There are two key components of successful programming—putting first that which is most important and learning how to adjust each training variable while maintaining the order of things. These will be covered in exceptional detail throughout this book.

1. Prioritizing That Which Is Most Important

Though it sounds so simple and obvious, people screw this up all the time.

When you train, many different factors influence each other and cause the resultant adaptations of the body. The experiences of trainees in gyms around the world for the last century, when combined with research over the last few decades, has enabled us to establish a fairly clear order of importance as to what will and won't give you the most from your training efforts.

When you see seemingly conflicting advice — which exercises to do, how heavy to go, how many sets to perform, whether to train to failure, lifting explosively or slowly to 'feel the burn' etc. — you need to decide how important these factors are relative to your goals, and how they will affect the other aspects of your training. By looking at these variables through the lens of a pyramid of importance, you'll save yourself unnecessary confusion.

As the classic analogy goes, if you want to "fill your cup to the brim" when it comes to your training potential, get your big rocks in place before your pebbles, and your pebbles in place before your sand.

2. Learning How to Adjust Each Training Variable

The next important part of achieving success with your training career is learning how and when to adjust the individual variables that go into your program. It's essential that you use critical thinking here and not the black and white type of mindset that pervades the majority of the training industry's commercial literature.

Here are some examples of black and white questions that ignore context:

- Are squats the best exercise?
- Is the leg press for wimpy men that are scared to squat?

- Is 5x5 better than 3x8?
- Is more volume better?
- Is training twice a week enough?
- Will training every day cause me to overtrain?

And now here are some examples of the type of critical thinking I'm going to teach you to use in this book:

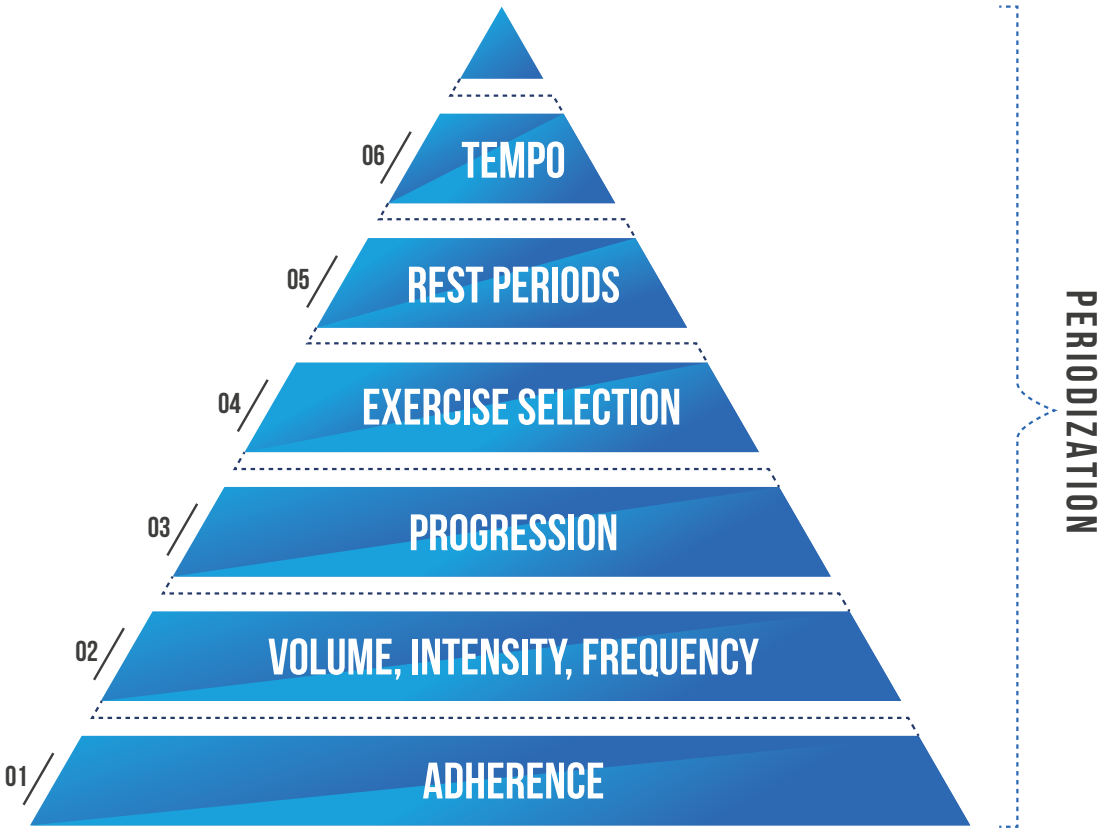
- What is unique about the barbell squat that makes it worthy of inclusion in a training program? What are the limitations?
- When is the leg press appropriate?
- What set and rep patterns are appropriate for what exercises, for me, and when?
- How is adding sets and volume going to affect progress?
- What is the best way for me to split the appropriate training volume over the training week?

Which way of thinking is likely to lead to a better long-term outcome? Ponder that question before moving on.

INTRODUCING THE PYRAMID

The Pyramid is an organizational structure that places the most important priorities of training in a hierarchy. There are six parts of this pyramid. The most important elements of your training program are at the bottom; notice that they have the largest area. These elements build the foundation of your training.

MUSCLE AND STRENGTH TRAINING PYRAMID



It is likely that ~80% of your progress will be made by focusing on these bottom three or four levels, and only the very small finishing touches will be affected by the last levels. Most of the time, our discussion in the final levels will primarily focus on how to just prevent you from doing something wrong.

Unlike The Nutrition Pyramid, the layers of The Training Pyramid are not as clear cut-and-dry because of how interdependent the variables of training often are. However, I think this construct I've created will help you get to your goals in a more efficient manner, and help you understand the concepts in a more complete way with respect to context. For trainers, it will better help you develop training plans for your clients, and if you're a student I hope to take some of the theory you have learned and put it into action.

The Hierarchy of Different Variables to Take into Account When Designing a Program for Strength or Hypertrophy

Periodization

There is a popular saying, "If you fail to plan, you plan to fail." Passion and hard work will take you far, probably further than anything else in training (and in life for that matter), but directing that passion and hard work in an efficient manner over time is what develops champions.

Periodization is often overcomplicated and misunderstood. Simply put, periodization is the intentional manipulation of variables over time to achieve specific goals. Organizing your training in an intelligent manner can help to optimize progress and also prevent burnout and injury, which in turn further helps you make progress.

Periodization covers changes in variables in each level of The Pyramid over time. For this reason, it is placed outside of The Pyramid as it encompasses manipulations of all of the levels.

Now as a brief introduction to The Pyramid, here are the levels in order of priority:

Level 1: Adherence

Strength training is a journey which must be continued consistently for a long time to produce meaningful results. Before losing yourself in the building blocks of making a solid training plan, I want to remind you of something more fundamental to your success—it doesn't matter how good your programming is if you cannot stick to it.

What may be technically more optimal on paper is entirely irrelevant if you don't do it. So let go of it. Work on making the best training plan you can within the confines of what you can adhere to. This chapter focuses on the principles that make a training plan one you are able to maintain consistently over time.

Level 2: Volume, Intensity, Frequency

Volume, intensity and frequency are what actually form the foundation of programs. These three variables are interrelated and inseparable from each other. Each affects the other and can do so in different contexts. Depending on the way you look at it, any one of these could be considered the most important. For this reason, we have them all in the same layer. The optimal combination of each will vary depending on your training age, goals, preferences, schedule and current stage within your athletic career.

This is the longest section and covers the majority of the most important concepts in this book, so make sure to read through it carefully.

Level 3: Progression

In order to keep getting bigger and stronger, you need to gradually increase the training stimulus. This is called *The Principle of Progressive Overload*.

If you are a novice or early-stage intermediate lifter, simply setting up a training plan specific to your goals with an appropriate volume, intensity and frequency will produce gains without much additional thought or effort. Simply selecting weights that challenge you on a session to session or week to week basis, even with the same set and repetition schemes within the week, will result in a gradual increase in strength and size. However, at a certain stage of your development, a plan for progression will become important to ensure continued progress.

This chapter covers detailed progression theory and examples for novice, intermediate and advanced trainees.

Level 4: Exercise Selection

The importance of exercise selection varies depending on perspective. Exercise selection for strength athletes (specifically those who

perform certain lifts or events in competition) is critical because their sport performance is actually the expression of strength via specific movements. The inclusion of these competition lifts, therefore, is a given. Thus, the focus of a discussion on exercise selection for a strength athlete should be centered on how much time is spent training the competition lifts in relation to assistance lifts.

For hypertrophy, a wide variety of exercises can be used to stimulate growth. That being said, based on the biomechanics of the individual, some exercises may be more effective than others. This is also a relevant consideration for a strength athlete. For example, even though a powerlifter may have to squat, in some cases the squat may not produce balanced development if that specific powerlifter is not well built to squat. Therefore, they might be better suited to doing more assistance work for leg development rather than more squats compared to someone who has limb and torso lengths well suited to squatting.

Physique-sport competitors must also consider not only what exercises best suit their body's lever lengths, but also how to modify their exercise selection to address weak points in their physique. Biomechanics, weak points, and technical skill can all influence what exercises you choose to use. However, in a broad sense exercise selection is primarily differentiated based on the goal of your training—whether you're training for hypertrophy like a bodybuilder or training for strength like a powerlifter.

Level 5: Rest Periods

How long one rests between sets has been theorized to be an important variable for resistance training, specifically when the goal is hypertrophy. However, the mechanisms by which short rest intervals were once thought to augment hypertrophy have been questioned and a solid body of research now challenges this convention. In this chapter, we discuss the ins and outs of rest periods and give practical recommendations to help you avoid potentially degrading your training quality and also to potentially allow you to complete your training in a time-efficient manner that optimizes performance.

Level 6: Lifting Tempo

In this final level, we discuss tempo, the speed at which you are lifting.

The concept of controlling tempo has gotten a lot of attention because it is thought to be an important aspect of hypertrophy training. Typically, the reason tempo is emphasized is because of the belief that 'time under tension' is a critical variable to maximizing muscle growth.

We discuss the reasons tempo has been suggested as an important hypertrophy training variable and then evaluate the evidence on this topic before I finally give you some recommendations.

Before losing yourself in the coming levels, the building blocks of what goes into making a solid training plan, I want to remind you of something more fundamental to your success—it doesn't matter how good your programming is if you cannot stick to it.

Let's discuss what makes adherence possible. Yes, some of this may seem obvious, but do yourself a favor and read it anyway so that you don't set yourself up for failure before you even start, as so many do.

The Three Important Conditions for Training Adherence

Training needs to be:

- Realistic
- Enjoyable
- Flexible

These are common to a lot of things, not just specific to strength training.

Now, there are people that are convinced they have an iron will and can handle anything, right? You might be one of those people. However, this type of thinking misses the point. When you set up a training program there is nothing impressive about choosing something that cannot be sustained. We all want fast progress, but until you commit to the long haul you will never realize your full potential. Understanding this truth will help you make far fewer mistakes in the long run, and reach your goals much more efficiently. It just requires some self-restraint and self-awareness. There are situations where will and determination alone simply will not cut it, or if a situation does require it, we need to understand how that impacts other aspects of our lives and training. This is something we need to continually bear in mind.

Realistic: Is Your Training Schedule Sustainable and Practical?

Time Frame

The first thing that needs to be considered when planning training is our schedule and time frame.

Bodybuilders and powerlifters with a specific competition date need to have a realistic plan based on the time frame they have before their contest. If you have 8 weeks until a meet, or 24 weeks until a bodybuilding show, you have to design your training plan built around this time frame.

Even for the recreational trainee, if your target is to look good on the beach next summer, you need to start planning *now* how long you will be gaining and when you need to start your cut, and how your training should fit in with these goals.

In short, you need to match up the time frames you are dealing with in real life, to the training approach you are considering. Though this may sound obvious, it's something that people miss. Often this occurs because the average lifter doesn't know how to design their own training program. So, they try to fit an 8-week cookie cutter program into their own 6-week time frame and run into problems. But, you are different. You bought this book because you are tired of banging your head against the wall. You want to actually learn how to set up your training rather than mindlessly follow a cookie cutter plan. So, make sure you consider a realistic time frame.

Schedule

You also need to think about your schedule on a week-to-week and day-to-day basis.

If you have decided that the "optimal approach" is training 6 days a week for two hours a day like your favorite bodybuilder, yet you are a father who works 50 hours a week, has a hobby, and tends to have family commitments on the weekends, that may not be realistic.

You have to start with what you *can* do before you decide what you *should* do.

Remember that "optimal" is not necessarily the same thing as "realistic". Always think about fitting your training program to what is sustainable and realistic in your life first, before assessing anything else.

If you think that a 5 day a week training program would be perfect but you only have time to train 4 days a week —it's not an option, let go of it! Focus on what you can do in the days you have available.

It's essential to think about what we are realistically able to do in the long term as well. That which on paper looks the best but makes us fall off the wagon on a regular basis is going to produce a worse outcome than something slightly suboptimal that we can adhere to.

Remember, consistency is what makes progress rather than perfection.

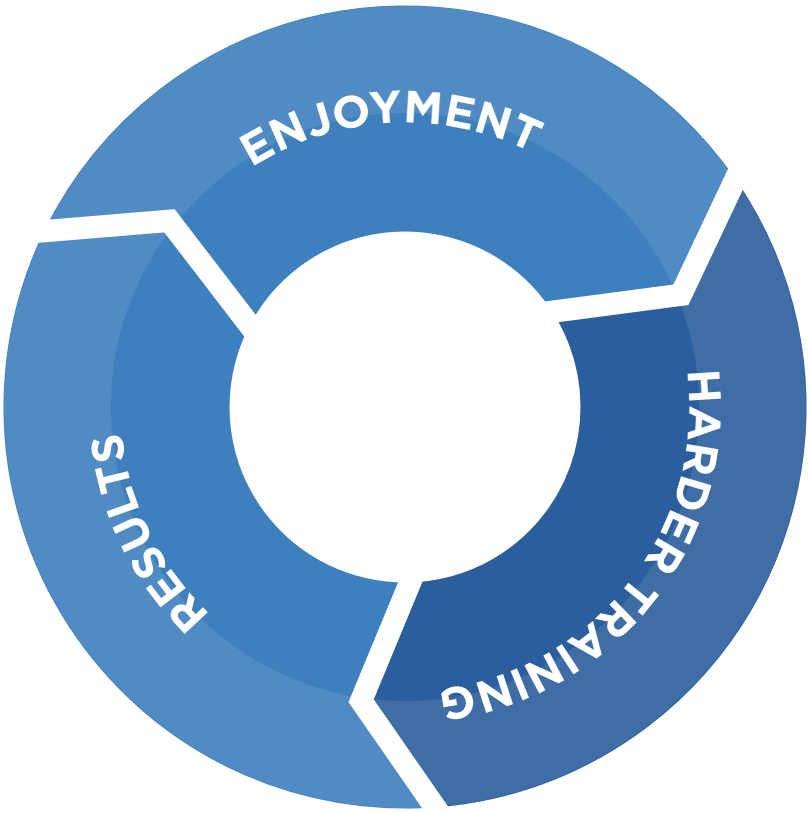
Enjoyable: Can You Enjoy Training This Way for a Long Period of Time?

When you have the "realistic" part in check, the next thing to think about is this "enjoyable" part.

So why is enjoyment so important? I guarantee you that if you take a suboptimal plan that you love, you'll put more effort into it than if you take an optimal plan that doesn't get your juices and your passion flowing.

To take a modern example, think of the rise of Crossfit. It's been successful for a reason — people are joining Crossfit gyms and making better progress than they ever have done in years. Why would this be? — Because they're enjoying their training more and thus putting in more effort. Perhaps the camaraderie was the thing they lacked before, not the quality of the programming.

You always want to think about how you are going to make the guidelines fit what you will enjoy. We're not all robots — whether or not we are motivated has a huge impact on adherence and ultimately the results we achieve. Seeing progress will make training more enjoyable and easier to continue with. Setting up your training around not only sound principles but also personal enjoyment can help you create a positive cycle of enjoyment driving harder training, producing results, which in turn, drives even more enjoyment.



Now, for some people, whatever gets them the fastest progress and closer to their goals is what they are going to love (a lot of athletes are like that). However, for everyone else, we have to make sure that we pay just as much heed to what will produce enjoyment as what will produce progress. In fact, sometimes focusing all your energy on achieving a goal, rather than the process of achieving the goal itself can undermine your efforts.

One study found just this to be the case; two groups were compared, one that focused all their attention specifically on the end-goal related to performing the selected task, while the other focused on the process of performing the task itself. The "end-goal" group was instructed to try to self-motivate by focusing on what they would eventually achieve by doing the task, while the "process-oriented" group was instructed to focus on the positive feelings they had while performing the task. An example in fitness would be focusing on eventually setting a new personal best on your squat one-rep max, versus focusing on how the act of squatting makes you feel strong and productive. Surprisingly, at the end of the study, the group that focused on goal-pursuit, rather

than the process actually achieved their goals with less consistency [1]! So the take-home is that you have to learn to enjoy the process. A mindset of program design based purely on what is the most "optimal" way to reach your end-goals might set you up for failure.

Think back to the previous section's example of the family man — if his training plan is thoroughly enjoyable, but so time intensive that it is putting a strain on his marriage and his relationship with his children, eventually this is going to take away from his enjoyment of his training, his stress levels will rise, sleep will suffer, and this will negatively impact the results — you have to question if it's worth it.

How many aging recreational bodybuilders are out there that silently regret being down at the gym so often because they were convinced they needed to have a six-day body part split? How much of this refusal to change is based on their unwillingness to acknowledge this?

The point I want to make is that there is a lot of wiggle room in determining what is best for you, and a huge amount of individual variation. This is why I'm not just giving you "the" workout plan, because it doesn't exist. I'm giving you the principles to build your training around.

Optimal does not equal sustainable — don't set yourself up for failure.

An Aside: Is There Any Such Thing as "Optimal"?

We don't really know what optimal is. There is no way to know. As scientists we try to continually push knowledge forward but, optimal remains a pie in the sky idea.

There is nothing wrong with reaching for more and trying your hardest, but don't fall into the trap of constantly questioning and changing what you are doing in the pursuit of the magic "optimal" formula. You will always be able to convince yourself "I should be progressing faster", and this mindset leaves you susceptible to the "magic formula" marketing that is so common in the fitness industry.

Flexible: Do You Have Flexibility in Your Program to Accommodate the Unexpected and Move Forward?

Flexibility is a requirement of the previous two conditions. It allows you to enjoy your training and allows it to be realistic.

If you are in this game for the long haul there will be times when you struggle to train as planned. Maybe work gets in the way, or there is a schedule change due to some family commitment — when these things happen it's important to have the flexibility to accommodate the changes and keep making progress towards your goals without giving up or program hopping blindly.

Flexibility is, in a large part, a state of mind, and this can be achieved by equipping yourself with knowledge of the principles in this book. You'll learn how to make these adjustments to your training while still keeping the goal, the goal, in the subsequent sections.

Flexibility When Stress is High

In a broad sense, the body receives many different types of stress collectively. Training, dieting, sleep deprivation, work, worries etc. — to the body they are all stressors.

While trainers and coaches would love to believe that the vast majority of the stresses you experience that affect your progress are all related to the things they can control (myself included), this just isn't the case. In fact, there is a study that shows that people who experience more negative life occurrences in the course of a training program don't adapt to it as well [2].

So while you can try to control for all the variables in the various levels in The Pyramid, it's important to also acknowledge the impact of the life stressors that you cannot control.

For example, if you have a lot of pressure at work, have trouble with your coworkers, a family member passes away, you divorce etc., anything that you can imagine, remember those stresses have an impact on your training.

That's why auto-regulating your training (developing structured flexibility in your approach) can be very useful so that your training stress matches your ability to manage stress. (We'll discuss auto-

regulatory methods in later chapters as well.)

Flexibility to Adjust Based on Energy Levels

So what does this mean to you? How can you implement elements of flexibility into your training? Well, there's a study where the participants were divided into two groups. One group was given three training options to choose from according to their energy level each day they trained: an easy, moderate, and a hard session. The other group did the same sessions, but in a pre-planned order every day they trained, regardless of how they felt.

The volume was matched so that by the end of the 12-week study both groups had performed the same volume of training. The group with the flexible periodization approach still completed all the sessions, but the flexible group that chose their training on a day-to-day basis based on how they felt, made greater strength gains than the pre-planned group [3]. Likewise, in a follow-up study, it was observed that when trained lifters could choose whether the weekly order of strength, hypertrophy, or power training based on their perceived readiness, they had better adherence than a group following a fixed order [4].

So what's the take-home message? Firstly, we know stress can affect progress in the gym. Secondly, we know that having a flexible approach to periodization can be superior to having a rigid one (not unlike dieting). So, once you have set up your training schedule, sure, follow it as planned when you are able. But, if you have a day where you feel terrible, weak, and depleted of energy, do the easiest workout you had planned for the week instead. Now this isn't the only way to implement a flexible approach into your training, and we'll cover more ways to do so throughout this book, but hopefully, it helps to shift your mindset to look at the big picture versus just the sets and reps in front of you on any given day.

Life Doesn't Stop for Lifting

The importance of realism, being flexible, and discussing adherence is often lost on people until they are faced with concrete personal experiences which force them into less-than-optimal situations. It's important to point out that most of the time when people are forced

into a situation when they can't adhere to the exact plan they've established, the real issue is not the situation itself, but how they react to it. What I mean is that vacations, injuries, travel, sports you might play recreationally or competitively, and unexpected work commitments are not the problem. Rather, the stress, indecision, overreaction and emotional decisions made in response to these minor hiccups are.

You may have heard the popular military quote, "No plan survives contact with the enemy." Obviously, I'm not saying you are a soldier going into war, but I think there is a parallel when people with families, careers, schedules, stresses and hobbies undertake a serious training plan. If you were a young, single, full-time athlete living at a high-performance sports training facility who was paid to train, and you could cordon yourself off from outside stressors and your sport was your life, maybe "optimal" and "realistic" would be much closer together. In my experience as a coach and trainer, many lifters pretend this is their situation when it's absolutely not, overlooking the reality that something could derail them. Then, when these lifters are faced with the thing that does (inevitably) derail them, they are wholly unprepared to adapt. Therefore, in the following sections, I'm going to outline some of the most common situations and questions related to "life happening" and my perspective on how to best handle each.

"What happens if I miss a workout?"

This is not a situation per se, but rather the most common result of many things that could disrupt your intended training schedule. While it is the most common problem, fortunately, it's also one of the most easily solved. In general, the solution I recommend to a missed session is just picking up where you left off next time you go to the gym. Yes, yes, I know you have a set schedule with a specific workout to do on specific days, but there is nothing that says you have to do it that way. If you train on Monday, Wednesday and Friday for example, and you miss a Wednesday workout, just do Wednesday's workout on Friday. I know, you're thinking, "But I'll be behind!" and my response would be—so what? Just finish the training plan a few days later than you initially intended, it makes almost no difference in the long run, and with certain setups, the alternative choice of cramming multiple days together (especially in a more intense phase of training) could be the

greater of the two evils.

The only time simply picking up where you left off could be a problem, is when you're preparing for a competition. You can't very well ask the meet director to delay the competition from Saturday to Monday because in week two of your build up you had to push Wednesday's session back to Friday. In this case, you will need to either skip a session or rejig things to accommodate the missed session in the current or following week—but which should you do?

Skipping sessions is a good option when the missed session is something that was an intended low-stress session. Examples are if it was your accessory day as a powerlifter, a day of grip work, calves and arms as a bodybuilder, or perhaps a 'power day' where you did a handful of singles at ~80% for technique work. In these cases, a good portion of that session's goal was active recovery, while also putting in a bit of useful work. By skipping the day, you are still achieving the goal of recovery, and you are only missing out on a small stimulus. That being said, given the stress is so low in sessions such as this, if you can make a previously unscheduled trip to the gym on Thursday, Saturday, or Sunday to make up the session, it's unlikely to negatively affect the following workout.

On that note, even if you were to do multiple hard sessions back to back, while probably not ideal, it's actually not as bad as you might think. There are now three studies I'm aware of where programs differentiated only by whether they were performed on consecutive days within a week (i.e. three days in a row), or with days off between sessions, resulted in similar strength and hypertrophy adaptations among groups [5–7].

Thus, if you have to occasionally do something like train Monday, Thursday, Friday or Monday, Friday, Saturday, it's unlikely to be a big deal. When this does happen, however, simply be prepared to not be 100% when you come in for the second session. Drop your loads appropriately so that the intended effort is where it should be, rather than rigidly sticking to the load you had listed in your excel sheet or that you had planned in your head (more on this later). This will allow you to actually get through the volume, without risking setting yourself back from really overdoing it.

Sport, Outdoor, and Fitness Activities Outside of Lifting

It's not uncommon for a lifter to love hiking, to be a group exercise instructor, to play in a recreational sports league, or to take martial arts classes in addition to training. Unfortunately for folks in this situation, most powerlifting and bodybuilding programs are written with the assumption that pretty much all you do physical activity-wise is the lifting itself.

While in a strict sense avoiding outside activity could be argued to be optimal for strength or hypertrophy, I would argue that being a happy, well-rounded person might be even more optimal if you look at it globally (which you always should).

Consider the known positive effects of being outdoors, making meaningful human connections, belonging to a community, and the subsequent stress relief and joy that comes from these activities [8–10]. If well managed, I would guess the positive effects of participating in these activities would outweigh the negatives quite easily. The only time you get into trouble is when you take your sport, fitness or outdoor activities just as seriously as lifting, and don't consider moderating either, and treat each like it occurs in a vacuum. Team sport athletes who have to do aerobic, anaerobic, plyometric, sport-specific and strength training all in the same week, heavily rely on periodization strategies to manage these overlapping stresses. Thus, it's probably a good idea for you to make some concessions as well if you are going to be seriously involved in both lifting and another physically demanding activity.

Later in this book, I'll discuss how to manage the simultaneous goals of competing in both strength and physique sports, but for those attempting to combine lifting with another sport, it's important to note that I think one has to take priority. For example, these days almost all athletes do some lifting to enhance their sport performance; however, they are doing just that—*lifting to enhance their sport performance*. Meaning, their mindset is always that lifting comes as an addendum to sport, and it is intended to serve sport performance. Thus, avoiding high-risk exercises, staying away from failure, finding the minimal volume and intensity necessary to improve sport performance, and avoiding soreness are all of paramount importance. A high-level dedicated soccer player shouldn't try to find the optimal bodybuilding or powerlifting program to do in concert with their sport as it would

violate this principle. Likewise, a dedicated competitive powerlifter or bodybuilder who plays soccer recreationally shouldn't find the optimal aerobic, anaerobic, and sport-specific conditioning program to do in concert with their competitive lifting pursuits.

So, let's say you're on board with keeping your non-lifting activities to a reasonable volume and level of effort; you might still wonder how to balance your activity with lifting. Fortunately, we have some good data on what's called the 'interference effect', which is essentially the potential negative effect of cardiorespiratory training on strength training adaptations. Unfortunately, the interference effect is a real thing, which makes sense considering we have a spectrum of energy systems to perform muscular work. Meaning, getting physiologically efficient at sustaining low levels of force for a long period (i.e. the adaptations to endurance training) can run counter to getting physiologically efficient at outputting high levels of force for a short period (i.e. the adaptations to strength training).

But before you freak out, let's put it into context. The interference effect doesn't make you lose gains, or even stop making gains, rather the collective research shows it just slows your rate of gains down. However, you can greatly mitigate the interference effects with just a bit of planning and foresight. In general, the literature comes to pretty common-sense conclusions; if you do hard cardio (or activity) immediately before training, it's probably going to hinder your ability to train and subsequently adapt.

If you do your cardio immediately after lifting, the interference effect is less. If you can place your lifting at least six hours prior to cardio, that's even better, and probably the best choice is to separate lifting and cardio by a full day if possible [11].

Injury

Unfortunately, serious resistance training can result in injury. Fortunately, the risk is not that high and I would argue the health benefits of a life that includes lifting far outweigh the negative effects of the injuries you might sustain along the way. But what are the risks? In the table below, you can see the data we have on injuries per 1000 hours among strength athletes. In fact, fewer injuries occur during bodybuilding training compared to

most non-contact team sports and endurance training, while powerlifting, weightlifting and CrossFit (you heard me right, you hater) all have similar rates of injuries to these sports and endurance training.

STRENGTH SPORT INJURY RATES AS REPORTED BY KEOGH AND WINWOOD [12] AND AASA ET AL. [13]	
Bodybuilding	0.24–1 injuries/1000 hours [12]
Powerlifting	1.0–5.8 injuries/1000 hours [12] 1.0–4.4 injuries/1000 hours [13]
Weightlifting	2.4–3.3 injuries/1000 hours [12, 13]
CrossFit	3.1 injuries/1000 hours [12]
Strongman	4.5–6.1 injuries/1000 hours [12]
Highland Games	7.5 injuries/1000 hours [12]

As a comparison to the strength sport injury rates shown in the table, consider that some studies report an injury rate of 8.5 to 11.1 injuries/1000 hours in basketball [14]! The reality is that an injury is almost guaranteed to happen at some point in your lifting lifespan if you take it seriously; however, comparatively the risks are lower than they are in most mainstream sports. More importantly, when you think about the alternative you realize this is not something to worry about (remember, being sedentary exposes you to injury as well, and other health complications for that matter). The question is, what do you do about it when it happens? Well for one, I am not a physical therapist or medical doctor. (If I was on a plane and an attendant asked: "Is there a doctor onboard?" I would raise my hand and yell, "Yes! What do you want to know about protein or RPE?") If you get a significant injury, seek out a physical therapist or sports injury doctor, preferably one who has specific experience working with athletes (ideally, lifters). I am shocked when I see people posting comments on my Instagram asking

what they should do about an injury...that's absolutely not treating your injury seriously; I'm not a specialist and even if I was, social media is not the appropriate venue for diagnosis or treatment.

With that said, not all injuries are serious, and aches, pains, strains, niggles, irritations and general stiffness are at times, part and parcel of the serious lifter's experience. When these gremlins pop up, it's important that you don't make poor decisions that lead to something minor becoming something major that requires serious medical intervention. Don't just train through pain. On the other hand, don't let fear make you irrationally conservative. I've seen people with a lower back strain, staying out of the gym completely for weeks, or people with an upper-body issue not training legs, etc. At 3DMJ we've prepped athletes who you'd never know had a lower-back injury in the middle of 'prep' (a caloric deficit) mind you, who had to stick to hip thrusts, leg extensions, and leg curls for lower body training, and replace much of their upper body free weight training with machines...who won shows!

So, where is this middle ground? First, if it hurts don't do it. Alter the range of motion, reduce the load, or replace the movement with something comparable that is pain-free. In the case of some (mainly single joint) movements, blood flow restriction (BFR) can be used to allow you to reduce the load a great deal (as low as 20% 1RM) while still getting a solid hypertrophy stimulus (more on this later if you don't know what BFR is). Finally, if you can't easily work around it or if the pain isn't gone in a matter of weeks, I would see a specialist.

Summary

To sum it up, remember the acronym REF—realistic, enjoyable and flexible. It takes self-awareness and restraint to be able to appropriately implement these philosophies into program design, so be sure to "REF yourself" throughout the process. We are not robots, "optimal" is a concept that doesn't always fit into our realities and the stresses we experience in life are largely out of our hands. Therefore, you need to be sure that the program you develop is specific to your individual life circumstances, considers your individual preferences, and is flexible enough to account for any curve balls life throws your way.

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Volume, intensity and frequency are what actually form the foundation of programs. These three variables are interrelated and inseparable from each other. Each affects the other and can do so in different contexts.

- If you train at a very high intensity of effort, near to failure, it takes longer for muscle damage to subside (exercise-induced muscle damage is the normal, easily repaired disruption to the fiber as a result of high tension or high volumes; in excess it interferes with performance and adaptation) and performance to recover back to baseline, potentially impacting the frequency you can train with.
- Likewise, lifting heavy (a high intensity of load) makes each individual repetition more stressful, requires longer rest periods, and can make a session take longer, limiting the volume you can (and probably should) perform.
- As a final example, doing 16 sets of the same movement in a single day would require you to either decrease volume (do less reps per set) or intensity (drop the load) due to cumulative fatigue as sets went on, to a greater extent than compared to doing 8 sets on two different days in the week.

Since these three variables are interdependent, they are all in the same layer of The Pyramid. The optimal combination of each will vary depending on your training age, goals, preferences, schedule and current stage within your athletic career.

This is a long section and covers the majority of the most important concepts in this book, so make sure to read through it carefully. Given the length and detail of this section, let's start with an overview of the recommended ranges where most novice and intermediate lifters should start for volume, intensity and frequency, and then go through all of the rationale for how we ended up here:

Volume • Intensity • Frequency
Summary of Starting Recommendations

Volume:	10–20 sets per muscle group/movement pattern per week
Intensity:	**Strength:** ⅔–¾ of volume in the 1–6 rep range, remaining volume in the 6–15 rep range at a 5–10 RPE **Hypertrophy:** ⅔–¾ of volume in the 6–12 rep range, remaining volume in the 1–6 and 12–20 rep range at a 5–10 RPE
Frequency:	2+ times per muscle group/movement pattern per week

VOLUME

Volume is the total amount of work performed, and to a point, shares a non-linear relationship with adaptation (more on this to come). It can be counted as 'volume load' (sets x reps x load), the total number of repetitions (sets x reps), or simply as the number of sets. Each counting method has its strengths and weaknesses. High-rep sets make volume load skyrocket.

Volume Load vs. Number of Sets

Volume Load the same, Sets differ.
Example:
7 sets x 3 reps x 100 lbs = 2100 lbs
3 sets x 10 reps x 70 lbs = 2100 lbs

Sets the same, Volume Load differs.
Example:
3 sets x 10 reps x 70 lbs = 2100 lbs
3 sets x 30 reps x 40 lbs = 3600 lbs

Consider 3x25x100 — *3 sets of 25 reps with a 100 lb or kg load,* which is 50% of a 1 rep max (1RM) in this imaginary example — versus 3x10x140 (70% of 1RM). The former produces a volume load of 7500 and the latter

4200, 78% more volume is produced with the high rep set. But is that representative of anything? Would you get 78% more hypertrophy or strength or experience that much more fatigue? No. We have data showing that sets of 8–12RM produce just as much hypertrophy on a set-to-set basis as sets of 25–35RM [1], and despite producing drastically less volume load, 3 sets of 2–4RM increases strength more than 3 sets of 8–12RM [2].

This issue is even more magnified when you just use total repetitions, consider the same example and you're comparing 75 to 30 repetitions, a more than two-fold difference! For this reason, we'll be quantifying volume as the number of sets performed in a given intensity range (both effort and load) and I'll explain why this is the best available option later in this chapter.

The Relationship Between Strength and Hypertrophy

We'll cover the following two points in more detail in the Intensity section, but for now, here's what is important:

1. Strength is a Product of Skill Acquisition, Neurological Adaptation, and Hypertrophy

How strong we are is a function of multiple factors—muscle mass (and other morphological factors), neurological adaptations, and how familiar we are with an exercise [3]. This means that volume is very important because it is not just the amount of work that we do, but also the amount of practice we get.

Strength is specific to a movement [4] and a rep range [1], so the more time you get moving loads with a specific exercise and a specific rep range, the stronger you will get on that specific exercise, in that specific rep range, with that specific load.

2. Volume is Important for Hypertrophy

Hypertrophy, on the other hand, is primarily related to the total work performed and is less specific to the intensity range [5] or the movement performed [6]. We can make our muscles grow using various exercises and various repetition ranges and loads.

Counting Volume for Strength and Hypertrophy

As I mentioned in the first section of this chapter, counting sets is probably the easiest and most effective way to quantify volume and has the added bonus of making volume adjustments and program writing simpler.

Over the years, meta-analyses (a statistical analysis of all the relevant research on a topic, "a study of studies") have established that as the number of sets increase, both strength [7] and hypertrophy [8] adaptations are enhanced as well (up to a point, more on this shortly). Also, to skip ahead a bit to the intensity section of this chapter, the rep-range used in a given set can be quite broad for the goal of hypertrophy.

Authors of a 2018 systematic review [9] pointed out that in the ~6–20 rep range, when sets are adequately hard (near enough to failure), it seems that number of sets is a strong predictor of hypertrophy and that if all else was equal, 3x6–8 would probably produce similar hypertrophy to 3x15–20. Briefly, if you do a low-load high-rep set, each individual rep provides less tension, but you can do more reps and as fatigue builds, more muscle fibers are forced to come to the party. Thus, the net stimulus ends up being similar to a high-load lower-rep set where each rep stimulates most, if not all fibers, but doesn't last as long—the only caveat is that too few reps in a set (less than ~6) doesn't allow enough time/repetitions to get a full stimulus.

For strength, it's similar. While it is true that there is a relationship with the number of sets and strength development, unlike hypertrophy [8], the magnitude of this relationship is weaker. Specifically, the differences between the effects of 1–4, 5–9, and 10–12 sets per week on strength, are only statistically clear when comparing 1–4 vs. 5–12 sets, and while present, only statistically qualify as being "small" differences [7].

Hypertrophy is just one of many components of strength and as I mentioned in the previous section, strength is highly specific to the rep range you train with. This is important because strength is measured via a 1RM in research. Meaning, if all else were equal and you compared a matched number of sets of moderately heavy training in the 3–5 rep range to very heavy sets in the 1–3 rep range, you might end up getting a similar strength response. Why? Because the 3–5 rep training (probably 80–85% 1RM) is less specific than the 1–3 rep training (probably 90–

95% 1RM) compared to the strength test: 100% of 1RM. But, the 3–5 rep training produces almost twice the reps and time spent contracting with maximal force (since both are really heavy) compared to the 1–3 rep per set training. Meaning, if sets were equated you'd expect to get a greater hypertrophy response from doing 3–5 reps per set, which might make up for the slightly lessened neuromuscular adaptations due to being less specific, resulting in similar net strength gains just via *slightly different mechanisms.*

When you get to the progression chapter and sample strength programs, you'll see how you can try to target the various physiological mechanisms which maximize strength through blocks of training with slightly different, but complementary volume, intensity, and frequency setups.

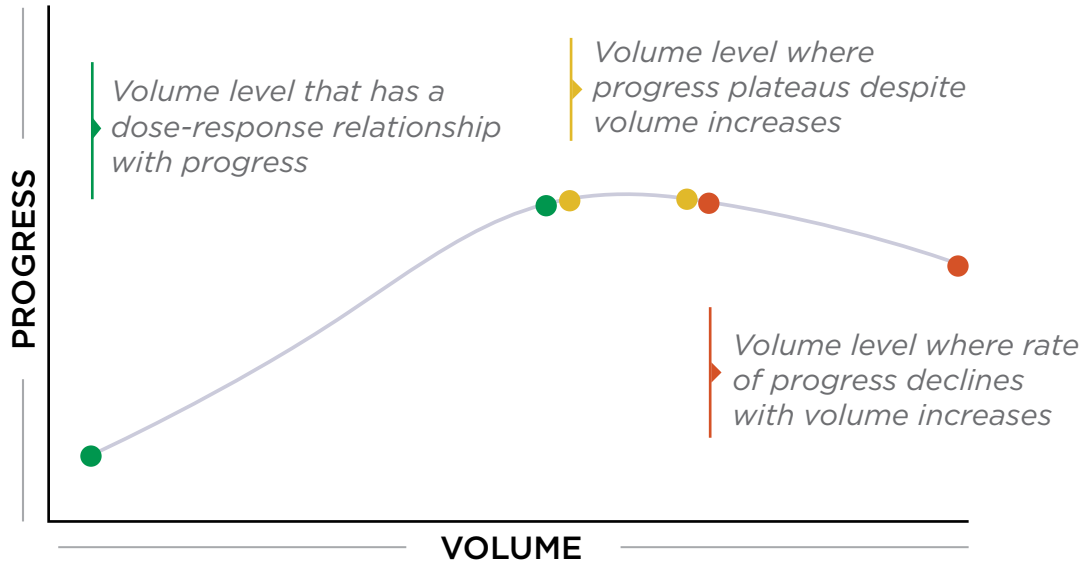
To sum things up, a valid, practical and effective way to track volume for both hypertrophy and strength is to count the number of sets performed in a given "intensity zone" or rep range, as the number of sets loosely represents the stimulus, up to a point.

Strength, Hypertrophy and Volume — A Dose-Response Relationship Up to a Point

Looking at studies with matched intensities and frequencies, it's apparent that strength [10] and hypertrophy [11] have a dose-response relationship with volume. Meaning, as you do more volume, you gain more strength and hypertrophy.

However, this is by no means a linear relationship. Indeed, the initial sets you perform give you "more bang for your buck" and as you pile on more sets, your return on investment diminishes further and further. Eventually, you get to a point where as you add sets no additional progress is made, then if you continue to add sets, progress comes slower than if you were doing fewer sets. Eventually, if you keep adding sets, you can overdo it so much that you actually plateau, making no progress or even regressing.

THE RELATIONSHIP BETWEEN VOLUME AND PROGRESS



- *Effective Training*
- *Over-reaching if fatigue is managed, non functional over-reaching if is not*
- *Non functional over-reaching leading to over training if unmanaged*

Demonstrating this "U-shaped" relationship between volume and progress, there are studies where greater gains in strength [12] and hypertrophy [13] are observed in moderate volume groups compared to both lower and higher volume groups.

Furthermore, illustrating the far right of this U-shaped relationship (where you really don't want to be), there are studies where very high volume groups actually made no progress compared to baseline [14] or even regressed [15], while a lower volume group made more progress. What this demonstrates is that increasing volume too much can lead to a fatigued state where there is an imbalance of fitness and fatigue. We call this 'non-functional overreaching' If left unchecked or if the volume is pushed further, eventually a state of 'overtraining' can occur (more on these terms to come).

Essentially, this means reaching a state where each additional increase of volume actually has a negative effect as it eats into recuperative abilities [16]. So yes, we could add sets almost endlessly by taking long rest intervals, quitting our jobs and reducing the weight as needed to keep doing more reps, but that is neither time-efficient nor advisable.

Volume, as a general rule, will need to increase over a training career; however, it should only increase when and as needed to progress.

The Fitness-Fatigue Model

To help you understand the relationship between volume and progress, and why more is not always better, let's discuss what is known as the Fitness-Fatigue Model.

As the name would suggest, this is a two-factor model looking at both fitness and fatigue. Both are generated from training; fatigue masks fitness and therefore affects performance [17]. Let's quickly define those terms:

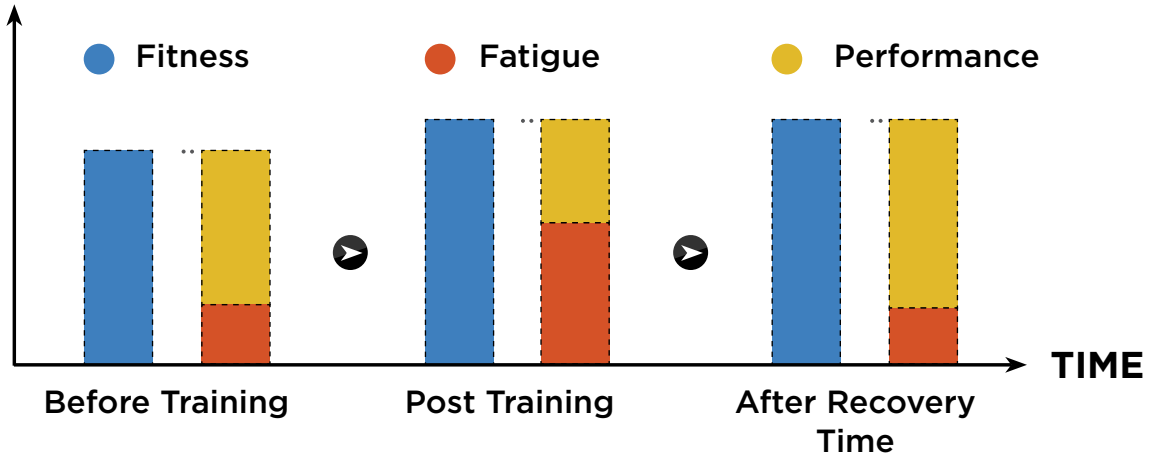
- ***Fitness*** is the physical capability that we have achieved as a result of training. As we continue to effectively train, it improves gradually over time.
- ***Fatigue*** is also a result of training. It is generated in proportion to the workload and the intensity of the workload performed. It is also generated based on how fatigue resistant you are. Fatigue resistance, or workload capacity, increases over time as you adapt to greater and greater training stresses. However, fatigue resistance (your ability to recover) can also be hindered or helped by external factors such as sleep, nutrition, life stress, menstrual cycle phase, and other environmental factors.
- ***Performance*** is ***Fitness*** minus ***Fatigue***. Now, other external factors also affect performance, like when the gym is too hot, using equipment that you are unfamiliar with, or when you are mentally affected by other stresses or distractions not related to training. Therefore, you cannot completely isolate your performance to the balance of fitness and fatigue, but their relationship is one of the largest components determining performance.

