Application of RPE to Strength Training

EXPLANATION AND IMPLEMENTATION

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Introduction to RPE

Rating of Perceived Exertion or what is more commonly called RPE, is a method used for fitness training to determine the difficulty of a specific exercise or the session itself.

Originally conceptualized by Dr. Gunnar Borg in the 1950's (1), the RPE scale has been modified in various ways to fit all modalities of exercise. Attempts to measure the intensity of aerobic training exercise led to the advent of the first RPE scale. Enter the Borg Scale, this scale ranges from 6-20 and measures the difficulty of the training during the time it is being performed by the individual. If a 6 to 20 scale seems illogical to you, understand that this is rooted in aerobic exercise where intensity is often correlated to heart rate. A score of 6 is considered resting, as is 60 beats per minute; and a score of 20 is considered maximum, as is 200 beats per minute. This scale is used to give researchers, coaches, trainers, and athletes alike a subjective way to quantify intensity.

Fortunately, there are incredibly bright minds in the field of strength training and the two we can credit for evolution of the RPE scale are Michael Zourdos (2) and Mike Tuscherer (3). In your training you will be using the intensity scale they helped develop to be more specific to resistance training. It is known as repetitions in reserve or RIR. Quantifying the difficulty of resistance training is efficiently completed when using this method. If not explicitly stated otherwise, any further mentioning of RPE will refer to the RIR based RPE scale.

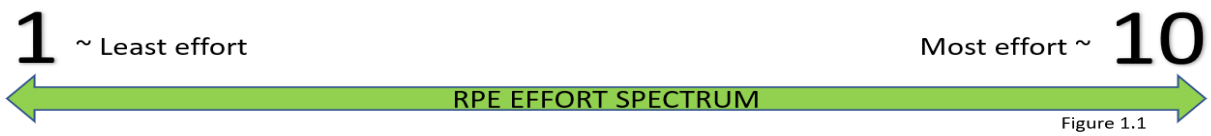

Figure 1.1

The basis of the RIR scale is exactly what its name implies; the amount of repetitions an individual lifter has left in the tank until failure. So, the RIR value is assigned based on how much more work you think

you could have done after your last repetition. If you give a number that is closer to the left then you gave minimal effort, conversely the closer you get to 10 the closer you get to maximal effort on that respective set. The scale ranges from the numbers 1 through 10.

With this is mind, let's take a look at what each of these numbers mean, how they feel, and what they physically represent through the table below.

RPE	RIR	*How it Should Feel*
1-5	Very light effort. Used for warm ups or rehabilitation and power training.	Like an empty bar
6	4	Light but good work, bar should not slow down
6.5	*Maybe 4*	Light but good work, bar should not slow down
7	3	Moderate difficulty, bar should slow down slightly
7.5	*Maybe 3*	Moderate difficulty, bar should slow down slightly
8	2	Hard, bar will slow down around the middle and end of a set
8.5	*Maybe 2*	Hard, bar will slow down around the middle and end of a set
9	1	Very hard, bar will be noticeably slower
9.5	*Maybe 1*	Very hard, bar will be noticeably slower
10 (False)	0 *But could have added additional weight	Extremely hard, heavy, grindy rep
10 (True)	0	Extremely hard, heavy, all-out effort, grindy rep

RPE numbers 1 through 5 in the scale are grouped together because the farther you are from max effort the less accurate you will be in subjectively quantifying how many more repetitions you could have completed. They are all very light efforts and really just constitute the warmup sets of a session. Also, sets done at these RPE ratings are not demanding enough to elicit any kind of driving stimulus. This is why you will not see any of these RPE numbers within the bulk of a strength training program unless they are used as a blueprint for warm up sets.

Moving forward, the most important aspect of this table is understanding that each RPE number, specifically 6 and above, represent how many repetitions are in reserve at that RPE. An easy way to remember what RIR number is associated to what RPE number is to subtract the RPE from 10. This simple subtraction will give you the RIR. So, an RPE of 9 would mean 1 RIR and an RPE of 8 would mean 2 RIR. This regressive trend continues until you pass RPE 6 and are too far away to provide an accurate RIR. The majority of the RPE numbers that you will see in your program will be from 6-9, as they are demanding enough to cause an insult to the body but not to a point of muscular failure.

An RPE of 10 requires additional explanation because it can be expressed in three different ways. One, taking a submaximal load to the point of muscular failure. This would be your typical bodybuilding bro benching 225 for 8 reps, and failing on the last rep. Failure here being defined as the inability to perform a full repetition with correct technique and without assistance.

