

MODULE 8

FUNCTIONAL VARIATIONS, PROGRESSIONS AND REGRESSIONS

Learning Objectives

1. Identify various methods for progressing or regressing a functional exercise
2. Provide examples of functional progressions for common exercises
3. Describe the “90% Rule” as it applies to exercise progression and regression
4. Describe how the variables of distance, speed and tempo can be used effectively
5. Describe how stance positions and arm movement patterns can be used effectively

Introduction

According to the principle of progressive overload, as individuals adapt to their current exercise program the individual exercises will need to be made more challenging in order to stimulate continued adaptation. However, sometimes exercises need to be regressed (made less challenging) because they are too difficult for the individual to perform, the client has been injured, a chronic condition has progressed or for some other reason. Assessments performed at the beginning of a program can help to determine the types of exercises and the initial levels of intensity that are appropriate. As an individual adapts to the initial exercise regimen, periodic reassessment can provide insight as to how to best progress the individual exercises and the overall program. However, the saying that “the exercise is the test and the test is the exercise” is also applicable as different types of exercise challenges can be given to the client to see how well they can perform them which serves similar purposes to formal testing. In addition, qualitative assessment (the trainer’s observation of the client’s movement) provides valuable insight as well. Not only do

physiological areas (muscle strength, proprioception, balance, etc.) adapt at different rates but so do individuals. Therefore, a blanket protocol for advancing exercises cannot be used for all clients. In this module, we will discuss principles to help guide you in your efforts to progress or regress exercises for your mature clients.

Progressing functional exercise movements is not always as straight-forward as progressing basic resistance exercise movements. While the same variables of progression such as load, sets and repetitions, still apply, there are many more variables to consider such as speed of movement, tempo, pace, rhythm, vertical distance (e.g. stride length), horizontal distance (e.g. squat depth), base of support, complexity, hold time (for isometric contractions), etc. Unfortunately, because of the large number of variables which can be manipulated, it is difficult to specify exactly how to progress or regress a particular movement. However, the individual functional goals set by the client will determine which types of variables are most important to manipulate.

For example, performing 3 sets of a bench press instead of 2 sets is considered a progression because of the increased volume. Increasing the load from 100 pounds to 120 pounds is also considered a progression because of increased load. However, moving from a barbell bench press to a dumbbell bench press could also be considered a progression even though load would decrease (compared to the bench press) because it takes greater neuromuscular control to perform the movement when the hands are free to move independently. All three progressions are considered to be “harder” but they challenge different physiological areas. Only the move to the dumbbells would really be considered a functional progression.

The issue is not whether an exercise is “harder” than another exercise (which is ambiguous) but which physiological systems (or functional components) are being progressively overloaded by the new exercise variation. It is important to be specific regarding which areas you want to

overload so that you can make intelligent, effective decisions regarding progressions. However, it is just as important to keep overall function as the primary goal without getting caught up in minute details. Otherwise you won't be able to see the forest for the trees.

There are some general guidelines regarding how to progress functional movements.

Regression	Progression
Slower	Faster
Anticipatory	Reactive
Smaller ROM	Larger ROM
More Stable	Less Stable
Shorter Levers	Longer Levers
Less Complex	More Complex
Static	Dynamic
Less Resistance	More Resistance
Less Attentional Demand	More Attentional Demand
One Dimensional	Three Dimensional
Single Move	Sequenced Moves

Here are some examples of exercise progressions that move along the continuum of what we would consider to be less functional to more functional based on their relevance to real-world activities and the number of functional subdomains they require. Recall that it is inaccurate to classify movements dichotomously: as either functional or not functional. Every exercise has the potential to have a functional impact when used purposefully to meet a specific client's needs.

Continuum of Functional Exercise Movements - Examples		
Bench Press	Standing Cable Chest Press	1-Arm Chest Press in Lunge Position
Seated Machine Row	Standing Bent-Over Row	1-Arm Cable Row with Reverse Lunge
Sit-Ups	Front Plank	Front Planks with Alternating Leg Raise
Seated Barbell Military Press	Standing Dumbbell Shoulder Press	Kneeling 1-Arm Dumbbell Shoulder Press
Leg Press	Weighted Chair Stands	Split Squats
Seated Lat Pulldown	Cable Lat Pulldown Seated on Stability Ball	Standing 1-Arm Cable Lat Pulldown with Split Squat

When progressing movements it is wise to minimize the number of variables that are being modified at any one time. For example, moving a split squat straight to a stationary lunge with one-arm cable chest press may be too much change for the client. It would be better to transition slower by moving to a stationary lunge and a standing one-arm cable chest press in lunge position (two exercises performed separately). Then, when both movements are performed well, they can be combined into one movement.