Acutely, when you train hard and get tired it is intuitively obvious that you cannot lift as heavy or as many times as when you are fresh. Think about if you squat your one rep max, drop the weight by 20% and bang out a set of five, sprint around a 400-meter track, and then come back to the squat rack—your one rep max is going to be considerably less in this "fatigued" state. However, if you give yourself time to recover you

could do it again.

The Fitness-Fatigue Model helps to capture this effect on a session to session basis, over the course of a typical training week, and over the course of a training cycle. It is exceptionally useful in helping to explain not only the importance of breaks between training sessions but why we need to include some periodization in our training plans and why volume should not just be added endlessly on a whim.

EFFECT OF A SINGLE SESSION ON FITNESS AND PERFORMANCE

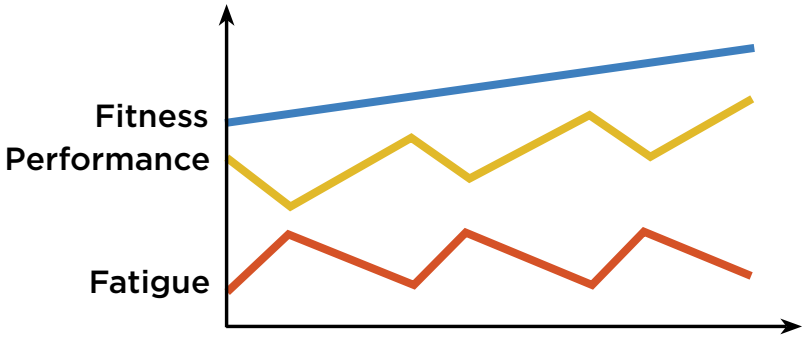


In the graph, you can see that before training, there is a small level of residual fatigue from previous training sessions. Post training, fitness increases due to the training effect, but fatigue increases also, masking the positive effect on performance. After some recovery time, fatigue drops to baseline and the increase to performance is apparent (shown by the increase in the size of the yellow performance bar overall).

Normal Adaptations to Training

With normal adaptations to training, performance increases over time. However, if we look at the performance changes in a single week's time frame, we can see that the performance curve fluctuates despite fitness increasing due to the effect of fatigue.

THE FITNESS-FATIGUE MODEL — CHANGES IN PERFORMANCE OVER A TYPICAL WEEK



With each training session, both fitness and fatigue go up, but then as the latter dissipates this will prompt a rise in performance. Over a larger time frame, if progressive overload is continually applied, the performance curve will continue upward with the fitness line. Well, ideally that is, but of course, things aren't always that simple.

Overreaching and Overtraining

As you train you develop both fitness and fatigue; however, to advance in training age the push to create progressive overload often results in the accumulation of residual fatigue. When residual fatigue surpasses your increases in fitness, performance will be negatively affected—you won't be able to train as hard or as heavy.

There are two outcomes that can occur at this point, one being an extension of the other.

The first outcome is that you enter a state of 'overreaching'. In this case if you let the fatigue dissipate with planned lower stress days or weeks that are incorporated into a periodized plan (often called 'deloads'), performance comes back, and hopefully returns to a level that you perhaps couldn't have achieved if you had not overreached in the first place [18]. Meaning, overload is required to drive adaptation in experienced lifters, and overload also produces fatigue, which acutely suppresses performance. This fatigue needs to be managed, and if the balance between recovery and overload is appropriate, it should result in an increase in performance. This type of overreaching would be deemed 'functional'.

On the other hand, if performance was not enhanced, but simply returned to baseline or didn't result in any better outcome than had you not overreached in the first place, that would be considered 'nonfunctional'.

It's worth pointing out, that there are always normal fluctuations in training performance, and in fact, training in a "fatigued state" is not necessarily a bad thing. Depending on training age, the time frame of your goals, your workload capacity, and the structure of your training, training in a fatigued state may be a normal or necessary occurrence. However, at some point, dictated by the periodization strategy being employed, performance should be seen to eventually improve.

The second outcome is an extreme extension of overreaching, and that is overtraining. In this case, fatigue has gotten so high that it prevents you from doing training of a high enough quality to increase or even maintain fitness, and you start to regress. This rarely occurs with resistance training, takes a longer period of time to reach this state, and subsequently requires a longer period than a simple taper or deload to resolve [16].

Personally, I have only seen resistance-trained athletes reach this state in two populations, competitive bodybuilders during contest preparation and CrossFit competitors who have to balance resistance training at a high intensity and volume with other fitness goals. So, don't worry that you will reach a state of overtraining all of a sudden; rather, you'll see signs of it coming in advance.

With the case of overreaching, the fatigue is manageable with the planned variations in stress that come from your periodized approach. This may be a short period where volume and/or intensity is reduced; however, with overtraining the fatigue has become unmanageable and a considerably longer recovery period is needed [16]. Functional overreaching is desired (and can be seen as an inevitable consequence of any program that supplies adequate overload for trained lifters), but nonfunctional overreaching and overtraining need to be avoided.

This is an important concept, so I'll explain it once again with some graphs just so that it sticks. Before that though, I need to quickly explain the often misunderstood concepts of 'deloading' and 'tapering.'

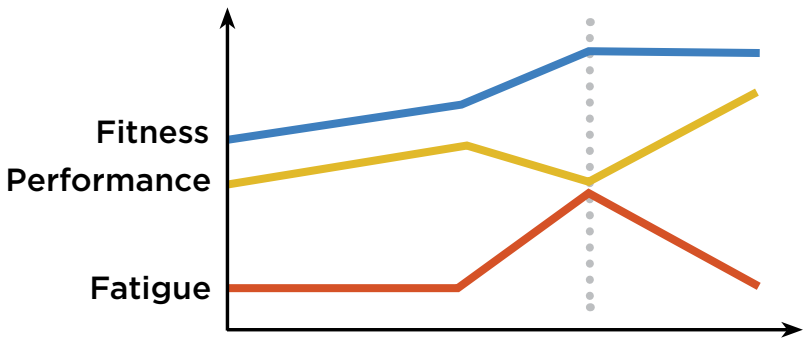
Deloading or Tapering means to reduce training volume in order to let

fatigue go down and express your full potential (fitness) in the form of performance. Tapering normally refers to when this approach is used prior to a competition. This is a strategy not only used by strength athletes such as powerlifters and weightlifters, but also by athletes in sports such as triathlon, track and field, and endurance events that have a single-day competition. The process involves timing your best condition for the competition day, called 'peaking', and tapering is an important part of that process. We'll come back to the specifics of tapering in Level 3: Progression, but for now, just think of tapering as a purposeful reduction in volume to let residual fatigue subside for competition.

Deloading is simply when this process is utilized outside of competition within a training phase. Fatigue dissipates at a faster rate than fitness, which is why deloads can be such useful tools. It's important to note that every periodization model ever designed, and every logical approach to training for any sport includes purposeful periods (be they days, weeks or training blocks), where training stress is purposely low. This is not only to allow for recovery and fatigue dissipation, but also to prompt better gains in the subsequent training to come. This is an important concept, because many overzealous trainees focus only on the recovery aspect, convincing themselves that they don't need a deload (you can always convince yourself you can push through more), forgetting that these periods are not only in place to dissipate fatigue but also to prepare them for the training to come and make it more effective.

All good? Excellent, let's delve into those graphs.

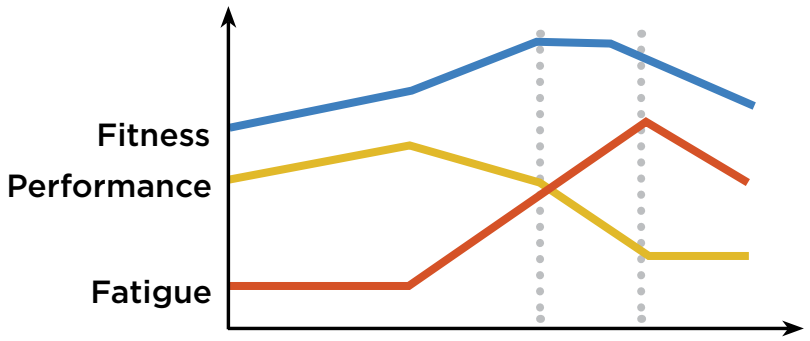
THE FITNESS-FATIGUE MODEL — CHANGES IN PERFORMANCE DUE TO 'FUNCTIONAL OVERREACHING' IN A TRAINING CYCLE



The left half of the graph represents a level of volume with normal training adaptations. That is to say that fatigue is maintained within a certain range (represented by the horizontal red line) and fitness and performance go up continuously over time.

1. At a certain point, training volume is increased—the trainee is attempting to push the envelope and increase their rate of progress, which causes fitness and fatigue to go up sharply. Performance starts to decrease because the residual fatigue is outpacing the increases in fitness.
2. The trainee notices the decrease in performance; however, they are either stubborn and don't want to decrease volume, or they are aware that a period of functional overreaching can help push them to new levels of fitness over the longer term, so they decide to not taper volume at this time.
3. At the point of the grey dotted line, the trainee guesses that any further continuation of the current level of training volume will be harmful to long-term progress. Either grudgingly or strategically, training volume is tapered to let fatigue dissipate before fitness levels are affected.
4. Fitness levels are maintained with the reduced volume, residual fatigue dissipates, performance reaches a new level, PRs are had, and there is much rejoicing.

THE FITNESS-FATIGUE MODEL—CHANGES IN PERFORMANCE DUE TO 'NONFUNCTIONAL OVERREACHING,' LEADING TO OVERTRAINING IN A TRAINING CYCLE



1. Up until the first dotted line we have the same scenario as in the overreaching explanation.
2. However, in this case, the trainee decides to not decrease volume. This isn't too uncommon—the trainee sees that their performance has been decreasing but they put it down to a bad run of training sessions, or maybe they actually take those posters seriously that say, "Pain is weakness leaving the body," decide that the issue is that they haven't been doing enough volume, and they make another increase.
3. The increasing fatigue causes a faster drop in performance. It is not possible to train in a manner that is sufficient to sustain training adaptations, and fitness goes down.
4. The trainee realizes their mistake and tapers training volume considerably at the point of the second dotted line. But, it takes a considerable time before fatigue dissipates, performance comes back, and training can be resumed to a level that will start to improve fitness.

In reality, most people will naturally stop before they corner themselves to such an extent due to the psychological and/or physical discomfort. When not planned for, and when this occurs due to stubbornness and an overzealous attitude, typically this just results in 'nonfunctional overreaching'. The person returns to a normal level of fitness (assuming they weren't injured) in a week or two, but in the end, made no progress. This "wheel spinning" is very common, while true overtraining is rare in strength and physique athletes. But nonetheless, it's important to be aware that when we train hard and performance doesn't seem to improve, if we push ourselves even harder, it can backfire.

Increase Volume as Your Fitness Improves

So, too much volume is counterproductive as it accumulates too much fatigue. But it is also true that for the most part, strength and hypertrophy gains increase with more volume.

When you have been training for a while and have made good strength and mass gains, but have plateaued with your current training, in order

An Aside: Balance Volume, Life, and Fatigue to Ensure Adherence and Sustainability

When we increase volume, it can cause more fatigue. However, as we mentioned in the previous chapter discussing adherence, our bodies are exposed to many different types of stress that affect performance [19], not only training.

Given that, to ensure maximum sustainability it may be best to consider an amount of volume that leaves some reserve in our tank rather than really pushing the limit every day. Serious athletes may need to take things closer to the edge to get the best results possible, but also remember that for a competitive athlete the consequences of reaching a state of overtraining are larger. There's no one size fits all answer like "everyone will be happy with 5 sets regardless" and you will need to take many different factors into account. As mentioned earlier, use critical thinking, be careful not to be black and white, but it's not a bad idea to be conservative and allow a bit of a buffer when choosing how much training stress to pile on.

to make more progress you may need to increase volume. You will not necessarily want to add volume each training day, week, or even month, but increasing volume gradually over your training career as necessary, may be needed for progression [20].

A good way to think about volume over your career is to do enough volume to progress and only to increase it when progress has plateaued (assuming you are recovering normally). This is a much smarter choice than constantly putting yourself in the hole with fatigue by adding volume prematurely and having to drop volume back and taper all the time. Also remember, that if you are lifting heavier loads, even if reps and sets are the same, that is an indication that progressive overload has occurred and you are adapting.

Remember, this is long-term stuff. Our coaching service is called "3D Muscle Journey", not "3D Muscle Tomorrow". It's going to take time, it's going to take commitment and it's going to take adherence. In order to do that, you must be able to manage your fatigue.

Volume Recommendations

"Do enough to progress, not as much as possible. Increase when plateaued if you are recovering well."

I can't tell you how often trainees try to justify to themselves doing more, and more, and more, when in fact they don't need to. Some of you may feel like I'm hammering this point home over and over and beating a dead horse, but indulge me. Invariably, some of you will latch onto the statements I've made at certain points in this text such as "strength and hypertrophy gains increase with volume" and ignore that I've also said you can do too much and that in fact doing too much can be counterproductive.

To help you avoid this mistake, I want to appeal to your intellect by pointing out a couple of key studies that should curb your appetite to buy into the "more is always better" attitude that is so pervasive in the bodybuilding community.

The first is a study that was done by Gonzalez-Badillo and colleagues in 2005 [12]. This study looked at young, healthy, well-trained competitive male weightlifters performing three levels of volume on the back squat, snatch, clean and jerk, and accessory lifts for 10 weeks. One group performed 1923 repetitions over this period, one group performed 2481 repetitions, and the last group performed 3030 repetitions. All groups progressed in strength; however, the moderate volume group performing 2481 repetitions progressed the most.

For those interested in hypertrophy and not strength, consider a study done by Heaselgrave and colleagues in 2018 [13]. In it, three groups of trained males performed either 9, 18, or 27 total sets consisting of curls, rows and pulldowns to try to establish the dose-response relationship between volume and biceps growth. While significant growth from baseline occurred in all groups, the moderate volume group performing 18 sets per week in total had meaningfully greater increases in their biceps muscle thickness than the low or high volume groups. Again, hypertrophy still occurred in the groups performing a higher or lower number of sets, but like strength in the Gonzalez-Badillo study, there was a "sweet spot".

Too much volume can have negative impacts on both hypertrophy and strength. Doing the most volume you can do while still progressing is not what is optimal for either hypertrophy or strength. That said, neither is doing the absolute minimum you can do while still progressing. However, the latter is a more sustainable approach as you can always add more volume when you plateau, and you are less likely to be injured. But of course, doing too little or too much is still not ideal. There needs to be balance, and at the end of this section I will be giving you some practical recommendations on where might be a good idea to start in terms of volume.

Now before you get too hung up on specific numbers of sets per muscle group, remember that exercises will overlap in terms of what muscle groups they work. Also, heavy enough warm-up sets will contribute to your volume, and it's difficult to determine at what point these sets "count". Also, remember that volume, frequency and intensity are all interrelated and affect one another. Increasing intensity impacts how much volume you can handle even if you keep sets and reps static. Increasing frequency while keeping load, sets and reps static increases your weekly volume a great deal. So what that means, is that the volume ranges below are guidelines at best, not commandments, rules, or the range that everyone "should" fall into.

Lastly, remember the Fitness-Fatigue Model when you are in a state of higher than normal fatigue and/or lower than normal recuperative abilities, the amount of volume that will be optimal will be less. This is because you will generate fatigue from outside of the gym, and fatigue will dissipate at a slower rate. That means whether you're dieting or gaining affects the optimal volume, as well as other things like life stress, travel, illness, etc. But, you should be able to find the right volume for yourself if you start within the range suggested in the table below and adjust from there according to your response.

Put this all together and here is our summary of recommendations for training volume. The summary is based on the combined data of two meta-analyses (again, studies of all the studies on a given topic; the highest quality of scientific evidence) published in 2017 on the number of sets performed per week on a given movement that maximize strength [7] and hypertrophy [8]. Both meta-analyses reach a similar conclusion

that 5–12+ and 10+ sets are optimal, on average, for increasing strength and hypertrophy, respectively.

But what is with that plus sign, and what about all my talk of doing too much? Well, unfortunately we don't have enough research to meta-analyze the limits of volume (yet), but we do have some studies showing that going past the ~20 set mark can sometimes be too much [13–15], which matches our experience with coaching thousands of 3DMJ clients, which gives us a good starting range for weekly volume.

On balance, there are two studies showing even higher volumes can be beneficial (30+ sets), but one was on well-trained individuals (~4 years training experience and ~200 lb bench press on average) [21] and the other was on young, fit, navy men confined to a ship with little outside stress and consistent nutrition and sleep schedules [22]. Thus, the smartest approach is to start with the recommended volume, only increasing past it if everything else is optimal (sleep, nutrition, life stress balance, technique, intensity, frequency etc) and only if it is absolutely necessary to break a plateau. Lastly, your training frequency and intensity will definitely affect how much volume might be appropriate, so before you change your training based on these recommendations, finish the rest of this chapter:

Volume	10–20 sets per muscle group/ movement per week	consider overlap and heavy warm-up sets

INTENSITY

Intensity is an important, often misunderstood variable. Many describe intensity based on subjective feelings of soreness, or how "hardcore" a workout was. However, intensity from an objective standpoint refers to either the 'intensity of load' or the 'intensity of effort'; how much you are lifting (often defined as a 'rep max' [RM] or percentage of a one-rep max [1RM]) or how near to your maximal effort that load is (often defined as a rating of perceived exertion [RPE] score), respectively. There are a number of ways to describe intensity, in absolute terms, and in relative terms which will be discussed, but we'll also discuss how

intensity fits into the big picture, rather than examining intensity as just a single factor. A large part of what dictates what load we decide to use depends on whether our goal is strength or hypertrophy.

Specificity

The first thing we need to think about is a concept in strength training called 'The Principle of Specificity' (also known as the SAID principle; Specific Adaptations to Imposed Demands) which we briefly touched on in the previous section. Recall, to get a certain outcome, we need to train for it. This principle is important when deciding intensity, specifically when discussing training for either strength or hypertrophy.

Measuring Intensity

There are a few ways to measure the intensity of effort and load.

1. Percentage of 1RM

A very common way to measure the intensity of load is the percentage of one-rep max (1RM). This can be calculated based on an estimated 1RM from performing an AMRAP set (as many reps as possible), or it can be based on an actual 1RM test. We then prescribe loads based on a percentage. For example, 5 reps with 80% of 1RM.

The downsides to this system are that it's not appropriate to do a 1RM on all movements — a bicep curl for example or a lateral raise. Additionally, depending on the person (and especially at percentages of 1RM below 90%), one person may be able to do a very different number of repetitions at a similar percentage of 1RM compared to another [23]. In fact in one study, among a group of resistance-trained males, there was a spread of 9 to 26 repetitions completed when performing an AMRAP with 70% 1RM on a back squat [29]. Thus, unless you know what your specific capabilities are, you can run into issues using this approach. Despite this limitation, it's still useful to know what most trained lifters can do on average at a given percentage of 1RM for programming. Thus, the following table can be viewed as a useful, albeit non-individual, guideline:

Percentage Of 1RM	Repetitions Allowed
100	1
95	2
90	3-4
85	5-6
80	7-8
75	9-10
70	11-12

2. A Rep Max (RM)

Very simply, this is load prescription using your previously tested max for a given number of reps. This is a little more useful for a bodybuilder. For example, while folks have differing abilities to perform repetitions at the same percentage of 1RM (e.g. you might be able to do 15 reps at 70% of your 1RM, I might only be able to do 10 reps) a 6RM is a 6RM. At worst, as you get stronger in a program your 6RM will become your 7, 8, 9 and eventually perhaps your 10RM. But, this still keeps you much closer to the target intensity of effort than a percentage of 1RM which has large inter-individual variability.

3. RPE (Specifically Based on Repetitions Remaining)

A relatively popular way of measuring the intensity of effort is using an RPE (rating of perceived exertion) scale based on repetitions in reserve (RIR). This was popularized and developed for powerlifting-specific resistance training by IPF champion and powerlifting coach and author, Mike Tuchscherer. Since 2014, I have researched this with Dr. Michael Zourdos and our colleagues at his muscle physiology lab at the Florida Atlantic University and at the Sports Performance Research Institute New Zealand here at the Auckland University of Technology [24].

Essentially, RPE when using this scale is based on how close to failure you get at the conclusion of each set. You simply do your sets and choose how close to failure you wish to get. A 10 RPE would be at failure (or rather, no additional load or reps could have been performed), a 9 RPE would

be one rep left, an 8 RPE would be two. If it's easier to conceptualize, you can also just think about RIR, and simply state whether you finished a set with 1, 2, or 3 RIR, etc. Experienced lifters are very accurate when estimating RIR, if you aren't an experienced lifter, or if you are but you tend to struggle with estimating RIR, try the following:

1. Record a video of your sets and rate the RPE after watching the replay.
2. Try a short block (3–6 weeks) of low volume training where you go to concentric failure frequently (get spotters or a workout partner) to really see where your limits are.
3. Rate your RPE in your head, then ask your (preferably experienced) training partner what they thought the RPE was.
4. Hire a coach who uses RPE, and ask for feedback on your lifting videos.
5. Do a set for as many reps as it takes to reach a target RPE, then when you think you've reached it, go to failure and see if you were accurate (e.g. grab a weight you think you can do for 8–12 reps, do reps until you hit an RPE 8, then keep going). If you can do more or less than the RIR you expected, you know you need more practice.

RPE Scale Based On Repetitions In Reserve	
10	Could not do more reps or load
9.5	Could not do more reps, could do slightly more load
9	Could do 1 more repetition
8.5	Could definitely do 1 more repetition, chance at 2
8	Could do 2 more repetitions
7.5	Could definitely do 2 more repetitions, chance at 3
7	Could do 3 more repetitions
5-6	Could do 4 to 6 more repetitions
1-4	Very light to light effort

You can use RPE alongside % 1RM, or RM to help give someone a place

to start, and then a guideline on how to adjust. This approach fixes the issue of some lifters being able to do only 9 reps at 70% of 1RM, while others can do over 20 [29].

For example, if you just prescribed 3x8x70% there are lifters out there who would be at a 9 RPE on set 1, hit a 10 RPE on set two, and only get 6 or 7 reps on their third set, unable to complete your prescription.

On the other end of the spectrum, there are lifters who would be at a 3–4 RPE on all three sets, barely feeling like they did anything, who wouldn't get the intended stimulus.

However in both cases, if you prescribed 3x8x70% @ 6–8 RPE, only the first set would be off target because they can adjust. In the case of the lifter "bad at reps" who recorded a 9 RPE on set one, they should reduce their load on the next set to put them between a 6–8 RPE. In the case of the lifter "good at reps", they should increase it.

4. Failure

While not technically a measure of intensity like the above methods, enough people train to failure almost exclusively that it is worth discussing in this section.

'Failure' has two common meanings: where there is a break down in form during a rep but maybe an additional repetition could be performed with poor form (technical failure), and where the weight can no longer be physically moved (muscular failure).

In general, we don't want to perform the big, multi-joint compound lifts to muscular failure (squat variations, deadlift, overhead press, etc) as the risk of injury is too high. Imagine you're squatting heavy to the point where you fail in the middle of a rep and are stuck half-way, without a spotter. It's very tough to lower the weight again from this position with good form, and the chances you break yo'self are high.

Even performing these lifts to technical failure on a regular basis is a bad idea for the same reasons and because the systemic fatigue generated is also very high (which can limit your ability to perform for the rest of the session and delay recovery for subsequent sessions) [24, 25]. That said, it is much safer to train to failure (both types) with isolation

exercises that don't require full body efforts such as bicep curls, leg extensions, or even some machine compound movements like rows, pulldowns, or perhaps the leg press.

You may be thinking at this point, "Why would I ever not want to go to failure? Doesn't failure increase the amount of muscle activation I get and ensure that I have trained the fiber completely?" Those things are true for the most part; however, that's looking at each exercise in isolation, rather than the big picture.

If you were to do 3 sets of bench with your 8RM load, and on your first set you maxed out and went to failure getting 8 reps, you would probably drop down to 6 on your second set, and then possibly 5 reps on your third. This will be 19 reps total.

However, if you were to stop and just do 7 reps on the first set, you may be able to maintain 7 reps for the next two sets as well. This will be 21 reps total.

In this way, it's easy to see that we can hurt the amount of volume that we can do by going to failure too frequently. Thinking even bigger picture, going past just the single exercise and thinking about subsequent training sessions, there are further negative implications from training to failure all the time. One study had two groups doing the same training in all aspects except the one group went to failure, while the other did not. At the end of the study, similar progress was made by both groups; however, the group training to failure had indications of being in an overtrained state [24]. Other research has shown that even when using the same load for the same total volume, a group going to failure took longer to recover their strength than a group not going to failure [25]. Finally, and probably most convincingly, the most up to date meta-analysis we have on training to failure or not found no advantage in terms of strength gains when training to failure [26].

"So, should we never use failure?" No, it just needs to be done intelligently. It needs to be for a purpose. If it's 1RM testing or for an AMRAP, it has a clear purpose. Also, going to failure on a squat or a lateral raise are very different things. You can probably go to failure on your isolation movements after your compound lifts and get some extra stimulation with little to no cost to overall recovery. Or, if you know that you are training a muscle group

with three different exercises you can take that last exercise's last set to failure, just to get a little more out of your training.

The point is that there needs to be a logical reason behind the use of taking sets to failure in your training, and it needs to fit in with your training progression. If we have an intended light week, or what people call a deload (or taper) in our periodization, we probably don't want to train to failure at all just to ensure that this week does its job of allowing for enough recovery before moving on to the next training block.

— Failure needs to be used with a purpose if used at all.

Intensity Considerations for Strength

There are three major factors that optimize strength [2]:

1. Muscle Mass (and Other Structural Adaptations)

A larger cross-sectional area and more mass means we have more muscle fibers to contract and we can move heavier loads. More muscle mass typically means more strength relative to when you had less muscle mass. There are also other structural changes including adaptations to the non-contractile elements of muscle (titin, the extracellular matrix, costameres, etc.), connective tissue (tendon, fascia and ligaments), myofibril packing density (how many contractile units are in each muscle fiber), and changes in pennation angle (the attachment angle of muscle fibers in orientation to the tendon), that can affect strength.

2. Neuromuscular Adaptations

It is the neurological system that recruits and activates our muscles and allows us to express strength. Neuromuscular adaptations to heavier loading allow contractions to be more forceful and efficient. This means that we can use more of the full potential of our existing muscle mass.

3. Motor Patterns / Skill

Strength is not just a quality of the body but also a skill, meaning that you need to get better at the movement that you want to be stronger at. Specificity relates to the velocity, load, joint angles and the recruitment patterns that you need to use to move external loads. How strong you

can be in the squat, for example, is affected by how familiar you are with the movement.

To optimize strength, you have to train in a specific way to develop all three of these qualities.

On the other hand, hypertrophy does not require the same degree of specificity in terms of loading. Muscle can grow quite well with both moderate and heavy loading, which was shown in a study by Schoenfeld [5]. He took two groups performing similar amounts of weekly volume so as to isolate the effect of intensity. One group did all of their training with three rep maxes, the other group did all their training with ten rep maxes, but total volume load was not statistically different between groups as the heavy load group did more sets to compensate for the lower number of reps. Interestingly enough, there was an equal amount of muscle growth in both groups. However, holding true to the principle of specificity, the three rep max group got stronger than the ten rep max group.

Unsurprisingly, this means that if you want to get good at lifting heavy things, you have to lift heavy things. However, muscle growth is not a specific adaptation like muscular endurance, speed or strength. Remember, the purpose of the human body is survival, so the adaptations it makes in response to a stress are always related back to being able to better handle that stress. Being stronger, having more endurance, getting faster, you can logically see how these qualities directly aid survival. But improved aesthetic appeal and increased muscle size don't fit the bill. Rather, hypertrophy is an effect of training with adequate volume at a high enough effort.

Extreme Specificity

Some of you reading the above may find yourself thinking, "Okay, so if I'm a strength athlete, and my goal is to increase my 1RM on 'x' lift, and if specificity is the key, then why shouldn't I just train by doing a 1RM, on that lift, every time I step in the gym?"

Well, you wouldn't be the first to ask that question, and in fact, there are entire weight training systems built on that exact premise. The Bulgarian weightlifting method specifically used a high frequency, high-

intensity, low-volume per session, daily 1RM approach where almost every training session began with a conservative max attempt on a lift, followed by some volume work. This approach was actually shown to be effective in a case study of three well-trained strength athletes who squatted to a max, every day, and who all got stronger following this approach [27].

However, the question does come down to, "Is it optimal?" Surely, we know that it can work and the upsides to this approach are directly related to how specific this approach is. Logically, it should result in more consistency in max effort attempts, increased mental toughness when it comes to max attempts, better ability to recover from high-intensity lifting, and theoretically increased 1RM strength.

That said, we can't forget the other not so positive implications of performing a 1RM on a regular basis. High-intensity approaches necessitate lower volumes per session due to the time and energy cost of using such a high intensity. The 'volume load' and number of reps performed in an hour using this approach pales in comparison to an approach using higher repetitions and moderate loads. This is part of the reason why the frequency is also so high in the Bulgarian system, to offset the low volume per session.

Also, higher intensity means higher fatigue. As will be discussed later, regular training to failure (performing the greatest number of repetitions you can at a given load, e.g. a rep max like a 1RM) can result in a state indicative of overtraining [28], increases the time course of recovery [29] and performing the same volume of training but using heavier loading, may result in more joint pain and injury [5]. Additionally, many people struggle to hold form at very high loads, and since strength is a skill, not just an attribute of the body, you must consider that if you struggle with form at maximal loads, you may not be ingraining the best motor patterns.

Most importantly, doing more and more of your volume at as high of an intensity as possible might not actually result in superior strength gains. Much like the study that was done by Gonzalez-Badillo on three volume ranges, Gonzalez-Badillo also performed a study on intensity. In this study, they once again examined young, healthy, well-trained competitive male weightlifters performing the back squat, snatch, clean and jerk, and

accessory lifts for 10 weeks. This time, the three groups performed the same total repetitions over this period; however, each group performed a different proportion of their reps in the 90–100% of the 1RM zone. One group performed 46, another 93, and the final group 184 of their total repetitions in the 90–100% of the 1RM loading zone. Interestingly enough, the middle group increased their strength the most [30].

The take-home message is that while an extremely specific, high-frequency, high-load approach can work and will likely make you stronger, it may not make you stronger than a more moderate approach for the reasons listed above. For it to be a feasible and maybe even an optimal approach in some cases, it likely should not be performed for extended periods, and might only be appropriate for overreaching blocks or in an intensification phase of competition preparation.

Intensity Considerations for Hypertrophy

For hypertrophy, the absolute load on the bar is much less important than it is for strength. However, 'intensity of effort' is critical, as is making sure that your loads increase over time across the spectrum of rep ranges you use in training.

How Light is Too Light?

A wider loading range can be effective for hypertrophy than for strength, but load is still important. The cardinal rule of progressive overload still applies if your goal is muscle growth, meaning we need to lift weights that actually provide an overload.

If you think about it, we're all under load all the time because we are on earth, which means that our muscles need to resist gravity in order for us to move around. If the magnitude of that load wasn't important for hypertrophy at all, we would all be as big as our genetics would allow a few years after puberty, just from being on planet earth and constantly experiencing 'time under tension'. So clearly, tension must be progressed for hypertrophy to continue.

Two aspects of intensity are important for hypertrophy, 'intensity of effort' (how close you are to failure), and to a lesser degree 'intensity of load', how heavy or light the loads you train with are.

Issues with Both Low and High-Intensity Training

It's been repeatedly shown, and demonstrated via a 2017 meta-analysis [31], that both high (>60% 1RM) and low (<60% 1RM) loads can cause comparable hypertrophy if the volume is similar, and effort is high. However, there is a bottom range of intensity of load that is too light to be optimal.

Lasevicius and colleagues demonstrated that even when doing a similar number sets to failure, 20% of 1RM produced less hypertrophy than sets in the 40–80% 1RM range [32]. Thus, it seems that very low-load, high-rep sets (40+ rep sets) produce too much global fatigue before resulting in adequate local muscular stimulus, or are so high-repetition that they are more similar to endurance than resistance training to be effective for hypertrophy. So, that means that you can certainly train in the ~15–35RM range, and if you perform a similar number of sets, you'd progress similarly to someone training in the more traditional 6–15RM range. However, there are also practical concerns for high repetition training even in less extreme (15–35RM) examples.

In a study by Schoenfeld [1], a group doing 3x25–35RM achieved similar hypertrophy in comparison to a group doing 3x8–12RM. However, according to Dr. Schoenfeld, a significant portion of the participants in his study in the higher-rep group experienced a great deal of discomfort. Vomiting during training was a common occurrence.

This is important to consider because if you are to use high-repetition sets, to ensure you are activating and training enough fibers, you have to get through the initial 'junk volume' and eventually reach an adequate proximity to failure. On certain movements like deadlifts, squats, lunges, presses, and free-weight rows, the global fatigue is so high that this is simply not worth it, as it can degrade your performance on subsequent sets and exercises. Also, higher rep sets near to failure take longer to recover from in subsequent days compared to lower-rep sets [25]. Additionally, in a study, you have a team of researchers pushing you to actually reach failure. In the real world, because of this global fatigue, your ability to tell when you are *truly* approaching failure gets worse the more repetitions in a set you do [33].

To sum up high-repetition, light-load training, growth can certainly be achieved training at ~30%–60% of 1RM (~20–35RM); however, it

comes at a cost, and for logistical reasons may not be as efficient as moderate or heavy-load training. Does that mean you should never do any training lighter than 12RM? No, not at all. The fatigue from doing high-rep compound movements is a problem, but lateral raises, curls, machine work, and other isolation exercises don't generate the same level of global fatigue. Also, if you get joint pain on certain movements, low-load, higher-rep training is an excellent tool. Finally, in theory, including some high repetition training (in the 15–20RM range) may be more effective for overall growth as it could theoretically be more effective for training slow fatiguing muscle fibers [5]. That said, this hasn't yet been adequately researched.

Additionally, the issues I've presented with low-load, high-rep training doesn't mean you should do a 180-degree turn and solely rely on heavy training either.

As I previously mentioned, Schoenfeld also did a study comparing matched volumes of 3RM to 10RM loads and found equal muscle growth, but greater strength in the 3RM group [5]. Slam dunk for the 3RM group right? Not necessarily.

- First, if your only consideration is hypertrophy, your absolute strength isn't a concern (you could make an argument that for long-term progressive overload, strength gains are important, but I would put forth that both groups got stronger, and getting stronger, not how much stronger you got, is what is key to continued growth).
- Second, the 10RM group was able to finish their training in a fraction of the time it took the 3RM group to finish. The 10RM group reported they felt capable of doing much more volume had they been allowed.
- Third, the 3RM group experienced more joint pain, had more dropouts due to injury than the 10RM group, and regularly felt beat up and tired.

So as you can see, from a practical standpoint, there are issues with using only heavy or light loading exclusively for hypertrophy. For light loading, especially with compound lifts, it forces you to generate a lot of acute fatigue, turning each session into a potential puke party and

also can extend your recovery time needed between sessions. When only using heavy loads, the time cost of each session is much higher, the strain to joints and soft tissue is higher, and the overall fatigue generated per repetition is higher, limiting the total amount of volume you can handle.

Intensity Recommendations

Intensity is specific to your goal. Lift heavy for strength, and ensure sets are performed at an adequate effort for size. Remember progressive overload.

For Hypertrophy

If hypertrophy is the goal, the weight just needs to be heavy enough (above ~30% 1RM) and sets need to be adequately challenging (5+ RPE). It is often said that the 6–12 rep range is the ideal rep range for hypertrophy but in fact, there's nothing magical about this range. It's just a convenient range to accumulate volume.

Lower intensity work (12–30 rep range) will also induce hypertrophy although it can be quite fatiguing on compound lifts and may prolong recovery if near to failure. However, it can still be beneficial when connective tissue health is a problem on certain exercises, and there is a theoretical rationale to train in a spectrum of rep ranges.

Likewise, while it shouldn't be a focus, it's important to not forget the usefulness of high intensity (1–5 rep range) strength work even if the main goal is hypertrophy. Getting stronger is important for progressive overload. When you're stronger, you can use heavier weights which allows you to do more volume more easily, so it is a good idea to include some heavy work as well.

Put this all together and here are practical recommendations for intensity for hypertrophy:

Perform ⅔ – ¾ of your volume in the 6–12 rep range at a 5–10 RPE, and the other ¼ – ⅓ in the lower-rep, higher-intensity (1–6 reps at a 5–10 RPE) and higher-rep, lower-intensity ranges (12–20 reps at a 5–10 RPE).

For Strength

If strength is the goal, specificity is needed so a considerably larger proportion of your volume needs to be performed with heavier loads.

So, for strength, does that mean that all your volume should be as heavy as possible? No.

Muscle can move weight when it's bigger, so you need enough volume to grow, so you shouldn't only use singles, doubles or triples in training.

Remember what Schoenfeld found comparing 3RMs with 10RMs, that the 3RM group not only took four times as long to complete their workouts (because they had to rest longer), but also experienced more joint pain, had more dropouts, and verbalized more mental burnout.

Remember also from Gonzalez-Badillo, the group that increased their strength the most had a moderate proportion of their volume from 90% 1RM+ loads, not the group that did the highest proportion of their work at 90%+. While volume is a stimulus for strength, its contribution is smaller than intensity, meaning that the exposure itself to heavy loads is more important for building the skill of strength than *how much* exposure you get. For example, there is data showing that the top intensity in a series of sets likely has a greater impact on changes in strength than the average intensity across sets [34]. Very high load training at a high volume comes at the cost of mental fatigue, and joint pain, and if used exclusively it's an inefficient and unnecessarily taxing way to accumulate practice.

Thus, there are advantages to mixing in some light and moderate loads to achieve the same volume for the sake of time efficiency, joint stress and ability to recover.

Put this all together and here are practical recommendations for intensity for strength:

Perform ⅔ – ¾ of your volume in the 1–6 rep range at a 5–10 RPE, and the other ¼ – ⅓ in the higher rep moderate intensity ranges (6–15 reps at a 5–10 RPE).

The following intensity recommendations represent the average values for those training for either strength or hypertrophy. In the next level of

The Pyramid, we'll discuss how these recommendations fluctuate over the course of a periodized plan.

Intensity	**Strength**	⅔–¾ of volume in the 1–6 rep range, remaining volume in the 6–15 rep range, at a 5–10 RPE
	Hypertrophy	⅔–¾ of volume in the 6–12 rep range, remaining volume in the 1–6 and 12–20 rep range, at a 5–10 RPE

FREQUENCY

Frequency is what organizes volume and intensity. It is about how you spread the training stress you need across the training week. Some people discuss frequency as if it's a stimulus in and of itself, but even though higher frequency training can be beneficial independent of volume or intensity, this is caused by optimizing training stress. Manipulating frequency is the way you organize your training to improve the relationship between stress and recovery so that no single session becomes overly taxing.

All work in one session is not equal to all work split across 6 sessions.

How Frequency Impacts Training

There are several aspects that we need to consider. Learning, recovery, and organization.

Learning Through Practice

Think of the extreme example where you try to cram all of your volume into one weekly session. Think of when you were a student. You may have done a lot of cramming, memorizing huge volumes of information in one day, the night right before a test. I'm guessing you usually did ok in the test, but didn't remember much of what you studied a week later, am I right?

There's a limit to the amount of effective study you can actually do in a single session, sometimes you just have to give the brain a break and wait

until it is ready for more. It might be useful to think of training this way too.

If you try to cram all of your training volume into the one day, you're not going to learn the movements as well, because the quality of movement degrades as the session drags on and you get more fatigued mentally and physically. The stimulus you are able to generate degrades as the session continues, potentially inhibiting the efficiency of strength development or hypertrophy.

At the other extreme, if you have six sets to do per week, and only do one set per day, you wouldn't really have much chance to identify mistakes and correct them on a day to day basis. If you do your one top set poorly, you don't have a second or third set to correct it. Even if you perform perfectly, you don't have a chance to repeat it and ingrain it until at least a day later.

Recovery

It's important to remember that we're not practicing drawing here, we're practicing heavy strength training. Our bodies are going to take a beating when we are training heavy and hard all the time. Even doing the same amount of volume, just by spreading it apart into more manageable blocks across the week, getting in sleep, proper nutrition, and just living life between sessions, may result in better growth.

This isn't just theory, there is a large body of evidence to suggest that we can do too much in a single session. In fact, studies have shown superior...

- neuromuscular adaptations [35, 36]
- hormonal markers for recovery [35, 37]
- strength improvement [35-39]
- and gains in lean body mass [36, 39]

in groups that split their volume up over more sessions, doing less volume per session, but the same amount in a week.

You may very well get to a point where you need to increase volume, and your total training volume per week becomes high enough that how you split it up is very important. Doing too much in one session is

a real thing that can happen and it may make sense to spread it out.

Some of the above-cited studies, while interesting on a theoretical basis, are not the most realistic of comparisons. In a few cases, a large amount of volume performed in only a single session is compared to three weekly sessions, or a single session is compared to two-a-day sessions. In most cases, this is not how the majority of strength and physique athletes train (except for some Olympic lifters). However, probably the most convincing studies that look at "real world" examples of both traditional bodybuilding and powerlifting training while manipulating frequency, are studies by Schoenfeld and colleagues [40] and Raastad and colleagues [39].

Schoenfeld specifically compared two, three-day per week training programs in well-trained men with different frequencies per muscle group. One was a split routine where the lifters trained chest and back on day one, legs on day two, and shoulders and arms on day 3, while the second group trained full body on every day. The exercises, sets, reps, and relative loads were the same across the week in both groups, and interestingly enough, significantly greater increases in hypertrophy were observed in the group training full body three days per week [40].

Similarly, Raastad and colleagues studied the Norwegian powerlifting team, dividing half the team into a three-day per week powerlifting split, and the other half into a six-day per week split where they performed half as many sets per session (to do the same number per week) and used the same average intensity per week. In this case, strength and hypertrophy were found to be higher in the group that split their training into more sessions despite equal volume and intensity [39].

However, more important than any single study is the meta-analytic data done in the last few years on the effect of frequency on strength and hypertrophy (remember, meta-analyses are studies of all studies on a given topic, and provide the highest quality scientific data we have available):

- Schoenfeld et al., found that *regardless of volume*, training each muscle group at least twice weekly resulted in superior hypertrophy to once weekly [41]

- Grgic et al., found higher frequencies improve strength by increasing volume, showing how frequency can be used as a tool to organize training stress [42]
- Ralston et al., reported similar findings to Grgic except that greater upper-body strength was caused by higher frequencies *independent of volume* [43]
- Similarly, Greg Nuckols showed in an open-access meta-analysis that higher frequencies lead to greater strength when the volume was matched, especially for upper-body pressing [44]
- Greg also posted an open-access meta-analysis on hypertrophy, showing higher frequencies, independent of volume, resulted in greater hypertrophy [45]

We limit ourselves to the amount of volume that we can do in a week by trying to split the work across too few sessions and if we are relatively advanced, we could potentially be making better progress by splitting the high volume we must perform to progress, into more frequent, more manageable sessions.

Frequency Recommendations

Organization matters. It is possible to do too much in a single session. Spread the work over the number of sessions required to accommodate volume.

When it comes to designing a program, realize there's no single perfect frequency. You must find the right approach for your training volume and your schedule. Some people may have certain days free, with large blocks of time, and they could train for three hours if needed. Others can only train for an hour, tops, but can train six days per week. So you have to organize your volume based on what your schedule allows. That said, most of the time training anywhere from 3–6 sessions is appropriate for hypertrophy or strength related goals (twice per week can work quite well for time-pressed novices), and this will determine how frequently you train each muscle group or movement.

1. Determine your volume (considering the number of exercises, sets,

rest periods and warm-ups) for the week that you need in order to make progress towards your goal. Then consider how much time it would take to complete it all. Consider what frequency of training would allow you to break up that training into manageable chunks that would allow you to perform it all with a high quality of focus, movement, and intention.

2. Try out your proposed schedule. If you find that you have too much volume on any single day to perform well, look to reschedule the volume across your current number of sessions or consider adding in another session to your training week.
3. Likewise, if you find that you have a day that is completed quickly and with minimal fatigue, consider rescheduling the volume to put more on this day so that your other training sessions aren't as fatiguing.