However, in the context of maximal loads (only one repetition can be performed) there are two expressions of RPE 10. They are a False 10 and a True 10. A False 10 is represented by a load that can only be completed for one repetition, but slightly more weight can be added. A lifter who squatted 500 pounds but could have squatted 510 would have completed a False 10. A True 10 is represented by a load that can only

be completed for one repetition and no additional weight could have been added. In this example, had the lifter chosen to put 510 pounds on the bar it would have been a True 10. A True 10 is a perfect display of maximal strength as shown by the absolute most amount of weight that can be put on the barbell.

As a side note a True 10 is a sign of neuromuscular efficiency and personal experience with maximal loads. It is clearly established that resistance training causes significant neuromuscular adaptations, particularly in the ability to recruit high-threshold motor units (4,5,6). This means that a True 10 can only be expressed by a trained individual. While untrained lifters will probably only be able to perform a False 10 until they learn the requisite technique and accumulate neural adaptations. Additionally, there is a learning curve to this type of training and if you are untrained you will need time to become familiar with it. The major point is that a trained lifter will be able to grind out a maximum lift because they have made the necessary adaptations to do so, while an unexperienced lifter simply doesn't have the tools capable of a maximum lift, let alone a True 10.

Additionally, every 0.5 within the RPE scale allows for some flexibility in assessing a specific RIR. This is because it is impossible to accurately evaluate RIR one hundred percent of the time. So, the usage of a 0.5 is applied when a lifter is unsure if they could have completed the amount of repetitions an RPE should represent or if they could have only completed the amount of repetitions the next RPE number up would represent. So, for example, a lifter completes a set of 5 reps of squats and was unsure if they could have gotten 1 or 2 more repetitions, this would then be an RPE of 8.5.

Finally, the velocity at which the barbell moves during a repetition has a strong correlation with RPE (6). A fast barbell means a relatively low effort. As the barbell starts to slow down, it is expected that RPE will begin to creep up towards the higher end of the scale. This is why

there are descriptions of bar velocity in the "How it Should Feel" section of the Table 1.1. If you are fortunate enough to have access to a linear force transducer, like a Tendo Unit or Bar Sensei, then you have objective data on the velocity at which you are performing lifts. In the likely scenario that you don't have access to a one of these, training videos or a trusty training partner can be good ways to help quantify RPE via the speed of your reps.

However, the most important aspect to understand about this scale is the fact that even though the scale itself is built on objective means, truly quantifying RPE is a subjective process. Meaning, you will be quantifying the RPE in your training based upon how things feel specifically to you and not objective measurement. Sure, as was stated earlier you can use velocity, video, and a training partner to help justify an RPE rating, but those methods should be used as a secondary measure. The predominant way we will measure RPE is through your ability to translate perceived intensity into RPE.

The beautiful result of the proper implementation and practice of this scale is that it allows you to become completely in tune with your body. Instead of being able to say that something was "somewhat hard" or felt "really heavy", you now have the means to standardize your efforts on any training day. This makes for a much more consistent and appropriate stimulus, and over time will result in more progress.

Understandably, things might seem a little abstract at the moment. Once you learn how to actually implement RPE in your training (which will be described in the next section) the process becomes much clearer.

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Implementation

Right now you are most likely confused. You're probably thinking, this RPE thing sounds good and all, but how the hell do I actually implement it within a program?

The RPE scale is versatile and possesses high practical utility so long as you understand how to implement it within a resistance training program. There are four methods of application in total and each method has its own specific advantages. This becomes apparent when putting together a sound program because of the need to highlight certain attributes (hypertrophy, strength, power) at certain times. This is why each method is used for specific things, which will be discussed in detail below.

1. Measuring Difficulty/Fatigue

Although RPE has been around for a while now, it is still a newer training idea and not widely used as the sole means of exercise prescription. Couple this with the magnitude of experience levels there are in strength training -- of which range from not able to do a bodyweight squat to being able to squat three times your bodyweight -- and you can potentially create a recipe for disaster if a period of RPE acclimation isn't used at first. So, just like you can get better and more experienced at resistance training, you can get better and more accurate with your RPE ratings. This is where the first method comes into play.

Basically, the idea here is to use RPE as the scale intends it to be used. A measure of difficulty. Let's look at how this is represented through an exercise protocol.

The figure below is a real example given to an MPS client. It is written out through a traditional sense. The athlete is given a training weight and a set and rep scheme to perform. To the right is an empty yellow column titled RPE. So, the objective is to assign an RPE rating to each set based upon how that set felt.

Exercise	Set #	Reps	Weight	RPE
Squat	1	4	295	
High Bar	2	4	295	
	3	4	295	
	4	4	295	

The results could potentially look something like this…

Exercise	Set #	Reps	Weight	RPE
Squat	1	4	295	7
High Bar	2	4	295	7
	3	4	295	8
	4	4	295	9

The first set was completed at a 7 RPE, as well as the second. However, as the session continued and acute fatigue accumulated, the RPE ratings got higher (as seen by the 8 and 9 RPEs respective to the last two sets).

