoid non-functional over reaching or overtraining.

  - Creating a greater volume load stimulus within a session or over time may be helpful for fulfilling the overload principle.

	0 RIR	
	Reps	RIR
Set 1	9.64 ± 1.45	0 ± 0
Set 2	7.21 ± 1.85	0 ± 0
Set 3	5.79 ± 1.85	0 ± 0
Set 4	4.29 ± 1.44	0 ± 0
Set 5	3.93 ± 1.27	0 ± 0

But How Accurate Can I Be?

- Hackett 2012
  - 17 competitive male bodybuilders
  - Experience: 8.2 + 3.2 yrs
  - 70% 1RM
  - After rep 10 verbalized how many repetitions they felt they had left and continued to do repetitions to failure.
  - **Participants estimated repetitions from failure with a high degree of accuracy.**
  - Accuracy improved when sets were closer to failure.

But How Accurate Can I Be?

- Hackett 2018
- 28 males and 20 females
- Experience: >1 year
- Bench Press 70% 1RM
- Leg Press 80% 1RM
- After rep 10 verbalized how many repetitions they felt they had left and continued to do repetitions to failure.
- RIR was superior to RPE when estimating repetitions to failure.
  - Underrated RPE.
- Accuracy improved after set 1. This was likely due to performing lower reps and being closer to failure on subsequent sets.
- Males tended to be more accurate.

But How Accurate Can I Be?

- Zourdos 2016
  - 15 experienced squatters (>1 year training)
  - 14 novice squatters (<1 year training)
  - Experienced squatters better able to provide accurate RIR scores at 1RM and were more consistent at gauging RIR as they approached failure.
    - Experience, skill, and practice.
  - "…novice lifters should practice recording RIR, but likely not base training intensity or progression solely on the RIR-based scale until increased accuracy is achieved." (Helms 2016)

Our bench marks (0-5 RIR)

- Remember it's not just quantitative but it's a subjective measure of how you feel.

- How did your last several reps feel?
  - Subjectively would you call it easy, moderate, hard, or very hard?
  - Local fatigue and burning sensation.
  - Speed.
  - Technique.

RIR	RIR Interpretation	Perceived effort	Speed relative to reps left
0	"fuck fuck fuck!"	Max Effort	"Grinder" very slow. We know we probably aren't going to make it to next week if we don't have a spot.
0-1	Near max effort maybe 1 left	Very Hard Effort/Near Failure (0 RIR allowed on safe movements)	
1-2	Confident 1 maybe 2 left	Hard Effort	Pretty damn slow and we know that wall is coming. Our spotter is probably reaching for the bar.
2-3	Confident 2 maybe 3 left	Moderate/Harder Effort	Reps probably noticeably slower but we know we aren't failing in a rep or two
3-4	Confident 3 maybe 4 left	Just starting to feel like work but not quite "hard"	Speed might have gotten a tad slower but not worried about failing within the next few reps.
>5	"Light weight baby" "nuttin but a peanut"	Light Effort/Warm up/Easy	Fast and uniform

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Bar Speed

- Reps 1-6: Fairly uniform in speed.

- Rep 7: Bar slows down just a little bit.

- Rep 8: Clearly much slower than previous reps and apparent fatigue is approaching.

- Rep 9: Very slow and apparent 0-1 RIR approaching.

- Rep 10: Near grinding and apparent 0 RIR.

Practicing RIR

- Start with warm ups, ramp to target working weight, estimate RIR after each set.

- Initially, just stop before failure or prior to reaching a super slow grinder.

- Start conservative and overload progressively with load and or reps over time. One of these days it'll get hard. ;)

- Log your training and estimated RIRs.

- Program planned AMRAPS (as many reps as possible) and use them to estimate loads for future training.

- Estimate new loads off of a training max.

Initial Warm Ups

- Practice, Practice, Practice!
  - Start with warm ups, ramp to target working weight, estimate RIR after each set.
    - EX. Target working load 200lbs x 10 reps (based on previous sessions or estimated rep max calc.)

      - 50% target load – 100lbs x 10 reps
        - Felt like an easy warm up = >5 RIR

      - 75% target load – 150lbs x 8 reps
        - Felt like an easy warm up = >5 RIR

      - 90% target load – 180lbs x 6 reps
        - Still pretty easy but feels like I'm pretty close to my target. We might just say about 5 RIR.

      - 100% target load – 200lbs x 10 reps
        - Started feeling kind of hard, bar just slightly slowed down a little, felt a bit of local fatigue, but still confident you have a few reps left = 3-4 RIR.