Remember, that as you progress (get stronger, bigger, and more advanced as a trainee) you will need to perform more volume in order to produce enough stress to keep your body adapting. So, in general, the number of days that you will need to train will increase as you advance to accommodate these volume increases.

The following frequency recommendations represent the average values to be used when training for strength or hypertrophy. However, for some strength athletes at certain points in a periodized plan, it may be appropriate to use a higher frequency on specific lifts, with a lower volume per session to achieve specific outcomes. This will be covered in more detail in the next chapter.

Frequency	2+/week per muscle group or movement pattern	Consider overlap between exercises.

VIF SUMMARY RECOMMENDATIONS

Whether your goal is strength, hypertrophy, or a blend of the two, here are some starting recommendations.

We discussed both the Schoenfeld and Ralston meta-analyses and

the overall body of evidence leaning towards ~10–20 sets per muscle group/movement per week as a good starting place for volume. We also established how important muscle size is for strength development and how for strength, specificity is very important.

While the best combination of volume, intensity and frequency (VIF) will be highly individual and will change over a lifting career, we can use the collective body of evidence to provide a starting point that is probably within the ballpark of optimal for most beginner to intermediate level lifters.

Whether you want to get really strong or just really big, hypertrophy is important—bigger muscles move bigger weights. So, we want to assign a level of volume that is appropriate for building mass and then for those interested in developing strength, we need to ensure that enough volume is performed in a specific enough way to develop the skill of strength.

Below are the summary recommendations for VIF, but remember that these are the average values over the course of a training block. There will be phases of training that emphasize higher or lower intensities and volumes depending on the time point in the periodized plan (more to come in the next chapter).

Volume: 10–20 sets per muscle group or movement, per week.

- Remember to consider the overlap between similar movements on how they affect both strength and the stimulus for muscle growth of the contributing musculature.

Intensity: The 1–15 rep range at a 5–10 RPE should be the range that you train in most of the time.

- If your main goal is strength, ⅔–¾ of that should be using the 1–6 rep range at a 5–10 RPE, and the rest should be lighter.
- If your goal is hypertrophy, ⅔–¾ should be in the 6–15 rep range at a 5–10 RPE with the rest being both above and below this load level.
- Mostly, but not alway RPE should be between 5–10 depending on the phase of training, and goal of the session (for example a single at 80% 1RM might be a 4 RPE, but is still useful skill work for a strength athlete)

Frequency: Train each muscle group or movement pattern at least twice weekly.

- Balance your schedule and time with the appropriate volume for your training age and workload capacity to determine an appropriate frequency.

This means 10–20 sets per muscle group/movement, with each muscle/movement trained at least twice per week, using the 1–15 rep range in the 5–10 RPE range in most cases.

Consider Overlap

If you think of some of the most common powerlifting routines, they will only train deadlifts or squats heavy once per week, and once per week light.

Sometimes squats might happen more frequently, but deadlifts less. Typically, the bench press is trained more frequently than the other competition lifts. This is because there is a lot of overlap between a hip hinge and a squat in terms of the muscles involved, even if the motor patterns of these movements are quite different.

Thus, if your goal is strength, while you do want to have a relatively high frequency of training on the movements you want to get stronger with, you also have to consider how the overlap of fatigue from one movement will affect another. For example, perhaps training squats three times a week and deadlifts three times a week at a high volume and intensity wouldn't be ideal for 90% of people because of the overlap and the subsequent local lumbar fatigue and the systemic fatigue caused by doing so.

Likewise, for those considering hypertrophy as their primary goal, we need to think more broadly about how the body works.

Just because we think of certain exercises being "for" certain muscle groups, the body does not "think" of movements as specific to muscle groups. For example, it doesn't think of the lat pulldown as only training the lats—in fact, your pecs do aid slightly in shoulder extension [46], think about how the pec is stretched when your arms are over your head;

when it contracts, it aids the movement. Thus, something like a pullover or a cable lat pushdown will train both the lats and chest. Also, the triceps cross the shoulder, so the triceps also aid in shoulder extension [47]. So in reality, a lat pulldown doesn't only train your "biceps and back" as your average bodybuilder might think, but also the triceps and chest to some degree. Thus, if you have been thinking about exercises in terms of "bench for the chest" and "overhead press for the delts", you might be thinking a little too simplistically. The reality is that they both train delts.

If you are thinking about deadlift for the back and squats for the legs, the reality is that they both train the back and legs (lumbar primarily).

A better way to think of what muscles a movement trains is to consider the biomechanical actions of a given muscle: how it moves a joint. While the joint actions of every muscle group are beyond the scope of this text, you can always use our friend Google and also simply think about what would happen to any given joint if a specific muscle was to shorten.

In addition to joint actions, we need to consider the range of motion for a given joint. For example, if you do a full range of motion close grip lat pulldown, or chin up, you move through a full range of elbow flexion; however, in a row, you do not. Thus, certain pushing and pulling variations are more likely to give a more complete stimulus to the biceps and triceps than others (typically full range of motion vertical pushing and pulling take the elbows through a more complete range of flexion or extension, and thus provide more stimulus to the arms).

To aid your biomechanical understanding of movements, you can view this chart as a way to assess movements and which muscle groups are primarily and secondarily trained in each "type" of movement (this chart will come up again in Level 4, along with a similar chart for categorizing movements for strength athletes).

Hypertrophy: Exercises and Muscle Groups Trained		
Movement Pattern	**Primary Muscle Groups**	**Secondary Muscle Groups**
Squat (all variations, leg press, single leg variants)	Quads, Glutes	Erectors (if free weights)
Hip Hinge (deadlift variations, good morning, back ext)	Glutes, Hams, Erectors	Scapular Retractors
Vertical Pull (chins, lat pull)	Lats, Bis	Rear Delts
Vertical Push (OHP variations)	Anterior Delts, Tris	Middle Delts
Horizontal Pull (row variations)	Lats, Scapular Retractors	Rear Delts, Bis, Middle Delts
Horizontal Push (flat, incline, decline pushing variants)	Chest, Anterior Delts	Tris (CG/dips: primary), Middle Delts (incline)
Horizontal Hip Extension (hip thrust, glute bridge etc)	Glutes	Hams
Pull Over (DB pullover, lat pushdown, BB pullover etc)	Lats	Tris, Chest
Fly (cable crossover, DB flys)	Chest	Anterior Delts
Isolation Exercises	Target muscle	N/A

A Note on the Middle Deltoid

In bodybuilding, middle deltoid development is important to make you appear wider, and tapered. Due to this, I often see emphasis placed on lateral raise variations, and hear the concern that without their inclusion, delt development will lack. While, I don't dispute the importance of lateral raises (you will even see them in a sample hypertrophy program later

in this chapter), it should be noted that due to the delt's biomechanics the middle delts contribute significantly to many compounds lifts. To some degree they are involved in any push or pull, but most notably during horizontal pulling [48] and vertical pushing [49]; meaning, they get hit all the time. You only need to spend time isolating them if you are advanced, and they are a clear weak point.

So, given how often compound lifts cover your bases in terms of the muscles they train, a question among strength-focused lifters might be, is it ever appropriate to focus on just a few big lifts (i.e. just doing 'the big 3')? Certainly, but that requires managing volume, intensity and frequency so as to manage any potential fatigue. For example:

- Rank beginners can benefit from the practice of the movements with a higher frequency and a lower intensity. Sessions don't need to be "all out" as progress comes easily and is largely driven by technique improvement.
- A powerlifter might train squat, bench, and deadlift very frequently at certain stages of competition preparation (with some days performing all three on the same day), but often only one movement is heavy, the other one might be moderate reps at a moderate volume (doing your hypertrophy work), and the last might be singles at 80%, to train technique which is not as fatiguing. Point being, there is a specific reason, a time restricted period this is done, and in a way to manage the fatigue overlap.

Each is just an example, but as you can see, a high-frequency protocol requires that you put more thought into overlap and fatigue management with heavy compound lifts.

A Starting Point from Which You Will Need to Adjust

Avoid Black and White Thinking

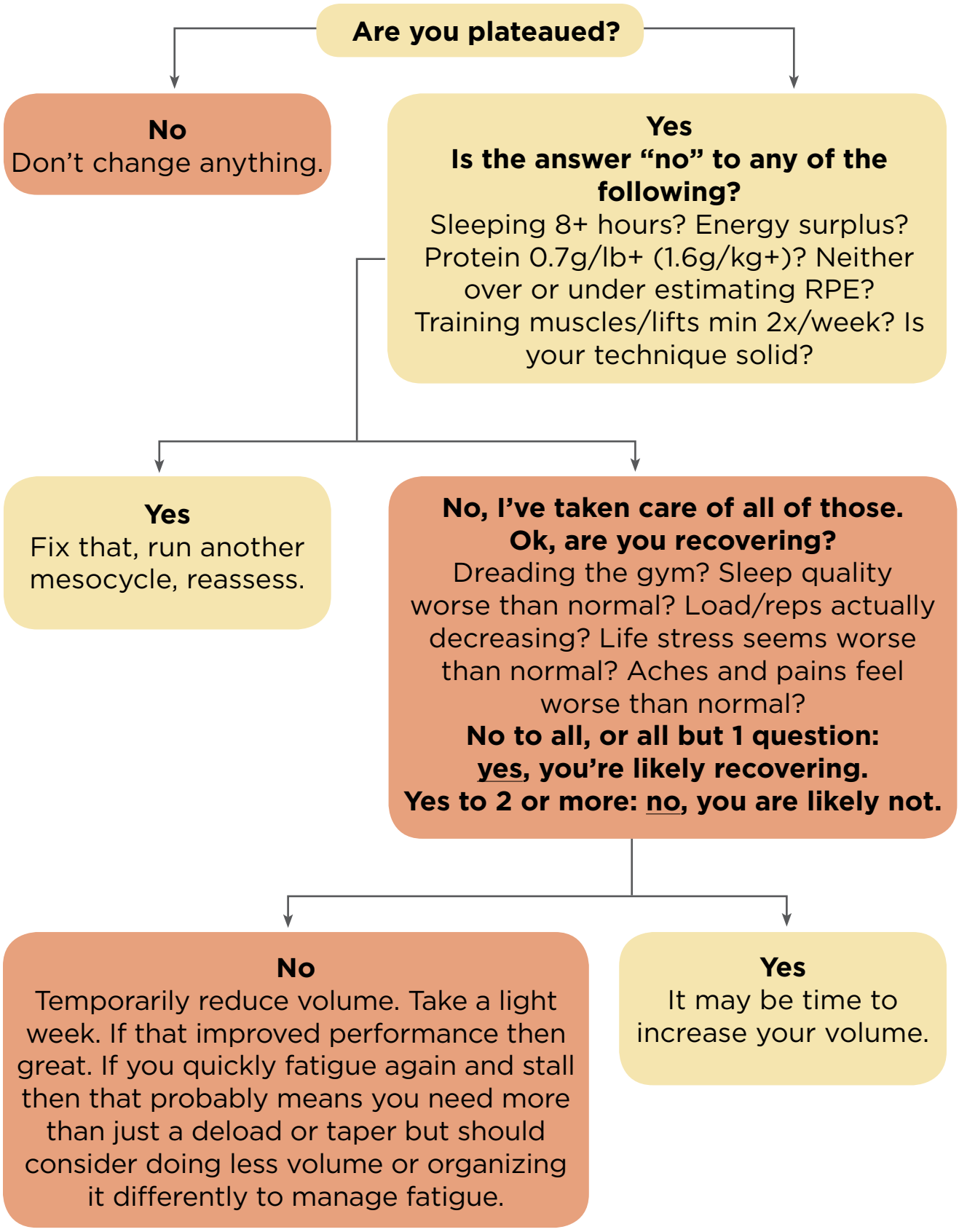
Don't look at the volume, intensity and frequency guidelines with your absolutist glasses on. Just because the number of sets we are recommending is in the 10–20 range, performing 9 sets doesn't mean you won't grow at all and performing 21 sets doesn't mean you will overtrain and regress.

Also, when looking to compare other programs, remember, you can make a good high-intensity, high-volume, or high-frequency program if you adjust the other variables. This means you may find an "optimal" approach that falls outside of these general guidelines—"optimal" for *you*, if you adapt to it.

Progress is not an on or off switch. It's not that we make gains or we don't, it's maybe we make better progress by adjusting some of the variables.

Remember the meta-analyses we have available are primarily on studies comprised of novice trainees with few studies on "trained" lifters that I would typically classify as intermediate. If you are a novice, start on the low end of the volume recs (~10–13 sets week). If you are more intermediate or advanced (and you don't know where to start), try the mid to high end of the range (~14–20 sets a week), and then adjust from there.

WHEN UNSURE ABOUT HOW TO PROGRESS - FLOWCHART



These Are Principles and Guidelines, Not Rules

There isn't a right or wrong way to train. We're just trying to get you in a ballpark of the right place to start so that you can adjust.

The recommendations are actually very wide-ranging when you think about it. There is a twofold difference between doing 10 sets and 20 sets for a muscle group or movement. Despite its broad nature, you will typically see a similar outcome in the majority of people training in this range. Plus, these guidelines should just be seen as the average range that will occur over the course of a cycle of training. There can and should be periods that are above and below these ranges depending on the phase of training.

Also remember, studies report averages, but each person is an individual and there are always outliers who will do best on substantially more or less volume or a lower or higher frequency than what we recommend. So, start here, give yourself time, see if you progress, then think about adjustments.

10–20 sets per muscle group/movement, a place to start and adjust from, not a law to live your life by.

Remember, don't get impatient. Volume will increase over the course of a training career as you progress; however, it won't necessarily increase from session to session, week to week, or month to month, because you'll have elements of periodization in your programming. The concept of needing more volume to grow is a concept to apply over a career of lifting, as needed when progress stalls. Don't use this book to justify doing full body 6 days a week with 20 sets per muscle group per session by next year because "volume has to keep increasing bro!"

Just do enough volume to progress and only increase when you need, not want, to do more.

EXAMPLE ROUTINES

Let's have a look at what training routines we can get by manipulating the variables that we've discussed so far. One each for strength and hypertrophy, four times a week. These are merely examples so don't

think you need to follow them "to a t".

Volume • Intensity • Frequency
Summary Of Recommendations

Volume:	10–20 sets per muscle group/movement per week
Intensity:	**Hypertrophy:** Perform ⅔ – ¾ of volume in the 6–12 rep range, remaining ¼ – ⅓ split between the 1–6 and 15–20 rep ranges, at a 5–10 RPE.
	Strength: Perform ⅔ – ¾ of volume in the 1–6 rep range, remaining ¼ – ⅓ in the 6–15 rep range, at a 5–10 RPE.
Frequency:	Each muscle group/movement pattern trained 2+/ week.

A Simple, Sample Strength Routine

The focus of the following routine is on developing strength of the main lifts, and also the whole body. As such, there is not a great deal of attention paid to small details, growth in the long head of the triceps for example. There is also overlap between exercises on the muscle groups trained, which is a useful way to show the nuance to the volume recommendations.

Monday: Bench 5x5, Cable Pullover 3x8–12, Row 3x8–12

- The bench press trains the chest, anterior delts, and triceps.
- The pullover trains the lats, chest and triceps.
- The row trains the lats, scapular retractors, biceps, and rear delts.

Tuesday: Squat/Deadlift 5x5, RDL/Front Squat 4x6

- We alternate each week between the squat and deadlift.
- Squats are paired with Romanian deadlifts (RDLs), the deadlift is paired with the front squat. So, if squats are performed as the first exercise, then the second exercise is the RDL. On the deadlift day,

front squats are performed as the second exercise.

- This pretty much trains the entire lower body (including the back to a degree, both lower and upper): glutes, hams, quads, and really, outside of some stimulation from squats, just the calves are neglected (but hey, who cares about calves if you're a strength athlete).

Thursday: Bench 5x3, OHP 4x6, Weighted (if needed) Chins 3x6

- The bench works the chest, delts and triceps; the OHP the delts and triceps, the chins work the lats, rear delts and biceps.

Friday: Deadlift/Squat 5x3, F. Squat/RDL 4x6

- This is a similar workout to Tuesday, but the exercises are flipped and the set/rep ranges slightly altered. So, if the squat is performed on Tuesday then deadlifts are performed on Friday. If the deadlift is performed on Tuesday then squats are performed on Friday.
- Remember that the deadlift and RDL also train the lumbar and front squats the upper back.

How Does This Stack Up with Our Recommendations?

You can see that the majority of the work is in the 6 rep and lower range on the "main lifts", with some accessory work in the 8–12. That's roughly ¾ of the volume in the 1–6 range, roughly ¼ of the rest, higher.

The total number of sets is 10 for the bench, 9 for the squat and hip hinge patterns (including RDL and front squats), which is less than 10, but we are considering the overlap between these two types of movements. So the main lifts we are trying to drive strength on are right at the bottom end of the volume range (but if we consider overlap on squats/hip hinges you could argue volume is higher). Also, we have accessory work in the form of overhead pressing, overhead pulling, rows, and a pullover to complement the fact that a bench press isn't as effective for middle delts or triceps as it is for chest and anterior delts, and that sets of 3–5 aren't as effective for hypertrophy as sets of 6+ reps.

Let's take a look at the back. To drive the discussion of overlap further, let's look at the back training. If you add up the pullover, row, and chin volume, it's 9 sets, just short of our recommendations which is

a problem right? Well, not so fast. With the RDL, to retain scapular retraction and lumbar extension, it takes a lot of effort, and thus this shouldn't be ignored. Likewise, the deadlift works the entire back to a degree to maintain position. Depending on your own biomechanics, the squat (especially if you use a low bar position) can be viewed the same way. Finally, anyone who has performed front squats with any degree of effort knows that the limiting factor is your ability to hold the front rack position. Doing so is largely dependent on your upper back.

So, in some spots you could argue we aren't hitting the minimum volume guidelines...but, is this a big deal? No, this is the example of a strength split where we are skirting the very lower end of the volume recommendations. But don't get too hung up on that falling a little short, because the overlap of barbell compound free weight movements (and the resultant fatigue) is considerable. Remember, don't think too black and white about the guidelines, being slightly below them is fine. Our volume recommendations are based on studies where not much overlap occurred anyway due to free weight barbell exercises being used less in research (leg press vs. squats and deadlifts almost never used). Also, if you stall, it's very easy to add a set here and there and/or potentially a fifth day.

Don't think that when writing a program you have to have at least 10 sets of direct work for each muscle group or movement no matter what. Again, the research we are using to form our volume recommendations count a row and a barbell curl as the same as far as stimulating biceps hypertrophy, so we can be equally as liberal in the way we count for comparative purposes. Thus, so long as you're in the rough ranges provided with a little wiggle room for overlap, that's absolutely fine as a starting point.

Sample Hypertrophy Routine

This sample hypertrophy routine is based on an upper-lower split set-up. The objective is to build muscle mass throughout the whole body. We care about growing every muscle group primarily, not developing strength, so overlap will be treated less liberally.

More isolation movements are incorporated in order to hit every single muscle. The volume is greater, and there is also less heavy lifting.

Monday: Bench 4x4–6, Row 3x6–8. Incline DB Press, Chins, Tri's, Bi's, Lateral Raises, all 3x8–12

- The bench press and incline DB press train the chest, anterior delts, and triceps.
- The row trains the lats, scapular retractors, biceps, middle delts and rear delts while chins train the lats, biceps, and rear delts.
- Triceps and biceps direct work and lateral raises isolate and train the triceps, biceps, and middle delts, respectively.

Tuesday: Squat, RDL 4x4–6. Leg Extensions, Leg Curls, 3x8–12, Seated Hip Abduction 3x12–15, Calf Raises 4x6–8

- Squats train the quads, and glutes primarily.
- The RDL trains the glutes, hams and the lower back primarily.
- Leg extensions, curls, abduction and calf raises isolate and train the quads, hams, glutes and calves, respectively.

Thursday: Flat DB Press, Lat Pulldown, OHP, Row, all 3x8–12. Chest Flys, Tri's, Bi's, 3x12–15

- The flat DB press trains the chest, anterior delts, and triceps, while the OHP trains the anterior delts, middle delts and triceps.
- The lat pulldown trains the lats, biceps, and rear delts while the row trains the lats, scapular retractors, biceps, middle delts and rear delts.
- Direct work isolates and trains the triceps and biceps, and flys hit the pecs and anterior delts.

Friday: Leg Press, Weighted Back Extension, 3x8–12. Leg Extensions, Leg Curls, 3x12–15. Seated Calf Raise 4x8–12

- The leg press trains the quads and glutes without lumbar fatigue, while the weighted back extension trains the glutes, hams and lumbar extensors.
- Leg extensions, curls, and calf raises isolate and train the quads, hams, and calves, respectively.

How Does This Stack Up with Our Recommendations?

You can see that the majority of the work is in the 6–12 range and a small amount is above and below. That's roughly ¾ in the middle of the range, roughly ¼ either side of that. As far as volume, there are 15 sets for glutes, 13 sets for chest, quads, and hams, 12 sets for biceps and triceps, and 12–16 sets for the delts, depending on which head (anterior, middle or rear) you are talking about. Although, four sets of bench, squat and deadlift are in the 4–6 rep range, so those sets are likely *slightly* less stimulative for hypertrophy as I mentioned earlier in this chapter.

Thus, this setup might be equivalent to say, one less set for each muscle group trained by these movements (chest, anterior delts, quads, glutes, triceps). But, even then, all muscle groups are still over our minimal volume target. However, as I mentioned earlier in this chapter, this is well worth it as there is value in doing some heavier training and regardless, we're still in the appropriate volume range.

The only muscle group that might be slightly under-stimulated by this approach are the calves. They receive a total of 8 sets per week from calf raises; however, the gastrocnemius does cross the knee so hamstring curls will hit them very slightly, and squats and leg press with a full range of motion will as well. Now if you look at the volume recommendations like immutable laws, this will inevitably cause anxiety, but I would put forth you shouldn't view the recommendations that way.

Remember the goal is to learn about programming principles so you can design an optimal approach for your lifestyle, schedule, goals, training age, weaknesses and strengths. These example routines are just that, examples, rather than what is optimal for you. They are science-based, but the science on volume is limited, as there are substantial inter-individual differences between people. This is a great place to start, but they aren't the be-all and end-all. In fact, I called these sample "routines" rather than programs because the acute variables don't change over time, which in a full program, they would.

These VIF recommendations are the average ranges that will occur over the course of a phase of training. Individual phases of training may look different. The next chapter will show how these recommendations play

out over the course of different periodization models, and at the end of this book, comprehensive sample programs for novice, intermediate and advanced lifters training for bodybuilding and powerlifting will be shown to help you fully integrate and apply these concepts.

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As mentioned a few times already, in order to keep getting bigger and stronger you need to gradually increase the training stimulus. This is called 'The Principle of Progressive Overload'. However, progression and progressive overload are not the same things. Setting up an appropriate volume, intensity and frequency of training will result in overload, which will then allow you to see progress. So in reality, progressive overload is largely taken care of in the previous chapter. This progression chapter, on the other hand, is more about planning into latter stages of a lifting career to ensure continued progress.

If you are a novice or early-stage intermediate lifter, simply setting up a training plan specific to your goals with an adequate workload will produce gains, without much effort put into creating a plan to ensure progress. Selecting weights that challenge you on a session to session or week to week basis, even with the same set and repetition schemes within the week, will result in a gradual increase in strength and size. However, at a certain stage of your development, a plan for progression will become important for continued progress.

Progressions Based On Training Age

There are a great deal of inter-individual differences in terms of how quickly we can gain size and strength [1]; however, one thing is universally true—nobody can get bigger and stronger forever and everyone has a genetic limit. In general, the closer we are to our limit; the slower progress will be and the more intention will need to go into training in order to make further progress [2].

When thinking about training age, as everyone is different, it is most useful to categorize ourselves based on the length of time it takes to improve (strength), rather than an arbitrary strength standard or the length of time we have been lifting. The reason I don't like to use an arbitrary strength standard is because some people are just naturally stronger than others (they have an elevated level of baseline strength), but they will still progress at a rate appropriate to their experience.

Likewise, I don't like to simply use training experience to categorize training age because many people spin their wheels for years without passing the late novice or intermediate stage, as they don't know how

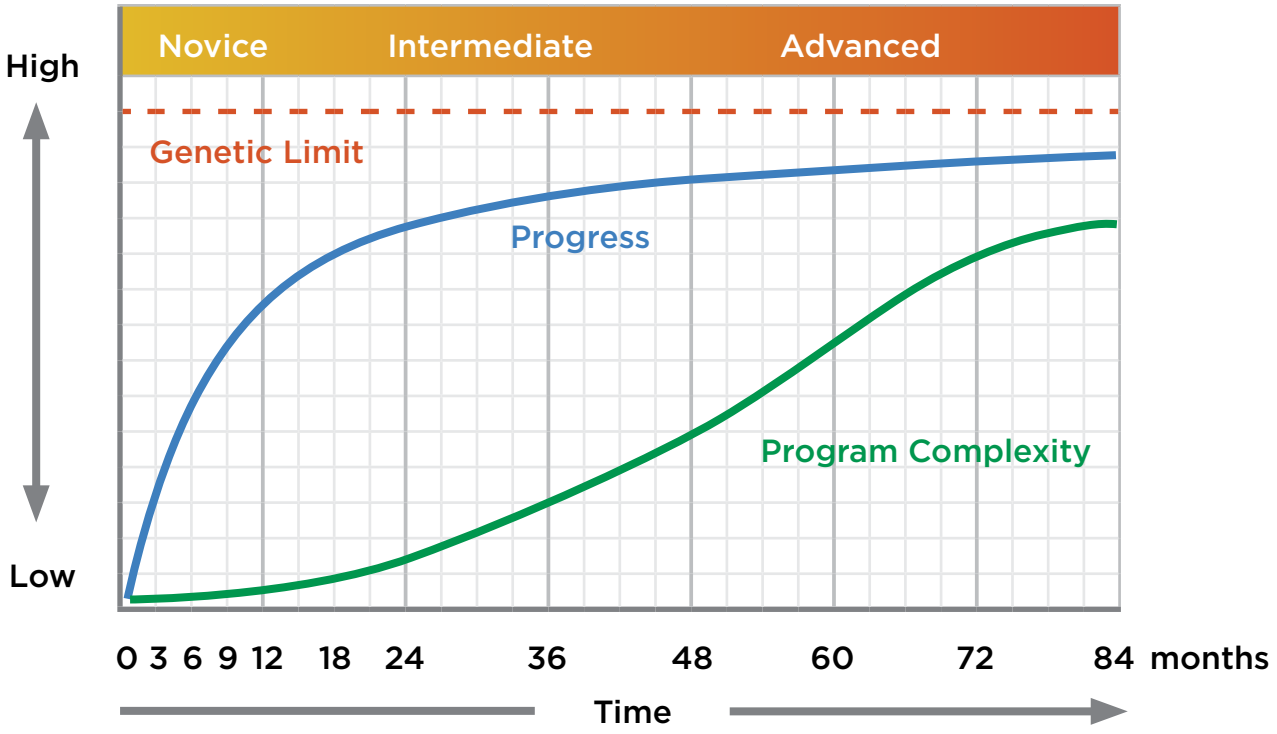
to progress once they reach this point. Thus, some lifters have been hitting the gym for over 10 years, but functionally are still intermediates, relative to their genetic limits.

The further away someone is from their genetic limit; the more easily they will be able to gain strength. This means that even for people who have been going to the gym for a long time if they haven't gained a lot of strength during that time, they may be able to get bigger and stronger pretty quickly with the appropriate changes to their training.

Volume May Need to Increase Over Your Training Career

The key to progressing from novice to intermediate to advanced is providing overload. As I've already pointed out, at the early stages, you can simply add weight to the bar and do the same reps and sets and make progress. But, this strategy often stops working, and when it does you have to find a new way to induce overload. If you physically can't add weight to the bar (because you aren't getting stronger), the solution is often an increase in volume (but not always, and not as a first option).

As in the graph on the following page, the bigger and stronger you get, the slower your progress will be. The same amount of volume will, unfortunately, produce less and less progress the more experienced you become. When your progress stalls, an increase in volume may be just what you need. However, recall that it is possible to do too much volume and negatively affect recovery as we discussed in Level 2. The key is figuring out how much volume is appropriate based on your individual needs and training age.



Progress Versus Progressive Overload

It's easy to get hung up on strength gains. Obviously, if your goal is strength your loads should increase. But, over time, your loads should go up as well even if your goal is hypertrophy.

This is not to say that increasing load is what causes hypertrophy. Muscle growth occurs due to cumulative tension stimulus over time; however, bigger muscles are stronger muscles. Therefore, muscle growth should eventually result in strength going up. But don't get so hung up on strength to the point that you think putting weight on the bar is the only thing that matters, or that doing so is what causes hypertrophy. It's actually the other way around, increased strength is a sign that you are providing an adequate overload for hypertrophy. You not only have to apply a tension stimulus (performing at an adequate RPE) for muscles to grow, but also ensure you have provided enough of that tension (volume; number of sets).

If you are gaining strength on most of your movements, that's a good sign that you are providing adequate overload.

How Quickly Can We Gain Strength?

In *Practical Programming for Strength Training,* the authors suggest that novices should be able to increase their performance workout to workout, intermediates from week to week, and advanced trainees from month to month

Now, obviously there aren't three distinct categories, it is a continuum, but these rules of thumb are useful in that they express how progress slows the more progress you make.

Even beyond the "advanced" level described by Rippetoe, for very high-level athletes progress can be even slower. Elite, natural bodybuilders may only add 1 lb (~0.45 kg) of lean body mass to their stage weight in the next competitive year; elite-level powerlifters may only add 15–30 lb (~7–14 kg) to their three-lift total from one season to the next (5–10 lb per lift), and some of the highest level Olympic lifters may only add 17–25 lb (~8–11 kg) to their two-lift total in a four year Olympics cycle.

Thus, our approach to progression should differ between lifters of different experience levels. However, before we get into how we provide overload at different levels, we have to discuss how we manage the fatigue of training as well; enter deloads.

Deloads, Unloads, Tapers, And Light Microcycles

We know from the previous chapter/level that it is necessary to gradually increase training intensity and volume in order to keep making strength and muscle mass gains. We also know from the discussion in the section on volume that this cannot continue forever linearly, as residual fatigue will build, hampering performance and eventually affecting our fitness.

This is why since the dawn of training programs, athletes and coaches from all disciplines have included periods of training where the overload is purposely less, or a week off is taken, or some plan to mitigate fatigue is emphasized. I've heard these periods referred to as light weeks, unloads, and other terminology, but these days, this is often referred to as a deload.

Simply put, this is just a period (typically a week) where the volume of training is less compared to your moderate or hard weeks of training, and the intensity might be lower as well (but not necessarily). The structure

of a deload is largely informed by the research on training 'tapers' (the same concept as a deload, but specifically prior to testing or competing to improve performance). However, I want you to think of these periods not as "special" or "different" from normal training, and rather to realize that they should be incorporated into periodized plans because they can optimize your rate of progress for a number of reasons.

Deloads can prove beneficial because they help to reduce fatigue and thereby allow the expression of improved performance. As covered in the Fitness-Fatigue Model, when we accumulate fatigue, we aren't able to perform to our full potential. In strength training, this is when we can't lift as heavy or do as many reps as we normally would, which is necessary to drive further training adaptations.

Accumulated fatigue is a common cause of training plateaus, but with a deload, we can expect to reduce fatigue, which then allows you to train harder and start making progress again as a result, in the time after the deload.

Likewise, deloads may also reduce the risk of injury. When we train, the entire body is loaded including bones and connective tissues, not just the muscles. When we accumulate fatigue, we have greater risks of experiencing pains and injuries. The deload helps to prevent injury by allowing the connective tissues of the body to recover. Finally, deloads allow often-needed mental recovery after especially difficult training blocks.

Introductory Cycles

Something very similar to a deload is an intro cycle. These are quite simple, they are put at the beginning vs. the end of a block and they serve the purpose of acclimating you to a new (or "new" in your recent training history) level of fatigue.

If you jump right into doing 20 sets per muscle group and training near failure, but previously were only doing 10 sets per muscle group at a lower RPE, things aren't going to go well. You'll initially get a crippling level of muscle damage (soreness) that will prevent you from being able to perform the target volume, that could have otherwise been avoidable.

The solution (well, besides not doubling your volume in the first place)

is to do an intro week, where you would do 75% of the volume you plan to be doing, at a slightly lower RPE than you *plan* to target.

Deloads are useful after a volume block when going into an intensity block (which I'll explain later in this chapter) to dump fatigue before doing higher-load, higher-RPE training. However, an intro week can be useful when finishing an intensity block and moving into a volume block, so you can acclimate to the higher volumes that you are no longer accustomed to. So while they are largely the same concept, they differ in purpose and are structured based on what's coming, vs. what you already did.

Volume Block > *Deload* > Intensity Block
Intensity Block > *Intro Week* > Volume Block

For example, if you finished an intensity block with a week where you did 10 sets per muscle group in the 3–6 rep range at an 8–10 RPE, and you plan to do a volume block next, where in week 1 you will do 16 sets per muscle group in the 6–12 rep range at a 7–9 RPE, you could implement an intro week between the two where you do 13 sets per muscle group (3 fewer) in the 6–12 rep range at a 6–8 RPE (one lower). Doing this would put you in much better shape to handle the transition to higher volume versus jumping straight in.

How To Deload

Again I want to emphasize that deloads shouldn't be seen as "different" from regular training, but should rather be "built into" a periodized plan. Periods of low-stress training should be incorporated into all training plans, but how they are incorporated differs based on training age.

For novices, who do not require complex training approaches, the approach used to manage fatigue is also not complex. When progression is just a simple matter of making linear increases in load, a deload can be as simple as a 10% reduction in the load used the next time that exercise is performed.

As one becomes more trained, the more traditional approach to a taper, of reducing volume while keeping intensity relatively the same [3], becomes more appropriate.

Deloads For Novices

As the novice gradually increases the intensity session to session, there will be a point where progress stalls. A good rule of thumb is that if you are unable to complete the target sets, reps, and load for two sessions in a row, reduce the intensity by 10% while using the same number of reps and sets. The 10% lighter load should feel easy and will allow recovery. Then, the next session you return to the load you used in the session prior to the deload and attempt to pick up the progression once again.

Deloads After The Novice Stage

For everyone else besides novices, you will more than likely have a more systematic approach to training in order to achieve progress. Different weeks will have differing levels of stress, and deloads should simply be built into your periodization as a way of progressing while managing stress. If you have high, medium and low training-stress microcycles (weeks), deloads are simply your low-stress training weeks.

As a decent rule of thumb, a week such as this should be roughly half of your normal training volume (normal being the volume representative of a medium stress week), with an intensity similar to what you are used to handling. An easy way to accomplish this, is to just drop a set or two from each exercise, and reduce the rep range or rep target by two repetitions or so but while using the same loads so that the RPE drops as well. Meaning, while the loading is similar to what you might be used to, you are simply doing it for fewer reps and fewer sets so you are further from failure. For example, 3x10x200 lb becomes 2x8x200 lb. Volume load is just about half, and the RPE for each set should be about 2 points lower.

However, to fully understand how to integrate deloads into training progression, you need to see how to actually set up training progressions in the first place. So, now let's look at some sample progressions for novice, intermediate, and advanced trainees in which these concepts are incorporated.

Progressing As A Novice Trainee

Novices can improve their lifting stats quickly because they have a lot

of room for progress. When you are just starting out, there will be a lot of things to learn so it is wise to start on a simple program, limiting the number of exercises and learning to train the whole body efficiently using compound exercises.

If you're using barbell exercises, use a weight that leaves a little bit in your tank in order to make sure that your form is correct and then add 5 lb to the bar each time you train. On heavy compound exercises like the squat and deadlift, you may be able to add 10 lb each time.

There will be a point where your progress slows down and it is not possible to make even 5 lb increases session to session. If you have micro plates (1 lb) you can use those to keep increasing the weight each session. If you don't have access to these (as with most gyms) increase the weight every other session, focusing on the feeling of it being easier in that second session (same weight, sets, reps, lower RPE).

Here is an example of how a novice male, without micro-loading plates, might progress with one of the large compound movements over the course of their first 29 training sessions.

Note: The following example is not meant to imply that only five by five should be performed; this is just an example of how to progress if, on a given day, five by five was programmed.

Example Novice Progression Using 5x5				
Training session	**Load**	**Reps (total)**	**Decision for next session**	**Volume**
1	135 lbs	5x5x5x5x5 (25)	Increase load	3375 lbs
2	145 lbs	5x5x5x5x5 (25)	Increase load	3625 lbs
3	155 lbs	5x5x5x5x3 (23)	Same load	3565 lbs
4	155 lbs	5x5x5x5x5 (25)	Increase load	3875 lbs
~omission~				
22	245 lbs	5x5x5x5x5 (25)	Increase load	6125 lbs
23	250 lbs	5x5x5x4x3 (22)	Same load	5500 lbs
24	250 lbs	5x5x5x5x5 (25)	Increase load	6250 lbs
25	255 lbs	5x5x5x4x3 (22)	Same load	5610 lbs
26	255 lbs	5x5x5x5x2 (22)	Decrease load 10%	5610 lbs
27	230 lbs	5x5x5x5x5 (25)	Increase load	5750 lbs
28	255 lbs	5x5x5x5x5 (25)	Increase load	6375 lbs
29	260 lbs	5x5x5x5x5 (25)	Increase load	6500 lbs

This is just an example and obviously, you will want to adjust according to how you progress. But, pay attention to the following points:

- The load is increased linearly using the same rep range. This is called 'single progression' (of load) or often referred to as linear progression (not to be confused with linear periodization). As a novice, you don't need much volume to progress, and if you are getting stronger session to session, it's a sign that volume is where it needs to be.
- When the target repetitions cannot be completed, the load is

maintained for the next session, and the repetition targets are attempted again.

- Reduce the load by 10% if you fail to achieve your target reps (or load) in two consecutive workouts. The next workout, return to the weight you were unable to complete the target repetitions with and you will more than likely succeed.

If your progress starts to stall on multiple movements after implementing 'deloads' as described above without a return to progress afterward (assuming 8 hours sleep a night, a slight caloric surplus, adequate protein, balanced life stress etc.), it means the rate of progress you can realistically achieve is probably slower than this single progression strategy pushes for, and thus it is time to consider changing your progression pattern to that of an intermediate trainee.

Progressing As An Intermediate Trainee

This is likely to be appropriate for people that have been lifting intelligently (which should not be taken for granted) for more than 6 months and less than two years, but more importantly, is marked by an inability to consistently progress on a session to session basis.

Some people can get to this stage in a matter of months if they have been using an appropriate program. Some people take years of going to the gym and still don't make it to this stage if what they have been doing is not effective.

Sample Intermediate Trainee Compound Movement Progression – 'Linear Periodization'

Here is a sample progression pattern for intermediate trainees with compound movements. Let's say that we have 3 sets using the 6–8 rep range planned:

- Choose a weight where you can complete 3 sets of 8, without needing a spot and rarely hitting failure on the last set (RPE below 10 on set 3).
- Increase the load and reduce the number of reps the next time you perform a given exercise the following week.

- The 4th-week workout with this movement is a potential deload where you assess if a reduction in load and reps is needed. (More on when to deload later.)
- If a deload was needed, on the 5th-week workout, start over at 3x8 and increase the load the next smallest increment from what you used for 3x8 previously.
- If a deload wasn't needed, do that on the 4th-week workout.

Intermediate Trainee Compound Movement Progression Example - 3 sets of 6-8 reps			
Training Session	**Load**	**Reps**	**Volume**
1	110 lbs	8, 8, 8	2640 lbs
2	115 lbs	7, 7, 7	2415 lbs
3	120 lbs	6, 6, 6	2160 lbs
4	110 lbs	6, 6 (deload)	1320 lbs
5	115 lbs	8, 8, 8	2760 lbs

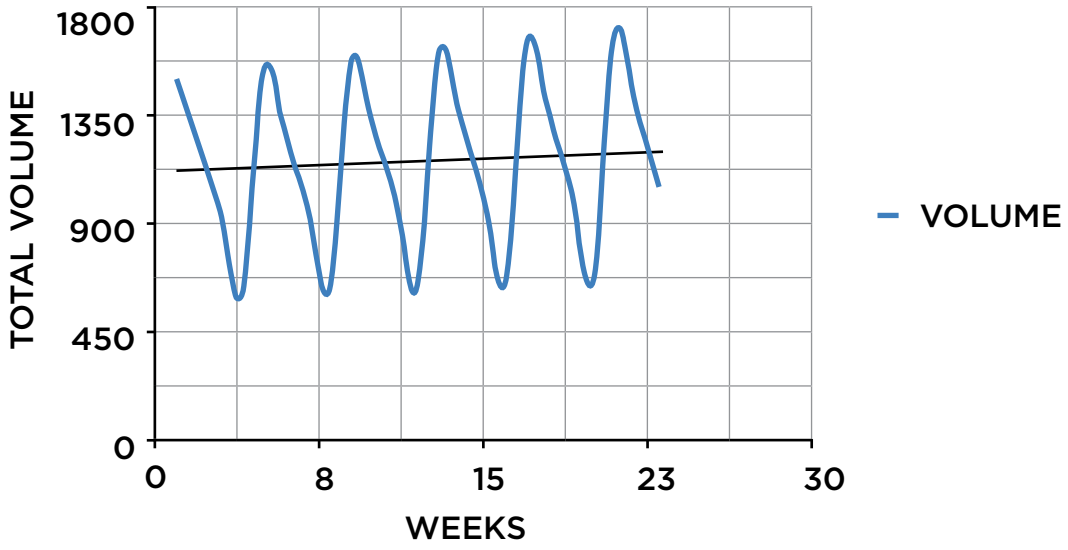
The load, reps and volume will fluctuate workout to workout, but the load being used will increase every repeat of the cycle. This is called 'linear periodization', meaning that intensity goes up as volume goes down.

This approach can also be used with the 3–5, 4–6, and 5–7 rep ranges. In each example, dropping the rep target by 1 rep is appropriate each week with only a 5–10 lb (2.5–5 kg) increase in load week to week. This wave loading intermediate progression can also be used with the "hypertrophy rep range" of 8–12, and in this case, you reduce the reps by 2 rather than 1 each week. So for example, you would do a week of 12's, 10's, and then 8's while increasing the load 5 lb to 10 lb each week (in most cases I would recommend 5 lb).

Wave Loading Periodization Example

Essentially, using this approach results in 'wave loading', where the same pattern occurs over and over, albeit with increases in load over time. This setup is appropriate when you are doing an adequate volume (number

of sets), which results in steady increases in volume load wave to wave as strength increases. The graph below illustrates how a 4-week period (a mesocycle) ending in a deload, when successful (you can increase loads), results in greater volume load relative to the last mesocycle due to the steady strength increases. If you are able to keep making the load increases each cycle, it means the volume is appropriate for you as it is producing the adaptation. However, this approach is really only appropriate for compound lifts or exercises where the absolute load being used is relatively high.



Sample Intermediate Trainee Isolation Movement Progression – 'Double Progression'

For isolation exercises, it is not realistic to increase load as quickly. If I use myself as an example, I've increased my bench press from 155 lb to 363 lb (~70 to 165 kg) over the course of my lifting career. This is more than a doubling of my strength in the 14 years that I have trained and in absolute terms, that is an increase of 208 lb (~95 kg). Thus, at the intermediate level, it is reasonable to expect to make increases of 5 lb (~2.5 kg) on compound lifts such as this every 5 weeks (as outlined in the progression above) for a long period of time. However, with isolation exercises this is not a reasonable expectation.

Imagine trying to add 5 lb to your dumbbell bicep curl every fifth week—it is simply an unrealistic amount of progress. That would be ten, 5 lb increases every year, requiring an addition of 50 lb (~23 kg) to your bicep curl each year when most people can't even dumbbell curl 50 lb

for one strict rep. So, obviously we can't increase isolation exercises as fast. Think about it in relative terms: If your max squat is 355 lb (~160 kg), a 5 lb increase is an increase of about 1.5%; If your max dumbbell curl is 50 lb a 5 lb increase is an increase of 10%. So that same 5 lb increase is over six times more of an increase for a curl than a squat.

Therefore, we need another approach for isolation exercises. One such approach is to add reps week by week, instead of increasing load. Essentially, where we are adding volume before increasing intensity, rather than adding intensity while decreasing volume. This is called double progression — we don't progress the second variable until we progress the first.

The first variable in this example is repetitions. In this example, we'll use 3x12–15 as the target (though this can be done with the 8–12 or other rep ranges as well).