Using RPE in this manner is more like a background element as opposed to a directive element (which are shown after this method). There are a number of reasons as to why this can be beneficial. For one, there are a wide variety of experience levels in resistance training. There is a good chance that you have heard of RPE before, but never actually used it. Therefore, this method is used as an introductory period to RPE training. Because it is used as a background element and not for prescription, there is no risk of derailing the program. It is essentially practice at getting better at understanding how each RPE number feels. That is the main goal here, to become more in tune with your body.

Say you just enjoy the traditional prescription that was listed before (Weight -- Sets x Reps). If you're and old school kind of guy or gal, then you should still use RPE and record it so that you have a more accurate training log. When you have a large enough amount of data, you can look back on your training with a deeper understanding of what was really going on and better track your training.

As an example, say you hit a back squat single at 315 pounds and you recorded it as an RPE of 8. Fast forward two months and you hit 315 pounds again but at an RPE of 6. That is undeniable progress! Even though it was the same weight and number of repetitions on both accounts, you handled it much more efficiently on the second go around. You wouldn't have known this if you only listed 315x1 on both days.

Finally, because RPE numbers represent effort, they are also really good at representing fatigue. To preface this, the majority of strength training should take place at the RPE of 6-8. Nine will be common as well, just slightly less common than the previous ratings. Therefore, if you are recording a lot of sub 6 RPEs, then your training is not difficult enough to warrant any adaptation. If you are recording mostly 9's and 10's, your training is most likely to fatiguing and you are training to hard.

2. Rep Stop Protocol

Paralleled by the introduction of the next RPE protocol is the authoritative switch of RPE. Where in the previous protocol RPE was used as a background element, think of RPE from here on out as an instructive element. Rating of Perceived Exertion will now be used as a backbone for sessions just like set and rep schemes are.

This next protocol is known as the Rep Stop Protocol and is illustrated below.

In our example 295 pounds is the given training load, and is followed by an RPE. A rep stop protocol is completed by taking the listed weight and doing it for as many repetitions as you can until you reach the prescribed RPE for each respective set. For instance, if a lifter was to start this workout they would do as many repetitions as they could until they only had 2 repetitions left in the tank (295 – 1 set @8).

Exercise	Set #	Reps	Weight	RPE
Squat	1		295	8
High Bar	2		295	9
	3		295	9
	4		295	10

It is extremely important to realize that each set is performed individually and each set has its own designated RPE assignment. This means that you should not allow the outcome or number of repetitions of the previous set to influence the performance of the subsequent set. Fatigue will inevitably accumulate from set to set, so you may not always be able to maintain the amount of reps you did on the first set. Sure, it is entirely possible that you actually are able to maintain the reps from the first set to the last. However, the goal here should not be to make every set outcome look exactly the same just for the sake of doing so. Our exampled lifter shows us how this might play out in the figure below, while it makes for an attractive training log it may not be an accurate expression of what happened during training.

Exercise	Set #	Reps	Weight	RPE
Squat	1	5	295	8
High Bar	2	5	295	9
	3	5	295	9
	4	5	295	10

Instead, as stated before, treat each set as an individual task and perform each one to its designated RPE. When doing this the lifter is able to complete 5 repetitions with 295 pounds for the first set at an 8 RPE. Because the lifter was not highly fatigued, the next set allowed 6 repetitions which was at a 9 RPE and so on. The Rep Stop Protocol is a step above the first protocol because it requires the lifter to focus and be more in tune with their capabilities under the bar.

Exercise	Set #	Reps	Weight	RPE
Squat	1	5	295	8
High Bar	2	6	295	9
	3	5	295	9
	4	4	295	10

This protocol is a well-rounded use of RPE. It allows for a tightly controlled stimulus because RPE prescription dictates how difficult a set should be, regardless of the exercise or other variables. There is no guessing game here. Whereas a 5x5 at 85% could result in two extremely difficult finishing sets because there is no flexibility, a Rep Stop Protocol shines because the intensity of the stimulus is explicitly known beforehand. It also meshes well with variant exercises whose best performances may be unknown. If a lifter has never done a slow tempo back squat, then it would be difficult to prescribe a preset amount of repetitions for this exercise because there is not standard to base performance off of. In this context it is a great tool for establishing baselines.

3. Set Stop Protocol

The Set Stop Protocol is essentially the same as the Rep Stop Protocol but now the weight and reps are given and the session is finished when you complete enough sets to reach the RPE. For reference see the below figure.

Exercise	Set #	Reps	Weight	RPE	Rest Period
Squat		5	295	9	3-5 M
High Bar					

Here the RPE number is representative of the end of the exercise itself. As soon as you have completed the amount of sets necessary to reach the RPE, the exercise is over. In this example, the lifter will high bar squat 295 pounds for 5 reps for as many sets as possible until he or she reaches RPE 9. This could be anywhere from 1 set to 10 sets. The outcome is dependent upon the lifter's conditioning, weight used, and chosen repetition scheme.