Also, realize that the manipulation of one variable may necessitate the manipulation of another. Going back to the bench press continuum in the example above, when the movement is progressed to a standing cable chest press then load must almost always be decreased. When it is further progressed to 1-arm then load must almost always be decreased even further. Similarly, when an exercise movement, say a stepping pattern, is made more complex, then movement speed must be decreased until the movement pattern is learned. Load also needs to be decreased when stability is decreased (such as when standing on a balance pad). Due to the amount of energy needed for muscular co-contraction while on an unstable surface, the primary muscle groups are not able to generate as much force as when a stable surface is used. An individual may be able to easily

perform 20 pushups on the floor but struggle to do even one pushup using suspension straps like Anchor Straps (www.anchorpointtraining.com) or TRX.

A helpful guide for some trainers is the “90% Rule”. This rule states that an exercise movement must be performed with 90% accuracy for the entire set before progressing to the next “level”. Obviously this is a subjective measurement that is made by the trainer based on their observation so there is a lot of room for differing opinions. However, the concept is reasonable. An individual should not be allowed to progress if they cannot perform the current exercise accurately. Unfortunately, it seems that it is common for trainers to ignore this basic concept and progress their clients too quickly. There may be several reasons for this such as: 1) They don’t want the clients getting bored with the same routine and therefore feel the need to “mix it up” often; 2) The trainers get bored with prescribing the same exercise with numerous clients; 3) There are a lot of fun tools (exercise equipment options) that are available and they want to use them; 4) The trainers want to demonstrate their skill and expertise to their clients. Regardless of the reason it is prudent to ensure consistent movement accuracy before progressing the client. On the other side it is also important to note that some people may not ever be able to perform a certain movement with 100% accuracy so we should not hold them back from progressing just because they cannot do it with textbook perfection.

Let’s look at an example of this. A client is performing standing lunges but with each repetition their upper body leans forward significantly, their knee goes past their toes, they keep their back leg too straight and their stride length varies considerably with each step. They have been performing the movement incorrectly for weeks and don’t seem to be getting any better even though the trainer constantly tries to correct them. Should the trainer, at this point, add dumbbells in order to make the exercise more difficult? Probably not because they are probably not even

performing the exercise with 50% accuracy. What this client probably needs at this point is a regression and/or to work on specific limitations (e.g. mobility, stability) that are keeping them from being successful.

The trainer could break down the movement into pieces or use different cueing techniques in order to help the client perform the movement with greater accuracy. For example, to correct the variable step length the trainer could place agility dots on the floor to signify where their feet should be. Instead of a lunge the client could perform split squats in which they drop their back knee onto a soft mat or foam pad. This would “teach” them the proper step length and how to bend their back leg appropriately. Chairs could be placed on either side so that they can use them for balance or assistance if the split squat is challenging for them. A mirror could be used so they can constantly check that they are maintaining an upright trunk position. As the client consistently shows they can perform this modified version correctly then the chairs, agility dots and mirrors can gradually be removed. Then the client could once again attempt the standing lunge with the agility dots and mirror. As they demonstrate accuracy the dots and mirror can once again be withdrawn.

Sometimes a movement cannot be performed accurately because the client has a deficit that has yet to be identified. It could be a deficit in muscle strength, dynamic flexibility, proprioception, balance, coordination, etc. that is keeping them from performing the movement as well as they should. If it is determined that this is the case then it would be appropriate to discontinue the exercise for a period of time so that the deficient area can be addressed. Some might argue that the original exercise will address the weak link in the movement chain and so they should continue to perform the movement. This is a yes and no situation. Yes the movement will, to some degree, challenge the area of deficiency. However, the movement could also reinforce a movement dysfunction or overstress other areas that have to take up the slack for the deficient area. Consider

a lateral pelvic tilt (hip drop) when walking (called a Trendelenburg sign) which indicates a weak gluteus medius muscle. One could argue that since the sign occurs during walking then walking would be the best way to challenge the weak gluteus medius muscle. However, this is not so. The gluteus medius muscle needs to be trained specifically (yes even in isolation) through exercises such as clamshells or side lying leg raises. It is then that the lateral tilt and walking performance will improve. Continued walking with a lateral tilt will only reinforce the improper gait pattern and will continue to place undue strain on other areas.

Spatial, Speed and Tempo Variations

There are many options for creating variability including changes in the spatial (distance and direction), speed, tempo and rhythm characteristics of an exercise movement that facilitate the ability to address very specific aspects of function (domains and subdomains). Manipulating these variables provides specific benefits beyond the typical variables of load, volume and repetitions. From an overall functional perspective it is important to build these type of variations into clients' programs and provide meaningful options for progression and regression. Let's take a closer look at each of these.