- Choose a load you can do at least 3x12 with, without hitting failure on your third set.
- Add reps each week, trying to get to the goal of 3x15. Take as many sessions as you need to achieve 3x15. Avoid hitting failure until the last set, or you'll sabotage your next sets.
- In the example, we have the 4th week as a deload (more on when deloads would be later). Regardless of what happens in the week prior to a deload, in deload weeks go to the bottom of the rep range and just do two sets (12, 12).
- After the deload you will hopefully come back, find yourself recovered and improve performance (in the example it shows the hypothetical person gets 15, 15, 14). Then in the next week, 15, 15, 15.
- Thus, now that the target is met, in the next session we increase the load, once again working back towards 3x15. There is no preset time frame or pattern for when this occurs, you just go up in load once you achieve 3x15.

Intermediate Trainee Isolation Movement Progression Example - 3 sets of 12-15 reps			
Training Session	**Load**	**Reps**	**Volume**
1	40 lbs	14, 13, 12	1560 lbs
2	40 lbs	14, 14, 12	1600 lbs
3	40 lbs	14, 14, 13	1640 lbs
4	40 lbs	12, 12 (deload)	960 lbs
5	40 lbs	15, 15, 14	1760 lbs
6	40 lbs	15, 15, 15	1800 lbs
7	45 lbs	13, 12, 12	1665 lbs

This is an example of how an intermediate trainee can still make pretty visible linear progress on a more or less week to week basis. Also, if going up in load after adding reps is too difficult in a narrow rep range such as 8–12 or 12–15, you can widen the rep range to accommodate load progression if you simply can't progress that quickly. Meaning, when the absolute load on an isolation movement is so low (e.g. going from 20 lb to 25 lb on lateral raises is a 25% increase) that the next jump in weight is too heavy to allow training in the same rep range, you can use double progression in a wider rep range. For example, let's say you did 3x12x15 lb on lateral raises building up from sets of 8, but you could only do 7 reps when you went to 20 lb, then it might make more sense to do double progression from 8–15 reps vs. 8–12 on this movement.

Also, this progression pattern isn't just restricted to isolation exercises. Any movement that forces a larger jump than you would otherwise prefer is a good candidate for double progression. For example, smaller individuals using DB compound movements are forced to make a 5 lb jump per dumbbell, which is often too much. This would be a good time to use double progression.

Finally, for those focused on strength as an indicator of progress, remember the ability to add reps with the same load is an increase in strength; and being able to add more reps tells you that the stimulus is

adequate to make you adapt.

Progressing as an Advanced Trainee

This is for people who have gained 80–90% of their genetic potential in terms of strength and/or hypertrophy, and are seeking to get the remaining 10–20%.

For the purposes of progressing you can consider yourself advanced if you have been seriously training in an intelligent manner for more than two years continuously, the rate of progress has substantially slowed down compared to what it was in your first year or two of training, and most importantly even when doing everything right you can't meet the progression timelines listed above for intermediates. Notice, I don't define advanced by your development of muscle mass or strength. I have trained lifters who developed natural, pro-caliber physiques in their first year of lifting, or who attained an elite total one weight class higher than the one they compete in after one year of training for powerlifting. Yes, in terms of performance these athletes are elite, but in terms of their personal genetic potential, they were still intermediates (as scary as that may be).

On the flip side, some people just don't have the natural genetic talent to perform at an elite level compared to others in the field but are still advanced in terms of how close they are to their own potential; how quickly they can progress and thus, how they should be training.

I'll use myself as an example. I've been training progressively for about 14 years. Currently, on a good day after a strength phase and a taper, I can total ~1400 lb (~635 kg) on my 3-lift powerlifting total at 198–205 lb (90–95 kg) body weight. In unequipped drug-free powerlifting, this is a decent total, it's a solid 400 Wilks score. However, at IPF worlds, it would place me in the last or second to last position (not that I would qualify), with the best lifters in my weight class hitting around and above an 800 kg total. I'm not an elite powerlifter and I'm not "advanced" by that standard, almost certainly never will be, but this doesn't mean I'm done improving, or that I can't improve as an advanced lifter. (In fact, at the time of writing the first edition of this book three years ago, my total was 5 kg lower, so there is hope for us all!) Rather, the point is that

"advanced" for one person, might be a far cry from what "advanced" is for another. However, if your rate of progress is very slow because you are near your ceiling, your training program should follow advanced lifter guidelines, regardless of how you compare to others.

Not everyone can be a world-class performer, but everyone can push themselves nearer to the limits of their own talents. However, to get to the point where you actually find out what you are truly capable of takes time, commitment, dedication, desire and discipline. The more advanced you are, the more clearly defined your goal will need to be and you will need to train accordingly. Progress will be hard fought and slow and not apparent on a week to week, or even month to month basis. So you need to plan your training and measure your progress periodically.

There are a few ways that I recommend people do this.

1. One way is to perform and compare a 1-rep max (1RM).
2. The second is to do as many reps as possible (AMRAP) with a given weight, also known as completing a repetition maximum (RM). An estimated 1RM can be derived from an AMRAP/RM, and then compared to a previous test (these tests don't necessarily need to be performed to a 10 RPE).
3. Finally, and what I primarily recommend, is comparing performances when programming load via RPE to see if strength is trending upwards during a block. For example, you can program a single rep at a 7 RPE prior to doing the rest of your working sets, and this would be your estimated four repetition maximum (a single at a 7 RPE means three repetitions in reserve).

If you want to estimate 1RM from AMRAPs and RPE-based performances, I advise using ~5RM or heavier to ensure a more accurate assessment of strength (the higher the reps you do to estimate strength, the less accurate). For example, you could do a 5RM AMRAP, you could do 2 reps at a 9 RPE (a 3RM, just estimated based on when you believe you have 1 rep remaining), or two reps at an 8 RPE (an estimated 4RM). Then you can calculate an estimated 1RM from that performance.

With that said, you can certainly gauge progress with actual or RPE

estimates of your 6, 8, 10 or even higher RM values; however, you simply shouldn't use these performances to estimate a 1RM as it will be inaccurate and lead to inappropriate load prescription. Rather, if loads are progressing in your higher-rep performances it does tell you that progressive overload is occurring, which is useful for bodybuilders in general, or strength athletes in volume blocks.

In the next two sections, I'll dive into the specific applications of these testing concepts for both strength and hypertrophy.

Tracking Progress When Training For Strength

If you are training primarily to increase your 1RM, you want most of your tests of progress to be semi-specific to your goals. That means, testing that is representative of your absolute strength. For example, a powerlifter would use changes in estimated or actual 1RM strength to monitor progress in the big three lifts (or whatever lifts you are focused on increasing maximum strength on if you are not a powerlifter).

As it's mentally and physically tough to regularly challenge your 1RM, it is important not to do this too frequently (or to do it only at targeted points in your periodization plan). The key is to make sure that the intervals between 1RM tests are long enough that a measurable difference in performance can be observed. Every 6–12 weeks is generally a good time frame for most advanced trainees.

For example, if you're a man of average weight currently squatting 440 lb (200 kg), or a woman of average weight squatting 275 lb (125 kg), it might take some time to make further progress. You might not see progress in the next few weeks, but you may be able to periodize your training to achieve a 5 lb (~2.5 kg) increase in an 8-week period to bring your 1RM up to 445 lb (~202.5 kg) or 280 lb (~127.5 kg).

If you manage to repeat the cycle for a year, it will add up to 30 lb (~14 kg), which is great progress for someone at this level of advancement.

As you can surely imagine, there will be a point where a lifter becomes advanced enough that even 30 lb added to a lift in a year is not a reasonable expectation. In these cases, planning becomes a bigger emphasis, and often strength athletes use a model where a few months are spent simply increasing volume without necessarily expecting a

measurable increase in strength. In block periodization (which we will cover in detail later), this is called an accumulation phase [4].

After a new level of work capacity has been established in this phase of training, and the athlete is able to perform reasonably heavy loads for larger volumes than they could previously, an intensification period is implemented whereby volume is reduced and intensity is increased. This is finished with a taper, leading to strength testing. The entire time spent going from accumulation to intensification to tapering to testing could last up to 4 months. Thus, high-level advanced lifters might only test their strength three times per year (less if they compete, as these function as tests).

By the end of the year, lifters may also need to recover from the work done to get to new strength levels or perform at peak capacity. Such a high level of fitness is typically not maintainable year round. This is seen in all sports; world-class sprinters don't run sub 10 second 100-meter sprints year-round, bodybuilders don't stay in peak condition year-round, and endurance athletes don't set new time trial records year-round either. The same is true in strength sport.

Thus, after the last 'peak' of the season, very advanced lifters may spend the first month or two in the 'offseason' performing lower-volume, lower-intensity training, less specific training, recovering from the peak in performance. In fact, it may be a few months after this recovery period before previous, or new levels of strength, are displayed.

However, this doesn't mean that high-level lifters only know their strength levels a couple of times per year and during competitions.

For one, your strength doesn't change by large amounts at this stage, so programming loads is a bit easier and predictable. Also as mentioned earlier, you don't necessarily have to do 1RM testing to gauge strength. If you are tracking RPE or using it to prescribe load, you can gauge strength in an ongoing fashion. For example, if you are doing triples at an 8–9 RPE, you know that the load you used is roughly your 4–5RM depending on how fresh you are.

Additionally, there is a time and a place for testing strength without testing 1RMs. For example, you could conclude an accumulation block with AMRAPs to see if you have increased your 6RM. Thus, without

necessarily testing 1RM you can gauge if your training is progressing.

Likewise, if you are trying to control and manage fatigue, 1RM or AMRAP testing does not have to occur at a 10 RPE. Advanced lifters, especially those familiarized with using RPE in training, are quite accurate at gauging repetitions in reserve at the completion of a set when they are near failure [5, 6]. Therefore, testing can be performed to an 8 or 9 RPE and the final repetition(s) can be assumed to have been successful for the purposes of estimating 1RM, but not actually performed in order to manage fatigue.

Tracking Progress When Training For Hypertrophy

At the advanced stage of your lifting career, you are not going to be able to increase your muscle mass at a pace that makes objective physique measurement and evaluation possible over any reasonable time frame. Thus, even if you are training to compete in a physique contest (or if you're trying to build a physique like those athletes) it is best to use changes in strength as the measure of progress versus visual assessments, caliper, or tape measurements.

To help you understand why, consider that it is not uncommon for advanced natural bodybuilders to compete every other year, or to take a few years off between seasons to make offseason progress. However, the progress they've made is often subtle enough that one cannot see it until these bodybuilders have dieted down again and competed (and even then, the changes are not often pronounced). In fact, frequently in these cases stage weight might only have increased by a pound or two (if at all, often they get better at maintaining muscle and come in leaner at the same weight, or just come in leaner, competing lighter than prior years). This is not to say large changes in stage weight never occur in natural, advanced bodybuilders, but when they do occur it is almost always a case of improved contest prep practices leading to better muscle retention, versus gaining much more muscle in the offseason.

To further put this in perspective, consider that all the available methods of measuring body composition have typical errors. In all cases, the typical error is larger than the progress that can be reasonably expected to be made in a sensible time period at this level. For example, even

a DXA scanner, the supposed "gold standard" of body-fat percentage testing, might have a + or -5% typical error, meaning that unless you can increase your lean body mass by more than 5% you can't reliably know if you had gained, maintained or lost lean body mass as it could have been covered up by this "noise". However, a 5% increase in lean body mass for an advanced natural bodybuilder might be 9 lb (~4 kg)! Nine pounds is a lot of muscle mass, especially at this stage. If it is even possible for the advanced lifter in question to gain a further 9 lb of muscle, it might take multiple years to do so and obviously tracking progress every few years isn't frequent enough to let you know whether your last training block was successful.

Therefore, you can see why at this level measuring progress by eye, tape measure, calipers or even lab measures is no longer appropriate and measuring performance instead becomes important. In essence, instead of measuring whether or not hypertrophy is occurring, you measure whether or not your training is producing progressive overload, which indicates hypertrophy is likely occurring if your training is appropriately designed.

It is not necessary to perform single rep maxes to test progress. Indeed, as a bodybuilder you may not even include 1RMs in your training at all. You may not even perform any of the big three lifts that powerlifters perform, preferring perhaps the RDL, front squat, and incline bench press instead; likely using more than three lifts to gauge progress as well. In this case you can use periodic AMRAPs to test strength on your primary compound lifts to see how you are progressing. Or, you can perform AMRAPs to a submaximal RPE; e.g. 6 reps at a 9 RPE. You can then directly compare your performance to previous AMRAPS with the same or lighter weights, or if you want to compare AMRAPs with different loads, you can estimate a 1RM (so long as you are using estimated 5RMs or heavier). To do so, you would simply use a 1RM calculator to estimate your one rep max using equations based on your AMRAP, comparing it to your last AMRAPs estimated 1RM.

To do that you can use the calculator we created for you on our site **here**. Just enter the reps you have done and the load. This can be used to assess progress, and also to program load if you are using a percentage 1RM based program in the next phase of your training.

Note:

- When performing an AMRAP with the purpose of estimating a 1RM, it's best to stick with an estimated ~5RM or heavier (e.g. an actual 5RM, or a 3RM, or 2 reps at a 9 RPE, 3 reps at an 8 RPE, etc.). Any higher than that and we start to get out of the range of being able to accurately estimate a 1RM, and thus future loading based on percentages won't be as appropriate.
- Powerlifters can also use AMRAPs to program their accessory movements or gauge progress in periods where volume is the focus. Again, you can use AMRAPs to submaximal RPE's, like a 9 RPE (just enter one more rep completed into the calculator) to avoid entering snap-city™, especially with free weight, technically demanding, high-risk exercises like the deadlift and squat variants.

Do You Even Need to Test Strength?

Consider this, if you just trained to failure all the time, you wouldn't need to test your strength to gauge progress, as you would always be testing your limits. While true, there are downsides to training to failure that make that a suboptimal option.

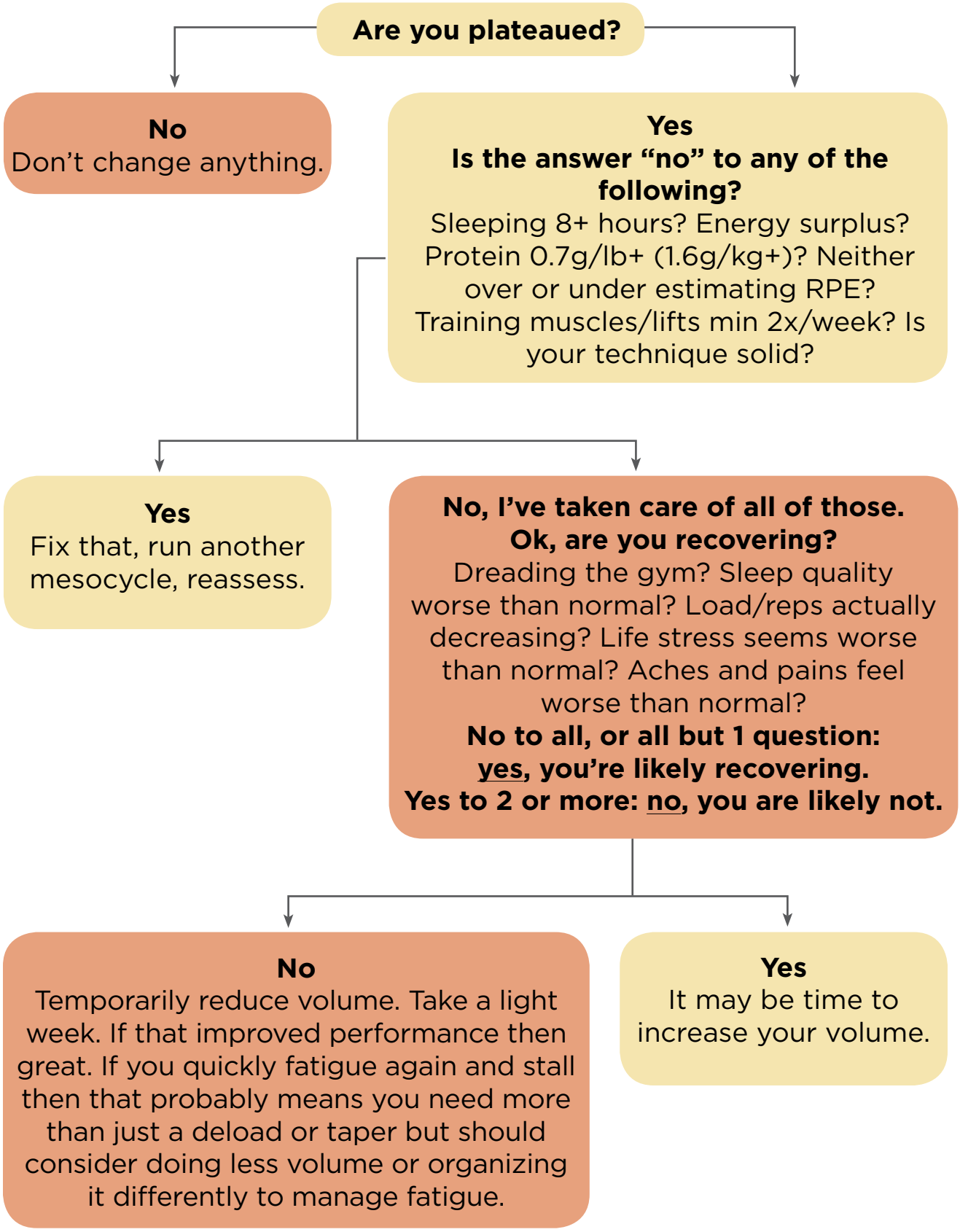
However, savvy readers may have realized as they read the two previous sections, that if you track RPE while training, you have a constant estimation of your RM at any given load. Indeed, a lifter who tracks their training and who can accurately track RPE probably does not need to do an AMRAP or 1RM to test, as they have an ongoing log of their performance trends.

The upsides to testing strength is that you can mimic the competition environment if you are a competitive strength athlete. You can do a trial run of your taper, even do your weight-cut protocol if you have one, and come in on a Saturday morning and run a mock meet. This will not only help you determine the efficacy of the final stage of your meet prep strategy, but also get you more used to the competition experience. However, if you are a physique competitor or not interested in competitively showcasing your strength, there truly is no need to test your strength if you are familiar and accurate with gauging RPE in training.

What To Do as an Advanced Lifter When You Don't Progress

If you get to the point where your strength makes no measurable progress over an 8–12 week period, then you can go back to the progress flow chart discussed in Level 2:

WHEN UNSURE ABOUT HOW TO PROGRESS - FLOWCHART



On Implementing Deloads

If you've taken care of nutrition, sleep, stress, training configuration, and effort, and you're not recovering, it may just be that you need to insert a light week (deload) into your training.

As you saw in the previous examples of progression at each experience level (novice, intermediate, advanced), deloads should be worked into your training. However, a lot more goes into your recovery status than simply volume and intensity and even a well-planned program with appropriately timed deloads will never get it right. It's easy to have them too frequently or too infrequently as you can't predict life stresses, poor nights of sleep, illness, etc.

Thus, my preferred method of implementing deloads (in non-dieting conditions) is to use a checklist after each mesocycle progression to assess recovery.

If you recall from the linear, wave loading style intermediate progression where you step down reps while stepping up the load for three weeks, you have the option of a deload in week 4. However, you may not need it and be able to simply rinse and repeat with heavier loads (i.e. you went wk1: 3x8x100 lb, wk2: 3x7x105 lb, wk3. 3x6x110 lb and you are capable of going right to 3x8x105 lb).

But how do you know if you need a deload or not?

Check out the checklist below. If you answer yes to two or more questions, it's not a bad idea to implement a deload.

Post Block Assessment
Dreading the gym?
Sleep worse than normal?
Loads/reps decreasing?
Stress worse than normal?
Aches and pain worse than normal?*
Yes to 0–1 questions: start next meso Yes to 2+ questions: deload week
**Yes only to aches and pains, high rep week*

As an aside, if you only say yes to having joint/tendon pain, you can probably do a "normal" training week in terms of volume and RPE, but just up the reps to being 12–20 and if that's not enough to be pain free, you could even lower the weight more and use blood flow restriction (BFR)—more on this in a second—for single joint movements. The second rule of thumb though, is that if you go through three consecutive mesocycles of training without a deload, no matter what, run one just to be safe.

BFR training is an interesting method of training used primarily in clinical settings whereby a blood pressure cuff, bandage, wide tourniquet or knee wraps (in the bro world) are applied at the proximal limb (upper thigh or armpit) during training so that venous blood flow out of a muscle is restricted, while arterial blood flow into the muscle is maintained. This prevents metabolites from clearing, results in earlier recruitment and fatigue of muscle fibers, and allows training loads as low as 20–30% of 1RM to be just as effective for hypertrophy (but not strength) as heavier loads (but not more effective [7]). This can be very useful when experiencing joint pain in the knees or elbows as you can maintain a muscular stimulus, with a load much lower than normal which may facilitate joint recovery [8]. So if you do happen to answer "yes" to the specific question related to aches and pains due to elbow or knee discomfort, you can swap out single joint exercises for BFR versions where you use a knee wrap (or flexible bandage, or even a specialized wrap sold for BFR specifically) wrapped to a 7/10 tightness. There should be no tingling in your limb and your limb shouldn't change color (shouldn't turn purplish), and if either happens it's too tight. Then, perform your normally programmed number of sets to failure using 20–30% of 1RM.

On Making Volume Decreases:

- If you've taken care of nutrition, sleep, stress, your training configuration (appropriate spread of training stress across sessions), and RPE is appropriate, and you're not recovering, and you've performed a deload but quickly find yourself in the same under recovered position again, you probably need to cut back on the volume systemically. You are probably simply doing too much,

such that only a microcycle or two puts you in the hole requiring a deload, which is an inefficient ratio of stress to recovery.

- In this case, you need to simply do less volume. A decent place to start for a volume reduction is ~20% across the board in terms of sets per muscle group/movement. So if you were doing 15 sets for a muscle group or movement, you'd go down to 12. Then, see if you can progress more consistently without having to constantly address overreaching.

On Making Volume Increases:

- Very frequently, a technique issue is preventing you from getting stronger, or bigger and adding more volume is not the answer. It's a good idea to regularly evaluate your form, either with a coach, or video feedback compared to an example of good form (check out **The 3DMJ Lifting Library** in the resources section) or by some other more objective method.
- If your technique is solid and all other potential bottlenecks are not causing the plateau (sleep, nutrition, life stress, training organization), you can increase volume by adding more sets across the board, on specific exercises, or by adding more exercises to your workouts.
- If you've plateaued on multiple upper and lower body lifts or muscle groups, adding 1–2 sets (yes just one or two) per muscle group/movement pattern is a good place to start. When working in the 10–20 sets per muscle group/movement pattern range, that's a 10% increase in volume, which is a good increase.
- If you are plateaued on a lift or muscle group that you specifically wish to improve then you should probably consider doing more sets of that lift or for that muscle group. For example, a powerlifter that has stalled on their squat who is doing 12 sets of squats and squat variants per week, should probably try doing 1–2 more sets of squatting as a first go-to solution.
- For strength athletes, it is also possible that a stall is simply due to needing more muscularity, so there are times when adding more accessory movements (or sets on accessory movements you are

already doing) might be a good idea. If you are a lean powerlifter at the top of your weight class and you are plateaued, for this reason, it may be worth considering moving up a weight class.

— *Add the volume in an intelligent place*. We'll talk more about this in Level 4: Exercise Selection.

On Making Training Frequency Increases

As you add more volume, remember from Level 2 that you don't want any day to get overloaded. So, you need to think about when it's time to add more days of training to accommodate volume increases. If you're starting to push the limit of how much quality training you can perform in your sessions (if you start to notice performance dropping off for a given lift, type of lift—pushing, pulling, squatting—or muscle group), consider adding another training day to spread out the work more effectively.

Overview Of Periodization Models

'Periodization' is simply the process of organizing training into periods. These periods are followed in a logical order, for the purpose of optimizing long-term adaptations, while avoiding stagnation and injury. Single weeks of training are often referred to as microcycles, longer blocks of training often lasting one to two months are called mesocycles, and the entire training plan for a given period (often a season or a year) or a collection of sequenced mesocycles is called a macrocycle [8].

Periodization encompasses the manipulation of a wide range of variables to include volume, intensity, frequency, rep range, exercise selection, exercise order, and rest intervals, etc., and that is why it is placed outside The Pyramid, as it is an overarching theme relevant to all levels.

There are many different periodization models. As a novice, the periodization approach you utilize will likely not make a difference in terms of the gains you make [9, 10]. However, as an intermediate or advanced lifter, the organization of your training becomes more important and can make a difference [11-18]. Thus, a discussion of the various models is needed.

We will cover linear periodization, block periodization, and undulating periodization (specifically daily undulating periodization, often abbreviated to DUP) as they are the most common models in practice.

Linear periodization also known as Western periodization is a model of training planning in which volume decreases as intensity increases over time.

In the original Western periodization model, this was manifested by athletes going through different phases of training for preparation, competition, and the transition out of the competition season back to the offseason. Typically, this started with months of training dedicated to higher-volume, lower-intensity work, such as hypertrophy and muscular endurance work, followed by months of training dedicated to lower-volume, higher-intensity strength training, and culminating with lower-volume power training before tapering and peaking performance for competition.

Over the course of the model, training becomes more sport-specific as the athlete gets closer to competition. Hypertrophy and muscular endurance build the base of fitness and structural adaptations. Then, the strength mesocycle increases the ability to recruit the newly added structure to produce higher forces.

Finally, the athlete trains to develop power by lifting lighter loads as fast as possible. The adaptations from high-velocity training combined with the adaptations from the strength phase mean greater power output (power in physics is force multiplied by velocity). This final phase is the most sport-specific for most athletes as they are typically moving their bodies, opponents' bodies, and lightweight implements like balls, pucks, rackets or bats through space. Therefore, light-load, high-velocity training is thought to have the most functional transfer to sports performance.

However, it's important to note that all periodization models are intended to be adapted according to the unique demands of each sport. For example, low-load, high-velocity power training is less specific to a strength athlete than actual strength training. Yet, in the traditional Western model power comes after strength.

So, for a powerlifter would you conclude a peaking cycle with 40% of

1RM jump squats? No, you would continue from the strength phase, doing lowered volume, high-intensity strength training, which in the case of a powerlifter would be more sport specific. A simple example of linear periodization in action is in the "Intermediate Trainee Compound Movement Progression" table from a few pages back, in which volume decreases as intensity rises.

Block periodization is arguably a simpler, more flexible form of periodization that shares many similarities with linear periodization but was developed to address some of the potential shortcomings that come with the traditional linear approach.

Block periodization divides the macrocycle into 3 (generally) separate blocks (mesocycles), with different goals for each block. Like linear periodization, it starts with a high-volume, lower-intensity block, then moves into a lowered-volume, higher-intensity block, then culminates in a taper to peak performance.

The main difference between block and linear models is that the mesocycles are shorter than in linear periodization. In traditional linear periodization, one spends multiple months training only for hypertrophy, before then moving on to only train strength for multiple months. One critique of this approach is that during this extended period of training for only one goal, the adaptations from the previous periods start to degrade. To address this, block periodization uses mesocycles for volume and intensity that last typically no longer than a month and a half. Mesocycle length can be adapted to the number of competitions that need to be peaked for within a season. Additionally, a volume block doesn't necessarily need to be devoid of high-intensity work, it just needs to be higher in volume and lower in intensity relative to the intensity block that follows it. In many ways block periodization is the same concept as linear periodization, but with a more flexible approach to meet the demands of athletes who might need to peak multiple times in a year.

Undulating periodization is a form of periodization that has more frequent changes in repetition ranges and intensity zones.

Daily undulating periodization (DUP), is a form of periodization that changes training variables each training session within a week. This can

be performed simply by varying the rep range used on each day, or by designating different days of the week with different training goals. For example, you might simply do 10's on day 1, 5's on day 2, and 8's on day 3, or you might have a "strength day", a "hypertrophy day" and a "power day" all in the same week.

DUP is just one form of undulating periodization. In fact, you can also have weekly undulating periodization or WUP. In this model, an entire week is dedicated to a specific rep range or training goal. Like block periodization, undulating models of periodization were developed to avoid the potential pitfall of losing previously attained adaptations associated with linear periodization. The proposed solution in undulating periodization is that each of the training goals (hypertrophy, strength, and power) are trained simultaneously in either a day to day (DUP) or week to week (WUP) fashion. Once again, the theoretical advantage is that this approach avoids detraining any one of these adaptations.

Much like the linear model, traditional undulating periodization is performed in the order of hypertrophy, strength then power. In a traditionally designed DUP model, this might mean training for hypertrophy on the first session of the week, strength on the second session of the week, and power on the final session of the week (if one is using a three day per week training setup). Using a WUP model, you would dedicate a week to each training goal, in that same order over a three week period.

These undulating models of periodization are sometimes called nonlinear models as well, but this is largely an inaccurate description, as most of the time there is a degree of linearity when you look at the big picture usage of undulating periodization. For example, a strength athlete may alternate between days within the week where they perform 8's, 6's, and 4's when they are a couple months out from a meet, but in the final weeks might be doing 5's, 3's, and 1's... a DUP model that is linear over time. In fact, these different models share many similar traits and goals and arguably should be integrated rather than be seen as separate.

Integrating Models Of Periodization

There are endless discussions around which model is better, but it's

important to point out that they are theoretical and conceptual, not hard science. Truly, periodization research has in my opinion, done a disservice to the lifting community in the way that the findings are presented [19].

There are practically an infinite number of ways that you can set up a linear, block or undulating training program. Thus, each study that might show the superiority of one model over another, cannot truly be said to show definitively that one theory of periodization is superior to another [8]. At best, a study can tell you that the specific iteration that was studied was better or worse than what it was compared to. I could easily devise a linear program that would outperform a block program or an undulating program that would outperform a linear program, or a block program that would outperform an undulating program and on and on.

Asking "Which type of periodization is the best?" is the wrong question. It assumes that these models have a clearly defined universal structure, which they do not, and it assumes that they are also mutually exclusive, which they are not either. Programs can have multiple periodization elements, and in many cases, this may actually be what works best.

In fact, if you were to pick a popular program, in many cases you would discover upon breaking it down, that it contains elements of more than one model. For example, if you were to look at one of the versions of Jim Wendler's 5/3/1, when the program is used to train and peak for a powerlifting meet, you would find that overall, the program's macrocycle follows a linear periodization approach, in that intensity gradually increases over time, and volume decreases. Also, you'd notice that there are distinct phases of training, much like in block periodization, and finally you'd see that each week was dedicated to a specific rep target, much like WUP. So in reality, a popular program that you might just think of as "Beyond 5/3/1" or "5/3/1 for Powerlifting" is actually a linear, block, weekly undulating program when broken down.

The take home is that almost every program is linear to some degree. Additionally, very rarely are you doing the same exact rep range every day or week, for months on end, so almost every program undulates. Finally, if you have phases to your training that last a month or so, you have incorporated a core tenet of block periodization. Fortunately, the cutting-edge researchers in the field of periodization are getting away

from the black and white "which model is best" back and forth that is arguably counterproductive [20] and have postulated that in fact, an integrated approach is likely superior [5, 17].

Integrating Linear Periodization

Integrating linearity into a program will pretty much happen automatically if you are following the concepts outlined in this text. Whether your goal is to be as big as possible or as strong as possible, you will start regularly testing your strength as described previously in this chapter to gauge progress.

To set yourself up to let fatigue dissipate, and to display the fitness you've developed in training in order to achieve peak performance when testing, you'll be decreasing volume in the period preceding your 1RM or AMRAP testing. Additionally, to follow the principle of specificity, you would be best served to use higher intensity loading in the training period leading up to your testing because the testing is of course, also high intensity. Doing so will ensure you are prepared to display your strength to the best of your ability so you can gauge your progress, and will mean that you are following a linear periodization plan to some degree.

On a very pragmatic level, let's say that you are following the "Intermediate Trainee Compound Movement Progression" scheme outlined earlier, but you also perform that same exercise on two other days in the week (following the frequency guidelines outlined in the previous chapter), and on each day you follow the intermediate progression scheme with a different rep range. This would be a very simple example of following a linearly periodized, DUP program. If you then organized a phase of training dedicated to higher volume using higher rep ranges, followed by a phase of training using lower rep ranges, then tapered and tested, you would be following a linear, DUP, block-periodized program.

See this example on the next page:

Phase 1 Volume			
	Day 1	Day 2	Day 3
Week 1	200x3x14	210x3x9	225x3x6
Week 2	205x3x12	215x3x8	230x3x5
Week 3	210x3x10	220x3x7	235x3x4
Week 4	200x2x10	210x2x7	225x2x4
Phase 2 Intensity			
Week 5	210x3x12	220x3x8	235x3x5
Week 6	215x3x10	225x3x7	240x3x4
Week 7	220x3x8	230x3x6	245x3x3
Phase 3 Taper & Test			
Week 8	210x2x8	220x2x6	250xAMRAP

- The intermediate progression is followed, with week 4 being a deload.
- During phase 1, the 10–14 rep range is utilized on day 1, the 7–9 rep range on day 2, and the 4–6 rep range on day 3.
- Phase 2 is the same, except it uses the 8–12, 6–8 and 3–5 rep ranges instead.
- Instead of a deload as is performed in week 4, in phase 3 a taper is performed whereby the last day is replaced with an AMRAP to gauge progress.
- Thus, while this is a linear periodized program, it contains elements of DUP and block periodization.

Integrating Block Periodization

As previously stated, this is a form of periodization that divides the macrocycle into 3 different blocks.

Below is just one example of how these blocks can be practically applied.

Block	Length	Goal	Specifics
Accumulation	6 weeks	Work capacity/ Hypertrophy	Build from 12 to 22 sets. 2 then 3 sessions/muscle group or movement weekly to accommodate. Load progresses when able vs. forced. Training submaximal (6–8 RPE). Rep ranges 4–15 depending on goal.
Intensification	4 weeks	Increase specific strength	Drop from 18 to 12 sets. 3 sessions/muscle group or movement weekly to maintain quality. Load and proximity to failure progress weekly (RPE 8.5–10). Rep ranges 2–10 depending on goal.
Realization	1 week	Tapering/ Peaking	Drop sets to 10 per muscle group/movement. Maintain similar loads and rep ranges to previous block, but stay short of failure (RPE 7–9). Maintain frequency.
	1 week	Testing	Main lift AMRAPs spread over week for hypertrophy. 1RMs end of week after 2–3 sets of singles on main lifts on 2–3 days at 5–7 RPE for strength. Halve sets on accessories.

Accumulation Block (~6 weeks)

The first block is known as the 'accumulation block'. This is a phase where we build a solid foundation by "accumulating" volume. In this block the goal is to build muscle mass and work capacity that allows us to handle high-volume training by increasing volume progressively. Intensity is kept moderate in this block and the goal is to increase work capacity; our ability to handle and recover from higher levels of volume.

In this block you would do the following:

- Week 1 starts with a 2x/week training frequency, with 12 sets per muscle group/movement split between both sessions (6 sets per muscle group/movement per session).
- For the next two weeks, increase the training volume by 2 sets/muscle group or movement/week from 12 in week 1, all the way to 16 in week 3 (8 sets per muscle group/movement per session in week 3).
- In week 4, increase training frequency per muscle group/movement from twice to three times per week, to accommodate another increase of 2 sets/muscle group or movement/week such that now you are doing 6 sets per muscle group/movement per session, over 3 sessions (18 sets per muscle group/movement per week divided over 3 sessions).
- For the next two weeks, keep increasing training volume by 2 sets per muscle group each week, such that in week 5 you are doing 20 sets/muscle group/movement per week, and in week 6 you are doing 22 (6–8 sets per muscle group/movement per session in weeks 5 and 6).
- Over the course of 6 weeks, you have now gone from 12 sets/muscle group or movement/week to 22.
- If your goal is strength, utilize the 4–6 rep range for ⅔ of your volume, and the 8–12 rep range for the remaining volume. If your goal is hypertrophy, utilize the 6–12 rep range for ⅔ of your volume, and the 12–15 rep range for the remaining volume.
- Do not train to failure, make sure you have a rep (or reps) left in the tank at the completion of each set to ensure recovery. RPE 5–8 should constitute the majority of this block.
- Only increase load when it is easy to do so without going near failure.

Intensification Block (~4 weeks)

The next block is known as the "intensification block" (although you may hear it called a "transmutation" block in some sports science texts), whereas the name suggests, we increase the intensity.

Volume is reduced compared to the previous accumulation block and instead of volume, the load is increased progressively. From the previous block, you have both increased your muscle mass and your work capacity. This means that you will recover quite well between sessions, and as you adapt to lifting heavier you will be able to push heavier loads because you have more muscle mass to recruit. Your intensity will approach near maximum towards the end of this block.

- In weeks 1 and 2, reduce the number of sets per week from 22 to 18 per muscle group/movement.
- In weeks 3 and 4, decrease to 15 sets per muscle group/movement, and then to 12 sets per muscle group/movement while attempting to increase loads each week.
- If your goal is strength, utilize the 2–5 rep range for ⅔ of your volume, and the 6–10 rep range for the remaining volume. If your goal is hypertrophy, utilize the 6–10 rep range for ⅔ of your volume, and the 3–5 rep range for the remaining volume.
- Intensity should increase and repetitions decrease over the course of the block in a linear fashion. Meaning you'd start with 5's and 10's, and progress your heavy sets down to 2's and your lighter sets down to 6's by the end of the block. Relative intensity (RPE) should approach near maxes as you do so. By the end of this period, you should be hitting 9's, 9.5's, and near 10's on the RPE scale.

Realization Block (~2 weeks)

The next block is known as the 'realization block', where we are able to 'realize' our improved fitness by letting the fatigue dissipate that has accumulated over the previous weeks. This is a taper, AKA a deload, thus it's important to reduce volume to let go of fatigue and maintain intensity to keep the strength adaptations just acquired.

- For the first week, taper training volume by reducing sets performed per muscle group to 10, maintain the same rep ranges from the last block but reduce proximity to failure slightly (RPE 7–9).
- If your goal is hypertrophy do AMRAPs on your main lifts spread over the course of the week. Only doing the 1 working set AMRAP on main lifts. For all other exercises, cut the number of sets in half. If your goal is strength, do 1RM testing on the final day on your main lifts together. On 2–3 previous training days, work up to a single on your lifts at a descending RPE starting throughout the week finishing at a 5 RPE, e.g. singles at 7, 6, then 5 RPE on M, W, F before testing on Sunday, or, work up to a single at a 6 then 5 RPE on T, Th, before testing on Saturday as examples. On all other movements, cut sets in half.

Integrating Daily Undulating Periodization (DUP)

In this example, we're going to integrate the concept of DUP into a training plan. Like traditional Western periodization, DUP was traditionally set up with the same order of hypertrophy, strength, then power to result in maximal athletic performance. However, for strength and physique competitors, it makes a lot more sense to try to peak strength for testing progress, rather than power.

In fact, to investigate this very topic, Dr. Mike Zourdos did his Ph.D. dissertation on a comparison of two forms of DUP in powerlifters. One group followed the traditional model of hypertrophy, strength, power (HSP) and the second group swapped power for strength and performed the goals in the order of hypertrophy, power, strength (HPS).

Traditional DUP - HSP

- Day 1: Hypertrophy — moderate intensity/high volume, think 6–12 reps at RPE 5–8
- Day 2: Strength — high intensity/moderate volume, think 1–6 reps at RPE 8–10
- Day 3: Power — moderately-high intensity/low volume, think 1–3 reps at RPE 5–7

The argument against this model is that there will be a lot of muscle damage and fatigue from Day 1's high volume hypertrophy session, which could compromise the most important session for the powerlifter — the strength session which occurred on Day 2. So he thought of organizing things slightly differently:

Modified DUP - HPS

- Day 1: Hypertrophy
- Day 2: Power
- Day 3: Strength

The strength session was swapped with the power session. The power session for a powerlifter is essentially just heavy technique work. In his study, he had the lifters perform single repetitions at a moderate RPE of 6–8. This is a low amount of volume, a chance to get practice with a decently heavy load but not so draining that you won't always be able to complete the reps (even when suffering soreness and fatigue from Day 1), and this would allow for additional recovery before the most important final session, strength.

In his study, on the strength day he had the participants perform AMRAP's with 85% of 1RM. Interestingly, he found with the HPS modified protocol, the lifters gained more strength and this was likely due to their ability to perform more volume on their strength day AMRAPs [17], presumably due to greater recovery.

So, the point is that even within the same model of periodization, there are variations which can substantially change the outcome. Additionally, it's worth pointing out that there was a linear periodized progression in Dr. Z's study! So once again, don't think in black and white when considering periodization.

Example Approach Using Modified DUP

Here is an example way of implementing DUP for a powerlifter.

- Training is done on four days per week. Your three, weekly off days can occur when desired to break up the four days, but I would advise

after days 1, 3 and 4 as they will be the most taxing.

- The bench press and squat are performed three days per week while the deadlift is only performed twice.
- The deadlift isn't performed with a hypertrophy focus, so it doesn't occur on day 1. Since in the deadlift the eccentric portion is normally rushed and uncontrolled (which is fine if you are a powerlifter but not great for hypertrophy), the squat and accessory movements are intended to get more volume on the associated musculature of the deadlift.
- To prevent excessive fatigue on any given day, bench and squat strength sessions occur together, then on a separate day (ideally with a day off between), the deadlift strength session is performed.
- The amount of accessory work done is scaled to the goal of the day. On day 1 where we are accumulating a lot of fatigue and doing a lot of work, it is high. On day 2 where we are doing heavy technique work and recovering from day 1, it is low. Then on our strength days, it is moderate.

Exercise	Day 1	Day 2	Day 3	Day 4
Squat	Hypertrophy	Power	Strength	Off
Bench	Hypertrophy	vv	Strength	Off
Deadlift	Off	Power	Off	Strength
Accessories	High Volume	Low Volume	Moderate Volume	Moderate Volume

When training a lift for hypertrophy, use moderate intensity and high volume. The key here is to get the necessary volume in. 6–12 reps at an RPE 5–8 is a good range for this. A good chunk of your weekly sets

should be done here, especially in a volume block (if integrating this with other periodization models, as you should). For example, if you are doing 12 sets of bench press per week, you might do 5 on Day 1, 3 on Day 2 and 4 on Day 3.

When training a lift for power, perform semi-heavy singles, doubles and triples. This is our technique day where we practice heavy lifting. 1–3 reps per set at 75–90% of 1RM is a good target (RPE 5–7). This day will be moderate intensity, low volume. No more than 3–5 sets per main lift on these days. The goal is recovery overall. These sets will build the skill and neuromuscular qualities of strength, and also facilitate recovery from the fatigue on Day 1, but will do little to build muscle mass. Thus, the volume on power days should be low in most phases, but might be a little higher in an intensity block (although total volume for the whole block would be lower) vs. a volume block (if integrating this with other periodization models, which again, you should).

When training a lift for strength, use high intensity and moderate volume. 1–6 reps at a 7–9 RPE is a good range, with multiple sets used to achieve the target volume. If you integrated this DUP setup with block periodization (which as you guessed I would say, you should), you would do more sets on this day in an intensity block, and less during a volume block. Also, in the portion of a block where it's time to test strength, use this day for 1RM or AMRAP testing. For example, if you integrated this DUP microcycle into a block, you could linearly periodize these strength days to go from sets of 4 in week 1, to sets of 3 in week 2, to sets of 2 in week 3, to then a 1RM test in week 4. This is similar to what was outlined previously for intermediates, or you can run through this cycle in longer blocks and test every 6–12 weeks after a taper.

On the note of tapers, let's get more into the details of that...

Tapering For Competition

We've talked a lot about the realization phase of block periodization without specifically explaining tapers in detail.

Tapering is a strategy commonly used by not only strength athletes such as powerlifters and weightlifters, but also by athletes in sports like triathlon, track and field, and endurance events that have a single-day competition.

Tapering means to reduce training volume in order to let fatigue go down and express your full potential (fitness) in the form of performance. Tapering is similar to a deload but differs in the purpose:

- The purpose of the deload is usually to reduce fatigue so that progress can continue.
- The purpose of tapering is to allow us to be at our best condition for competition day, a process known as 'peaking'.

Tapering Can Be Done As Follows:

- Roughly 1–4 weeks out, begin tapering to decrease accumulated fatigue. The length of the taper should be proportionate to the time spent overloading and the amount of fatigue you incurred.
- Reduce volume during the taper by ⅓, up to ⅔.
- Maintain or slightly decrease intensity (no more than 10% reduction). Or if you are using a longer taper (3–4 weeks) it can slightly increase as a part of the linear periodized progression with volume decreases.
- In the immediate days before the competition, this reduction in volume can also be done by taking 1–3 days off of training immediately prior to competition.
- However, there is data showing that a light "primer session" may improve performance for 24–48 hours [21]. So it may make sense to have a very low volume, low RPE session 1–2 days before the competition. For example, working up to a 4–5 RPE single on the big 3 and nothing else.