It is common for an athlete to accumulate a large amount of sets when using this method compared to traditional prescriptions. Traditionally, it would be rare for more than 6 or 7 sets to be performed for a compound exercise, such as the bench press. Interestingly, without a finite number of sets to perform lifters are able to safely and successively perform upwards of 10 sets, in some cases. This may seem like a potentially harmful amount of volume, but if the final set resulted in the listed RPE number -- which in this case is 9 -- then every repetition before that was most likely in the neighborhood of 6-8. In essence, a large amount of

high-quality work (both in a stimulating and technical sense) can be completed through the Set Stop Protocol.

This protocol excels when used for targeting a specific biomotor attribute, such as the many forms of strength, power, or speed. Through the prescription of weight and repetitions, a specific stimulus is created. For example, say you wanted to create a general strength block for the high bar back squat. The first thing you would do, using the Set Stop Protocol, is choose the desired weight that would allow you to express general strength work the best. Then pick a repetition number that would allow you to handle more than 1 or 2 sets because the goal would be to accumulate volume, and consequently quality work.

The Set Stop Protocol is also commonly used when structuring exercises whose previous performances are known, as there is a standard to base training off of. For instance, if you are a powerlifter, your competition exercises will mostly be prescribed through this protocol because these exercises have no variation that would cause any changes in performance (like the tempo squat example did in the Rep Stop Protocol).

4. Weight Stop Protocol

The last RPE protocol is autonomous in nature. It allows the lifter to select of the actual weight being used based on what is prescribed. In this instance, the amount of sets and repetitions are given, as well as RPE, but the lifter must work up to a weight that fits the formula.

Exercise	Set #	Reps	Weight	RPE	Rest Period
Squat	1	1		9	3-5 M
High Bar					

Here, the lifter is told to work up to a heavy single that would result in an RPE of 9. Depending on the experience of the lifter, sometimes a range of weight will be listed to help choose the appropriate weight.

Just like the example, weight selection through RPE is most often used in the form of singles. This allows for a potential range of weight to be used as opposed to being strictly limited to a prespecified weight. Because of this, the

weight stop protocol works well when getting ready for a powerlifting competition or on a testing day.

This method requires trust between the coach and athlete. It is far too common for a lifter to see "work up to a heavy single @9" and irresponsibly or mistakenly read it as "try to set a new PR!!!". The odds are you are not in a position to set a new PR at an RPE that is lower than 10 because substantial progress takes time. The execution of any single performed lower than an RPE of 10 should be unquestionably clean. So, just because you see a single in your training does not give you the opportunity to try to set a new PR. Be a responsible lifter

The pattern revolving around all of these RPE protocols is flexibility. They can give the desired stimulus on any given day not matter where a lifter's current fatigue may be. Also, RPE protocols are adaptable to each and every lifter. This is critical because each lifter is different from all others. Optimal training is only optimal when a program is specifically created for an individual person, and RPE is a platform that creates this environment. The autoregulation section explains this in detail.

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Accuracy

The thing that scares most people about RPE training is how subjective the process is. In fact, it really is entirely subjective. People in the strength and conditioning world do not like subjectivity. It's all about numbers, spreadsheets, and percentages. The idea of basing a training program off of subjective response is iconoclastic to say the least.

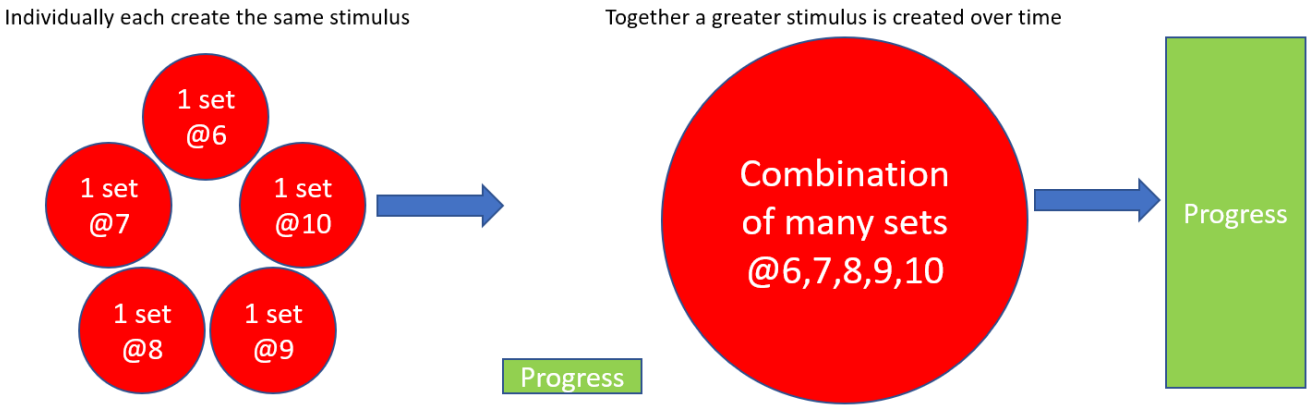
Self-efficacy also plays into the indifferent mindset that the general public has towards RPE training. In order to be successful with RPE, you have to take more responsibility of your training. You have to pay attention to subtle things, you have to learn, and you have to be adaptable. Some may find this easier than others, but generally speaking people don't believe that they can use RPE because of the learning curve. They would much rather stick to the tried and true excel spreadsheets and percentages.