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Logging Training & AMRAPS

Week 1 based off previous Phase. Looks like I under estimated. :p

Previous estimated 1 RM: 340
75% 1RM: 255

Week 1			Week 2			Week 3		
Sets	**Reps**	**INT/RPE/%**	**Sets**	**Reps**	**INT/RPE/%**	**Sets**	**Reps**	**INT/RPE/%**
1	6	255	1	Reps to RIR	264	1	Reps to RIR	272
2	6	230	3	Same Set 1	237	3	Same Set 1	245
Confident 3 maybe 4			**Confident 2 maybe 3**			**Shy of technical breakdown**		

Load	Reps	RIR	Load	Reps	RIR	Load	Reps	RIR
255	6	5	265	10	2	275	9	1
230	6	5	235	10	3-4	245	9	3
230	6	4	235	10	2-3	245	9	2
			235	10	2	245	9	0-1

- What now? We have a couple options….
  - First, what is your next phase going to look like? (6-8 reps, 8-10 reps, etc…)

  - Can we estimate Wk 1 starting numbers with these training numbers?
    - Yes… 275 for a 9-10RM would give us 6 reps @ 3-4 RIR.
    - If we want to go with 8 reps… week 2 could be used as a target for 8 reps at 3-4 RIR (265 x 10 @ 2 RIR).
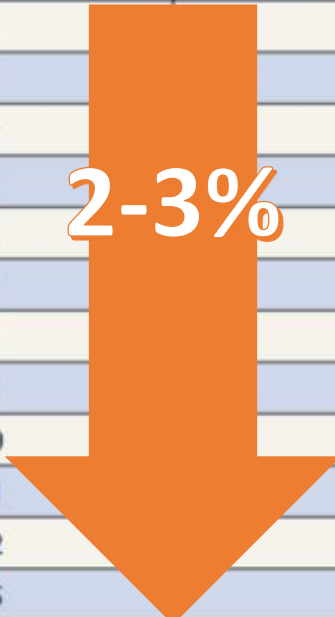
  - Estimate new 1 RM

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Using Your 1RM Chart

- Estimate 1 RM from old training numbers.
  - EX.
    - 275 x 9 @ 1 RIR
      - Approximateliy 10RM
    - 10RM ≈ 75%
    - 275 ÷ .75 = 366
  - In this example let's say we wanted to start training at with about 8 reps at 4 RIR.
    - 366 x .67 = 245.2
  - Still will need to gauge effort by feel.

Number of Repetitions Performed	Percent of 1-Repetition Maximum	Multiply Weight Lifted By:
1	100	1.00
2	95	1.05
3	93	1.08
4	90	1.11
5	87	1.15
6	85	1.18
7	83	1.20
8	80	1.25
9	77	1.30
10	75	1.33
11	70	1.43
12	67	1.49
15	65	1.54

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Using Your 1RM Chart

- Notice any trends?
  - Generally, the difference between rep maxes is 2-3% change.

  - Coincidentally, if doing straight sets you might expect rir to drop by approximately 0.5-1 RIR from set to set.
    - Dependent on rest intervals, individual work capacity, and training adaptation.
    - EX:
      - S1: 220 x 8 @ 3 RIR
      - S2: 220 x 8 @ 2 RIR
      - S3: 220 x 8 @ 1 RIR

Number of Repetitions Performed	Percent of 1-Repetition Maximum	Multiply Weight Lifted By:
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9	77	1.30
10	75	1.33
11	70	1.43
12	67	1.49
15	65	1.54

2-3%

Overloading With Effort Over Time

Week 1		Week 2		Week 3		Week 4	
Effort	3-4 RIR	Effort	2-3 RIR	Effort	1-2 RIR	Effort	0-1 RIR

Over the weeks we are working closer to failure and thus increasing our overload stimulus. →

Week 1			
Load	**Reps**	**Effort**	**VL**
200	**6**	**3-4 RIR**	**1200**

Week 2			
Load	**Reps**	**Effort**	**VL**
200	**7**	**2-3 RIR**	**1400**

Week 3			
Load	**Reps**	**Effort**	**VL**
200	**9**	**1-2 RIR**	**1800**

Week 4			
Load	**Reps**	**Effort**	**VL**
200	**11**	**0 RIR**	**2200**

Both volume load and effective rep count increasing over weeks.

Major Applications and Takeaways

- RIR is subjective. Don't let it overwhelm you.

- If you're new to subjective measures of effort allow time to practice.

- Use the transition from warm ups to working sets and AMRAPS to learn your bench marks (0-5 RIR).

- Start conservative. Anything <5RIR is still considered effective training.

- Use AMRAPS and percentages to guide training.

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