The above tenets are based on research as to what is the most effective method for tapering to allow expression of maximal strength [3].

A very simple method of tapering that can be applied to most powerlifting programs at two weeks out is as follows:

- At 2 weeks out, begin including some days where you train all three lifts, in order (if you aren't already). Use low reps (1–3), but similar percentages of 1RM as you might use on sets of 4–6 (75-85%). This will maintain the intensity of load, but keep RPE low for recovery.

Additionally, the increased frequency of main lift training by doing all three lifts together will not only increase specificity prior to the meet, but also prevent the volume from falling too excessively from this repetition decrease.

- Perform fewer total sets as needed to reduce weekly main lift volume by 50–70%.
- Continue to perform accessory work 2 weeks out, but only do half as many sets.
- Conclude your 2 weeks out microcycle with opener practice. That is, work up to your proposed openers on the big 3, the Saturday before your meet (7 days out). These should be singles at a 7.5–8.5 RPE.
- The week of the meet, start the week the same way as 2 weeks out began, but also perform the second to last day of training 1–2 days before you compete, and work up to a single on the big 3 at a 4–5 RPE and do nothing else, as a primer. Additionally, the last day of training of the week isn't performed. Instead, you compete!

Finally, don't forget how important attempt selection is. A great training plan and taper can be ruined by poor attempt selection on meet day. Be smart, build the biggest total you can rather than focusing on individual lift personal bests. A good strategy that sets you up for success, is to open with your current 3RM, do your current 2RM as a second attempt, and then go for the next incremental personal record *if it's there* on your third attempt. If it's probably not there, make a conservative jump to get what you can on that day.

The next incremental personal best is a 2.5 kg increase in most federations, which might not seem like much. But, if you compete two to three times per year, and you go up 2.5 kg on all three lifts, you're adding 15 to 22.5 kg (33 to 50 lb) to your competition total each year! The only time I'd recommend being more aggressive is if you've made such massive gains since your last competition (common in novices) that you are regularly doing more than your old 1RM for reps in training.

For competitive bodybuilders, peaking for a competition is about appearance and is therefore related more to nutrition than training. In fact, as a bodybuilder in your final week what you do with your training

has nothing to do with reducing fatigue to allow strength to peak — tapering in the traditional sense is only used to test strength periodically throughout the year. For competition, the goal is to peak performance and that means adjusting training to help your carbohydrate load.

Thus, you want to challenge the glycolytic energy system (using glycogen as fuel) in the final week to encourage more glycogen storage (carbs in the muscle). So a simple way to do this is as follows:

- Keep your exercises, split, and number of sets the same but perform 8–20 reps on all training days the week of your competition.
- However, keep RPE at 6–8.5, avoid performing movements that cause soreness (new movements or those with heavy eccentrics at long muscle lengths, like RDLs), and typically aim to finish your split two to three days out.
- On the final one to two days before competition, you can do a full body pump up routine similar to what you would do the day of competition, but RPE should reach no higher than 6 and this should only take 30 minutes.

For more details, especially on the nutritional side of peaking, make sure to check out the Muscle and Strength Nutrition Pyramid book!

Summary

Setting up your volume, intensity and frequency is just the structure of the overall plan, but periodization and progression are how that plan changes and adapts over time. The VIF guidelines from Level 2 will get you in the ballpark, but how you adjust these variables over micro, meso and macrocycles are how you hit home runs.

Make sure to only use as advanced an approach as is appropriate for your training age, and once you get to the intermediate and eventually the advanced stage, be sure to avoid black and white thinking. Use the examples in this chapter of how you can integrate and combine concepts in order to set up a plan for progression that will enable you to fully realize your potential.

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The importance of exercise selection varies depending on perspective. Exercise selection for strength athletes is critical because their sport performance is actually the expression of strength via specific movements. The inclusion of these competition lifts, therefore, is a given. Thus, the focus of a discussion on exercise selection for a strength athlete should be centered on how much time is spent training the competition lifts in relation to assistance lifts.

For hypertrophy, a wide variety of exercises can be used to stimulate growth. That being said, based on the biomechanics of the individual, some exercises may be more effective than others. This is also a relevant consideration for a strength athlete. For example, even though a powerlifter may have to squat, in some cases the squat may not produce balanced development if that specific powerlifter is not well built to squat. Therefore, they might be better suited to doing more assistance work for leg development rather than more squats compared to someone who had limb and torso lengths well suited to squatting.

Physique-sport competitors must also consider not only what exercises best suit their body's lever lengths, but also how to modify their exercise selection to address weak points in their physique. Biomechanics, weak points, and technical skill can all influence what exercises you choose to use. However, in a broad sense exercise selection is primarily differentiated based on the goal of your training—whether you're training for hypertrophy like a bodybuilder or training for strength like a powerlifter.

To begin, we will start with a summary of the recommendations and then dive into the rationale afterward.

SUMMARY OF RECOMMENDATIONS

Exercise Selection Guidelines	
Strength (Powerlifter)	Competition lifts for 50–75% of the total volume. Accessory work for 25–50%
Hypertrophy (Bodybuilder)	1–2 compound exercises for each major muscle group. 1–3 isolation exercises for each muscle group.

Hypertrophy: Exercises and Muscle Groups Trained		
Movement Pattern	**Primary Muscle Groups**	**Secondary Muscle Groups**
Squat (all variations, leg press, single leg variants)	Quads, Glutes	Erectors (if free weights)
Hip Hinge (deadlift variations, good morning, back ext)	Glutes, Hams, Erectors	Scapular Retractors
Vertical Pull (chins, lat pull)	Lats, Bis	Rear Delts
Vertical Push (OHP variations)	Anterior Delts, Tris	Middle Delts
Horizontal Pull (row variations)	Lats, Scapular Retractors	Rear Delts, Bis, Middle Delts
Horizontal Push (flat, incline, decline pushing variants)	Chest, Anterior Delts	Tris (CG/dips: primary), Middle Delts (incline)
Horizontal Hip Extension (hip thrust, glute bridge etc)	Glutes	Hams
Pull Over (DB pullover, lat pushdown, BB pullover etc)	Lats	Tris, Chest
Fly (cable crossover, DB flys)	Chest	Anterior Delts
Isolation Exercises	Target muscle	N/A

Strength: Exercises and Movement/Muscle Group Categories	
Movement/Muscle Group Categories	**Exercises**
Upper Body Push	Bench and variants (CGBP, board press etc.), horizontal and vertical pushing, triceps work
Upper Body Pull	Deadlift and variants (RDL, pause deadlift etc.), horizontal and vertical pulling
Lower Body	Deadlift, squat and variants (front squat, safety bar squat etc.), all lower body accessories

Specificity

Specific Gains In Specific Movements

When speaking in terms of basic exercise selection, the most efficient route to getting stronger in a specific movement is to train that specific movement [1–4].

Simply put, when you do a lot of squats, you will improve your skill with the squat, develop the specific muscle groups that are activated during the squat, and the strength that you gain will be best expressed in the squat itself. In contrast, even if you have developed a lot of muscle mass in the quads, glutes and hamstrings from leg pressing for example, if you are not experienced in the squat, and not used to its motor pattern, you will not be able to exert the same force you could when leg pressing as when squatting. This, in essence, is what movement specificity means.

As mentioned in the Intensity section, specificity also applies to intensity. If you only train with 10RM loads, your strength gains (measured by 1RM testing) will be less than someone who regularly trains with the same volume, but using 3RM loads [5]. This is because a 3RM is more similar from a neuromuscular perspective to a 1RM than a 10RM.

So as you can see, specificity applies to many aspects of training. In the case of powerlifting, a sport of competing with 1RMs on the squat, bench and deadlift, it's essential to develop a high level of skill with

the motor patterns of these exercises and to also train the ability to lift heavy. That doesn't necessarily mean you only train the competition lifts, but for optimal results, they should be a large focus of training.

Your primary movements if training for strength should be the movements that you want to get stronger in.

For hypertrophy, it's a little bit different.

Unfamiliar Movements Are Less Effective For Inducing Hypertrophy

In the world of bodybuilding, it is often advised that you have to swap out exercises frequently so that you will continue to adapt and grow from training. This is often referred to as "muscle confusion" and sometimes touted as an important principle of training. But in fact in some ways, quite the opposite is true — hypertrophy is not as effectively gained when you're not familiar with the movement.

Back in 1998, a study was conducted where the participants performed the bench press, leg press, and bicep curls for 20 weeks. At the midpoint and endpoint of the study, measurements of hypertrophy and strength (1RM) were taken. Increases in muscle mass in the arms were significant at the midpoint as were increases in strength. But interestingly enough, muscle growth in the trunk and the legs was not yet observed. However, at the 20-week mark, hypertrophy in the limbs and trunk finally became apparent.

Why was there a delay in muscle growth in the trunk and legs and not the arms?

Well, the researchers concluded that movements with a low complexity such as the bicep curl are quickly learned, while the time needed to become proficient in compound movements is longer. Additionally, only once you become proficient with a movement are you able to effectively overload the movement to cause muscle growth.

Therefore, the easy to learn bicep curl was mastered quickly and began to cause adequate overload to cause growth, while there was a delayed effect from the leg press and bench press [6].

Initial strength gains on new exercises, especially complex ones, are primarily (but not exclusively) due to neuromuscular adaptations [7].

Once the movement skill is developed over time, the lifter can expose the muscle to progressive overload and more efficiently produce hypertrophy [8]. Thus, even if your goal is purely hypertrophy, you want to become an expert in the movements that you use to drive muscle growth. So it can be counterproductive to set up your training in such a way that you are never able to become skilled at your movements of choice [9].

Now, does this mean that we shouldn't ever change up our exercises and there isn't value in it?

No, in fact, exercise variety is important for optimizing hypertrophy. However, ensuring adequate variety is not the same as the concept of "muscle confusion". So, how much variety is appropriate? We'll talk about this next.

A Degree Of Variety Can Be Important

As much as we don't want to have too large a range of exercises in a training program, or to change things up too frequently, we also don't want to have a rigid adherence to a single movement. In fact, this is true even if your goal is strength.

Like was stated at the beginning of this chapter, for pure strength athletes 50–75% of your volume should come from the specific movements you are trying to get stronger in.

The rationale for why your exercise selection should not solely consist of the single exercise you are trying to improve is encapsulated in a 2014 study that compared a few groups performing resistance training of differing exercise selections. Some of the groups did just the Smith machine squat, and some other groups did the Smith machine squat in conjunction with the leg press, deadlift and lunges. Both groups did the same total number of reps and sets, just spread over one movement, or over four.

After reading my previous section on specificity, you might expect that the groups doing only the Smith machine squat would have gotten the strongest on that movement, but in fact, you'd be incorrect. When comparing the changes in their 1RM strength in the Smith machine squat, the researchers found that the group that did the four exercises made more strength gains than the group that did the Smith machine squat only [10].

So why is it that doing more volume with the one movement was inferior to using multiple different exercises?

Let's think about it like this:

A compound movement is the combination of a bunch of different joints and muscles coordinated together. However, that compound movement may not necessarily be the most efficient way to train each one of those single muscle groups. Think of a chain being pulled until it snaps - it will do so at the weakest link, right? Similarly, if there is a weak link in all of the muscles contributing to a movement, that muscle can potentially limit strength. So perhaps by performing some accessory work with other movements, one can ensure more balanced growth in muscles that would otherwise be limiting factors. This is important from both strength and hypertrophy standpoints.

Now, it's also important to point out that this study had some limitations. The same outcome may not have occurred with the free-weight barbell squat. A Smith machine squat is a complex, multi-joint movement, but it's not as complex as the free-weight squat in which the bar can traverse forwards and backwards—there's less ability to screw up a Smith machine squat. The complexity of a free-weight squat is higher, and it is not an unreasonable notion that perhaps more time spent doing free-weight barbell squats would have been more beneficial from a motor learning perspective.

Also, the overall magnitude of hypertrophy, whether doing the four exercises or the one, was the same. However, they found more uniform growth in all four heads of the quadriceps in the group that did the four movements. While this could simply be due to statistical analysis (values only reaching significance in certain heads), it also could be interpreted that if you do a specific movement you will get specific hypertrophy. If your goal is to get uniform, symmetrical development, you want to have more variety in your movements.

This may sound similar to the arguments that one needs specific movements to "shape muscle" or "peak the biceps". But in actuality, the notion that one can shape muscles or target specific regions of muscle like the "inner chest" is contrary to basic anatomy. However, it is true that muscle is often compartmentalized [11]. An example would be

the four heads of the quadriceps which have varying attachments and muscle actions depending on the head in question. Another example is the clavicular head of the pec, which has different attachments than the sternal head. Furthermore, these different compartments of muscles are preferentially activated based on joint position and angle [12].

For this reason, some researchers have recommended the use of more exercise variety for those wishing to maximize hypertrophy relative to those training for general fitness or strength [13, 14]. However, one must be cautious with how this recommendation is interpreted and how frequently exercises are rotated in and out of use, so as to avoid delaying skill development. Thus, if your explicit goal is hypertrophy, a practical recommendation is to choose 1–2 compound and 1–3 isolation movements for each muscle group. The compound movements should primarily remain static throughout your training phases. Meaning, they should be included in some capacity at all times, while isolation movements due to their low complexity, can be rotated more frequently if desired [9].

Autoregulated Exercise Selection

On the topic of rotating exercises more frequently, a 2017 study compared trained lifters who had to use a fixed combination of three exercises for a given muscle group paired with a specific loading zone (e.g. squat, bench press, etc. @6–8RM, leg press, incline DB press, etc. @12–14RM, and leg extension, cable fly, etc. @18–20RM) to a group that got to choose what exercise they wanted to perform for each session, with each loading zone. Interestingly, the autoregulated exercise selection group made more upper-body strength gains and gained more lean mass than the group with a fixed selection [15].

What this tells us, is that trained lifters have some insight into which movements are best suited for their body, seem to work best when paired with specific rep ranges, and most importantly it tells us that for hypertrophy purposes, it's okay to switch things up within reason. But what is reasonable? Well, the lifters in the autoregulated group still trained each movement 4–14 times over the 9-week study. Meaning, they didn't switch it up so often as to lose movement proficiency, and a large part of why they probably gained more lean mass was because they selected compound exercises more often, and isolation

movements less often, resulting in probably more volume, frequency and stimulus per muscle group than the fixed order group.

How does this translate to you? Well, for hypertrophy goals, your main compound lifts which you use to gauge progress (at the very least a upper-body push, upper-body pull, squat and hinge pattern) should remain in your program for the length of multiple mesocycles, up to a full macrocycle, but isolation movements can be rotated workout to workout or mesocycle to mesocycle. For the goal of strength, you can basically apply the same principle to all non-main lift movements (squat, bench and deadlift patterns).

Efficiency: Compound vs. Isolation

Now that we have established some guidelines for how many exercises to perform based on your primary goal, and how often they can be rotated, the question becomes how do you actually decide which exercises to do?

With exercises that involve multiple joints, you can train more muscles at the same time, accumulating volume for multiple muscle groups simultaneously. Thus, it is efficient to include compound exercises at the core of our programs. Additionally, compound barbell exercises allow you to use heavier loads, which is important so that you can track small relative changes in strength over time to measure progress as we discussed in the previous chapter.

However, recall that the 2014 study showed that training with Smith machine squats exclusively, led to uneven growth in the quads (or perhaps just less growth and this only showed up statistically for a few heads of the quad). Thus, for those focused on maximizing proportional muscular development as their primary goal, it would be a smart idea to ensure a broader exercise selection for balanced development. To do this, it is probably a smart idea to include the use of accessory/isolation exercises in addition to the main compound exercises.

When Training For Strength

Use the compound exercises that you want to be stronger on at the core of your program, e.g. the big 3 in the case of a powerlifter. You should decide your accessory work based on how the accessory exercises

might contribute to improving your main compound exercises. Recall the analogy of the chain breaking at the weakest link — the bench press, the deadlift, and the squat are not always necessarily the best tools to cause muscle growth in each of the muscles that contribute to these movements. Thus, depending on individual needs, other lifts should be included to "assist" the competition lifts.

When Training For Hypertrophy

While it is important that you are familiar with the motor patterns of your main compound lifts, you don't need to be as much of a specialist as a powerlifter. In fact, it might be suboptimal for total body muscular development to only focus on 3 main compound barbell lifts. However, for beginners, their priority is to become proficient with the main lifts as quickly as possible. So for novice bodybuilders or those just starting who have the primary goal of muscle gain, remember you will grow with substantially less volume per muscle group than a more experienced lifter. That means, at the novice stage you don't need to worry much about ensuring isolation movements are included to a large extent. Novices will achieve global hypertrophy without much emphasis on isolation exercises and their time is better spent learning the basic skills of lifting. However, as you get more advanced it becomes important to add in accessory work according to your weaknesses to ensure balanced muscular development.

Weak Points

'Weak points' can refer to a specific strength deficiency in the muscle groups contributing to a lift, or a specific muscle group's lack of development from an aesthetic standpoint. There is a place for isolation/assistance movements to assist in these cases.

Hypertrophy

First let's talk about this from a hypertrophy perspective, where a weak point is generally an area lacking muscular development.

Often, a weak point simply stems from the way you are built genetically. You might have a narrow rib cage and wide hips, and thus you need to focus your efforts on getting hypertrophy in your shoulders and

quads to offset the "narrow" look to your physique to get an "x-frame" appearance. For the most part, there is not much you can do outside of just getting as big as possible to offset structural weak points. It's also important to point out that from a muscular development standpoint, you might not actually have a weak point. For example, you might have big delts and lats, but narrow shoulders, making you look narrow regardless of the fact that you have good development.

However, sometimes weak points develop for other reasons. In some cases, you may not be structurally suited to a certain movement and emphasizing it might not be a good idea from an injury risk or hypertrophy standpoint. For example, if you have extremely long femurs (thigh bones) relative to the length of your torso, you will have to lean very far forward to keep the load of the barbell positioned over your midfoot (your center of gravity) during a back squat. This means that there will be less knee flexion, and more hip flexion relative to someone who can perform the squat in a more upright position. Therefore, the knee extensors (the quads) won't be as effectively stressed as the hip extensors (the lumbar, hips, and hamstrings). Additionally, the stress on your lower back will be higher. In this case, while the squat would effectively develop your posterior chain, it might not be the best choice for posterior chain development if it causes lumbar pain and it certainly wouldn't be a good choice for quad development. So even though the back squat is often considered the "best exercise" for leg development, some people might be better off using the leg press or doing front squats complemented by exercises to train the posterior chain like a Romanian deadlift or other deadlift variants.

Weak points in a physique also frequently arise from issues with how exercises are performed. Doing rows and pulldowns, for example, you may find that certain parts of your back just don't seem to get as much growth as others, or your biceps may take over. You may find that doing pressing you get a lot of growth in your triceps and delts, but not your pecs (or you just don't feel them very well). You may have to modify grip position, angle, and choose variations of an exercise to find what gives you uniform growth.

As a personal example, when I first started doing rows, lat pulldowns, and other back work I had a tough time feeling the main compartment

of my back—the latissimus dorsi. This is the muscle that spans broadly across the back from the lumbar to the mid back and then fans out attaching at the top of the upper arm near the armpit.

I found that when I trained my back I got a lot of teres major activation (the muscle right underneath the armpit on your back that assists the lats) during pulldowns, and I was only getting mid-back activation from my rows. Also, I got a lot of bicep activation from both rows and pulldowns. I ended up developing good arms, mid back and rear delts and essentially more of a 't-taper' instead of the 'v-taper' that we're after as bodybuilders. To get more growth in my lats, I had to do some specific things to alter my approach to rows and lat pulldowns. During experimentation, I found that pulling towards my waist with rows helped engage my lats, and using straps or a thumbless grip helped to get less bicep activation. Doing this as well as actively thinking about the movement of my ribcage and scapulae helped me to get more uniform muscular activation. Once I was able to effectively perform these exercises in a balanced way, I was able to get much more complete back development (by the way, these aren't recommendations for how to train your back, just what helped me, this will be individual).

Proper form is critical to effective training. In fact, there is research to show that when novices are given expert instruction on how to perform lat pulldowns they are able to get better muscular activation in the latissimus dorsi [16]. The take home is that on compound movements that involve multiple muscle groups that all work together to perform the same joint actions, it is not uncommon to struggle with uniform activation and to have one muscle group unevenly perform and to subsequently get unbalanced muscular development.

Thus, proper form is of paramount importance when attempting to build a balanced physique. While I can only teach theory and programming here, and I can't teach you to lift, I would highly recommend the **3DMJ Lifting Library** where I do just that. It's an excellent companion to this text.

Strength

A powerlifter may have a "weak link in the chain" of a lift. For example, you may be able to pull more with straps than you can with just chalk. This is a great indication that your grip strength is what is holding back

your deadlift.

While some might argue that the most specific way to develop grip strength in the deadlift is to simply deadlift more frequently or with more volume, this logically falls flat. If doing deadlifts was the simple solution to lagging grip strength for someone performing deadlifts, the issue likely wouldn't have surfaced in the first place. This is not to say that doing more deadlifts would not strengthen the grip. It certainly would. But perhaps not in proportion to the potential strength of the other muscle groups, or in the most time efficient manner possible.

So for a powerlifter in this predicament, he or she might find that a much more direct way to get stronger in the deadlift would be to directly attack the weak link with specific grip strength training. For example, the lifter might do a partial deadlift from the rack nearly at lockout with a high percentage of their 1RM, and hold the loaded barbell for time. Then, over subsequent training cycles slowly progress the time and the load until the grip strength deficiency is resolved.

But again, this is just one of many potential reasons a powerlifter might need to emphasize non-competition lifts. To use a previous example, let's revisit the back squat. Consider a powerlifter, who like our previous bodybuilder example, has to perform a squat with a great deal of forward lean to keep the bar over their center of gravity due to his or her limb lengths and torso length. To make matters worse, it's very likely that this powerlifter is a low-bar squatter, meaning the bar is placed across the lower traps and supported by the rear delts, versus the bar being placed across the top of the traps in the case of a high-bar squat.

Low-bar squats are often performed by powerlifters to keep the load closer to the center of gravity to give the lifter a biomechanical advantage. In this case, all of the issues the bodybuilder experienced with the back squat would occur, but to a greater extent. However, the powerlifter does not have an option to choose another exercise because the squat is a competition lift that must be performed. Like the bodybuilder, the powerlifter might not get great quad development from squats, and if the vast majority of their lower body training only comes from low-bar squats and deadlifts, they will have great posterior chain development but relatively poor quad development.

Now, the quads definitely contribute to this hypothetical lifter's low-bar squat, it's just that they aren't worked through a very full range of motion due to there not being a lot of movement around the knee (compared to a more upright squat). So in this lifter's case, much like the bodybuilder, it might be a good idea to perform front squats or even a leg press to attempt to get more quadriceps development. That said, the back squat is still performed frequently and emphasized as it is the competition lift and this skill must be developed. But it is just that the volume should be lower to avoid injury and accessory training is emphasized as well so that hopefully when the squat is performed, more weight can be lifted because the quads are better able to contribute.

Many other situations can be thought of which might require a pure strength athlete to emphasize non-competition lifts. Let's take the bench press for example. Let's say that doing a high frequency and volume of the bench press causes you elbow and shoulder pain; however, if you limit the frequency and volume of your bench press you make slower progress or even stall. In this case, instead of throwing up your hands in frustration or frequently injuring yourself stubbornly doing a high volume of benching, it might be prudent to only perform the frequency and volume you can get away with on the bench press while avoiding elbow and shoulder pain. Then, accepting that you can't perform the requisite volume with the bench press, you perform more volume with a close-grip bench press, military press, or dumbbell press in an attempt to get the best results possible for your situation.

Now, these are just examples, but I could give hundreds more. There is a huge amount of variation between individuals in terms of height, torso length, limb length, upper to lower limb length ratios, limb length to height ratios, and limb to torso length ratios. There are also situations where injury or pain prevention might require you to make certain decisions to use movements outside of the big three to a greater degree. Due to these individual differences, and based on the phase of your periodized plan, the volume dedicated to accessory work can fluctuate between 25 to 50% of your total training volume.

Movement Weak Points and "Sticking Regions"

Up to this point I've addressed weak points mostly from a musculature

perspective, and with a nod to limb lengths. However, there are schools of thought that focus more on the output; weaknesses in portions of the movement itself.

Common in powerlifting circles, often a "sticking point" or region is targeted in one manner or another either with pausing at or around these points, by using specific variations of the big three that are thought to train that point differently, or by using variable AKA 'accommodating resistance' (e.g. bands and chains—more on this in a moment) to change where the weak point of a lift is. Some of these approaches have merit, while others operate under flawed assumptions.

The tactic of using a pause at a given point in a lift *can* be effective, depending on how it is performed. For example, if you "stick" at a given point in the range of motion of a lift, does it make sense to pause at that point in training? I've heard it argued that this allows more time spent exerting force at the point you are weakest. However, that doesn't make sense if you think about it for two reasons:

1. Intentionally pausing at a point in your range of motion requires you to *reduce the force output at that point*, so that the bar stops moving. Do you want to train to exert less force at your sticking point? Probably not.
2. The visible portion of the range of motion where the bar sticks is *after* where you could no longer generate enough force to maintain bar velocity. When you hit the brakes in your car, you screech to a halt *in front* of where you tried to stop. So, are you even pausing at your sticking point at all?

However, this doesn't mean pausing is always useless, or counterproductive. Slowing down a portion of a lift gives you more time to be aware of what your body is doing and the position of the bar relative to you at that point. Done intentionally and prescribed logically, pauses can make sense.

There is nothing wrong with pausing below the knee on a deadlift, for example. If you often let the bar drift out in front of you, pausing here might teach you to keep the bar close. This approach may be a useful way to ingrain a better movement pattern by breaking the lift into

"chunks" that are more manageable from a motor learning perspective.

Likewise, if you lose tightness as you come out of the hole on squats and struggle to control the 'bounce', pausing in the hole allows elastic energy to dissipate and gives you time to pay attention to, and focus on generating tightness. Doing pause squats may allow you to better control the transition from eccentric to concentric when you go back to regular squats.

As a final example, as you get closer to competition, you might decide to do longer pauses on your chest before pressing the bar up when benching. Given you aren't always sure how long you'll have to wait for a press command in competition, getting better at generating force from a dead stop may help you on comp day.

Also, don't get me wrong, there is merit to the idea of training to exert more force at a given portion of a range of motion where you are weaker. As I discussed in Level 2, strength is specific in many ways, including at specific joint angles. While pausing in the middle of a dynamic repetition won't address this deficiency for the reasons I gave above, there are some approaches which might help address such weak points [17].

Isometric (pressing against an immovable object) training at the point in a range of motion where you are weak may be a potential way to get stronger at a sticking point. However, the problem remains that exactly where you are weak, versus the visible point where momentum stopped carrying you through the sticking point, is hard to discern. (To be exact it would require lab equipment or at least video analysis.)

Another cause of sticking points in certain lifters is when a technical fault predictably occurs near maximum. Some lifters perfectly execute squats at 90% of 1RM and lower but perform "squat mornings" (the hips shoot up out of concert with the torso, back tightness is lost and it slightly resembles a good morning) when going heavier.

Another common technical fault at maximal loads is when the normally rigid thoracic (and sometimes lumbar) spine moves into flexion during deadlifts. These faults (and others) can prompt or exacerbate a sticking point. Likewise, it is certainly reasonable to use variations on the main lifts which "punish" these movement faults and "reward" when they are avoided (as my friend Mike Tuchscherer would say). For example,

a front squat will be almost immediately dumped forward and lost if your hips shoot up and you lose back tightness. Maintaining a proper rack position requires intentional focus and provides an anti-flexion challenge to the back extensors. Other such exercises that highlight when you make an error can be used in similar scenarios for other technical faults that might lead to a sticking point.

Finally, variable or accommodating resistance is commonly used to address sticking points. By adding chains to a barbell, more and more links uncoil off the ground as the bar is lifted further from the floor during the concentric phase, making the load progressively heavier. Similarly, with bands attached to the bar and anchored to the floor, the resistance on the bar increases during the concentric as the bands stretch. Either method changes the resistance curve of the movement, as typically the squat is most difficult in the mid-point after ascending from the hole, the bench press a few inches above the chest, and the deadlift is (typically) hardest below the knee. Subsequently, these movements get easier (not always) as you approach lockout. Adding accommodating resistance alters this slightly such that as you gain a biomechanical advantage, load also increases.

The use of bands and chains gained original popularity with equipped lifters. To some degree, bands and chains mimic the strength curve of lifting with suits, knee wraps and bench shirts. This lifting equipment provides most of its assistance in the early stages of the concentric phase, and less assistance you approach lockout. However, suits, wraps and shirts are difficult to get in and out of, uncomfortable, and are time-consuming to train with. Subsequently, training in equipment is not done year-round. Instead, a fair amount of time is often spent training raw with accommodating resistance, to provide a bit more specificity to lifting in equipment.

The latest meta-analytic data suggests there is not an advantage of training with accommodating compared to traditional resistance [18]. However, it is worth noting studies haven't assessed the effect of traditional versus accommodating resistance on equipped 1RM strength. Furthermore, just because accommodating resistance may not be better on average, doesn't mean it couldn't prove to help individuals with specific weaknesses near lockout. Finally, it has been proposed

that generating greater force prior to a weak point in a lift may help by helping momentum to carry you through a sticking point [17].

While traditional, heavy resistance training is an effective way to increase the rate of force production, explosive "power" type training (often called "speed work") has been proposed as well. Accommodating resistance can be helpful for power training as traditional speed work with light loads results in a "braking" phase near lockout [19] as you decelerate the bar to prevent your back from "jumping" off the bench or your feet from leaving the floor when squatting or deadlifting. With bands or chains, the increasing resistance makes lighter loads heavier near lockout, preventing this from occurring [20]. Thus, bands or chains can allow you to attempt to accelerate the bar through the full range of motion. Therefore, an argument could be made if you are a lifter who gets stuck right off your chest when benching, in the hole when squatting, or who can't break the bar off the ground when deadlifting, that explosive training (possibly with accommodating resistance) could be of utility. However, it seems that whether or not explosive training improves the rate of force development compared to just heavy lifting, is highly individual [21].

To summarize weak points and sticking regions, let's recap the potential approaches a powerlifter or strength athlete might take [17]:

1. Pauses at certain points in a range of motion to "break up" a movement and improve motor learning. But probably not pausing at a sticking point.
2. Isometric training at a point where you have a force deficit (finding this exact point would require motion capture or lab equipment, unfortunately).
3. Using variations on the main lifts that force you to use a more efficient technique, and avoid technical errors that are often limiting factors at maximal loads.
4. Explosive training to improve the rate of force development *prior* to a sticking point, with or without accommodating resistance (not everyone is a responder to this type of training, unfortunately [21]). When assessing the above options as a lifter or coach, you'll see there is a degree of guesswork involved in implementing some of

the options, and a great deal of individuality in most as well. Thus, I want to reiterate that choosing variations on the main lifts, be they with pauses, bands or chains, limited or increased range of motion, etc., should be intentional and logically informed. They also aren't required. Sometimes the best way to improve a lift is to do more practice with the lift in competition form. Don't confuse variation with randomization, be intentional.

Finally, it's important to understand that in reality, sticking points don't actually change. Rather, addressing them *might* be a more efficient way to attack the weakest link in the chain of a movement, and therefore a faster way to increase strength. If this ends up being the case for you, the stick will still occur, you'll just be able to lift more weight despite it.

A Note on Form

As I already mentioned, proper form can be critical in order to engage muscles in a uniform manner in compound lifts such as a lat pulldown. For bodybuilders, exercises are simply a means to end; they are performed to achieve muscle growth. On the other hand, strength athletes must perform specific exercises. Thus, for powerlifters, the mastery of the squat, bench press and deadlift is critical to avoid injury and lift as heavy a load as possible.

Due to this distinction, many bodybuilders focus on a concept called the 'mind-muscle connection', suggesting that to effectively train a muscle group you must have a kinesthetic awareness of it during a movement. While it is true that focusing on a target muscle group can enhance activation [16, 22], when loads get heavy (80% 1RM or higher) on a compound lift such as the bench press, this effect seems to go away [22]. Meaning, that when a load is light enough that you can move it without the effective involvement of all muscle groups contributing to the movement, the emphasis can be partially shifted from one muscle group to another. However, when a compound lift is performed with a high load, all muscle groups must maximally contribute in order to complete the movement.

For this reason, even if you are a bodybuilder, focusing on the 'mind-muscle connection' during the performance of your heavy compound

lifts probably isn't aiding you. Unless you have a specific issue as I did with my back activation, simply performing compound lifts with heavy loads correctly will result in maximal activation of the involved muscles. Think about it logically, if you weren't able to maximally activate your muscles during a heavy compound lift, how would you lift the weight?

My advice is that while it is important to ensure you are engaging muscles in a uniform way while performing compound lifts, internally cueing the activation of single muscle groups is probably only effectively used when you are trying to learn or re-train a movement pattern like I was for my back work. Once I was able to actively engage all of the target muscles, I began lifting heavier loads focusing on the proper execution of the form. So while the 'mind-muscle connection' is real, it might only have applications for isolation exercises and as a tool in the process of developing proper technique or when you have issues engaging specific muscle groups.

Exercise Order

Finally, once you have selected your exercises, you must consider how you order them. It is important to note that you will be able to perform more volume with the exercises performed first in a session when you are fresh [23, 24]. Logically, this means that the compound barbell exercises should be performed first in most cases. These exercises are the most complex, the most fatiguing, have the highest injury risk, and also stimulate the most hypertrophy with each repetition performed as they train many muscle groups at once.

However, in the specific case of a bodybuilder with a glaring weak point that is not trained by one of these compound lifts, it may be advisable to perform an isolation exercise for this muscle group first [9]. Doing so may allow you to accumulate a bit more volume on this lift to help offset this weak point. However, this strategy should only be used if fatiguing this muscle group would not hinder the performance of your compound barbell exercises to a significant degree (potentially hindering overall development or even risking injury).

For example, a bodybuilder with weak biceps or calves may decide to train them first before doing overhead press, or bench press or squats or deadlifts, respectively. Training the biceps before the bench press

won't negatively influence the performance of this exercise. Likewise, training the calves prior to a squat or a deadlift should have a minimal effect on the performance of these lifts as well.

Range of Motion

As the final portion of Level 4, let's discuss 'range of motion'.

First, notice this discussion did not occur earlier in this chapter under the "Note on Form" section. I point this out because some people are far too dogmatic in their approach to range of motion, believing that there is never a reason to perform anything less than maximal range of motion, and anyone doing so has "poor form". This attitude does not pay respect to individual differences in bone structure, soft tissue extensibility, and the resultant safe ranges of motion person to person. Indeed, this dogmatic view when forced on others can lead people to train in unsafe ways in some cases.

What we should be advising, is specifically to train with the full range of motion *you* have. For example, squatting until your hamstrings and calves touch is fantastic... if you can do it while keeping a neutral spine and your feet flat. If you round your lower back to achieve this position, that's probably not a good thing.

With that said, it's worth pointing out that studies comparing partial to full range of motion squats [25], biceps curls [26], and leg training (including various free weight and machine movements) [27], have all shown greater hypertrophy when using a full range of motion; even though the partial range of motion groups can lift heavier loads. So, while you should train with the full range of motion you have, if you have limited joint range motion, it's probably a good idea to slowly try to increase it. Do this by making small increases in the range of motion in the weight room and by stretching—just not immediately prior to training (more to come on this in the sample program chapter).

As a final note on range of motion, as I mentioned previously, strength is specific. This applies to range of motion as well. If you do partial squats, you get stronger at partial squats with poor transfer to full squats [25]. However, full squats tend to make you stronger at both the full movement, and partial variations (since the full range includes

what is trained in a partial rep) [25]. So, while there are cases where it is worth targeting specific portions of a lift (see Movement Weak Points and "Sticking Regions"), you should still include some full-range training as well, to ensure you don't lose specific strength.

Summary

Specificity

- The movements you want to get stronger at should dominate your program.
- If your goal is hypertrophy, it's still a good idea to include compound barbell movements. These lifts give you the biggest bang for your buck, but you want to make sure that you have proportional development everywhere and that you're not neglecting anything. So, you will have a mix of multiple compound movements as well as more isolation movements, but not so many so that you are not proficient in their execution. You will be a jack of all trades as a bodybuilder rather than a specialist in two or three lifts, but you must still be good at what you do so that the motor learning process isn't getting in the way of muscle growth.
- If you are a powerlifter or a strength athlete, you need to be a specialist. But, you will also need to choose exercises that help you perform. Don't rigidly adhere to a single movement, as taking specificity too far can cause issues in some cases. You must do the competition lifts, but sometimes a weak link in the chain, either in terms of strength or the potential for injury, might require the inclusion of non-specific lifts.

Efficiency

- Hammer the compound movements primarily for uniform, muscular development in a time efficient manner. However, include isolation exercises as needed to ensure no weak points develop and that every muscle group is effectively trained.

Weak Points

- Weak points can develop for structural reasons that may require more focus on specific muscle groups if your goal is bodybuilding.
- Biomechanical issues like limb lengths might make certain exercises less than ideal if your goal is purely hypertrophy. If your goal is strength, you may not be well built for a competition lift, but you must still master it. Without the option to swap it out for another lift, instead, use other lifts more suited to your biomechanics as assistance exercises.
- Proper form is vital to ensure you are effectively engaging all the target muscle groups in a balanced manner.

Exercise Order

- In most cases, perform compound barbell exercises first when you are fresh to optimize your performance. If you have a single muscle group that is a weak point that if fatigued won't hinder the performance of your compound lifts for the day, it can be trained first for the same reason.

SUMMARY OF EXERCISE RECOMMENDATIONS

Exercise Selection Guidelines	
Strength (Powerlifter)	Competition lifts for 50–75% of the total volume. Accessory work for 25–50%
Hypertrophy (Bodybuilder)	1–2 compound exercises for each major muscle group. 1–3 isolation exercises for each muscle group.

How long one rests between sets has been theorized to be an important variable for resistance training, specifically when the goal is hypertrophy. However, the mechanisms by which short rest intervals are thought to augment hypertrophy have been questioned and a solid body of research now challenges this convention. In this chapter, we discuss the ins and outs of rest periods and give practical recommendations to help you avoid potentially degrading your training quality and also to potentially allow you to complete your training in a more time-efficient manner.

The Hormone Hypothesis

In Level 2 we stated that the traditionally recommended repetition range of 8–12 is not superior to other rep ranges for the purposes of inducing hypertrophy for any mechanistic reason. Rather, this repetition range is practically useful in that it allows you to accumulate volume in a time-efficient manner with a heavy enough load to produce hypertrophy. The distinction between this being the practical versus mechanistic rep range for hypertrophy stems from the history of the research in this area.

In the late ’80s, ’90s, and through the early 2000s, a large body of evidence was accumulated that seemed to suggest that the hormonal “spikes” that occurred for short periods after resistance training were associated with hypertrophy. These associations were consistently found, and eventually, it became nearly a foregone conclusion that if you wanted to optimize hypertrophy, you had to design your training in a way that created the largest hormone (typically growth hormone) spike possible post-training [1]. This body of evidence is what led to the hypertrophy-training recommendations of using compound movements, moderately-high repetitions and short rest intervals, because all of these methods caused a large post-exercise hormone response.

This viewpoint went largely unchallenged until the late 2000s when a number of research groups began testing, and then subsequently questioning, this conventional thinking [2–7]. As was previously discussed, it is now known that to a point there is a dose-response relationship with volume of resistance training and hypertrophy. However, higher volumes of training also carry a greater metabolic demand as more fuel is needed to perform more work. Importantly, one of the many functions of growth hormone is to mobilize fuel. Thus, it has been speculated that at least

in part, the hormone responses associated with hypertrophy were not necessarily causing the muscle growth, they were in fact caused by the training, which was causing the growth. Meaning, that rather than the hormone response being the mechanism causing hypertrophy, it was simply correlated with muscle growth because high-volume training produced a large growth hormone response [4].

This is not to say that hormones have no impact on muscle growth. Certainly, we know that anabolic steroids (testosterone) taken exogenously as performance-enhancing drugs in supra-physiological amounts can have large impacts on muscle growth and strength [8]. However, continuously injecting anabolic steroids in much larger amounts than are present naturally is completely different than temporary elevations that occur post-exercise in the much smaller (natural) physiological range. Additionally, growth hormone, which was primarily emphasized in the hormone hypothesis, unlike testosterone, doesn't appear to have a significant impact on hypertrophy even when taken at supraphysiological levels comparable to doping programs for a full month [9]. For these reasons, recommendations for hypertrophy training based on post-exercise hormone manipulation have been seriously questioned.

Understandably, this questioning also carried into the research on rest periods. In one study, a group of researchers found that the acute anabolic hormone response was higher in a group resting one minute between sets compared to a group resting two and a half minutes. However, interestingly, muscle growth in the arm favored the longer rest period group [10]. Most likely, this was because the loads selected in this study were chosen so that the final sets on exercises were taken to failure. Thus, the longer rest period group most likely was able to use heavier loads in training. To conclude, at this stage we can confidently state that the hormonal response to exercise is not the cause of subsequent muscle growth, and therefore the recommendation to restrict rest intervals to enhance hormonal response is unfounded. But, are there other ways that restricted rest periods could aid hypertrophy?

Metabolic Fatigue

Besides progressive tension overload, which is the primary driver

of natural skeletal muscle growth in adults [11], muscle damage and metabolic fatigue have also been proposed to play roles in resistance training-induced hypertrophy [12]. As was discussed in Level 2, the result of effective hypertrophy training is the combination of increased strength and muscular work capacity. As the muscle cell increases in size and its work capacity increase concomitantly, the eventual result is an optimized increase in muscle size.

Both low and high-load training can be used in hypertrophy training. Low-load, high-repetition training can produce appreciable muscle growth [13, 14] as it forces the muscle to adapt to a high workload and if taken to failure stresses the fiber's ability to keep contracting. For this reason, an argument can be made that by restricting rest periods, one could enhance metabolic fatigue to cause hypertrophy [15]. However, training that primarily emphasizes metabolic fatigue would prove suboptimal if it subverted the primary driver of hypertrophy, progressively increasing tension and volume over time [16].

For example, it is well established that using very short rest intervals can reduce the number of repetitions that can be performed on subsequent sets [17]. Thus, if you restrict rest periods for the purpose of increasing metabolic fatigue to the point where you perform fewer total repetitions, or have to use lighter loads on subsequent sets, you are essentially "throwing the baby out with the bathwater". Meaning, you have sacrificed total volume for metabolic fatigue.

In fact, the rare study that showed the superiority of shorter (1 min) compared to longer (4 min) rest intervals for hypertrophy, was designed so that the participants trained sub-maximally (not to failure) and therefore didn't risk "losing reps" [18]. While this is a smart way to train in real life (see Level 2), as it allows you to perform more volume with subsequent sets and in subsequent days and weeks of training, for research intended to determine the mechanistic effect of rest intervals, this is a confounding variable. If both groups are not training to failure but using similar loads, this would mean that the group resting one minute would be less recovered between sets. Thus, due to cumulative fatigue, they would be providing more stress per set even if the sets and reps are the same. While you could argue that this is the appropriate way to train; restricting rest intervals but not restricting them so much

as to detract from subsequent set performance, you also have to remember that in the real world we don't just manipulate rest periods, but also volume and load. Yes, a restricted rest period can be used to induce overload, but if you had the option of doing more repetitions with a heavier load or restricting rest intervals, the option of doing more volume with a heavier load would be the better choice.

Muscle Damage

But what about the role of decreased rest intervals and their effect on muscle damage?

First of all, the muscle damage response to decreased rest intervals is inconsistent, and variable between individuals [19]. But even more importantly, we have to unpack the role of muscle damage in hypertrophy.

Like the growth hormone response to high volumes of moderate-load training, muscle damage has to occur to some degree when performing progressive resistance training. Muscle fibers are damaged and must regenerate during the process of completing muscular work. If you complete a large volume of work, there will logically be a larger amount of muscle damage. For this reason, it is difficult to discern whether muscle damage is causative, additive, or simply an unavoidable intrinsic process that occurs alongside resistance training-induced hypertrophy.

While this is an evolving field, certainly it is known that in a practical sense, noticeable muscle damage is not required for muscle growth. Meaning, that you don't have to purposely design a training program to elicit damage and subsequently cause yourself soreness to ensure growth [20]. In fact, muscle damage can reduce force production capacity which can result in lowered volume and intensity in subsequent training bouts [21, 22]. Indeed, excessive muscle damage can actually interfere with hypertrophy [23]. This is not to say that damage should be avoided, rather that it simply does not need to be sought out. An appropriate amount of damage will occur naturally as you try to ensure progressive overload in your training by following the principles in Levels 2 and 3.