The good news is that it does not take that long for RPE training to start making real sense. In fact, in order to grasp the basic tenants of RPE it usually takes about a month and RPE accuracy continues to improve with experience (1). This is why the introductory month is so important. It allows athletes to incorporate RPE into their training, practice it, and become comfortable with it.

It is also important to understand that being successful with RPE training does not mean being absolutely perfect in your RPE ratings. You are not a robot, and you cannot quantify physical exertion to the same degree every day. There is going to be some variance in your estimations. But! This is completely fine. The perfectionist in you may be uncomfortably reading this thinking…I couldn't bear to be allow such uncertainty!

Here is why its ok; if you are able to estimate RPE within one repetition, that means you are still staying within the 6-9 range. As long as you are staying within this range, your training is sufficient enough to induce adaptation. Finally, as long as you are able to recover from this training, you will get stronger over time. The idea that you have to be spot-on with every RPE estimate is a classic case of missing the forest for the trees. A single set is not going to be enough to insult the physiology of a trained athlete, no matter if that set was an RPE of 6,7,8,9, or 10. **Rather, it takes the summation of many sets and sessions over time to move**

the needle. The idea that every set must be a perfectly calculated RPE rating loses its validity under this paradigm.



The same rings true for the RPE protocols we explored prior to this. No matter if you are using RPE to influence reps, sets, or weights you will have been accurate enough, as long as you are close to the desired stimulus for the session. **The point is to not be precise with your estimations, but to be really good**. As long as you are learning more about yourself and your body's response to training, you can rest assured knowing that your RPE training is moving along well.

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Autoregulation

Now that the applied information is out of the way, the underlying principle that makes RPE so effective can be discussed. This principle is called Autoregulation (AR), and defined in research as "a form of periodization that adjusts to the individual athlete's adaptations on a day-to-day or week-to-week basis" (1). Using RPE training allows for an individualized and adaptable approach. When the significant differences that exist between all of the lifters and athletes that a coach could potentially come across are taken into consideration, it makes sense as to why an individualized and adaptable program would be beneficial. To set the stage, let's look at some of the potential drawbacks of a traditional percentage-based program.

First and foremost, the efficacy of percentage-based programs hang on the accuracy of the test used to determine a 1 rep max. If the test that took place isn't representative of what an athlete is truly capable of, then a program structured around that test would not be as effective as a program that can adapt to such a circumstance. It is also important to understand that any test represents one point in time. With this in mind, tests in the strength training world are done at a unique point in time. This uniqueness exists because an athlete will usually have gone through a tapering period, which consequently allows fatigue to dissipate and fitness to increase. Because of this an athlete is then given the best opportunity to complete a test at their highest level of fitness. During actual training, fatigue will be at a moderate or high level and potentially mask what an athlete is really capable of. For this reason, a percentage-based program conflicts with a central tenant of periodization, the stimulus-fatigue-recovery-adaptation theory (SRA for short).

Summarily, this theory states that exercise is a stimulus to the body which causes fatigue. Once fatigue is recovered from, the body reaches a new level of fitness and adaptations are made. While the nuances of these topics are relevant here, the main point is that the presence of fatigue makes us temporarily weaker. We also know that at some point we will be stronger compared to our prefatigued selves because of the adaptations made. This means that there are fluctuations in readiness, or the capacity of an athlete to perform in training on any given day. While only the influence of exercise on readiness has been discussed, nutritional and sleep habits also impact readiness. Ratings of perceived exertion training takes

these things into consideration by allowing you to subjectively autoregulate, while a percentage-based program assumes that none of these realities exist.