To conclude, if the rationale for reducing your rest periods is to augment

hormonal response, metabolic fatigue, or muscle damage, that rationale needs to be reconsidered. The potential detrimental effect of short rest periods on your ability to perform outweighs any potential benefit of short rest periods.

The Final Word On Short Rest Periods For Hypertrophy

If the above explanation of why the proposed arguments are flawed for using short rest periods to augment muscle growth didn't sway you, I have a feeling that the sheer weight of the evidence might:

- De Souza [24] found no significant difference in muscle cross-sectional area when comparing rest intervals of 2 minutes to rest intervals as short as 30 seconds.
- In a 6-month study by Ahtiainen [25], 2-minute rest periods were compared to 5-minute rest periods with matched volume programs of differing intensities, and no significant differences in muscle size were found.
- In Schoenfeld's 2014 study [26] using matched volumes in a powerlifting style split compared to a bodybuilding style split, muscle thickness changes were not significantly different in the powerlifting style group using 3-minute rest periods and the bodybuilding style group using 90-second rest periods.
- In our review on bodybuilding training, we stated, "No investigation to date has yet found variations in rest periods between 1 to 5 minutes to alter the hypertrophic response." [16].
- In a review in Sports Medicine by Henselmans and Schoenfeld on rest intervals for hypertrophy [19], the authors stated, "To date, no study has demonstrated greater muscle hypertrophy using shorter compared with longer rest intervals. Longitudinal studies that directly measured hypertrophy in groups with various rest intervals found either no differences between groups or, in the study by Buresh et al. [10], a higher increase in muscle girth in the group using 2.5-min rest intervals than in the group using 1-min rest intervals."
- In two systematic reviews by Grgic and colleagues, the first on

strength [27] and the second on hypertrophy [28], in both cases, it was concluded that while shorter rest intervals still allowed for robust strength and hypertrophy responses, longer rest intervals seemed superior.

As we previously stated, it's the rare study [18] that shows the superiority of shorter rest periods for hypertrophy, and this is more than likely due to what I would argue is a study design issue. While on the other hand, the majority of studies show either no difference [24, 25] or the superiority of longer rest periods [10] for muscle growth, which was confirmed in two systematic reviews on both strength and hypertrophy [27, 28].

A Place For Reduced Rest Periods In Training

From what we've discussed so far in this section, it may sound like the only reasonable recommendation would be to rest as long as you want, auto-regulate your rest periods and then train when you are ready.

In fact, this is a logical conclusion to make. But is there a place for reduced rest periods in training? I would argue that there is, in a way, using forms of training that save time without compromising stimulus. The first of such training modalities is what's called 'antagonist paired sets'.

Antagonist Paired Sets

Simply put, an antagonist paired set (APS), is performing one set on an exercise, and then instead of performing a second set on that exercise after resting, you perform a set on an exercise that is the 'antagonist' of the muscle group trained on the first set. An example would be performing a set of leg extensions and then performing a set of leg curls. The joint action of extending the knee, is 'antagonistic' to the joint action of flexing the knee, hence the name.

Now honestly, this is something we in the bro community would just call 'supersets'; where during the rest interval of one exercise, instead of just purely resting, another exercise is performed. But there is an important distinction. Supersets are often performed with an exercise that trains the same muscle group, while with APS the opposite muscle groups are used in the second exercise. For example, a set of shoulder

presses immediately followed by a set of lat pulldowns is an APS, a shoulder press followed by a front raise is not. Other examples are a leg extension paired with leg curls, bench press paired with rows, or bicep curls paired with tricep extensions.

Using supersets to train the same muscle group is essentially an approach that emphasizes metabolic fatigue. Often, these supersets are performed in such a way that can actually hamper total volume. For example, if you are supersetting shoulder press with front raises, and using minimal rest periods, not only will you run into the potential issue of "losing reps" like we discussed earlier, but also the fatigue generated from performing one shoulder exercise will decrease the load you will be able to lift on the other. While you might stimulate a lot of muscle fibers via fatigue and training the shoulders to failure, the total training volume and the mechanical tension will likely be substantially less than had you rested between sets.

Interestingly enough, APS, unlike supersets, can potentially allow you to increase performance.

Imagine that you do the bench press paired with a bench pull (commonly referred to as a 'seal row' by the cool kids these days). When doing the bench press you're training your pushing musculature, then you go over and you do your seal row. While you're doing your seal row you're essentially resting all of the pushing musculature while you're training your pulling musculature. However, because the antagonists are being moved through an active range of motion but not actively contracting against the load, it has been proposed that this might produce some sort of active recovery or potentiation effect that could actually improve performance when returning to the antagonist exercise. In fact, one study on APS for bench pulls and bench press found exactly that — an increase in the volume load performed in the APS group compared to the traditional group [29]. (As a side note, as I mentioned in the last chapter, the long head of the triceps does contribute to a degree to shoulder extension, thus for those who get triceps fatigue from pulling movements this strategy should perhaps be avoided.)

A review on APS in 2010 concluded that overall this improved performance effect is not always necessarily shown in research, but at the very least structuring training in this manner could be a time

efficient way to train that would not harm performance [30]. However, since the publication of that review, more studies have been conducted which found a performance-enhancing effect [31] and others have clarified when it might be a bad idea to implement this strategy [32].

So How Does One Implement Antagonist Paired Sets in an Effective Manner?

Well, first you have to remember that despite the practical similarity, the underlying philosophy of APS is fundamentally different from supersets. Instead of ramping up fatigue, you are trying to improve muscular performance to enhance volume. So, when performing APS with compound upper body push and pull movements, you want to ensure the cumulative fatigue doesn't detract from performance, so resting between sets is still important. Basically, you would pair a push and a pull, and complete a set of each in roughly a 3–4 minute period. This allows the completion of one set on the pushing exercise, a rest period of two minutes or so, and then the completion of one set on the pulling exercise [29]. Because these are compound exercises that can produce significant total body fatigue, I would advise auto-regulating your rest periods and simply performing the next set on the antagonist exercise when you feel ready if you don't quite feel ready after a two-minute rest period.

When you are performing isolation exercises with APS, such as tricep extensions and bicep curls, or leg curls with leg extensions, there is less total body fatigue to worry about. In the research examining APS for isolation exercises, more repetitions are performed when the rest period is approximately one minute between sets on opposing muscle groups [31]. Thus, you might perform a set of leg extensions, rest one minute or so, then perform a set of leg curls, as an example.

Finally, we do need to talk about when this strategy can go wrong. One study found that performing squats with a three-minute rest interval, but doing a set of bench press and seal rows during this rest interval, reduced total repetitions performed on squats [32]. Truly, a squat is a full-body movement. Even though the legs are the primary movers, the load is supported on the back. Thus, all of the muscles that support the spine and posture have to be aggressively activated in order to perform each rep. Meaning, squats and other movements that

require full-body effort generate local fatigue in many muscle groups at once and also generate a lot of cardiovascular stress that can leave you winded. Therefore, for "full-body exercises" such as the deadlift, deadlift variants, back squats, squat variants, and lunges it's a good idea to simply rest between sets without doing anything else. I would even argue that powerlifters should be cautious when considering using APS with the bench press. Many consider a properly performed powerlifting bench press as a full-body movement due to the intended 'leg drive' that is used.

Example Programming With APS

Imagine you have an upper-body day pairing a horizontal push with a horizontal pull, a vertical push with a vertical pull, and a tricep exercise with a bicep exercise.

Programming this day with APS might look like the following:

Incline Bench	Overhead Press	Tricep Press-downs
~2 minutes rest	~2 minutes rest	~1 minute rest
Seal Row	Chins	Bicep Curls
~2 minutes rest	~ 2 minutes rest	~1 minute rest
Incline Bench	Overhead Press	Tricep Press-downs
~2 minutes rest	~2 minutes rest	~1 minute rest
Seal Row	Chins	Bicep Curls
~ 2 minutes rest	~2 minutes rest	~1 minute rest
Incline Bench	Overhead Press	Tricep Press-downs
~2 minutes rest	~2 minutes rest	~1 minute rest
Seal Row	Chins	Bicep Curls
~2 minutes rest	~2 minutes rest	

Not only will this not negatively affect your performance, but it may

also positively affect your performance. Plus, much of the time you would usually spend sitting on your butt listening to music or getting distracted by Facebook or Instagram posts will be spent training. You can finish your workout earlier, and accomplish the same amount of (if not more) total volume while maintaining your loads.

However, if you are a bodybuilder and you have a leg day that includes the squat, or a back day that includes the deadlift or if you're doing a deadlift variant, a squat variant, a lunge, or some other movement that requires a lot of full body effort and stabilization, APS would not be advised as it could potentially harm the performance of the main movement—rest as much as you need so you can give it all you've got.

Lastly, don't forget the obvious time you would not want to do this: when the gym is very crowded and holding two pieces of equipment would be rude or impossible.

Drop Sets and Rest-Pause Sets

Besides APS, there are other methods of performing sets which can be effective in different circumstances depending on the goal. In the lifting community, these approaches are often called 'intensity techniques' as they often have to do with working past failure or in a fatigued state, but not always.

First, let's discuss drop sets. Drop sets are simply when you hit failure with a given load, and then you reduce load so you can keep going. You will only get a few reps each drop because even though the load is reduced, you are fatigued from the previous sets. This is a time-saving technique as it allows you to keep muscle recruitment high and keep stimulating fibers with lower loads that would normally require way more reps because you "primed" the drops with the initial set to failure. In one study, a group that performed 3 sets of 80% 1RM to failure with 3 minutes rest between sets was compared to a group that did one set with 80, 65, 50, 40, and 30% of 1RM, all to failure, while only taking enough time between sets to switch dumbbells. The drop set group completed their protocol in just over 2 minutes and did a total of 35 reps across the various loads they used at each drop, while the traditional training group took just under 7 minutes to complete their protocol and did 15

reps total on average. Both groups improved strength and size without significant differences between one another [33].

So, as you can see the drop set group was more time efficient, but on a rep by rep basis, the work they performed was less efficient (similar gains, more than twice as many reps). Does this 'rep efficiency' matter? In a practical sense no, it was just as effective and allows you to get in and out of the gym in less time. But I point out the difference in volume because this is an arbitrary comparison; in the real world, we have no way to know how to compare straight sets to drop sets. A normal set followed by four drop sets seemed equivalent to three straight sets in this study, but is that the norm? How big of drops should you take? How many reps should you be able to get on each drop? We simply don't know the answers to these questions.

To get around this ambiguity, you can just compare sessions where you do drop sets to one another. For example, if using the setup above, you could gauge progress week to week by when you are able to do more reps at each of the drops (80, 65, 50, 40, and 30% of 1RM) or by when you can do a similar number of reps at each drop, but with greater loads (i.e. your 1RM has increased). However, you wouldn't really be able to compare volume during a program with a lot of drop sets very effectively to a program without them from a more meta sense.

If drop sets are a small part of your approach this isn't a big deal, but the more dominant a role they play, the more you end up shooting in the dark. One of the most important aspects of making continued progress towards your goals is being able to gauge your progress by making "apples to apples" comparisons between different combinations of volume, intensity, frequency, and exercise selection. So sometimes it's not a question of whether it works in a study, but rather taking the long-term lifting career view. The question at play is, how do you keep inducing progressive overload if you can't quantify overload?

Rest-pause sets are similar to drop sets but don't include a load reduction.

Rest-pause sets are typically defined as selecting a load, training to failure, resting around 20–30 seconds, doing more repetitions to failure, and repeating this process until you've reached a target number of reps. For example, let's say you had the goal of reaching 15 reps with

100 lb, and you did 100 lb for 9 reps to failure, rested 30 seconds, did 5 more reps to failure, rested thirty seconds, then did your final 1 rep.

Like drop sets, this technique has been shown to be effective in promoting strength and hypertrophy adaptations [34] and also saves time. If you did 3x5x100 lb (which would be a 6–8 RPE across all sets) with 2 minutes rest between sets, that would take ~5 minutes, while the drop set protocol would take only ~2 minutes. Again, it works and saves time but, it still presents some tracking issues. In both of the above cases you did 15 reps with 100 lb, so you can compare your reps at a given load to previous workouts with that same load even if you didn't use rest pause (just looking at total reps). Also, you can compare volume load (sets x reps x load) between programs using rest-pause sets to those not. However, a general assessment of volume in terms of sets performed for a given muscle group or movement (such as I use in this book for guidelines), wouldn't be possible.

So How Does One Implement Rest-pause or Drop Sets in an Effective Manner?

So you are probably thinking, well then how do I use either? Personally, I'm not a big fan of drop sets because the quantification of overload is especially limiting and the tracking is more of a logistical pain in the butt (you have to track each drop). However, if you are pressed for time only have left an accessory movement left, and one not biomechanically suited to maintaining form while doing rest pause sets (i.e. imagine hitting a 10RM on lateral raises and doing rest pause sets of 2–5 reps, you'd have a lot of form breakdown trying to maintain ROM), drop sets can have utility. In the future, if you did drop sets again, you could then compare back to the last performance to gauge progress.

However, I think rest pause sets have more utility than drop sets because you can actually do what's planned if you are pressed for time. For example, if you have 3x8x225 lb planned, you can just look at that as 24 reps at 225 lb and get it in via rest pause in a shorter time frame. The downside here is that now you are training to failure (which is also true of drop sets mind you), and if it is a compound main lift, that means training in a fatigued state and potentially ingraining bad technique and plausibly increasing injury risk. So again, I would keep

this to accessory work where an injury is unlikely, and the fatigue from failure is much reduced.

Hitting failure on compound lifts is generally not a compromise that pays off in the long run. Sure, that acute set is more stimulating, but fatigue can leak into subsequent sessions throwing off your game plan. For example in one study, a group doing 3x10 to failure took an extra 24–48 hours to recover muscle damage and performance compared to a group doing 6x5 with the same load (5 reps short of failure), even though volume and load were identical [35].

The take home? Rest-pause sets probably induce more fatigue than straight sets matched for volume and load, so if you do them use it for accessories, and preferably at the point in the week where you have the longest time frame before you train that muscle group or movement pattern again (e.g. on Friday if you train Mon, Wed, Fri).

Rest Period Recommendations

After all of that information and all of the theory we discussed, in the end, the recommendations are quite simple. Rest until you feel ready to perform at your best on the next set [19]. However, if you happen to be hyperactive when training, or have a history of feeling like you need to sweat, or that you habitually under-rest, it would be a good idea to actually clock your rest periods to ensure you rest at least 1.5 minutes between smaller muscle groups and at least 2.5 minutes between compound lifts when training in a straight-set fashion. If you are performing APS for upper body push and pull exercises, rest for roughly 2 minutes between sets on exercises, and if you are performing APS for isolation exercises rest for roughly 1 minute. Drop sets are effective time savers, but need to be tracked and only compared to other, similarly performed drop sets. Rest-pause sets are also effective time savers which can be applied in more situations without tracking confusion. However, both drop and rest pause sets induce more fatigue than traditional training, and thus should be relegated to accessory movements and you must consider where they fall in the microcycle to avoid fatigue bleed over.

We have now reached the final and arguably the least important level of The Pyramid. However, this is actually one of the more complex topics. Focusing on training minutia over the foundation, without understanding the context, has sent many a trainee down the wrong path. This occurs because often the things that are the least important are the most confusing (which is probably why people get them wrong so often).

Because of this, I get a constant stream of questions from confused people spinning their wheels, obsessing over the minutia. But don't get me wrong, this is not entirely a bad thing. These questions are the reason I have written this book to help give you an understanding of priorities and what to focus on.

While there is some complexity in this chapter, remember to keep in context the importance of this information in relation to the bigger picture. At this level, we're discussing topics that yes, if you overthink and get them wrong, can slow you down a little. But this isn't like Levels 1–4 where you really need to spend effort getting things right; at the highest levels of The Pyramid, we just don't want to get things wrong.

In this final level, we're talking about tempo, the speed at which you are lifting.

The concept of controlling tempo has gotten a lot of attention because it is thought to be an important aspect of hypertrophy training. Typically, the reason tempo is emphasized is because of the belief that 'time under tension' is a critical variable to maximizing muscle growth.

So, let's discuss the reasons tempo has been suggested as an important hypertrophy training variable and then evaluate the evidence on this topic before I finally give you some recommendations.

Eccentric Muscle Actions

'Eccentric muscle action' refers to the lowering portion of lifts. Let's discuss how this relates to strength and hypertrophy.

Strength

Typically, people don't make recommendations for time under tension when it comes to the pursuit of strength. The reason is quite simple; it's

due to the load-velocity relationship.

As the load gets heavier, it's harder to overcome its inertia and it goes slower. If you watch a lifter's third attempt (the final and heaviest) in a powerlifting meet, it's typically the slowest attempt (if they make it). In powerlifting, the best lifts, the lifts that increase a lifter's total the most, are the slowest. This is because they are closest to the heaviest load the person can lift [1]. The mark of a well-trained strength athlete is that they can complete 1RM attempts at very slow speeds, as they have the ability to grind through attempts that novices simply don't [2].

So, for strength, this is pretty easy. The load determines the tempo. Most wouldn't argue that when training for strength, you should control the load on the eccentric (the lowering portion) so that you can get in the best position to lift it, and then attempt to accelerate the load (with good form) as quickly as possible (not that it will actually move fast if it is heavy) on the concentric (the lifting portion).

There is not much debate here; however, there is a lot of discussion around tempo for optimizing hypertrophy.

Hypertrophy

One of the reasons that the common recommendation is to go slow on the eccentric portion when training for hypertrophy, is because of the focus on eccentric muscle actions as a training tool in exercise science. I call this a 'muscle action' rather than a contraction because unlike the concentric, the eccentric is not an active contraction in the same manner—the eccentric portion of a lift is when you are lowering the weight. The muscle is lengthening because you are producing less force than is needed to resist the load; which can occur involuntarily because the weight is too heavy, or voluntarily when you are controlling a load into position (for example, setting a coffee cup down).

This is an important distinction because many people often only think of movement in concentric terms. So for example, when I pick up a cup of coffee, the bicep shortens and the load is brought to my mouth. When I lower it, the triceps aren't pulling it down, the bicep controls the tension to lower it; this is the eccentric phase. Using an exercise example, the eccentric portion of a squat is when you lower the bar

(and yourself) into position, and then the concentric is when you squat it up. On a deadlift, unlike a squat, you begin with the concentric, and then when you lower it down this is the eccentric portion of the lift.

First, let's discuss some of the ins and outs of eccentrics.

- Because an eccentric action is not active in the same way that a concentric contraction is, it requires less energy.
- Also, you don't have to overcome the inertia of the load—you're just lowering it.
- Finally, an eccentric action occurs as the muscle lengthens, which "loads" the structure of the muscle in a way that generates force (think of pressing down on a stretched rubber band).

For all of these reasons, you are substantially stronger eccentrically than concentrically [3].

Think about this logically—the amount you can lower 'into the hole' in a squat is more than you can stand up with. That's why when people miss squats it typically happens on the way up. The same thing with bench, you lower it to your chest and then typically get stuck trying to get it up off the chest.

So you are stronger eccentrically than you are concentrically, and because of that, in studies on eccentric only training, more volume can be performed (remember sets x reps x load).

Now you are probably wondering where I am going with this. What does this have to do with tempo, and why should you care about eccentric only training since it's difficult to do for most exercises outside of a laboratory?

Well bear with me, what I'm trying to do is express that the main reason why eccentrics are thought to be a useful training modality for developing strength and hypertrophy in the literature, is probably because you can lift heavier [3], so you produce more tension, and more volume (which takes us back to Level 2 of The Pyramid — VIF).

Now, unfortunately, some people who read exercise science texts or research, and then generate content based on that, don't necessarily understand this mechanism behind eccentric training and also don't

understand that what you can do in a lab doesn't always necessarily translate to real training.

If you don't have the equipment to load the eccentric portion heavier while making the concentric portion lighter (or eliminate it completely), such as is done in many studies, how can you translate the effectiveness of eccentric training to free weights and machines?

One thought process is that if the eccentric is so important, you should spend more of your time lifting on the eccentric vs. the concentric. An example would be to lift with a normal speed performing the concentric but to lower slowly on the eccentric. The thought is that by accentuating the eccentric action it will create more growth.

However, now that you understand the mechanism behind why eccentric training can be effective, it is clear that excessive slowing of the eccentric phase of a lift runs contrary to the benefits of eccentric training.

- The amount of load you can lift in the gym with a machine or a free weight is limited by your concentric strength, the weakest link in the chain.
- So it doesn't really make sense from a conceptual standpoint to do excessively slow eccentric actions to try to get greater hypertrophy, because
- The whole reason we do eccentrics is to lift heavier,
- But we can't lift heavier than we can lift concentrically in the gym,
- So you'll be limited by your concentric strength,
- And then you won't be using the type of heavy loading that makes eccentric training beneficial.

(More on overloaded eccentrics later in this chapter).

Time Under Tension?

So, we now understand that the rationale of using slow tempos to accentuate the benefits of the eccentric portion of a lift is flawed. But, there are other reasons why people have stipulated that you want to do a specific tempo

or slow down your lifting when you're training for hypertrophy. The most prevalent reason is to get a greater time under tension.

I've put a question mark in the title here because I feel the term 'time under tension' is missing something.

As we know from the intensity section earlier in the book, there does seem to be a certain threshold for the load that you have to lift in order to get your gains. Just by being on planet earth you're constantly resisting gravity, and you're constantly under tension, but you don't simply continually grow.

What the time under tension concept misses is that it is not just the time spent under tension, but also the *magnitude* of this tension that is important.

Magnitude of Tension = Force

Think about this logically. If you think the magnitude of tension doesn't matter and only the time spent under tension matters, then you're telling someone that putting on ankle and wrist weights and walking a marathon in 6 hours would produce a greater stimulus for muscle growth than lifting challenging weights for an hour.

Intuitively we know this isn't true, so therefore we must acknowledge that time under tension is only part of it. To truly consider whether or not lifting tempo is important, we have to consider the magnitude of tension we produce, not just the time spent producing it. Fortunately, this is a very easy concept to understand. We produce force, lift objects, and move by generating tension. By contracting our muscles and transferring that force to our skeletal structure, we move. Thus, force output scales with muscle tension. The more force generated, the higher the levels of muscle tension.

Allow me to get a little more into the weeds here...

Force Multiplied by Time = Impulse

In physics, *force multiplied by time is impulse.* Impulse is essentially the combination of the time spent under tension and the magnitude of that tension.

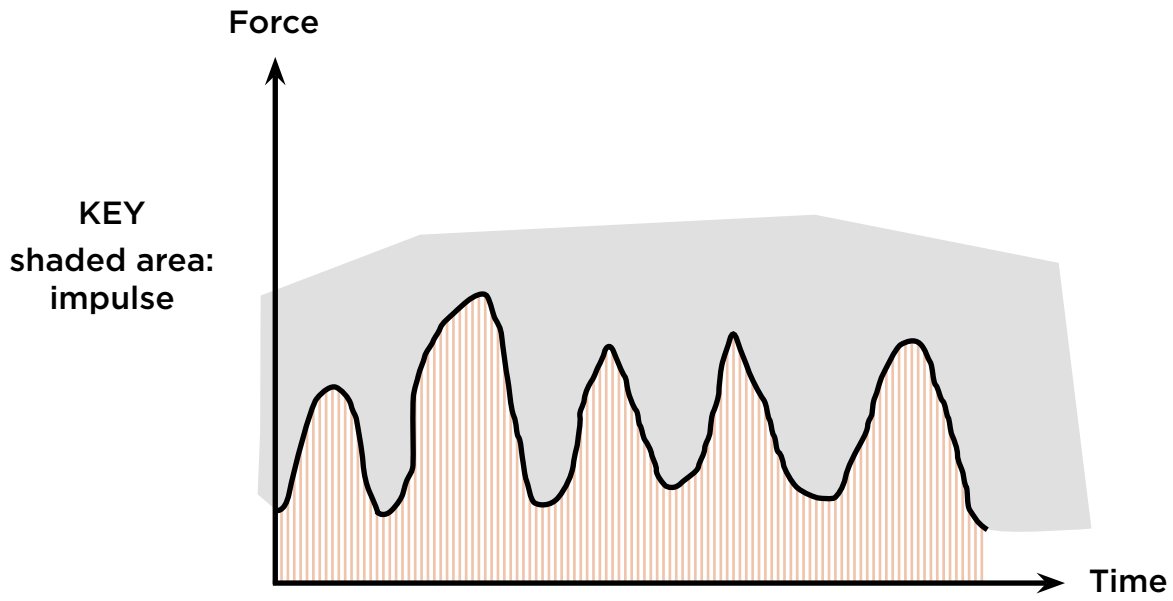
Now there is a pretty cool study where two groups were compared performing an equated volume of squats with different intensities. One group did 3 sets of 12 with 70% of 1RM and the other group did 6 sets of 12 with 35% of 1RM to match the volume of the first group. In both groups, they lifted as fast as they could with maximal intent to accelerate the bar (without leaving the ground) [4].

As an aside, there's a relationship between force and velocity that we're not going to get into, but if you think about it from a very basic perspective, you can only put so much force into a light bar during a squat before you overcome its mass and do a jump squat.

Getting back to the study, the total time under tension for the training session ended up being much higher in the 35% 1RM group. This makes sense, they did 72 reps with 35% 1RM while the 70% of 1RM group did 36 reps. If we thought only time under tension was important and not the magnitude of tension, or that only volume was important and that there wasn't a threshold to where load became important, we'd likely conclude that this group doing more repetitions and more time under tension would be getting a better stimulus. However, because we understand that both the magnitude of force and the time spent producing it are important, we know that we should actually be looking at impulse (force x time).

Interestingly enough, the total impulse was ~25% higher in the 70% 1RM group despite velocity, power (which is force x velocity), and time under tension being higher in the 35% 1RM group [4]. So, you can see that sacrificing load to spend more time lifting it, when taken to extremes, can actually hamper the total tension stimulus to the muscle.

Now, that doesn't mean there isn't a reason to train using light loads with a high velocity. If you want to increase power (which is velocity dependent) that might make a lot of sense — especially for an athlete who only has to propel his or her body mass or a lightweight implement. But if we're talking about muscle and strength development, we also have to think about the magnitude of tension. And remember, if we are talking about producing muscle force and the time spent producing it, now we're talking about impulse, which is force multiplied by time — the area under the force curve.



Slowed Eccentric, Reduced Load & Volume

Another relevant study on lifting tempo took a group of lifters through two different protocols.

First, the lifters maxed out using a 2/0/2 tempo — two-second eccentric, no pause, two-second concentric. This is close to a normal lifting tempo for most people using moderate to moderately-heavy loads who aren't trying to change their lifting speed. Then, days later the lifters tested their maxes again but using a 4/0/2 tempo, changing the lowering speed to 4 seconds to accentuate the eccentric action.

After determining their 1RMs at these specific tempos, they then days later returned to perform AMRAPs with 75% of 1RM after warming up; once using the 4/0/2 tempo and once using the 2/0/2 tempo. What did they find out? Well unsurprisingly, on the 1RM tests with a 4-second eccentric they couldn't lift as heavy. They got more fatigued from going really slow before they pushed it back up. This is kind of a, "So what?" outcome, as we previously discussed we know that going very slow (it really is slow, count out loud to 4 seconds using "Mississippi's") isn't ideal for strength. But what was more interesting was the effect the tempos had during the AMRAPs on volume, which as we discussed in Level 2, is highly relevant for hypertrophy.

On the AMRAPs, the slower group performed on average about one and a half repetitions less, to which you might respond, "So what, the

reps took longer, it was probably the same or even more total work." Well, fortunately, they actually measured total work performed. Work is the actual physics calculation of volume that takes into account not only the total reps and the load of the bar, but also the distance the bar travels. Interestingly enough, the total work was about 10% less in the slower group, which isn't surprising since they lifted a lighter load. To conclude, the slower tempo forced volume down by compromising load. Ironically, by focusing on increasing the total time under tension, this can decrease the total volume and load [5].

Therefore, it's critical that you remember not to over-focus on minor things that you think might help you grow to the point where you sacrifice the big-ticket items like volume and intensity. This is the same kind of thing that happens with rest periods. If your rest periods are short in a bid to increase fatigue, they can actually end up being too short, degrading your ability to use more volume, use higher loads and generate greater muscle tension.

If you are slowing the weight down so much that you have to reduce the load, or you can't do as many reps, you might be producing less total impulse—this is probably the best way to think about hypertrophy stimulus from a physics perspective.

Slow Training Inferior in Most Studies

Just like in Level 5, you may have gotten to the end of my logical arguments and still might not be convinced. Well, once again, that's fine because if the logic didn't convince you, the sheer weight of the evidence will.

Indeed, with little exception [6] traditional speed resistance training results in superior adaptations when compared to slower speed lifting which requires lower loads [7–11]. In fact, in a 2015 meta-analysis that examined the effect of intentional repetition duration on hypertrophy, it was concluded that the duration of repetitions had no effect on hypertrophy until reaching the point where repetitions lasted 10 seconds or longer. At the point where repetitions took this long, it was concluded that this had a negative effect on muscle growth [12]. Finally, in terms of strength development, one study actually found that training with maximal intent to accelerate the load on the concentric portion of the

bench press resulted in almost double the strength gains compared to purposely performing the concentric at half that speed [13].

Exceptions to The Rule

In service of being complete, it is important to point out that there is evidence showing that deliberately slower tempos of heavy lifting (2–4 second concentric and eccentric phases with 60–85% 1RM) can help with tendon pain and rehab—although the evidence is a bit stronger for isometric and eccentric training [14]. With that said, we are not injury specialists and don't know how, nor is it within our scope of practice, to make recommendations about injury rehab. Rather, I'm just pointing this out so you don't think any and all uses of slow tempo training are misguided.

Supramaximal Eccentric Training

While manipulating the *time* spent performing the eccentric action doesn't make sense from a hypertrophy or strength development standpoint, savvy readers may be wondering if manipulating the load might have value.

If you thought, "Hold on, if you can lower more eccentrically than you can lift concentrically, what would happen if you had some way of making only the eccentric heavier so a set was more challenging?" you are not alone. Indeed, many exercise scientists have investigated this specific question. Most people are 20–40% stronger eccentrically than concentrically, and we know this from watching the bros train. When they grind out the last rep on bench press they can do on their own, and their training partner yells "3 more!" you can watch them lower the weight back down to their chest three times on their own, while the spotter only helps them on the way up when they get stuck ("All you bro!!" is traditionally said as well).

Logically, there is something worth investigating here in my opinion.

From a strength perspective, you are getting to handle loads beyond your concentric maximum, which could be viewed as an 'overload stimulus' plausibly resulting in beneficial neuromuscular and architectural adaptations for strength.

From a hypertrophy standpoint, you're placing a higher tension on your muscles that you could normally not even train with (as it's greater than your RM for the set), and getting some volume in with it. But there are barriers to the adoption of this type of training as well. For one, logistically, most free weight exercises don't lend themselves to supramaximal eccentrics. You can get a bro-spot on the bench press and other free weight pressing exercises, but squats require a very friendly and strong spotter who doesn't mind risking injury, and deadlifts are just hilarious to consider (between the legs floor press for your spotter). For the most part, machines are the only way to do supramaximal eccentrics flying solo. You can use two limbs on the concentric, and one limb on the way down for the eccentric, basically doing single arm/leg machine work while self-spotting loads with your other arm/leg on the concentric phase only. Unfortunately, when getting a spotter's assistance or self-spotting, it's difficult to gauge how much concentric assistance you are getting session to session which might make performance quite variable.

But before you consider doing a block of eccentric training, it's worth pointing out that currently, the evidence is limited and unfortunately, not very promising at this stage.

For hypertrophy, a meta-analysis of 15 studies found no significant difference between traditional and supramaximal eccentric training, and although nonsignificant, the data did trend towards a small benefit of eccentric training [15].

For strength, a meta-analysis of only 5 studies found no significant difference between supramaximal eccentrics and traditional training either [16].

Thus, for now, I wouldn't advise supramaximal eccentric training until more promising research is published. Also, supramaximal eccentric training is difficult to implement, hard to track, potentially dangerous if using free weights, and likely to cause more soreness, damage and acutely suppress performance more than normal training. If you're an advanced lifter trying this out in an expert-supervised, controlled environment as an experimental block to see if you can crack into elusive late-career progress, it's perhaps worth giving a go. But in my opinion, most lifters won't benefit from its use.

Practical Guidelines

So, given everything discussed above, what is the take-home message?

Actually, it's quite simple: just lift weights. Yes, just lift the weights. Don't try to intentionally slow down the tempo of lifting (unless you are a beginner, then do slow down as needed to perform exercises with proper form), just use good form, and lift them.

Now to be fair this is a slight oversimplification. It's important to point out that letting gravity do the lowering portion of the lift for you is not a true eccentric action. What makes it an eccentric action is that you are in control. This is primarily for those training for hypertrophy. You want to make sure that the eccentric part of the lift is actually a muscle action rather than relaxing and letting gravity drop the load back down.

If you're training purely for strength, you can make an argument that during certain time periods you don't want as much eccentric volume. Perhaps you just want to practice the lift — like the deadlift — so you do just let gravity take the bar down. But most of the time, whether training for hypertrophy or strength, you want to make sure that the eccentric is performed under some measure of control.

In fact, control is very important for strength training; you need to have enough control so that you can get in the right position for the concentric. For example, top-level powerlifters typically lower a squat in a relatively controlled manner to ensure they are in the right position to squat it back up and complete the lift. Additionally, you don't get a "press" command on bench press until the weight is visibly motionless on your chest, so lowering it slowly with control can get you a faster command from the referee because it's easier to follow when it stops on your chest. So remember, the eccentric should be controlled so as to set you up for a forceful concentric in the right bar path; in these cases, a slow eccentric may not only be warranted but would be ideal for performance.

To conclude, the biggest debates over tempo are related to time under tension. While time under tension is important, so is the magnitude of tension. So to ensure you are maximizing muscle growth, ensure that gravity is not doing the work for you on the eccentric, and that you're trying to forcefully accelerate the load on the concentric (Force = mass

x acceleration). You want a forceful concentric contraction, and then a controlled eccentric contraction, but not unnecessarily slow.

So once again, just lift the weights!

After reading all of the previous chapters you may be experiencing information overload, or at the very least, having some trouble "connecting the dots" between the levels and actually creating an actionable resistance training program. This chapter serves to link the main points of each level into a step by step guide to teach you how to build a training plan. In this chapter, I'll take you through each level of The Pyramid, highlighting the main points and the subsequent decisions you'll have to make from each as they relate to building a program.

Remember, this is a quick start guide, so it won't include the full breadth or depth of knowledge or its explanation from previous chapters. Rather, it is designed to create an actionable plan to build from. As you gain more understanding of the principles, you can use the program you will build as the foundation to lay other concepts on top of.

Step 1: Adherence

While there is a lot to learn from Level 1, one of the best biggest practical applications of the information relates to how many days per week you train. Specifically, choose a realistic number of training days that would not put stress on your life or schedule. Truly, this value can be anywhere from 2–6 days per week.

Determine whether fewer, longer sessions fit better with your life, or more frequent, shorter sessions. Also, your training age interacts with this decision, as at a certain point it is next to impossible for most people to make progress without training at least three times per week. So, if you are a novice, you can make a two day per week program work, but after that, the decision boils down to whether you want to train 3–6 days per week as two days per week becomes infeasible with the often-requisite volumes (sessions become far too long, practically, and training quality will tend to degrade towards the latter half of the sessions).

Once you've come up with a number, this results in a number of possible microcycle-level setups (AKA 'splits') that could fulfill the frequency requirements of Level 2—training each movement/muscle group a minimum of twice per week), a maximum of every day.

In the chart below you will see sample options for strength (setup for powerlifting) or hypertrophy. Find the number of days you can train in

the left column and then you will see your training split options in the row to the right:

Strength Frequency Matrix for Choosing Splits					
Training Days Per Week	**Movement Frequency for Bench and Squat/Deadlift Combined Per Week**				
	2	3	4	5	6
2	S/B, B/D	NA	NA	NA	NA
3	S/B, B, D	S/B, B/D, S/B	NA	NA	NA
4	S, B, D, B	S/B, B, D, S/B	S/B, B/D, S/B, B/D	NA	NA
5	S, B, D, B, Accessories	S/B, B, D, S/B, Accessories	S/B, B/D, S/B, B/D, Accessories	S/B, B/D, S/B, B/D, S/B	NA
6	S, B, D, B, Accessories, Accessories	S, B, D, B, S, B	S, B, D, B, S/B, B/D	S/B, B, D, S/B, B/D, S/B	S/B, B/D, S/B, B/D, S/B, B/D

S = Squat
B = Bench
D = Deadlift,
"/" indicates performed in the same session, commas separate days.

Hypertrophy Frequency Matrix for Choosing Splits					
Training Days Per Week	Muscle Group Frequency Per Week				
	2	3	4	5	6
2	Full Body, Full Body	NA	NA	NA	NA
3	Lower, Upper, Full Body	Full Body, Full Body, Full Body	NA	NA	NA
4	Lower, Upper, Lower, Upper	Legs, Push, Pull, Full Body	Full Body, Full Body, Full Body, Full Body	NA	NA
5	Legs, Push, Pull, Lower, Upper	Legs, Push, Pull, Lower, Upper	Full Body, Full Body, Full Body, Upper, Lower	Full Body, Full Body, Full Body, Full Body, Full Body	NA
6	Legs, Push, Pull, Legs, Push, Pull	Lower, Upper, Lower, Upper, Lower, Upper	Full Body, Full Body, Full Body, Legs, Push, Pull	Full Body, Full Body, Full Body, Full Body, Upper, Lower	Full Body, Full Body, Full Body, Full Body, Full Body, Full Body

Remember, your choice will dictate the volume per movement/muscle group per session, and subsequently the time it takes to complete each session.

If you were to choose six 'full body' days, for example, you'd end up with fewer exercises per muscle group, sets per exercise, and time spent in the gym per session. Likewise, if you were to choose two 'full body' days, you'd end up with more exercises per muscle group, sets per exercise, and time spent in the gym per session.

On the strength side, it is organized around how often you train the bench press, and how often you train squats and deadlifts combined (as there is significant overlap between the two in terms of stimulus

and stress). If you choose a very high frequency, again, you end up doing very few working sets per exercise per session, and vice versa.

Either very-high or very-low frequencies can be problematic depending on the individual. Most obviously, you don't want a session to be too overloaded for a given movement or muscle group or training quality degrades as the marathon session drones on. However, for some people, certain movements cause connective tissue stress somewhat independently of the total volume and/or load. Thus, high frequencies of any significant volume or load become problematic. Simply put, for 90% of people I'd recommend training 3–5 days per week with a muscle or movement frequency of 2–4 times per week, as this typically strikes the best balance between stimulus and recovery.

So, pencil in the split you've chosen for now, because in step two we'll discuss some other potential considerations that might impact your decision.

Step 2: Volume, Intensity, Frequency

As a reminder, these are the broad starting guidelines appropriate for most people:

Volume: 10–20 sets per muscle group/movement pattern per week

Intensity:

Strength: ⅔–¾ of volume in the 1–6 rep range, remaining volume in the 6–15 rep range at a 5–10 RPE

Hypertrophy: ⅔–¾ of volume in the 6–12 rep range, remaining volume in the 1–6 and 12–20 rep range at a 5–10 RPE

Frequency: 2+/week per muscle group or movement pattern.

These variables are how you ensure overload occurs, and how you organize it.

Frequency is already penciled in. Next, let's choose an appropriate volume. In an ideal world, you'd have meticulous training records showing rates of progress and volume levels at each point of your career and you could make an educated start to what would be appropriate

given the large individual variance in optimal volume. However, if you're reading a quick start guide to program design, there is a strong possibility that's not the case.

The appropriate volume might depend on a lot of factors, which could logically include: training history, training age, genetics, habitual sleep quantity and quality, biological age, total body mass, nutritional status, psychological resilience to stress, personality, and perhaps sex. Unfortunately, we don't have the relationships of all these variables teased out, but there is good anecdotal evidence, a theoretical basis, and limited scientific evidence to suggest that on average, more experienced lifters need more volume to continue progressing. Thus, with all else being equal, here are some decent guidelines for establishing volume within the 10–20 set recommendation.

Volume and Frequency Recommendations by Training Age		
Training Age	**Weekly Sets Per Muscle/Movement**	**Recommended Weekly Frequency**
Novice	10–12	2–3
Intermediate	13–15	3–4
Advanced	16–20	3–5

Note, the higher your volume, the more it makes sense to spread it over more sessions to prevent individual sessions from becoming too long and stressful. This maintains session quality. As you can see in the column on the right, there is a generally recommended weekly frequency at each volume step to better spread stress. If this doesn't match up with your split choice from Step 1, consider a different amount of volume, or a different split.

With your volume level and frequency chosen, whether your goal is hypertrophy or strength, you will spread that volume for each muscle group, or each movement (bench, and split between squats and deadlift patterns), across the week. Once again, just pencil this in to get an

idea of how your week is shaping up. For example, let's say you are an intermediate doing 13–15 sets with a 4-day, two times per week muscle group frequency, doing a 'Legs, Push, Pull, Full Body' split. Spreading things out, you'd probably do 4–6 sets per muscle group on your Full Body day, leaving 9–11 sets per muscle group for your Legs, Push, and Pull days.

Lastly, you'd assign intensity; both the load and the effort. See the two charts below that show appropriate repetition ranges and RPE values for strength and hypertrophy based on exercise and microcycle organization.

Rep and RPE Range General Recommendations for Hypertrophy by Exercise Type		
Exercise	**Rep Range**	**RPE Range**
Lower Free Weight Compound (squat, deadlift, RDL, etc.)	3–8	5–8
Lower Machine Compound (leg press, hack squat, etc.)	6–12	6–9
Lower Isolation (calf raise, leg extension, leg curl, etc.)	8–20	7–10
Upper Free Weight Compound (OHP, bench, BB row, etc.)	3–12	6–9
Upper Machine Compound (lat pulldown, cable row, etc.)	6–15	6–10
Upper Isolation (curls, tricep pushdown, lateral raise, etc.)	8–20	7–10

As you can see, for hypertrophy, the higher the fatigue generated by the movement, and the greater the technical demand, it makes more sense to curtail the RPE and rep range. This avoids fatigue bleeding into the rest of a session, may reduce the risk of injury, and also ensures that the volume you perform is effective because as discussed

in previous chapters, it's harder to accurately rate RPE on high-rep, fatiguing movements. Therefore, compound movements are generally a better vehicle for doing the portion of your volume that is lower rep and thus heavier. Likewise, isolation exercises and machines are better vehicles for the higher-rep, lower-load portion of your volume.

Rep and RPE Range General Recommendations for Strength by Goal		
Exercise	**Rep Range**	**RPE Range**
Main Lift Strength (specific strength in main lifts/variants)	1–5	7–10
Main Lift Volume (for specific hypertrophy, work capacity)	4–8	5–8
Main Lift Technique (or "power", technical work, recovery)	1–3	4–7
Compound Accessory (OHP, good morning, BB row, etc.)	4–8	6–9
Machine/Isolation Accessory (tricep pushdown, HS row, etc.)	8–15	7–10

For strength, rep and RPE ranges are largely dictated based on whether you are performing a main lift or accessory, and your goal with the movement. For main lifts and variants whether you are building specific strength in the lifts (or strength that easily transfers to them), specific hypertrophy and workload capacity with those lifts, or whether you are performing technique work which is heavy enough to be useful, but light enough to allow recovery, different RPE and rep ranges are appropriate. Likewise, rep range and RPE will change depending on whether you are performing compound accessory movements intended to build general strength (which are more taxing and technically demanding), or machine and isolation accessories (which are less taxing and technically demanding) for hypertrophy purposes.

When you combine this information with Step 3, you can really start to see how your program unfolds.

Step 3: Progression

At this stage, the program really starts to take form, and we get to start assigning reps and sets across the week and the mesocycle. How this shapes up is dictated by the type of exercise (isolation or compound) and the rate of progress you can reasonably expect (training age).