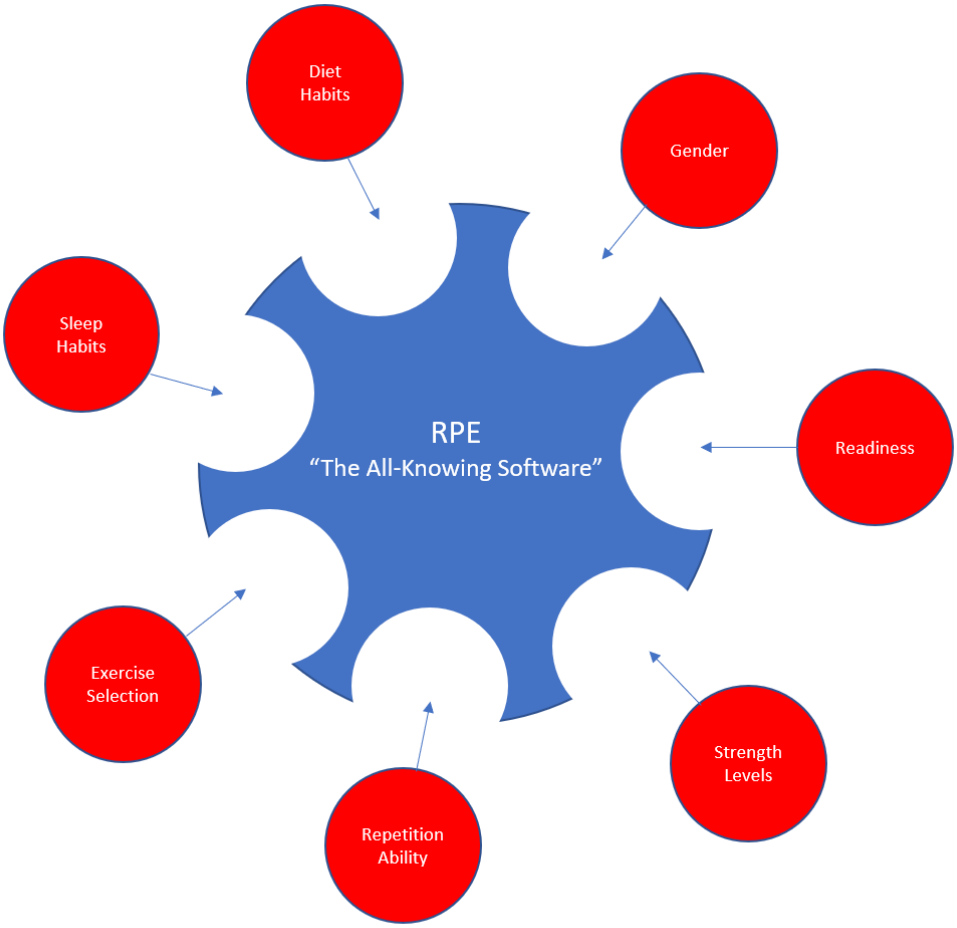
A percentage-based program also assumes that a specific percentage means a specific performance. In the context of programming, that specific performance is generally transcribed as a number of repetitions. There is a chart that is all too common in strength and condition texts, and while is it convenient, it is not accurate. It usually looks something like this…

Percent of 1RM	Number of Reps
95	2
90	4
85	6
80	8
75	10
70	11
65	15

This chart assumes that every athlete is capable of completing the listed number of repetitions at each respective percentage. The reality is that this is just not the case because of the many differences that exist between athletes, such as training experience, strength levels, and gender (7,8). Just because one athlete can complete 10 repetitions with 75% of their 1RM does not mean another athlete is capable of the same. This is not taking into consideration exercise selection either which could cause intrapersonal differences in repetition performance. An athlete may be able to perform 10 repetitions at 75% with the squat, but only 8 repetitions with 75% in the bench press. Because these many intra and interpersonal characteristics that exist, the chronic use of a percentage-based program could potentially lead to inadequate results.

The good news is that training with a program built around RPE solves these problems through autoregulation. Training using RPE is like using an all-seeing and all-knowing software that is custom to each individual. It can take into account

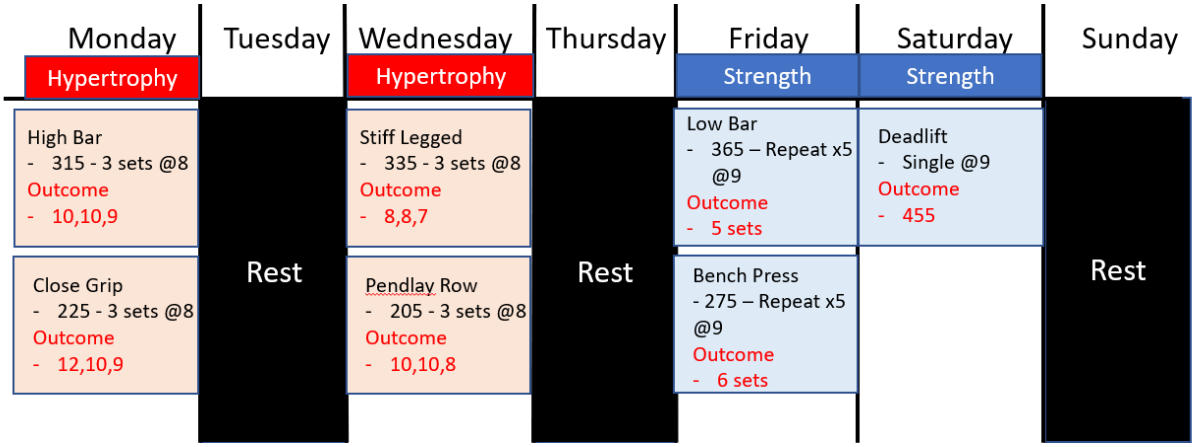
any possible variable that can influence performance and still create the intended training dosage. This is, again, because autoregulation is adaptable. It does not exist between a concrete set of parameters. It exists within the perceptions of each and every athlete.



Possible Variations in Performance RPE Training Automatically Adjusts For

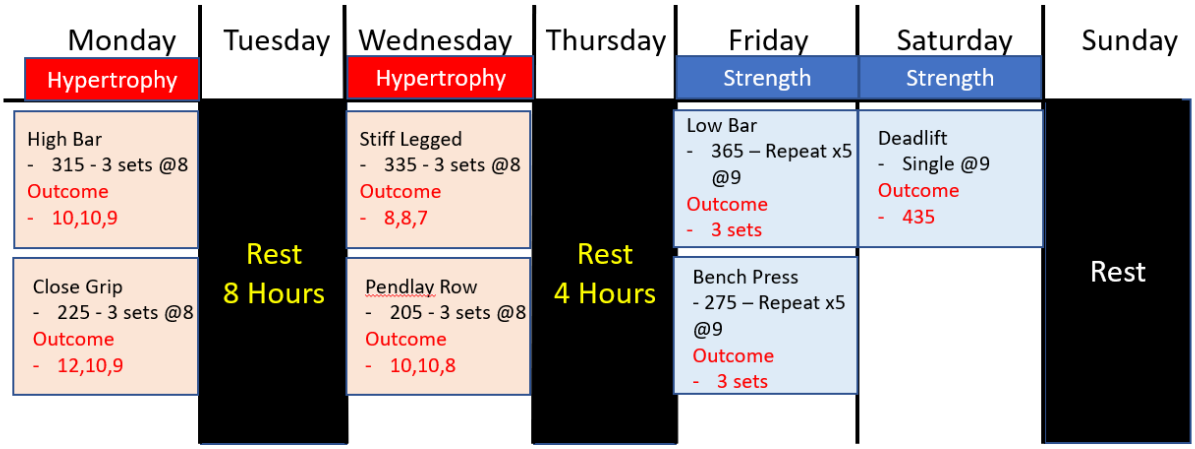
Training with RPE is capable of all of this because through RPE training performance is a dependent variable and not an independent one. Performance is traditionally preplanned (for example a 5x5 with 315 pounds) which makes performance independent. Instead, with RPE training, performance is dependent on the RPE protocol used and the readiness of the athlete on that day. The result is individualized and consistent training because each athlete is getting exactly the training they need and are intended to receive.

Let's look at this in practice as one week of training:



This is a basic 4-day frequency training week utilizing every RPE protocol. Already it is clear to see how autoregulation is manipulating each session to create the desired training effect. As the sets progressed on Monday and Wednesday the reps were maintained or dropped by one or two from set to set because of fatigue. Even so, the stimulus remains the same due to the final set being performed at the same RPE as the sets that preceded it. Friday shows autoregulation as well. The athlete did as many sets as they could until reaching RPE 9, which took 5 sets for Low Bar and 6 sets for Bench Press. Because each exercise terminated @9 we know that the volume beforehand was within @6-9, which is the range of RPE we highlighted as the sweet spot for accumulating quality training. Finally, Saturday finished up the training week with an autoregulated deadlift single, until reaching RPE 9. This allows the athlete to choose the weight that feels like a 9, where a pre-selected weight could have been too much or not enough.

Training using RPE is really just like using an adaptable software. The previous example was only autoregulated through the training itself, and not any outside influences. Consider this example.



Our athlete did well by sleeping for 8 hours on Tuesday, but on Thursday he only managed 4 hours. This affected the training on both Friday and Saturday. Because of poor sleep habits, our athlete could only muster 3 sets for both lifts on Friday, and he dropped 20 pounds for the lift on Saturday. Training with RPE gives us the freedom to adjust training based on how the day is feeling, good or bad, while a traditional program does not provide the same degree of flexibility.

This is why the utility of RPE training is far beyond that of traditional means. To clarify, the argument is not that traditional programs do not work. Because they do. Plenty of champions have been bred with such a program. And while they do work, they may not be optimal. A review of the scientific literature on the topic provides that training to failure should be planned into the training cycle and not a primary driver (4) so that the coach and athlete may be able to account of the added fatigue. Although, RPE training is difficult to implement through team strength and conditioning programs that house large amounts of athletes. In this context a traditional program may be more appropriate. In closing, RPE training **narrows the gap between optimization and knowledge/experience.** The latter is expressed through the core programming decisions (periodization strategies, exercise selection, volume allocation, etc), and the former is largely expressed through the platform (traditional vs RPE) chosen for those core decisions.