Summary of Progression Strategies		
Progression Strategy	**Appropriate Uses**	**Example**
Linear Load Increases	Compounds for novices	W1 Day 1: 3x8x100 kg W2 Day 1: 3x8x102.5 kg
Linear Periodization (wave loading)	Compounds for intermediates, isolation for novices	W1 Day 1: 3x8x100 kg W2 Day 1: 3x7x102.5 kg W3 Day 1: 3x6x105 kg W4 Day 1: 3x8x102.5 kg
Block Periodized Mesocycles	Compounds for advanced	*Accumulation* W1-6: Sets per week increase from 15 in W1 to 20 in W6. Rep range 10–20, load increases when possible, RPE 6–8. *Intensification* W7-10: Sets per week stays at 14. Wave loading from 12 reps in W7 to 6 reps (2 rep increments) in W10. RPE 8–10. *Taper & Test or repeat*
Double Progression	Isolation for intermediate and advanced	Add reps within rep range, e.g. 8–15, with fixed load week to week until all sets can be completed for the top end of the range, e.g. 25 kg x 15,15,15. Then, go up next smallest increment in load and repeat.

As a quick recap, *linear progression* (linear load increases) is simply adding more weight to the exercise while keeping reps and sets the

same each time you repeat a session.

Linear periodized progression is keeping sets the same, reducing reps each session, while increasing load.

Block periodized mesocycles are a sequential approach where you do an accumulation mesocycle of higher volume at a moderate RPE and higher rep ranges (but specific to your goal), followed by an intensification mesocycle of lower volume at a high RPE and lower rep ranges (but still specific to your goal), and then taper and test—or simply rinse and repeat after a deload if you can gauge your estimated strength in training (e.g. starting some days with a single at a 6–9 RPE).

For a novice, you would simply spread your 10–12 sets per muscle/movement across your days of training, and each week when you repeat a day's session, try to increase load (typically the smallest increment available to extend progression longer).

For an intermediate, you'd spread 13–15 sets over your days, and follow a linear (load up reps down) approach week to week, and double progression for your isolation movements.

Finally, **an advanced lifter** could set up an accumulation cycle of building number of sets, followed by an intensification mesocycle similar to how an intermediate would progress, and then taper and test, or rinse and repeat.

To continue our example, sticking with our 4 days per week, 2/week muscle group training frequency setup as an intermediate with hypertrophy goals doing 13–15 sets per week, things start to take shape:

Sample Intermediate 4-day, 2x/week Muscle Group Hypertrophy Program Overview				
	Legs: 6–20 rep range	Push: 6–20 rep range	Pull: 6–20 rep range	Full Body: 4–8 rep range
Volume	~9 sets/ muscle	~9 sets/ muscle	~9 sets/ muscle	~6 sets/ muscle
Compounds	Wave loading 8–12 rep range	Wave loading 8–12 rep range	Wave loading 8–12 rep range	Wave loading 4–6 rep range
Isolations	Double progression 12–15 rep range	Double progression 12–15 rep range	Double progression 12–15 rep range	Double progression 6–8 rep range

Showing how this plays out in a strength program is a little easier once we discuss exercise selection and break things into categories.

Step 4: Exercise Selection

For a bodybuilder or hypertrophy-focused trainee, you can slot in various exercises to fill the weekly muscle group volume goals. If you view the following table you can see which muscle groups a given exercise “counts” for.

As it currently stands, we know an exercise that trains a muscle group indirectly (labeled 'secondary') probably doesn’t provide quite as much stimulus to the muscle as something that trains it directly (labeled 'primary'), but the scientific data up to this point has counted secondary and primary muscle group volume the same. So, count everything on a one to one basis for each muscle group, just be aware that you don’t want all your volume for a given muscle group coming from indirect work.

Hypertrophy: Exercises and Muscle Groups Trained		
Movement Pattern	**Primary Muscle Groups**	**Secondary Muscle Groups**
Squat (all variations, leg press, single leg variants)	Quads, Glutes	Erectors (if free weights)
Hip Hinge (deadlift variations, good morning, back ext)	Glutes, Hams, Erectors	Scapular Retractors
Vertical Pull (chins, lat pull)	Lats, Bis	Rear Delts
Vertical Push (OHP variations)	Anterior Delts, Tris	Middle Delts
Horizontal Pull (row variations)	Lats, Scapular Retractors	Rear Delts, Bis, Middle Delts
Horizontal Push (flat, incline, decline pushing variants)	Chest, Anterior Delts	Tris (CG/dips: primary), Middle Delts (incline)
Horizontal Hip Extension (hip thrust, glute bridge etc)	Glutes	Hams
Pull Over (DB pullover, lat pushdown, BB pullover etc)	Lats	Tris, Chest
Fly (cable crossover, DB flys)	Chest	Anterior Delts
Isolation Exercises	Target muscle	N/A

For a powerlifter, however, things are little easier to categorize. As almost the entire body is trained and utilized in the performance of the big 3, but we aren't necessarily looking for complete muscular development everywhere. Thus, you can view things as follows:

Strength: Exercises and Movement/Muscle Group Categories	
Movement/Muscle Group Categories	**Exercises**
Upper Body Push	Bench and variants (CGBP, board press etc.), horizontal and vertical pushing, triceps work
Upper Body Pull	Deadlift and variants (RDL, pause deadlift etc.), horizontal and vertical pulling
Lower Body	Deadlift, squat and variants (front squat, safety bar squat etc.), all lower body accessories

Understanding the above, here's how the same intermediate choosing a 4-day per week, 2/week movement pattern training frequency might setup a powerlifting program with the S, B, D, B split (see the training split matrix for strength) doing 13–15 sets per week:

Sample Intermediate 4-day, 2x/week Movement Strength Program Overview				
	Squat: 4–6 rep range	Bench: 4–6 rep range	Deadlift: 3–5 rep range	Bench: 8–12 rep range
Main volume Acc volume	5 sets 4 sets upper pull	5 sets 3 sets upper push	5 sets 3 sets lower	4 sets 3 sets upper push 4 sets upper pull
Main Lift	Wave loading 4–6 rep range	Wave loading 4–6 rep range	Wave loading 3–5 rep range	Wave loading 8–12 rep range
Accessories	Double progression 6–8 rep range	Double progression 6–8 rep range	Double progression 6–8 rep range	Double progression 8–12 rep range

This example meets the guideline of having 13–15 sets for Upper Body Push, Upper Body Pull, and Lower body from a muscle group perspective, as there are 9 sets of bench, and 6 sets of non-bench upper body pushing (for a total of 15), 10 sets combined between squat and deadlift, and 3 sets of lower body accessories (for a total of 13), and 5 sets of deadlift and 8 sets of upper body pulling (for a total of 13).

Globally, we also meet the guideline of having 50–75% of volume from the main lifts, as out of a total of 36 sets, more than half (19 sets) come from the big three. As a reminder, here are the guidelines for how to distribute volume over exercises for strength and hypertrophy.

Exercise Selection Guidelines	
Strength (Powerlifter)	Competition lifts for 50–75% of the total volume. Accessory work for 25–50%
Hypertrophy (Bodybuilder)	1–2 compound exercises for each major muscle group. 1–3 isolation exercises for each muscle group.

Step 5 and 6: Rest Periods and Tempo

At this stage, you don't have much left to do. If you'd like, you can set up your upper body push and pull exercises with antagonist paired sets (APS). Likewise, if your goal is hypertrophy you can set up APS for leg extension and leg curl, and biceps and triceps as well.

Also, if you are time-pressed and your current setup is pushing the limits of what you think you can reasonably accomplish, you can perform some of your accessories or single-joint movements for hypertrophy as drop sets or rest pause sets.

Beyond this, just make sure you rest appropriately, control the eccentric to some degree, and perform forceful concentric contractions and you've made your way through The Pyramid. All that remains is making it more flexible and a bit more specific to your needs.

Customizing Your Program with Autoregulation

Now that you've got the basic structure, there are some things you can do to better match this program to your specific needs.

Autoregulating Days Off or Training Days

If you recall from the Adherence chapter, training hard when you are most recovered, and matching easier sessions with days you are less recovered has been shown to benefit strength and adherence. So, you can apply this by not having fixed training days (e.g. Monday, Wed, Fri) within the week, or by having floating off days when you feel you need them the most. This helps with not only your life schedule but may aid performance.

The former strategy, flexible training days, works best when training 2–3 times per week, as you have more off days than training days. The latter strategy, flexible off days, works best when training 4 or more days as you have fewer off days than training days.

Autoregulating Load

I'd advise programming with both percentage 1RM and RPE on exercises you test or determine an actual or estimated 1RM on. You can program with percentage 1RM, say 3x8x70% but also provide an RPE range, like 6–8, and then if the first set at 70% wasn't in that range, increase or decrease load to something that you think will be.

For exercises you don't estimate or test your 1RM on, you can just use RPE. For novices who don't yet have the training experience to accurately gauge RPE, just track it for now without using it to set or modify load. Give it a few months at least to develop competency with RPE before doing so.

Autoregulating Deloads

After each mesocycle of training (for intermediates when you've completed a progression cycle, for advanced when you've completed a block), use the chart from Level 3 to assess whether a deload (or a high-rep week maybe with BFR) might be beneficial:

Post Block Assessment
Dreading the gym?
Sleep worse than normal?
Loads/reps decreasing?
Stress worse than normal?
Aches and pain worse than normal?
Yes to 0-1 questions: start next meso Yes to 2+ questions: deload week **Yes only to aches and pains, high rep week*

Make sure to do a deload *just in case* every third mesocycle no matter what if you haven't run one yet. See Level 3 for specifics on how to implement a deload.

Autoregulating Exercise Selection

Giving yourself more choice in exercise selection may allow you to enhance your enjoyment, pay heed to any current aches and pains, and subsequently improve performance as discussed earlier in the book.

For those interested in hypertrophy, you can change to a different 'horizontal pull' or 'vertical push' or 'hip hinge' (or any compound lifts) mesocycle to mesocycle (so long as you come back to it every few mesocycles) instead of sticking with one all the time. Likewise, for isolation movements, you can even give yourself the choice to change session to session. If you do so, just make sure to record your training loads. This allows you to know where you left off so you can pick back up with the appropriate load upon returning to it.

Similarly, those who want to gain strength can choose a different variant on the main lift mesocycle to mesocycle when far from a competition (closer to the competition you should choose the competition lift). Additionally, strength focused trainees can switch between variations of accessory movements session to session (so long as it trains the same movement pattern or muscle group), like a hypertrophy focused trainee does on isolation movements.

V

A final consideration for your training plan is how to modify it if you are cutting. If it is a brief or non-aggressive cut to sustainable levels of leanness, you probably don't need to modify training at all. However, if you are going on a longer-term or more aggressive cut, as is typical when dropping a weight class, or certainly if you are dieting for a show, changes should probably occur.

Some very general guidelines are (you can modify the sample programs from the next chapter using this information as well):

1. Step down one category of volume (e.g. from intermediate to novice, or advanced to intermediate) to accommodate reduced recovery. You probably don't need to do this immediately, but maybe at some point into the first third of a diet, it's a good adjustment to make to ensure a better balance between stimulus and recovery (again, only if you're dieting to unsustainable levels of leanness, or with a sizeable deficit).
2. Switch from doing deloads based on how you score on the checklist, but to doing them automatically after every mesocycle to facilitate better recovery.
3. Use the autoregulation strategies preceding this section so that you can account for your performance being more variable.

If you've made it this far, you've constructed a plan, added in elements of autoregulation, and adjusted it to your situation to better match it to your needs.

However, it would be understandable if you still didn't feel quite comfortable writing a program just yet. To see in even greater detail how you can apply these guidelines to program creation, in this chapter I've created sample novice, intermediate, and advanced programs for both strength and hypertrophy (6 total programs) and I take you through the entire progression plan for each one in detail.

Warming Up

The purposes of a warm up is to prepare you for the training to come, potentially enhance the performance of training, and also to hopefully reduce the risk of injury.

One of the primary mechanisms by which a warm up provides these benefits is an increase in body temperature, which has beneficial physiological effects that include increasing muscle blood flow and oxygen availability, and also increasing the speed and sensitivity of the neuromuscular system [1].

While static stretching to enhance flexibility has been traditionally performed as a part of a warm up [1], stretching to the point where flexibility is increased acutely prior to training can reduce muscular performance [2–4]. If you think about it, making a muscle tendon unit more compliant and forcing it to 'relax' so that it elongates, intuitively seems to conflict with the goal of making it contract against heavy loads. However, you could make an argument that this reduction in performance may be worth it, since static stretching has also been proposed to reduce the risk of injury. Unfortunately, the data on whether or not static stretching reduces the occurrence of injury is mixed at best [3, 5–7].

The likelihood that static stretching reduces the risk of injury is inconclusive, and if it does, it likely does not reduce injury risk to any greater degree than an active or 'dynamic' warm up [6]. However, even if static stretching does not provide any additional benefit in regards to injury prevention from what is provided by a dynamic warm up, there

may be some individuals who find it necessary to improve flexibility prior to training in some cases. For example, if inflexible calves prevent the completion of a full range of motion squat without coming up onto the toes or causing premature 'butt wink' before you reach depth, it may be advisable to attempt to increase calf flexibility prior to training.

Other examples exist such as, tight pecs or shoulders preventing pain-free positioning of the bar during low-bar squats, or tight triceps and forearms preventing pain-free positioning of the bar during front squats. In these cases, static stretching prior to training may be a consideration despite the potential to reduce the performance capability of the stretched muscle.

There are some ways to work around this potential conundrum. First, if you need to increase the flexibility of a muscle group for exercise performance but you aren't training that muscle (such as the pecs and delts during low bar squats), feel free to statically stretch the muscle as this won't degrade performance. However, if you need to enhance the flexibility of a muscle group you are going to train, you have a few options.

- You can stretch for a short period of time (less than 60 seconds), and not to the point of discomfort as this appears to prevent any decrease in muscular performance [2]. However, this is also unlikely to improve your flexibility very much.
- You can perform foam rolling, AKA 'self-myofascial release' (not that this is actually 'releasing' fascia) on a muscle group, which has been shown to increase range of motion without decreasing force production [8].
- You can perform a dynamic, sport-specific warm up (which we will discuss in a moment) after static stretching which will likely negate any performance decrement due to static stretching [9].

Finally, let's clearly define what should be done for a complete warm up.

Arguably the most reasonable recommendation for a complete warm up is to perform submaximal-intensity aerobic activity followed by general dynamic movement prep and then finish with sport-specific dynamic activities [4]. The purpose of the submaximal aerobic exercise

is to aid in increasing body temperature; however, personally, I find this a bit redundant as a full-body dynamic movement prep also serves this role. With that said, if you find you are slow to warm up, or if you exercise in a cold environment feel free to include it.

The full-body dynamic warm up should consist of full range of motion, explosive movements to prepare you for the high force output resistance training to come, that in totality incorporates the entire body. Unlike static stretching that has the potential to degrade performance, a dynamic warm up has the potential to improve it [4].

Finally, as a strength or physique athlete the 'sport-specific' warm up simply consists of your warm-up sets on each lift.

Below is a sample warm up to perform before training (feel free to modify it to your own preferences, there is not one "magic" warm up):

5 Minutes Submaximal Aerobic Warm Up (Optional)
Sample Dynamic Warm Up
10 Leg Swings Front to Back
10 Leg Swings Side to Side
10 Arm Circles Forward
10 Arm Circles Backward
10 Cross Body Arm Slaps
10 Walking Lunges w/Trunk Rotation

Working Set Rep Target 1–5			Working Set Rep Target 6+		
	Reps	Load		Reps	Load
Set 1	5–10	Bar if applicable (optional)	Set 1	8	50% Working Weight
Set 2	5	50% Working Weight			
Set 3	4	60% Working Weight	Set 2	4	70% Working Weight
Set 4	3	70% Working Weight			
Set 5	2	80% Working Weight	Set 3	2	90% Working Weight
Set 6	1	90% Working Weight			

Overview of Sample Programs

An Important Note on These Sample Programs

Before we get into the rationale for these programs and how to run through them, it's important to note that the primary purpose of these programs is actually not for you just to take them and use them exactly as written.

By definition, these programs cannot be optimal for you, because they are not specific to you and your needs. These programs can get close, as they allow you to match up your goal (powerlifting or bodybuilding) and your experience level (novice, intermediate, or advanced) to the program, and in some spots they allow you freedom to choose a variation on an exercise or the schedule to fit your needs, but they still aren't true individualized programs.

Individuality is key to long-term success, and just like it's not a good idea to use someone else's diet regardless of whether your maintenance calorie intake or initial body-fat percentage is similar to theirs or not, it's also not a good idea to jump into a program regardless of how the volume, intensity, or frequency of the program compares to what you

are currently adapted to.

Instead of using these sample programs as "the be-all and end-all" that you just jump right into, use them primarily as learning tools. These programs are the synthesis of the entire Training Pyramid. They combine the concepts presented throughout this book into usable systems. By examining these sample programs you are looking at only a few of the possible iterations of the concepts embodied in this text. If you are a trainer, you can use these sample programs to help you learn how to create customized programs for your clients, and if you are an athlete you can use these programs to help you design a more individualized plan for yourself.

This overview section is fairly detailed. If you're just looking to get started and the quick start guide didn't get you all the way there, I'd suggest that you just read the subsection that is relevant to you (powerlifter or bodybuilder, and novice, intermediate or advanced), and then skip to the corresponding 'Progression' section and read through as you look at the Sample Program tables at the end.

The Novice Powerlifting Program Overview

The Novice Powerlifting Program is a three or four-day program built around developing skill and strength with the competition lifts, while also developing a base of muscularity to aid further strength development.

While it is true that programming is different for novice, intermediate and advanced lifters, you will see similarities in the structure and organization of the training program at each level.

The primary differences in programming between lifters of various experience levels are the rate of progression that is attempted, the total volume of work that is performed, and the structure of the program related to organizing these differences in volume. However, most of the other aspects of programming remain the same.

As a novice, complex approaches to periodization are not necessary to maximize the adaptive response. Thus, unlike the intermediate and advanced programs, you won't see the same elements of block or linear periodization. Rather, a simple, single progression model where increases in load occur session to session is used. However, that doesn't mean

training should completely lack variety and be highly monotonous.

You will see that the program is built on the framework of a daily undulating model where hypertrophy,‘power (essentially heavy technique work), and strength are trained. Strength is achieved through the combination of larger muscle fibers increasing force production, neuromuscular adaptations increasing force production and the optimization of technique that allows for a more efficient expression of the force produced.

Additionally, training with a lack of variation in load or volume is not only psychologically monotonous but also has been shown to increase the chance of overtraining, degrade performance, increase the frequency of illness; and when training that is highly monotonous (little variation in load and volume) is made less monotonous, increases in performance occur [10].

For these reasons, different rep and load combinations are used on different days.

- If you use the three-day version, Day 1 is dedicated to higher-rep, moderate-load work to accumulate a relatively high volume (hypertrophy). Day 2 is dedicated to low-rep, moderately-heavy work at a low volume on bench (power) and low-rep heavy work at a low volume on deadlift (strength). Day 3 is dedicated to low-rep, heavy work at a moderate volume on squat and bench (strength).
- If you use the four-day version, the structure is the same, except only the main lifts are trained on Days 1 through 3, while Day 4 is dedicated to accessory work.
- If you have no issue with the cumulative fatigue of performing the main lifts first and don’t mind dedicating more time to longer training sessions, go with the three-day version. If you would prefer shorter training sessions but one more session per week or find that the fatigue of the main lifts is detrimental to your accessory work, choose the four-day option.

The volume performed for specific individual muscle groups is not nearly as important a consideration as it would be for a bodybuilding program. For this reason, all the powerlifting programs are expressed in terms of total lower-body, upper-body push, and upper-body pull volume.

The volume is established at the lower end of the weekly volume per muscle group recommendations made in Level 2 and follows the training age specific recommendations from the quick start guide. The volume is also split up so that ~⅔ of the volume is heavy work, while the rest is lighter, and just over half of the volume is performed with the competition lifts while the rest is performed using accessory lifts.

The breakdown for the Novice Powerlifting Program is shown below (deadlift and deadlift variant volume is counted towards lower-body and upper-body pull volume).

Movement Category	Sets/ Wk	Exercise	Sets/ Wk	% of Total	Main Lift Intensity	Sets/ Wk	% of Total
UB Push	12	Main	18	56%	≤ 6 reps/ set	12	67%
UB Pull	11	Accessory	14	44%	> 6 reps/ set	6	33%
Lower	12	Total	32	100%	Total	18	100%

The Intermediate Powerlifting Program Overview

The Intermediate Powerlifting Program is a four-day program that builds upon the base that was established from the novice program. Volume is increased globally, with a greater increase coming in the form of lower-body and upper-body pushing volume. Additionally, a second horizontal pull (I advise a free weight option for the heavier rowing session) and a bench and squat variation are added to round out development and ensure that no "weak links in the chain" occur now that the foundations of technical skill have been established.

Four days are utilized to accommodate the increased volume. Unlike the novice program there is no three-day option.

Heavy loading accounts for 70% of the volume while lighter loading accounts for 30%. Similarly, nearly the same proportion of volume comes from the competition lifts and accessory movements, respectively.

A daily undulating model is still the approach used on a week-to-week basis in a similar manner to the novice program. Higher volumes of moderate-intensity work are performed on Day 1 with a squat variation (I advise a variation that allows you to say upright to give your hips a break if you squat low bar, e.g. front, high bar, or safety bar squat) and bench press. Accessory movements are trained for both strength and hypertrophy on all days, and Day 2 is dedicated to heavy technique work with the competition lifts. Strength work is spread between Day 3 and 4 with squats and bench press being trained for strength on Day 3, and then the deadlift trained for strength on Day 4 with some moderate load work on a bench variation (if you bench wide, I advise a close grip variation, or you can do a weak point specific variation — see Level 4). Ideally to allow recovery between heavy competition lift training, place a day off between Day 3 and 4 if possible.

As an intermediate, a periodized approach to progression is utilized rather than the single-factor progression model that was used as a novice. A linear periodization model is utilized in a wave loading format for all lifts on a week to week basis.

Savvy readers will realize that they can create versions of this program geared more towards accumulating volume or more towards intensification (determined by the time point in the season) by simply increasing or decreasing the rep range and loads. For example:

- To make this program more volume focused a lift performed for 3 to 5 repetitions at 82.5 to 87.5% of 1RM could instead be performed for 4 to 6 repetitions at 80 to 85% of 1RM.
- To make this program more intensity focused, a lift performed for 3 to 5 repetitions at 82.5 to 87.5% of 1RM could instead be performed for 2 to 4 repetitions at 85 to 90% of 1RM.

The breakdown of the Intermediate Powerlifting Program is shown in the following table.

Movement Category	Sets/ Wk	Exercise	Sets/ Wk	% of Total	Main Lift Intensity	Sets/ Wk	% of Total
UB Push	15	Main	27	69%	≤ 6 reps/ set	19	70%
UB Pull	15	Accessory	12	31%	> 6 reps/ set	8	30%
Lower	15	Total	39	100%	Total	27	100%

The Advanced Powerlifting Program Overview

The Advanced Powerlifting Program continues to build upon the qualities that the lifter has developed over the earlier phases of his or her career as a novice and as an intermediate. A daily undulating framework is once again utilized and now training is spread out over six days to accommodate the increases in volume that are required for continued adaptation at this stage of the lifter's career.

Additionally, the program is split into distinct block-periodized mesocycles, where the lifter has distinct periods of training focused on the desired adaptation so that more efficient adaptations occur over the long term.

Within and over the course of the block-periodized mesocyles, elements of linear periodization are also utilized. Changes in intensity and repetitions follow a wave loading model similar to the intermediate program and specificity increases over the course of the entire program.

The accumulation cycle emphasizes the use of more accessory movements, higher repetition ranges, and lower intensities. On the whole, the goal is to encourage hypertrophy and work capacity adaptations to set the lifter up for the subsequent intensification cycle.

Half the training volume comes from the competition lifts while accessory work makes up the remaining half. Likewise, roughly 56% of the repetitions performed are in the heavier loading range while ~44% are performed with lighter loads.

The breakdown for the accumulation block is shown in the following table.

Movement Category	Sets/ Wk	Exercise	Sets/ Wk	% of Total	Main Lift Intensity	Sets/ Wk	% of Total
UB Push	21	Main	27	50%	≤ 6 reps/ set	15	56%
UB Pull	15	Accessory	27	50%	> 6 reps/ set	12	44%
Lower	18	Total	54	100%	Total	27	100%

The intensification block is marked by a global decrease in volume load and repetitions via reductions in reps per set and dropping some accessory work, and an increase in intensity. The number of training days remains the same and the rep ranges decrease while the loads increase in the intensification block.

The linear periodization model is still apparent week to week, albeit with lower repetitions and higher loads. Finally, many of the accessory movements drop away, while the frequency and the proportion of the volume of the competition lifts increases.

In contrast to the accumulation block, now the emphasis becomes more specific with 75% of the volume performed using the competition lifts and the remaining 25% is performed with accessory movements. Likewise, just over 80% of the main lift sets fall in the heavier loading zone while just under 20% are performed with lighter loads. While the accumulation and intensification phases individually stray towards the ends of the Level 2 VIF guidelines, the advanced program as a whole falls right smack in the middle of them.

The stats for the intensification block are as follows.

Movement Category	Sets/ Wk	Exercise	Sets/ Wk	% of Total	Main Lift Intensity	Sets/ Wk	% of Total
UB Push	20	Main	36	75%	≤ 6 reps/ set	29	81%
UB Pull	13	Accessory	12	25%	> 6 reps/ set	7	19%
Lower	22	Total	48	100%	Total	36	100%

vThe Novice Bodybuilding Program, unlike the Novice Powerlifting Program, does not have a three day option. This is a four day program, and it has more exercises to ensure all muscle groups are adequately trained and has a higher total volume compared to the Novice Powerlifting Program. In all of the bodybuilding programs, unlike the powerlifting programs, volume is not only considered in relation to lower body, and upper body push and pull, but rather for each specific muscle group. Thus, they have been designed to ensure complete, symmetrical development over time.

The framework of the Novice Bodybuilding Program is still that of an undulating model; however, there is no "power" or heavy technique work performed because this is not a primary concern for a physique athlete. Instead, there are days focused on accumulating volume to stimulate hypertrophy, and also days focused on building strength. Strength development complements the accumulation of volume and aids hypertrophy by encouraging progressive overload and allowing heavier loads and greater mechanical tension to be applied over time.

Because skill development is not as important to a bodybuilder as it is to a powerlifter, and because greater volumes are performed on each day, a lower/upper split is used to balance out fatigue and recovery across the week. Similarly to the Novice Powerlifting Program, a single factor progression of load is used on a week to week basis.

Roughly 65% of the volume in this program is accumulated using moderate rep ranges and moderate loads, while the remaining 35% is dedicated to heavier loads paired with lower rep ranges and lighter

loads paired with higher rep ranges. The sets per muscle group largely fall between 10–12, as per the guidelines in the program quick start chapter; however, you'll notice that calves and hams fall just short, while glutes exceed those guidelines. Remember, both squat and hip hinge patterns train the glutes, so they get worked in the majority of compound lower body movements and you'll notice a pattern of their volume being higher for this reason. Also, while the hamstrings aren't trained effectively in squat and single leg patterns, they are trained to some degree. Calves are also trained to some degree on both leg curls, squat (and single leg) pattern movements, so their volumes appear deceptively lower than the actual stimulus.

The breakdown for the Novice Bodybuilding Program is as follows.

Upper Body	Sets/Wk	Intensity	Sets/Wk	Intensity	Sets/Wk	% of Total
Pecs	11	Quads	11	6–12 reps/ set	36	65%
Back	10	Glutes	14	Other	19	35%
Ant. Delts	10	Hams	9	Total	55	100%
Med. Delts	10	Calves	8			
Rear Delts	10					
Biceps	12					
Triceps	12					

The Intermediate Bodybuilding Program Overview

The Intermediate Bodybuilding Program builds on the novice program by increasing volume globally. Additionally, the progression is changed to be more suitable to an intermediate level lifter and follows a linear-periodized, wave-loading pattern in the same manner as the Intermediate Powerlifting Program.

The framework is similar to that of the Novice Bodybuilding Program in that the week starts off with strength focused training on Day 1 and 2 in a lower and upper-body format. However, for the rest of the

week muscle groups are organized in a three-day split. Lower body, push, and pull are performed in that order, after the lower and upper body training sessions on Day 1 and 2, respectively. Thus, this is a five-day program; however, the frequency per body part remains at two times per week like the novice program. The change from four days of training in the novice program to five days in the intermediate program allows for more volume to be performed per muscle group, while also spreading the additional workload over more days in the week to allow for recovery.

The proportion of volume from moderate loads relative to heavier and lighter loads that was present in the Novice Bodybuilding Program is retained in the Intermediate Bodybuilding Program. Volume largely falls within the 10–20 set/wk range for all muscle groups, and mostly lands in the ranges suggested for intermediates in the program building chapter. However, arm volume is higher due to the increase in total upper body pushing and pulling volume. With that said, most of the added arm volume is indirect, so this disproportionately makes arm volume seem high. Likewise, with additional pressing, anterior delts are trained more. This is an unavoidable outcome from doing more compound movements (and a reason I almost never include front raises in programs). Lastly, as described in the Novice Bodybuilding Program description, glute volume is also high.

The breakdown for the Intermediate Bodybuilding Program is on the next page.

The Advanced Bodybuilding Program Overview

The Advanced Bodybuilding Program continues the increase in volume from the intermediate program, like the intermediate program did in comparison to the novice. Similarly, to accommodate this increase in volume, the number of days per week is increased to six, so that less volume can be performed per session while still increasing total work.

This program returns to the lower/upper division of muscle groups, this grouping is performed three times in a week. Meaning, three lower-body days and three upper- body days are alternated and performed each week for a total of six training sessions.

The linear-periodized model of progression is performed in a similar manner to the intermediate program; however, a block periodized model is also integrated in the same fashion as the advanced powerlifting program. Also, the daily undulating model is emphasized to help organize the training stress of the week.

Much like the modified daily-undulating model in which "power" is performed after hypertrophy to allow for recovery before the final strength session is performed, the first two days of this program are higher reps, volume, and RPE and the next two are sessions with lower total volume and relative intensities and the final two sessions of the week are dedicated to strength. While "power", or what amounts to heavy technique work, is not performed like it is in the powerlifting programs, the concept of having a training day that allows recovery, before heavy loads have to be lifted, is utilized.

The accumulation and intensification blocks in the Advanced Bodybuilding Program are very similar to one another and have less disparity than the blocks in the Advanced Powerlifting Program. Exercise selection remains the same, and the only differences are that the repetition ranges decrease while the loads increase in the intensification block relative to the accumulation block. Volume load and total reps are higher in the accumulation phase and more repetitions are performed in the moderate intensity range, while volume load and total reps are slightly lower and more repetitions are performed in the heavier loading zones in the intensification phase.

Upper Body	Sets/Wk	Intensity	Sets/Wk	Intensity	Sets/Wk	% of Total
Pecs	13	Quads	13	6–12 reps/ set	51	65%
Back	15	Glutes	20	Other	28	35%
Ant. Delts	19	Hams	16	Total	79	100%
Med. Delts	15	Calves	10			
Rear Delts	15					
Biceps	18					
Triceps	19					

Sets remain the same, which is unlike the examples in the quick start guide and in Level 3; which shows you another way to program. However, more sets in the intensification block are below the 6–20 range such that the hypertrophy-stimulating volume is slightly lower in the intensification block. With that said, with heavier loads in the intensification block, it would be a mistake to try to compensate by increasing sets. The combination of heavier loads and more sets would cause excessive fatigue. Finally, you'll see the trends in volume distribution per body part continue from the intermediate program with arms, glutes and anterior delts with higher volumes due to their indirect involvement in many exercises, deceptively low volume for calves (remember indirect work from leg curls and squat patterns), and a general increase across the board to match up with the recommendations from the quick start guide.

The breakdown of the accumulation block is as follows.

Upper Body	Sets/Wk	Intensity	Sets/Wk	Intensity	Sets/Wk	% of Total
Pecs	17	Quads	16	6–12 reps/ set	66	69%
Back	17	Glutes	24	Other	29	31%
Ant. Delts	23	Hams	17	Total	95	100%
Med. Delts	19	Calves	12			
Rear Delts	17					
Biceps	20					
Triceps	22					

The breakdown for the intensification block is as follows.

Upper Body	Sets/Wk	Intensity	Sets/Wk	Intensity	Sets/Wk	% of Total
Pecs	17	Quads	16	6–12 reps/ set	55	58%
Back	17	Glutes	24	Other	40	42%
Ant. Delts	23	Hams	17	Total	95	100%
Med. Delts	19	Calves	12			
Rear Delts	17					
Biceps	20					
Triceps	22					

Novice Progression

Percentage of 1RM Is Used to Set Load on Compound Barbell Lifts

Ratings of Perceived Exertion (RPE) based on repetitions in reserve (RIR) requires lifting experience and practice to become familiar with. For your "main lifts" you'll use a percentage of 1RM (%1RM) to guide loading and simply make linear load increases over time until you no longer can (which means you've graduated to intermediate). This will require strength testing prior to starting this program. However, do track your RPE on each set to get familiar with self-assessing how close you are to failure after each set (use video and/or coach feedback to help you learn this skill).

(Consider having a reread of the "Measuring Intensity" section in the Volume, Intensity, Frequency Level now for a quick recap on what we mean by RPE and RIR.)

As a novice, ensure you have received skilled coaching on how to properly perform the exercises you will use.

Establishing Initial Maxes

- On the exercises with a percentage of 1RM listed, perform a 3–5RM under supervision from a skilled, experienced lifter or coach, and have spotters. Then, use our website's 1RM calculator to estimate your 1RM. For powerlifters starting the novice program, a 1RM test is certainly acceptable given this is something you'll do in competition, but do have spotters. Remember, the novice programs are for novice bodybuilders and novice powerlifters, rather than complete novices to the weight room. For complete novices, no max testing of any type needs to be performed. Simply start with light to moderate loads, work on perfecting technique and progress loads each session while working on form for a few weeks until your basic fundamental lifting skills are established. Then, this approach can be followed.
- For squats and deadlifts (and variants like the front squat or RDL), do your AMRAP or 1RM to technical failure, not absolute failure. These movements when performed incorrectly not only change the muscles that are emphasized but also risk injury. Thus, loads must be based on your estimated max with solid execution to ingrain good technique.
- For any exercise where a %1RM is not listed, I don't advise max testing. These exercises are difficult for novices to perform without losing form when loads are very heavy. Rather, you will use RPE from the start, which will also serve as a learning tool. These exercises require the coordination of fewer movements, are low risk, and even if you initially gauge RPE inaccurately, there will be little to no consequences in terms of under or overtraining in the grand scheme.
- You'll notice the RPE values for the novice programs are always "First Set RPE 8". Meaning, you should be able to do all the prescribed sets for the day by sticking with your initial set's load if it matched up correctly with the target RPE (close to an 8 RPE). If you "miss reps" on subsequent sets at the same load as the RPE climbs past 10, you either started too heavy, didn't rest long enough, or perhaps made a technical fault; all of which are learning experiences for your next session.
- Some tips to get better with RPE: 1) Even on your main lifts where you are using % 1RM, write down an RPE just to get familiar with

rating RPE, 2) record your sets on your phone and/or get feedback from an experienced training partner or coach if they are present. Consult the video and/or consider the feedback, and use it with your assessment of how the set felt to determine your RPE/RIR.

With maxes established, let's dive into the program.

The First Week of Training

Alright, so here I'm going to talk you through how to take your initial maxes and use them with the notations in the spreadsheet. It's actually quite simple, but it might be confusing at first when you're unfamiliar with it.

For instructional purposes, even if you are a bodybuilder, I am going to walk you through the "Novice Powerlifting Sample Program" so you understand how these programs work. You can refer to the table at the end of the book as I talk you through it. Just in case you're reading this on a device that makes it a trouble to skip back and forth between pages, here is day one.

Day 1				
Exercise	**Sets**	**Reps**	**%1RM**	**1st Set RPE**
Squat	3	8	70%	NA
Bench	3	8	70%	NA
Vert Pull	4	10	NA	8

You can see that we have three exercises on this first training day.

- **Exercise/sets/reps:** The first exercise is the squat. You're going to perform 3 sets for 8 reps.
- **%1RM:** The weight you will use will be 70% of your 1RM (or calculated 1RM).
- **1st Set RPE:** This is the rating of perceived exertion scale based on repetitions in reserve. For your first set aim to hit this target so subsequent sets are not too difficult such that they result in

failure. For the exercises without an RPE, just use the percentage of 1RM, but still record RPE (only adjust the load if you actually can't complete the reps). As you gain more experience, you'll get better at accurately rating your RPE which will help you as you'll eventually use RPE to adjust your loads regularly (see advanced progression).

So, let's say that your current 1RM in the squat is 180 lb (~80 kg). You'll load the bar so that the total weight is 70% of that, 125 lb (57.5 kg) and then perform 3 sets of 8. This might feel relatively easy, but resist the temptation to do more. Some people can get substantially more than 8 reps at this percentage, but our goal is to be submaximal as you'll be making linear increases in load every time you repeat this session. Your second and third sets you will more than likely find to be a harder than the first due to cumulative fatigue. Move onto the next exercise, the bench press.

Now, let's say your 1RM for the bench press is actually a little higher than the squat, 200 lb (~90 kg). It is not an uncommon situation for many ,typically male, lifters to be more proficient and stronger at bench pressing than squatting when they first get serious about powerlifting. Have no fear if this is your situation, it will be corrected quickly. Load the bar so that the total weight is 70% of that, 140 lb (~62.5 kg) and then perform 3 sets of 8.

After you have completed all three sets move onto the Vertical Pull (this can be chin-ups if you are strong enough to do 10 at an 8 RPE, or a cable or machine pulldown). After doing your warm-up sets, make your best guess at what weight you think you could do for 12 reps, and do a set of 10 (meaning, 10 reps at an 8 RPE). Repeat this for all three remaining sets. Don't worry if the first set or the whole session ended up being way too easy, you can increase the load on your following sets or sessions, respectively. Also don't worry if you overshot and missed reps, just reduce the load on subsequent sets. When you get more experience, you'll be able to pick a load you can do for all your sets on the exercise with the last set getting harder, but not so hard you can't complete all 10 reps. At this point, you can make small jumps each week in load.

If you are performing the Novice Bodybuilding Program, the process is almost exactly the same, except the exercise selection differs. Also, on

Days 2, 3, and 4 there are opportunities to use Antagonist Paired Sets (APS, see Level 5). You can use APS on horizontal and vertical push and pulls, triceps and biceps, and leg curls and extensions on Days 2 through 4. As a general reminder, if you are unsure about how long to rest between sets or how to do APS see Level 5 again briefly.

Progression Rules (After The First Training Week)

Now, with this first week out of the way, it's time to make linear increases in load. You saw a simple example of these progression rules in action in the "Example Novice Progression Using 5x5" table of the Progression Level. Have a look back at that now to refresh yourself before reading further.

Done? Ok, let's continue.

Treat each day as a separate progression on a week to week basis, meaning the load used on Day 1 has no bearing on the load you use on Day 2, rather, Day 1 is compared to Day 1 of the previous week.

For the Novice Powerlifting Program, start by increasing the load by 10 lb (~5 kg) on the squat and deadlift each week, and increase the load by 5 lb (~2.5 kg) on the bench press. For accessories, use the next smallest increment available. For the Novice Bodybuilding Program use the same progressions but, use 10 lb (~5 kg) increases on squat, deadlift, hip hinge and leg press variants, and 5 lb (~2.5 kg) load increases (or the smallest possible increment on non-barbell lifts) on all other exercises.

On exercises with a first set RPE target, if you selected your load properly, you should be able to complete your final set with the same load without missing reps (if you're completely new to lifting, don't worry if this is difficult to gauge initially). If you cannot complete all the reps on the final set (or previous sets), you started with a load that was too heavy or didn't rest long enough.

Finally, try not to perform reps to true failure at this stage of your lifting career. Specifically, do not perform reps on squats and their variants, deadlifts and their variants, bench press and other pressing movements, OHP, front squat or RDL beyond technical failure. As a novice, you may be able to do more reps by allowing form to deviate, but this will hurt you in the long run. If you watch IPF worlds, and see world-class lifters, you'll notice the only difference between 1st and

3rd attempts, is a slower bar speed in most cases. When you get really good at lifting, you shouldn't be able to alter form to get more reps, technical and absolute failure become the same thing. You will only get to this point by ingraining good habits though.

As per the novice progression, if you cannot complete all sets and reps as assigned with the same load, do not increase the load on the same day the next week, attempt the same weights again.

If you go two weeks in a row and do not get your target repetitions, decrease the load by 10% the next week on the same day. Then the week after, return to the load you were previously stalled with (see page 39 for example). If you then stall once again, use the same progression pattern, but start increasing the load only half as much week to week as you were previously. Meaning, if the lift is squat, deadlift, leg press, or a hip hinge, make load increases of 5 lb (~2.5 kg) versus 10 lb (~5 kg). If the lift is bench press or any other exercise, switch to micro-loading if you have the plates available; using 2 lb (~1 kg) increases per week (if you don't have access to micro plates, simply increase the load every other session).

Repeat the process of increasing, maintaining, or decreasing load based on whether you get all the reps, don't get all the reps for one session or don't get all the reps for two sessions in a row, respectively. If you have to decrease load even after the 10% reset, and switching to smaller increment increases (5 vs 10 lb or 2.5 kg vs 5 kg) on the majority of your lifts, it is time to move on to an intermediate approach to training and progression. As a final note, remember your bench press on Day 2 where you start with three reps at 80% is meant to be a technique building day. It should always be a good 4–6 reps from failure, so don't wait for this day's progression so stall out before going to the intermediate progression. If your heavy days (Day 3 and 4) have stalled even after dropping down to 5 lb (~2.5 kg) load increases, it's time to move on.

Intermediate Progression

RPE Based on RIR is Primarily Used to Set Load

Now with some weight training experience under your belt, RPE based

on RIR can be more accurately used; you should be able to tell with reasonable accuracy how many reps you have in the tank. For this reason, load selection is based on the first Set RPE on all lifts, and %1RM is used as a reference. In the bodybuilding program this is really straightforward, everything is a first set RPE of 8. This is a good starting RPE that should prevent you from hitting failure if you maintain load for your subsequent sets, but also keeps effort high.

For the powerlifting program, you'll see on Day 1 on the main lifts and their variants first set RPE is a 7. This is to ensure you don't hit failure as you do multiple sets to keep form pristine and to minimize muscle damage from bleeding into subsequent days where you have to perform the lifts again. Likewise, on Day 2 you have first set RPEs on the 'big 3' lifts, of 5. This is your technique building day and this day should always be 4–6 reps shy of failure as we are looking to focus on form with "heavyish" loads, versus inducing fatigue. However, your strength work on Days 3 and 4 and accessory work have first set RPEs of 8, meaning you can push these movements more and this is where you should be challenging yourself.

Progression Rules

Follow the intermediate, wave loading progression model in the "Progressing As An Intermediate" section of the Progression Level for all lifts in the Intermediate Powerlifting Program, and all lifts except for the isolation exercises in the Intermediate Bodybuilding Program.

Intensity will go up over the course of a three week cycle, while volume will come down. When you see the % 1RM range listed, this is a reference value that should put you roughly around the first set RPE, and highest % 1RM corresponds to the lowest rep wave. For example, in the Intermediate Powerlifting Program on Day 1, Bench is listed as 7 to 9 reps at 67.5-72.5% 1RM. Thus, you might do 9 reps at ~67.5% in week 1 (the percentages are just an estimate of what will result in the target RPE remember), 8 reps at ~70% in week 2, and 7 reps at ~72.5% in week 3 (assuming this resulted in a first set RPE 7 in week 1, if not you'd go heavier or lighter as needed in week 1).

Like the novice program, each day of each week is progressed independently, meaning, you will not compare Day 1 to Day 2 or Day 2

to Day 3, but each exercise progression continues from the same day the previous week.

After hitting the target first set RPE in week 1, for squats, deadlifts, and variations in the powerlifting program, use 10 lb (5 kg) increases in load each week as reps decrease. For all other movements, use 5 lb (2.5 kg) increases each week. For the bodybuilding program, use the same increases for squat, deadlift, hip hinge, and leg press variants, and then all other exercises, respectively.

Do the deload assessment (the checklist is in the quick start chapter for reference) after every three-week wave loading pattern is completed. If needed, implement a 4th-week deload before starting the next heavier wave load. Use the lowest number of reps and the lowest load you used in the prior 3 weeks during the deload, while performing two-thirds as many sets. If on regular weeks you performed 3 or 4 sets on the exercise, during the deload, perform 2, and if you performed 5 or 6 sets on regular weeks, perform 3 sets during the deload. So for example, if you performed 6x3 with 200 lb on bench press on Week 1 Day 2, 6x2 with 205 lb on Week 2 Day 2, and 6x1 with 210 lb on Week 3 Day 2, then you would perform 4x1 with 200 lb on Week 4 Day 2 for your deload.

The next three-week cycle begins 10 lb (5 kg) heavier or 5 lb (2.5 kg) heavier (depending on the exercise) and you repeat the pattern again.

For the isolation exercises in the Intermediate Bodybuilding Program, use the “Double Progression” model and deload it as outlined along with the other lifts if the deload is required. Remember, if you make it through three wave loading cycles (9 weeks) without deloading, do a deload regardless of your score on the checklist just to be sure.

Like the novice progression, we don’t want to miss reps, it should only occasionally occur in pursuit of the planned progression on your final sets. This will happen as you push the limits of your strength week to week and cycle to cycle.

When selecting loads, once again choose a load that lines up with the first set RPE target provided, so as to give yourself room to progress and to account for cumulative fatigue from multiple sets. This way you will avoid hitting failure initially when performing multiple sets and extend your ability to progress. If you struggle to add reps using as narrow of

a repetition range as provided without hitting failure, extend the range by a rep on either side. So for example, 3–5 becomes 2–6, 4–6 becomes, 3–7, 5–7 becomes 4–8, and 6–8 becomes 5–9. Meaning, your cycle length will extend, as it takes three weeks to drop from 8's, to 7's, to 6's, while it takes five to drop from 9's, to 8's, to 7's, to 6's, to 5's. If you extend your ranges, deloads become mandatory every two cycles instead of three.

Also, the 8–12 range is wave loaded in this book with two rep increment drops for intermediates; i.e. 12, 10, 8. If you extend the range, you need to, therefore, add two reps a side to the range (6–14), so you'd be on the same pattern as your single rep drop wave loaded exercises (3–5, 4–6, 6–8, etc.). You'd make two rep increment drops; i.e. 14, 12, 10, 8, then 6 to line up with the rest, and remember deloads are mandatory every two cycles with this extension versus three.

When Unable to Progress in Any Given Exercise

Over time, if you are unable to complete the progression as outlined on a given exercise:

- Finish the current 3-week cycle in which you are stalled by decreasing loads as needed so that all sets and reps are completed.
- Take the deload in Week 4 regardless of your checklist score to make sure fatigue is controlled for, on all exercises.
- After the deload, in the first week of your next cycle, select a load that you will be able to complete the wave loading pattern with for that exercise you stalled on (5–10% lighter than the load you stalled with on the week or weeks you stalled).
- Then, after the cycle is complete and for each successive cycle make a smaller load increase.

Like the novice progression plan, after you stall, reduce the rate of progression, so that instead of increasing the load by 10 lb (5 kg), you increase the load by 5 lb (2.5 kg) — you could microload as well if you had access making the increments even smaller but this typically makes subsequent weeks too easy when dropping reps week to week. If you stall once more and are unable to progress your loads on most lifts every

cycle by even 5 lb (2.5 kg), it is time to consider an advanced approach to training and progression. Again, like the Novice Powerlifting Program's bench "power" training on Day 2, on Day 2 of the Intermediate Powerlifting Program, you should not wait to stall on this day's lifts as they are intended to remain submaximal throughout. Base your decision to change to the advanced progression when you stall on your strength days.

Modifications to Peak for a Powerlifting Competition

To use the Intermediate Powerlifting Program as part of a meet prep plan to peak for competition, we will combine it with the approach shown at the end of Level 3.

To set it up, start a 4-week cycle 4 weeks out from a meet. Then, simply change the rep range on the squat and bench on Day 3, and deadlift on Day 4 from 3–5 to 1–3.

Starting Week 3, the week prior to your competition, begin a deload on your accessory lifts — all lifts that are not the competition lifts (including squat, bench and deadlift variants). This is a week earlier than usual.

Additionally, swap the bench variant on Day 4 with the bench on Day 3, and move Day 3's squats to Day 4. Thus on Day 4, you will perform squat, bench, and deadlift in order. However, instead of performing multiple reps for singles, doubles or triples (remember we changed the rep range to 1–3), you will simply work up to your opener, for 1 rep.

The week of the competition, include a deload for the rest of your lifts as well (the competition lifts), and on Day 3 just work up to 2 singles at a 4 RPE on squat and bench press and 1 single at a 4 RPE on deadlift, doing nothing else. Perform Day 3 24–48 hours prior to your meet as a priming session (this may help meet day performance [11]). Then, of course, Day 4 is replaced with the competition itself.

If you were wondering why there was not a novice competition preparation plan, it's because a novice should wait until they are

intermediates before they begin competing.

Advanced Progression

Using RPE Ranges

In the advanced programs, you'll see RPE ranges instead of the "first set RPE" which was used in the novice and intermediate programs. At this stage, you should be well aware of how much you have left in the tank, and you should be able to be objective and accurate. Thus, as described in Level 2, you'll use the percentage 1RM guideline for your first set (unless you are very confident it would put you outside of the RPE range), and then based on the RPE of that set, modify your subsequent sets up or down to fall within the given range. This serves two purposes, 1) it allows you to have a more individualized load assignment and, 2) it allows you to see if you are getting stronger without necessarily running AMRAPs or 1RM tests (although I've set the programs up so you can do that if desired).

Overview

The advanced program has two different 3-week mesocycles; an accumulation block, and an intensity block. The volume starts high and then decreases week to week while intensity increases. As outlined in Level 3, after each block assess if you need a deload using the deload checklist (see Level 3 or the Quick Start guide). If a deload is needed, repeat week 3 but with ⅔ the sets, RPE ranges 1 point lower and percentage 1RMs 5% less. Remember, if you finish three training blocks without running a deload, run one just in case. Additionally, there is a competition taper listed for powerlifters and a testing week listed for bodybuilders.

For Powerlifters

Depending on how advanced you are, you can run 2–4 cycles of the blocks in isolation, or in a combined fashion. Then, if desired, you can perform 1RM or AMRAP testing on the main lifts. If you are early in the season and many months prior to a competition you could run back to back accumulation blocks followed by AMRAP testing (or just gauge if you are getting stronger via observing if loads are increasing at the same RPEs).

If you are further along in the year but not peaking for a competition, you can run 1–2 accumulation blocks followed by 1–2 intensity blocks and finish with 1RM testing on the main lifts. But again, as discussed in Level 3 you don't have to actually run testing. Since you will be using RPE to adjust load throughout the program, you'll be able to see if you are getting stronger.

If you do want to test strength after an accumulation block with AMRAP testing, run a deload as described above (repeating week 3 but ⅔ the number of sets, RPE ranges 1 lower and percentage 1RM 5% less) but modify the deload week as follows:

1. Perform Day 1 as normal per the deload guidelines.
2. On Day 2 do an AMRAP at 85% (or just try to set a new 4–6RM) on your vertical push (or run it as deload if you don't test this lift) and perform your HH variant and triceps per deload guidelines.
3. Perform Day 3 and Day 4 as normal per the deload guidelines.
4. Skip Day 5.
5. Replace Day 6 with AMRAPs at 85% (or just try to set a new 4–6RM) on the competition lifts.

If you do want to test strength after an intensification block with 1RM testing, run a deload as described above but modify the deload week as follows:

1. Perform Day 1 as normal per the deload guidelines.
2. On Day 2 do an AMRAP at 90% (or just try to set a new 3–5RM) on your vertical push (or run it as deload if you don't test this lift) and perform your HH variant per deload guidelines.
3. Perform Day 3 and Day 4 as normal per the deload guidelines.
4. Skip Day 5.
5. Replace Day 6 with a mock meet, performing 3 attempts on each competition lift in hopes of setting new 1RMs.

If you are peaking for a competition:

1. Run an accumulation block.

2. Follow it with an intensity block.
3. Follow it with a modified deload week like you would if you were going to do 1RM testing, following the first four steps above.
4. Replace Day 6 with opener practice, working up to your opener attempts on each competition lift. These should be between 87.5–92.5% of your current 1RM (which you might not know if you've gotten stronger), but should fall in the range of a 7.5–8.5 RPE. This day should occur 1 week out.
5. Run the competition taper the week of the meet, it's listed after the intensification block.

For Bodybuilders

Bodybuilders have a very similar setup in that there are accumulation and intensification blocks of the same length as the powerlifting program. However, the implementation for testing is more straightforward since you won't be competing in powerlifting meets (see the end of Level 3 for peak week adjustments to training for bodybuilders). Rather, you can (but don't have to, as you can gauge progress from training loads using RPE) use the testing week to gauge your lifting progress.

Depending on how advanced you are, and if you decide to test at all, I would advise testing every 8–16 weeks. This can be accomplished by performing 1–3 accumulation blocks followed by 1–2 intensity blocks with the final intensity block culminating in a testing week. The implementation of the testing week is very straightforward, just run it immediately after the intensification block as is shown in the example.

Accessory Exercises

Vertical and Horizontal Pulls

Vertical and horizontal pulls simply refer to back work in the vertical and horizontal planes, i.e. a pulldown and a row, respectively. Choose whichever movements you enjoy, that you can feel the target muscles working during, and that you have access to.

For the horizontal row, choose an exercise that doesn't fatigue your

lumbar (this is more critical to the powerlifting routines where the performance of the deadlift should not be compromised). I would advise a cable, single arm dumbbell, chest supported dumbbell, seal/bench or machine row.

For vertical pulls feel free to select what you would like; however, if you do choose to do chin ups or pull ups, make sure you can perform it at the appropriate RPE and rep range. If you are very strong at these, you might need to do weighted chins or pull-ups, and if you aren't strong enough to fall in the appropriate RPE and rep range, choose a lat pulldown or machine pulldown instead. If you don't have access to either, a band-assisted pull up can work as well.

When you see low reps and heavy loads assigned for vertical and horizontal pulls, I would opt for a solid free weight or bodyweight version. For example, an elevated Pendlay row or bench row (AKA seal row), or chins (with weight as needed).

Vertical and Horizontal Pushes

Vertical and horizontal pushes simply refer to pressing work in the vertical and horizontal planes. For example, an overhead press and a chest press, respectively.

Preferably choose barbell based movements when using a %1RM based progression as these allow smaller increases in load, micro-loading, and more accurate estimations of 1RM from AMRAPs. If you have an injury-related issue that prevents the use of a barbell for pressing, dumbbells or machines can be used, and the dumbbell load can be added together to estimate 1RM (just be aware of the limitations I mentioned), or simply use RPE.

For horizontal pressing, you can use a decline or incline press, just don't use a very severe angle in either direction. In the novice bodybuilding program on Day 4, you'll see I specify an incline push specifically. This can be dumbbell, barbell, or machine as desired.

For vertical pressing, feel free to do either standing or seated presses.

Squat Variants

When given the choice of performing a squat variant, any variation of a barbell free weight squat can be performed. This could be high-bar, low-bar, front, Zercher, safety-bar squats or squats with a pause or accommodating resistance.

Select the variant that is pain-free, a low injury risk, one that you enjoy, that you are confident that you can master, and that suits your biomechanics. For example, if you find that you are very bent over when you perform a low-bar squat to full depth, you may wish to choose one of the other variations that allow a more upright body position to ensure more even lower-body development. You may decide to perform the same variation of squats on all days or to perform different variations. Just be aware, that if you always use different variations it may increase the time to master both movements.

If you are a powerlifter and you are aware of any specific technical faults well suited to a specific squat variant (see the weak point discussion in Level 4) this is a good place to use that variant.

If an injury prevents you from performing a barbell based squat of any type, a leg press variant can be used in the place of a squat variant.

Leg Press Variants

Leg press variants include any form of hack squat or leg press machine or even Smith machine squat if the legs are placed out in front of you while you lean back into the bar to maintain an upright torso. Essentially, the goal is to perform a squat-like movement without having to support the load with your upper body as much as you do when performing a squat variant.

Leg press variants are placed in the bodybuilding programs strategically to reduce lower-back and hip fatigue and stress while still allowing a squat-like movement to be performed to train the legs.

Choose whichever variation you prefer that you can perform for a full range of motion pain-free. These can be replaced with squat variants, just be aware of the potential for increased lumbar and hip fatigue and stress.

Hip Hinge Variants

Like the leg press variants, hip hinge variants are used to strategically train the posterior chain without having to support the load with your upper body as much as you do when you perform a deadlift variant. These exercises are slotted in to reduce lumbar and hip fatigue.

Hip hinge variants include movements such as glute ham raises, weighted back extensions, reverse hyperextensions, barbell hip thrusts or glute bridges (you can use the Smith machine). Cable or machine hinges (like a pull through) can also be used. If you do decide to test these movements just be aware of the limitation that AMRAP 1RM estimations will be less accurate when using them. A deadlift variant can be used in place of a hinge variant, just be aware of the potential risk of increased lumbar and hip fatigue and soreness.

Deadlift Variants

Deadlift variants in the bodybuilding programs refer to conventional, sumo, Romanian deadlifts, good mornings, or deadlifts with a modified range of motion or with accommodating resistance.

When selecting a deadlift variant, choose one with a low risk of injury, and make sure you perform it with proper, safe form, and don't neglect the eccentric portion of the lift (it can be fast, but not completely uncontrolled how a powerlifter might perform it).

If you select a sumo stance deadlift, do not perform it ultra-wide if you only compete in bodybuilding, rather use a stance just slightly wider than your hand position. This can be a great position for a bodybuilder to perform a deadlift as it allows a straighter back, more upright torso, thereby reducing injury risk, while also mimicking the biomechanics of a conventional deadlift.

When you see a deadlift variant with higher reps programmed (6+), I recommend using a Romanian deadlift or a good morning. The advantage of selecting a Romanian deadlift or a good morning is that the eccentric will be automatically controlled; however, these movements take more kinesthetic awareness and time to master and perform properly with heavy loads.

If you are a powerlifter and you aware of any specific technical faults well suited to a specific deadlift variant (see the weak point discussion

in Level 4) this is a good place to use that variant.

If an injury prevents you from performing a barbell deadlift variant of any type, a hip hinge variant can be used in its place.

Bench Press Variants

In the powerlifting programs, bench variants refer to alterations to your competition bench, such as a closer or wider grip, board presses, flat back or feet up, longer pauses (e.g. 2 count bench), or bench press with accommodating resistance. Close-grip bench press should not be performed with an extremely close grip, rather just closer relative to your competition bench press grip width. The closest the grip width should be is a width similar to that of a push up performed with the elbows tucked at your sides.

If you are a powerlifter and you aware of any specific technical faults well suited to a specific bench variant (see the weak point discussion in Level 4) this is a good place to use that variant.

Dips

Dips are performed on parallel bars or a dip station with added weight if needed to reach the target intensity and repetition combination. If injury precludes you from doing dips in this fashion, you can do them on a chair with your feet up and the external load placed on your torso or in your lap, but this removes the pecs from the equation. Rather, if an injury prevents you from doing dips as advised, swap dips out with a decline press of your choosing, barbell or dumbbell preferably.

Single-leg Squat Variants

Single-leg squat variants are primarily in place to ensure equal development across legs, and to ensure adequate coordination and even contribution of force when performing bipedal exercises such as squats or leg press to reduce the risk of injury.

Preferably, select a free weight (or bodyweight or assisted with bands version if you are not strong enough to add external load yet) movement such as Bulgarian split squats, lunges, step ups, or single-leg squats with a kettlebell or dumbbell on the floor if you have the mobility or

with one leg off a plyo box.

You can select a machine based movement such as a single-leg leg press, but this will only help you ensure equal force production between legs, and not necessarily coordination and balance. Thus, the injury prevention effect will be reduced; however, heavier loaded single-leg squats sometimes are better suited to machine based options.

Isolation Exercises

Bicep curls, triceps extensions, leg extensions, leg curls, and other single-joint movements should be performed with a full range of motion and in a safe manner that is pain-free. Whether you use free weights, machines, cables or some other variation you would like to employ is entirely your choice, just ensure that you are able to perform it pain-free and with a full range of motion.

Flys can be performed with cables or dumbbells or machines and can be performed at incline or decline angles if preferred.

Standing calf raises don't necessarily need to be standing, they just need to be straight legged (for example a calf raise on a leg press).

When you see the same exercise listed on multiple days with a number after it, like "Leg Curl 1" or "Leg Curl 2"; this means to choose two different variations on the same movement. This could be a seated leg curl on one day, and a lying on the other (or a standing leg curl if you have access), or if you only have one type of leg curl, it can be a single leg on one day, bilateral on the other day.

Grip Work

In the advanced powerlifting program, you will see grip work listed for 3 sets. You have a number of options. You can do timed holds with a barbell pulled just out of the rack near deadlift lockout; I advise doing holds for 10–20 seconds with 90–110% of your max, building up over time. Another option is to do a single arm bodyweight hang for time, again 3 sets of 10–20 seconds. The latter is a good choice when your spine is fatigued from compression. Lastly, you can do other types of grip work of your choice, but just remember as a powerlifter, the specific grip strength you need is holding statically onto a very heavy

barbell (squeezing something closed won't transfer as well).

Why There Are No Shrugs or Direct Abdominal Work in the Bodybuilding Programs

To be perfectly honest with you, I've never actually seen a bodybuilder improve their abs or their upper traps by adding in these exercises to an already well-balanced routine that includes deadlift and squat variants, overhead pressing, rowing, other compound free weight exercises.

I've seen bodybuilders who *don't* have a program that includes a lot of compounds seemingly benefit from performing shrugs and direct ab work, but I've never seen these exercises reliably improve trap or abdominal development when a program already has free weight rows, squats, deadlifts, and presses.

I've also met many bodybuilders who claim that these exercises are critical to the development of their traps and abs, but invariably these bodybuilders are already performing forty-odd exercises, so how would they know what was doing what?

Most convincingly, I've seen bodybuilders remove shrugs and direct abdominal work from well-balanced plans that include a lot of compound exercises without any detriment to their traps or abs.

Now, all that said, when I work with bodybuilders who specifically have weak traps or abs, I *do* prescribe direct ab work and shrugs. That's just common sense and even if it's not successful, it's worth the attempt. So, if you do happen to be someone with weak abdominal muscles (and not just someone who holds fat in their midsection) or upper-trap development, feel free to add a few sets of these exercises per week.

Substitutions

Swapping out accessory movements is also an option in any of these plans. To do so, just make sure that you have a rationale for your choices, and also make sure the substitutions are of similar movement patterns and train similar muscle groups. This is important in order to maintain the integrity of the programs as they are designed to take overlap into account.

Dual Athletes

It is very common these days to compete in both strength and physique sport throughout a lifting career, season to season, or sometimes even in the same season. I personally compete in both powerlifting and bodybuilding and have for years. That said, to successfully compete in both sports requires careful planning and appropriate periodization.

Most commonly, bodybuilders will compete in powerlifting in the offseason as a way to keep their competitive drive, encourage progression, and to have the bounds of an appropriate weight class to prevent excessive fat gain. Less commonly, powerlifters might compete in a bodybuilding show as a part of a weight cut that takes them to a lower weight class, and results in getting as lean as a competitive bodybuilder. Finally, some athletes equally enjoy both sports and train for both without having a primary focus.

"Powerbuilders" have to be careful to ensure that participation in one sport doesn't negatively affect their goals in the other. Also, I highly advise novices to not compete in either sport. Once you are an intermediate you can consider competition.

For the Bodybuilder Who Competes in Powerlifting

If your primary goal is bodybuilding, but you enjoy competing in powerlifting in the offseason, or perhaps in a lighter weight class when you are dieted down for your shows in-season, I would advise running the bodybuilding programs in this book as written. All that needs to be done is to select the powerlifting style competition back squat, deadlift and bench press in all instances where you can choose a squat, deadlift, or horizontal push variant, respectively.

Additionally, for intermediates, a cycle of the Intermediate Bodybuilding Program can be performed with slightly lower rep ranges and higher loads (as is indicated in the intermediate bodybuilding overview above) in the final mesocycle immediately prior to the meet.

Advanced bodybuilders should perform an intensification cycle immediately prior to the meet like they would prior to AMRAP testing.

In the case of either an intermediate or advanced bodybuilder competing

in a powerlifting meet, the final mesocycle should be followed by a competition taper modeled off the tapers for the intermediate and advanced powerlifting programs, per your experience level.

For the Powerlifter Who Competes in Bodybuilding

If your primary goal is powerlifting, but you occasionally compete in bodybuilding after the process of dieting for a weight class, I would advise running the powerlifting programs as written. However, you simply need to add 2–3 sets of 8–15 reps per week each, for triceps, biceps, and calf isolation to round out your physique. Additionally, it wouldn't be a bad idea to add 2–3 sets of 8–15 reps per week of hamstring curls as the short head of the bicep femoris only crosses the knee and thus may be underdeveloped if only hip extension movements like squats and deadlifts have been performed [12]. Finally, the rectus femoris is targeted more in a leg extension while squats train the other three heads more effectively (vastus lateralis, medialis and intermedius) [13]; so, it wouldn't be a bad idea to include leg extensions as well in a similar manner to curls.

Try to progress these movements in a linear fashion using an RPE of 6 to 8 for as long as possible. Eventually, when you stall, switch to the intermediate linear wave loading progression and smaller load increases to extend your progression.

When it comes time to peak for your bodybuilding competition, follow the training adjustment recommendations for bodybuilding peaking at the end of Level 3 and have them coincide with a deload. But, I would not advise doing high-repetition competition deadlifts or squats as you will not be adapted to the high levels of fatigue. Rather, perform isolation movements or a leg press variant.

For the True "Powerbuilder"

For those who place equal importance on both sports, essentially you will use a combination of the above two methods depending on what competitions you have on the horizon. When you are in an offseason from bodybuilding and competing in powerlifting, use the recommendations for a powerlifter who competes in bodybuilding. At the point that you are three to six months out from starting bodybuilding contest prep,

start using the recommendations for a bodybuilder who competes in powerlifting, and continue this throughout your bodybuilding season.

If you have a powerlifting meet in the midst of what is primarily your bodybuilding season, perform a competition taper and modify training as recommended for the bodybuilder who competes in powerlifting. If you have a bodybuilding show in the midst of what is primarily a powerlifting season, coincide a deload week of training with the training adjustment recommendations for bodybuilding peaking at the end of Level 3 (again, following the advice on exercise selection I mentioned in the last subsection).

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Sample Program Tables

Training Program Abbreviation Key	
Vert	Vertical
Hor	Horizontal
Sq	Squat
HH	Hip Hinge
SL	Single Leg
St	Standing
LP	Leg Press
Se	Seated
Wt B Ext	Weighted Back Extensions
Wt Ab	Weighted Ab Exercise
Inc	Incline

You can see an explanation of these exercise choices in the text of this chapter prior to these tables.

Novice Powerlifting Sample Program

Novice Powerlifting 3 Day Option

Day 1				
Exercise	Sets	Reps	%1RM	1st Set RPE
Squat	3	8	70%	NA
Bench	3	8	70%	NA
Ver Pull	4	10	NA	8

Day 2				
Exercise	Sets	Reps	%1RM	1st Set RPE
Bench	3	3	80%	NA
Deadlift	3	3	85%	NA
Ver Push	4	10	NA	8
SL Variant	3	8	NA	8

Day 3				
Exercise	Sets	Reps	%1RM	1st Set RPE
Squat	3	4	85%	NA
Bench	3	4	85%	NA
Hor Pull	4	10	NA	8
SL Variant	3	8	NA	8

Novice Powerlifting 4 Day Option

Day 1				
Exercise	Sets	Reps	%1RM	1st Set RPE
Squat	3	8	70%	NA
Bench	3	8	70%	NA

Day 2				
Exercise	Sets	Reps	%1RM	1st Set RPE
Bench	3	3	80%	NA
Deadlift	3	3	85%	NA

Day 3				
Exercise	Sets	Reps	%1RM	1st Set RPE
Squat	3	4	85%	NA
Bench	3	4	85%	NA

Day 4				
Exercise	Sets	Reps	%1RM	1st Set RPE
SL Variant	3	8	NA	8
Hor Pull	4	10	NA	8
Ver Push	4	10	NA	8
Ver Pull	4	10	NA	8

Novice Bodybuilding Sample Program

Day 1 - Lower				
Exercise	Sets	Reps	%1RM	1st Set RPE
Sq Variant	3	5	82.5%	NA
DL Variant	3	5	82.5%	NA
SL Variant	3	8	NA	8
St Calf	4	8	NA	8

Day 2 - Upper				
Exercise	Sets	Reps	%1RM	1st Set RPE
Hor Push	3	5	82.5%	NA
Hor Pull	3	5	NA	8
Ver Push	2	8	72.5%	NA
Ver Pull	2	8	NA	8
Flys	2	15	NA	8

Day 3 - Lower				
Exercise	Sets	Reps	%1RM	1st Set RPE
HH Variant	3	8	NA	8
LP Variant	3	8	NA	8
Leg Ext	3	12	NA	8
Leg Curl	3	12	NA	8
Se Calf	4	15	NA	8

Day 4 - Upper				
Exercise	Sets	Reps	%1RM	1st Set RPE
Hor Push	3	10	67.5%	NA
Hor Pull	3	10	NA	8
Inc Push	2	12	NA	8
Ver Pull	2	12	NA	8
Triceps	2	12	NA	8
Biceps	2	12	NA	8

Intermediate Powerlifting Sample Program

Day 1				
Exercise	Sets	Reps	%1RM	1st Set RPE
Sq Variant	3	7 to 9	NA	7
Bench	3	7 to 9	67.5–72.5%	7
Ver Pull	3	7 to 9	NA	8

Day 2				
Exercise	Sets	Reps	%1RM	1st Set RPE
Squat	3	1 to 3	80–85%	5
Bench	3	1 to 3	80–85%	5
Deadlift	3	1 to 3	80–85%	5
Ver Push	3	4 to 6	NA	8

Day 3				
Exercise	Sets	Reps	%1RM	1st Set RPE
Squat	3	3 to 5	82.5–87.5%	8
Bench	3	3 to 5	82.5–87.5%	8
Hor Pull	3	4 to 6	NA	8
Leg Curl	3	12	NA	8

Day 4				
Exercise	Sets	Reps	%1RM	1st Set RPE
Bench Variant	3	6 to 8	NA	8
Deadlift	3	3 to 5	82.5–87.5%	8
Hor Pull	3	8 to 12	NA	8

Intermediate Bodybuilding Sample Program

Day 1 - Lower				
Exercise	Sets	Reps	%1RM	1st Set RPE
Sq Variant	4	3 to 5	82.5–87.5%	8
DL Variant	4	3 to 5	82.5–87.5%	8
SL Variant	3	6 to 8	NA	8
Leg Curl	3	6 to 8	NA	8
St Calf	5	6 to 8	NA	8

Day 2 - Upper				
Exercise	Sets	Reps	%1RM	1st Set RPE
Hor Push	4	3 to 5	82.5–87.5%	8
Hor Pull	4	4 to 6	NA	8
Ver Push	3	5 to 7	77.5–82.5%	8
Ver Pull	3	6 to 8	NA	8
Triceps	3	8 to 12	NA	8
Biceps	3	8 to 12	NA	8

Day 3 - Lower				
Exercise	Sets	Reps	%1RM	1st Set RPE
HH Variant	3	6 to 8	NA	8
LP Variant	3	6 to 8	NA	8
Leg Ext	3	8 to 12	NA	8
Leg Curl	3	8 to 12	NA	8
Se Calf	5	12 to 15	NA	8

Day 4 - Push				
Exercise	Sets	Reps	%1RM	1st Set RPE
Ver Push	3	6 to 8	75–80%	8
Hor Push	3	6 to 8	75–80%	8
Dips	3	8 to 12	NA	8
Flys	3	12 to 15	NA	8

Day 5 - Pull				
Exercise	Sets	Reps	%1RM	1st Set RPE
Hor Pull	3	6 to 8	NA	8
Ver Pull	3	6 to 8	NA	8
Wt B Ext	3	8 to 12	NA	8
Face Pull	2	12 to 15	NA	8

Advanced Powerlifting Sample Program

Advanced Powerlifting Accumulation Block

Week 1 Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	8	NA	6 to 8
Bench	3	8	70%	6 to 8
Ver Pull	3	10	NA	6 to 8

Week 1 Day 2				
Exercise	Sets	Reps	% 1RM	RPE
HH Variant	3	8	NA	6 to 8
Ver Push	3	8	NA	6 to 8
Triceps	3	10	NA	6 to 8

Week 1 Day 3				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	4	77.50%	5 to 7
Bench	3	4	77.50%	5 to 7
Hor Pull	3	8	NA	6 to 8

Week 1 Day 4				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	3	4	77.5%	5 to 7
Be Variant	3	8	NA	6 to 8
Wt Ab	3	10	NA	6 to 8

Week 1 Day 5				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	5	82.5%	7 to 9
Bench	3	5	82.5%	7 to 9
Face Pull	3	12	NA	6 to 8

Week 1 Day 6				
Exercise	sets	Reps	% 1RM	RPE
Deadlift	3	5	82.5%	7 to 9
Ver Push	3	5	NA	6 to 8
Grip Work	3	see description		

Week 2 Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	7	NA	6 to 8
Bench	3	7	72.5%	6 to 8
Ver Pull	3	9	NA	6 to 8

Week 2 Day 2				
Exercise	Sets	Reps	% 1RM	RPE
HH Variant	3	7	NA	6 to 8
Ver Push	3	7	NA	6 to 8
Triceps	3	9	NA	6 to 8

Week 2 Day 3				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	3	80%	5 to 7
Bench	3	3	80%	5 to 7
Hor Pull	3	7	NA	6 to 8

Week 2 Day 4				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	3	3	80%	5 to 7
Be Variant	3	7	NA	6 to 8
Wt Ab	3	9	NA	6 to 8

Week 2 Day 5				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	4	85%	7 to 9
Bench	3	4	85%	7 to 9
Face Pull	3	11	NA	6 to 8

Week 2 Day 6				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	3	4	85%	7 to 9
Ver Push	3	4	NA	6 to 8
Grip Work	3	see description		

Week 3 Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	6	NA	6 to 8
Bench	3	6	75%	6 to 8
Ver Pull	3	8	NA	6 to 8

Week 3 Day 2				
Exercise	Sets	Reps	% 1RM	RPE
HH variant	3	6	NA	6 to 8
Ver Push	3	6	NA	6 to 8
Triceps	3	8	NA	6 to 8

Week 3 Day 3				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	2	82.5%	5 to 7
Bench	3	2	82.5%	5 to 7
Hor Pull	3	6	NA	6 to 8

Week 3 Day 4				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	3	2	82.5%	5 to 7
Be Variant	3	6	NA	6 to 8
Wt Ab	3	8	NA	6 to 8

Week 3 Day 5				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	3	87.5%	7 to 9
Bench	3	3	87.5%	7 to 9
Face Pull	3	10	NA	6 to 8

Week 3 Day 6				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	3	3	87.5%	7 to 9
Ver Push	3	3	NA	6 to 8
Grip Work	3	see description		

Advanced Powerlifting Intensification Block

Week 1 Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	7	NA	6 to 8
Bench	3	7	72.5%	6 to 8
Ver Pull	3	10	NA	6 to 8

Week 1 Day 2				
Exercise	Sets	Reps	% 1RM	RPE
HH Variant	3	7	NA	6 to 8
Ver Push	3	7	NA	6 to 8

Week 1 Day 3				
Squat	3	3	80%	5 to 7
Bench	4	3	80%	5 to 7
Hor Pull	3	8	NA	6 to 8
Hor Pull	3	8	NA	6 to 8

Week 1 Day 4				
Deadlift	4	3	80%	5 to 7
Be Variant	4	7	NA	6 to 8
Be Variant	3	8	NA	6 to 8

Week 1 Day 5				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	4	85%	7 to 9
Bench	3	4	85%	7 to 9

Week 1 Day 6				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	1	77.5%	4 to 6
Bench	3	1	77.5%	4 to 6
Deadlift	3	4	85%	7 to 9

Week 2 Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	6	NA	6 to 8
Bench	3	6	75.0%	6 to 8
Ver Pull	3	9	NA	6 to 8

Week 2 Day 2				
Exercise	Sets	Reps	% 1RM	RPE
HH Variant	3	6	NA	6 to 8
Ver Push	3	6	NA	6 to 8

Week 2 Day 3				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	2	82.5%	5 to 7
Bench	4	2	82.5%	5 to 7
Hor Pull	3	7	NA	6 to 8

Week 2 Day 4				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	4	2	82.5%	5 to 7
Be Variant	4	6	NA	6 to 8

Week 2 Day 5				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	3	87.5%	7 to 9
Bench	3	3	87.5%	7 to 9
				6 to 8

Week 2 Day 6				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	1	80%	4 to 6
Bench	3	1	80%	4 to 6
Deadlift	3	3	87.5%	7 to 9

Week 3 Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	5	NA	6 to 8
Bench	3	5	77.5%	6 to 8
Ver Pull	3	8	NA	6 to 8

Week 3 Day 2				
Exercise	Sets	Reps	% 1RM	RPE
HH Variant	3	5	NA	6 to 8
Ver Push	3	5	NA	6 to 8

Week 3 Day 3				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	1	85%	5 to 7
Bench	4	1	85%	5 to 7
Hor Pull	3	6	NA	6 to 8

Week 3 Day 4				
Exercise	Sets	Reps	% 1RM	RPE
Deadlift	4	1	85%	5 to 7
Be Variant	4	5	NA	6 to 8

Week 3 Day 5				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	2	90%	7 to 9
Bench	3	2	90%	7 to 9

Week 3 Day 6				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	1	82.5%	4 to 6
Bench	3	1	82.5%	4 to 6
Deadlift	3	2	90%	7 to 9

Advanced Powerlifting Competition Taper, Perform After Modified Week 4 Deload Following Intensity Block

Day 1				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	2	5	NA	5 to 7
Bench	2	5	75%	5 to 7
Ver Pull	2	6	NA	5 to 7
Day 3				
Exercise	Sets	Reps	% 1RM	RPE
Squat	3	1	82.5%	5 to 7
Bench	3	1	82.5%	5 to 7
Deadlift	2	1	82.5%	5 to 7
Day 5 - 24-48 hours prior				
Exercise	Sets	Reps	% 1RM	RPE
Squat	1	1	77.5%	5 max
Bench	1	1	77.5%	5 max

Day 2				
Exercise	Sets	Reps	% 1RM	RPE
OFF				
Day 4				
Exercise	Sets	Reps	% 1RM	RPE
Squat	2	1	80%	4 to 6
Bench	2	1	80%	4 to 6
Deadlift	1	1	80%	4 to 6
Day 6 - Meet Day				
Exercise	Sets	Reps	% 1RM	RPE
Squat	COMPETITION DAY			
Bench				
Deadlift				

Advanced Bodybuilding Sample Program

Advanced Bodybuilding Accumulation Block

Week 1 Day 1 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	10	65%	6 to 8
DL Variant	3	10	65%	6 to 8
SL Variant	3	10	NA	6 to 8
Leg Curl 1	3	10	NA	7 to 9
St Calf	4	10	NA	7 to 9
Week 1 Day 3 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
LP Variant	3	8	NA	5.5 to 7.5
HH Variant	3	8	NA	5.5 to 7.5
Leg Ext	3	10	NA	6.5 to 8.5
Se Calf	4	15	NA	6.5 to 8.5

Week 1 Day 2 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	10	65%	6 to 8
Hor Pull	4	10	NA	6 to 8
Flys	4	12	NA	7 to 9
Triceps	3	10	NA	7 to 9
Lat Raise	3	15	NA	7 to 9
Week 1 Day 4 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Ver Push	3	8	67.5%	5.5 to 7.5
Ver Pull	3	8	NA	5.5 to 7.5
Dips	3	10	NA	6.5 to 8.5
Biceps	3	15	NA	6.5 to 8.5
Face Pull	2	15	NA	6.5 to 8.5

Week 1 Day 5 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	4	6	80%	7 to 9
Sq Variant	4	6	80%	7 to 9
Leg Curl 2	4	8	NA	7 to 9
St Calf	4	8	NA	7 to 9

Week 1 Day 6 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	6	80%	7 to 9
Hor Pull	4	6	NA	7 to 9
Ver Push	3	6	80%	7 to 9
Ver Pull	4	6	NA	7 to 9

Week 2 Day 1 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	9	67.5%	6 to 8
DL Variant	3	9	67.5%	6 to 8
SL Variant	3	9	NA	6 to 8
Leg Curl 1	3	9	NA	7 to 9
St Calf	4	9	NA	7 to 9

Week 2 Day 2 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	9	67.5%	6 to 8
Hor Pull	4	9	NA	6 to 8
Flys	4	11	NA	7 to 9
Triceps	3	9	NA	7 to 9
Lat Raise	3	14	NA	7 to 9

Week 2 Day 3 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
LP Variant	3	7	NA	5.5 to 7.5
HH Variant	3	7	NA	5.5 to 7.5
Leg Ext	3	9	NA	6.5 to 8.5
Se Calf	4	14	NA	6.5 to 8.5

Week 2 Day 4 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Ver Push	3	7	70%	5.5 to 7.5
Ver Pull	3	7	NA	5.5 to 7.5
Dips	3	9	NA	6.5 to 8.5
Biceps	3	14	NA	6.5 to 8.5
Face Pull	2	14	NA	6.5 to 8.5

Week 2 Day 5 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	4	5	82.5%	7 to 9
Sq Variant	4	5	82.5%	7 to 9
Leg Curl 2	4	7	NA	7 to 9
St Calf	4	7	NA	7 to 9

Week 2 Day 6 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	5	82.5%	7 to 9
Hor Pull	4	5	NA	7 to 9
Ver Push	3	5	82.5%	7 to 9
Ver Pull	4	5	NA	7 to 9

Week 3 Day 1 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	8	70%	6 to 8
DL Variant	3	8	70%	6 to 8
SL Variant	3	8	NA	6 to 8
Leg Curl 1	3	8	NA	7 to 9
St Calf	4	8	NA	7 to 9

Week 3 Day 2 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	8	70%	6 to 8
Hor Pull	4	8	NA	6 to 8
Flys	4	10	NA	7 to 9
Triceps	3	8	NA	7 to 9
Lat Raise	3	13	NA	7 to 9

Week 3 Day 3 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
LP Variant	3	6	NA	5.5 to 7.5
HH Variant	3	6	NA	5.5 to 7.5
Leg Ext	3	8	NA	6.5 to 8.5
Se Calf	4	13	NA	6.5 to 8.5

Week 3 Day 4 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Ver Push	3	6	72.5%	5.5 to 7.5
Ver Pull	3	6	NA	5.5 to 7.5
Dips	3	8	NA	6.5 to 8.5
Biceps	3	13	NA	6.5 to 8.5
Face Pull	2	13	NA	6.5 to 8.5

Week 3 Day 5 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	4	4	85%	7 to 9
Sq Variant	4	4	85%	7 to 9
Leg Curl 2	4	6	NA	7 to 9
St Calf	4	6	NA	7 to 9

Week 3 Day 6 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	4	85%	7 to 9
Hor Pull	4	4	NA	7 to 9
Ver Push	3	4	85%	7 to 9
Ver Pull	4	4	NA	7 to 9

Advanced Bodybuilding Intensification Block

Week 1 Day 1 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	9	67.5%	6 to 8
DL Variant	3	9	67.5%	6 to 8
SL Variant	3	9	NA	6 to 8
Leg Curl 1	3	9	NA	7 to 9
St Calf	4	9	NA	7 to 9

Week 1 Day 2 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	9	67.5%	6 to 8
Hor Pull	4	9	NA	6 to 8
Flys	4	11	NA	7 to 9
Triceps	3	9	NA	7 to 9
Lat Raise	3	14	NA	7 to 9

Week 1 Day 3 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
LP Variant	3	7	NA	5.5 to 7.5
HH Variant	3	7	NA	5.5 to 7.5
Leg Ext	3	9	NA	6.5 to 8.5
Se Calf	4	14	NA	6.5 to 8.5

Week 1 Day 4 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Ver Push	3	7	70%	5.5 to 7.5
Ver Pull	3	7	NA	5.5 to 7.5
Dips	3	9	NA	6.5 to 8.5
Biceps	3	14	NA	6.5 to 8.5
Face Pull	2	14	NA	6.5 to 8.5

Week 1 Day 5 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	4	5	82.5%	7 to 9
Sq Variant	4	5	82.5%	7 to 9
Leg Curl 2	4	7	NA	7 to 9
St Calf	4	7	NA	7 to 9

Week 1 Day 6 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	5	82.5%	7 to 9
Hor Pull	4	5	NA	7 to 9
Ver Push	3	5	82.5%	7 to 9
Ver Pull	4	5	NA	7 to 9

Week 2 Day 1 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	8	70%	6 to 8
DL Variant	3	8	70%	6 to 8
SL Variant	3	8	NA	6 to 8
Leg Curl 1	3	8	NA	7 to 9
St Calf	4	8	NA	7 to 9

Week 2 Day 2 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	8	70%	6 to 8
Hor Pull	4	8	NA	6 to 8
Flys	4	10	NA	7 to 9
Triceps	3	8	NA	7 to 9
Lat Raise	3	13	NA	7 to 9

Week 2 Day 3 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
LP Variant	3	6	NA	5.5 to 7.5
HH Variant	3	6	NA	5.5 to 7.5
Leg Ext	3	8	NA	6.5 to 8.5
Se Calf	4	13	NA	6.5 to 8.5

Week 2 Day 4 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Ver Push	3	6	72.5%	5.5 to 7.5
Ver Pull	3	6	NA	5.5 to 7.5
Dips	3	8	NA	6.5 to 8.5
Biceps	3	13	NA	6.5 to 8.5
Face Pull	2	13	NA	6.5 to 8.5

Week 2 Day 5 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	4	4	85%	7 to 9
Sq Variant	4	4	85%	7 to 9
Leg Curl 2	4	6	NA	7 to 9
St Calf	4	6	NA	7 to 9

Week 2 Day 6 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	4	85%	7 to 9
Hor Pull	4	4	NA	7 to 9
Ver Push	3	4	85%	7 to 9
Ver Pull	4	4	NA	7 to 9

Week 3 Day 1 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	3	7	72.5%	6 to 8
DL Variant	3	7	72.5%	6 to 8
SL Variant	3	7	NA	6 to 8
Leg Curl 1	3	7	NA	7 to 9
St Calf	4	7	NA	7 to 9

Week 3 Day 2 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	7	72.5%	6 to 8
Hor Pull	4	7	NA	6 to 8
Flys	4	9	NA	7 to 9
Triceps	3	7	NA	7 to 9
Lat Raise	3	12	NA	7 to 9

Week 3 Day 3 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
LP Variant	3	5	NA	5.5 to 7.5
HH Variant	3	5	NA	5.5 to 7.5
Leg Ext	3	7	NA	6.5 to 8.5
Se Calf	4	12	NA	6.5 to 8.5

Week 3 Day 4 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Ver Push	3	5	75%	5.5 to 7.5
Ver Pull	3	5	NA	5.5 to 7.5
Dips	3	7	NA	6.5 to 8.5
Biceps	3	12	NA	6.5 to 8.5
Face Pull	2	12	NA	6.5 to 8.5

Week 3 Day 5 - Lower				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	4	3	87.5%	7 to 9
Sq Variant	4	3	87.5%	7 to 9
Leg Curl 2	4	5	NA	7 to 9
St Calf	4	5	NA	7 to 9

Week 3 Day 6 - Upper				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	5	3	87.5%	7 to 9
Hor Pull	4	3	NA	7 to 9
Ver Push	3	3	87.5%	7 to 9
Ver Pull	4	3	NA	7 to 9

Advanced Bodybuilding Testing Week, Use After Intensity Week 3

Week 4 Day 1 - OFF				
Exercise	Sets	Reps	% 1RM	RPE
OFF				

Week 4 Day 2 - DL Variant Test				
Exercise	Sets	Reps	% 1RM	RPE
DL Variant	1	AMRAP	85-90%	9 to 10
Leg Curls	3	10	NA	6 to 8
St Calf	3	8	NA	6 to 8

Week 4 Day 3 - Hor Push Test				
Exercise	Sets	Reps	% 1RM	RPE
Hor Push	1	AMRAP	85-90%	9 to 10
Hor Pull	3	5	NA	6 to 8
Triceps	3	7	NA	6 to 8

Week 4 Day 4 - OFF				
Exercise	Sets	Reps	% 1RM	RPE
OFF				

Week 4 Day 5 - Sq Variant Test				
Exercise	Sets	Reps	% 1RM	RPE
Sq Variant	1	AMRAP	85-90%	9 to 10
Leg Ext	3	10	NA	6 to 8
Se Calf	3	10	NA	6 to 8

Week 4 Day 6 - Ver Push Test				
Exercise	Sets	Reps	% 1RM	RPE
Vet Push	1	AMRAP	85-90%	9 to 10
Ver Pull	3	10	NA	6 to 8
Biceps	3	10	NA	6 to 8