Sources of Information and Continued Reading

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Training to Failure

Using RPE as a pillar of training, the coaches of Milo Performance Systems do not advocate training to failure, on a regular basis. As previously discussed, repetitions that fall between @6-10 are stimulating enough to warrant adaptation, and the majority of training will take place within @6-9. Unfortunately, bro culture does not like to accept this due to two primary reasons.

One, the modern gym ego. It is a common belief that if you aren't pushing yourself to the limit on every set, lifting as much weight as you possibly can, inking out every single rep until your spotter is doing a bent over row to get the bar off your chest, then you aren't training hard enough. The irony in this situation is hilarious, because a back squat for 4 sets @9 is more difficult than your typical gym bro could even fathom. Jokes aside, some people find it difficult to buy into training that is predicated on training right before failure and not until failure. This is a psychological issue, and RPE or not, if you are unable to get past your ego you are never going to reach your true potential.

The other reason is the school of thought that it takes training to failure to train the entire population of muscle fibers within the exercising muscle. Or basically, if you don't do a bicep curl until you literally can't pick your arm up then you have left some muscle fibers untapped. In this argument the real work happens on those last couple of reps, and if you stop before those happen you have wasted precious gains!

While it seems to be rooted in science, the fact is the idea of training to failure was originally spawned from a marketing scheme by Nautilus in the 1970s. And yes, there were likely athletes who did this to become bigger and stronger before that, but after the marketing scheme this became the claim to fame of many gym bros. When a large group of people are doing something, scientists want to investigate it and see if it is really something the academic world recommends. This resulted in a body of research supporting training to failure. Specifically, it is thought that training to failure activates more motor units (1). This is really the key to the argument by those who prescribe to this school of thought, as motor units are said to follow the size principle. Where motor units, or the peripheral nerves and the associated muscle fibers, follow a progressive pattern of activation, smallest to largest (2). Allowing for more fibers to be recruited by training to failure is thought facilitate strength and hypertrophy (1, 3) as the larger and stronger fibers need to

be activated so that they can adapt. However, sport science research is often done in a very fixed perspective, meaning that one thing is isolated and studied for a short period of time, usually 8 weeks. So, while the research provides some support to the argument of using training to failure, it is only part of the picture.

Fortunately, there is evidence to suggest that those key high threshold motor units can be recruited by training just shy of failure. One specific investigation's data shows that the maximum motor unit activation occurs between three and five reps to failure (4). While this is only one study, it is evidence that there is more to the picture than an absolute statement claiming - you have to go to failure, bro. Further, research indicates training to failure too frequently may cause resting blood concentrations of testosterone to drop and cortisol to rise (5). These are important points to understand when wrapping your head around our training philosophy. You need to cause the appropriate training stimulus AND be able to recover from it. If you can't recover from your training you are ultimately in your own way.

You have to commit to patience, discipline, and what we call calm violence under the bar to reap the benefits of your training. However, in the respect of being transparent and recognition that everything, especially in the world of training, exists on a spectrum we will note that research suggests the more trained you are the more appropriate training to failure is (6). Really, what this research is saying is that the more of a beginner you are the easier it will be to reap those benefits and the longer you train (with the right principles in position) the harder you will have to work to continue to progress. This is where the implementation of RPE 9 and 10 come into play. We have to plan the hard work into the training cycles so that you are able to recover and reap those adaptions so you may grow bigger and stronger.

Just like all variables within a resistance training program, especially training to failure, it needs to be planned in and accounted for. Taking a set to failure is more taxing than a set to RPE 7 or 8. The actual exercises that are taken to failure will be planned as well. Compound lifts such as the deadlift and back squat are rarely if ever going to be performed at an RPE of @10 unless in the context of a max single. These exercises involve heavy loads and a lot of moving parts so performing them until failure make for some risky situations. Common sense should tell us putting 600 pounds on our backs and squatting until we literally dropped would do more harm than good. Instead, exercises that isolate

muscle groups can be safely performed to failure. A reverse hyper and quad extension are both examples of this.

Hopefully this has challenged the way that you think about training. We are all held back by our egos at some point on our strength journey. During this time we think we are training to better ourselves and our bodies but the reality is we are training to inflate our ego. Real and meaningful progress comes when you become aware of your ego and are able to put it behind you. This is paralleled by the implementation of the training that we have discussed within this document. The combination of both of these things will lead you down a path of perpetual physical and mental growth.

The coaches here at MPS want nothing more than to help you on this path.

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