Spatial Variations: Spatial characteristics include the distance (vertical, horizontal) and direction of the movement. For example, an arm curl performed through its entire range of motion has a higher spatial characteristic than a partial range of motion arm curl. Older adults may have difficulty with the spatial aspects of an exercise due to deficits in joint mobility, strength, balance, an existing condition or other factor. Increasing the distance or direction of the movement may be a sufficient and meaningful progression for some clients although it may necessitate the need to regress another variable such as load.

Consider the squat pattern. The “ideal” for a squat is to have the hips drop below the knees. More depth is going to increase the range of motion required of the ankle, knee and hip joints and challenge the muscles to a greater degree. A lower functioning individual may need to perform a half or $\frac{3}{4}$ squat because they cannot perform the ideal. Others may need to limit their depth due to knee osteoarthritis which becomes exacerbated when loaded through a larger range of motion. In order to help these clients be successful we need to train them within their current spatial abilities while gradually trying to improve on them. And so, in dealing with people that are a little bit frailer or don’t have quite a high level of function, one of the strategies is to challenge them as much as possible within the spatial constraints that they have. A person that cannot stand up from a seated position without assistance would benefit from placing pads in the chair or using a taller stool. This will enable them to perform a sit to stand movement successfully. As they become stronger and more confident we can gradually reduce the height of that chair or that stool so they have to go lower and lower.

Lunges also have important spatial characteristics that can be manipulated for the benefit of the client. Some older adults have balance issues that make them uncomfortable when stepping out in any direction. Start within their comfort zone by having them take a small step at first, maybe six to 12 inches, and drop down only a few inches. As they become more confident step length and lunge depth can both gradually increase. Placing an agility dot on the floor can help challenge their step length and placing foam pads under their back knee can help challenge their depth.

Speed Variations: As discussed in the section on muscle power (Musculoskeletal Domain), speed is an important variable to consider for older adults. Power drops off significantly with advancing age due to losses in muscle strength and contractile velocity. But there are several factors that are important to consider when increasing movement speed.

As a person tries to move quicker, their accuracy goes down. A client might be able to perform a movement really well at a slower speed but as they speed up the movement they get really sloppy or inaccurate with their movements. This could put someone in a risky position that could potentially increase their chances of becoming injured. The goal is to increase speed while limiting the amount of inaccuracy, but a certain amount of inaccuracy is just going to come with the territory. Having the client practice at low and then moderate speeds before progressing to higher speeds (“as fast as possible”) can help them to perform the movement correctly.

Tempo Variations: Another effective way to add variety is to change up the tempo (beat or rhythm) at which a movement is performed. Tempo is the rate and regularity at which you perform subsequent repetitions. Tempo and speed are related but are not the same since increasing tempo may or may not require an increase in movement speed. A person can perform very high-speed movements at a slow tempo by allowing a pause or rest in between each repetition. As discussed earlier in the section on power training, most power exercise movements are performed as fast as possible but with a slow tempo so that the eccentric portion is slow and controlled. Performing as many vertical jumps as you can in 30 seconds would be an example of an exercise that requires both increased speed and tempo because you have to generate high movement speed and as soon as you land you are quickly performing another jump.

There are advantages to increased tempo other than increasing movement speed. Introducing a higher tempo can also cause the client to have to think and react quickly. If a person is given plenty of time to perform a movement then they can concentrate on doing it correctly. But this does not always represent real-life scenarios where we are called to react and move quickly. Consider performing a clock lunge where a person imagines standing in the middle of a clock face on the floor with the numbers of the clock encircling them. When the trainer calls out a time the client’s

task is to lunge to that time on the clock and then return quickly to standing. Calling out the times in a more rapid succession (increased tempo) will cause the client to not only move faster but react (cognitively) to the numbers the trainer is calling out faster.

Changing up the tempo can be valuable when performing gait and mobility related exercises to force clients to either increase or decrease their pace. When performing high-knee marching it is helpful to slow down the tempo so that clients are forced to be in single-limb stance longer which will challenge their balance. One of the gait exercises that is effective for using different tempos is the game “Red Light, Green Light”. Line up your clients at one end of a room. When you say “green light” they take off as quickly as they can (walking, not running) and when you say “red light” they’ve got to stop as quickly as possible and freeze their position. The tempo is controlled by the trainer. Saying “green light” and then “red light” right away causes them to start and then stop again very quickly. Saying “green light” and waiting a few seconds to say “red light” allows them to increase their speed more which makes stopping quickly a little more difficult. Giving them random tempos requires the clients to pay close attention and react quickly to your commands.

Stance Positions

Altering a client’s stance position provides a lot of variety in order to get to the functional components that need to be addressed. Following is a description of some of the stance positions that should be considered with older clients:

Hip or Shoulder Width Stance: This is considered to be a “base” position that most people will adopt naturally and provides general stability in all directions. It can be used for many upper-body lifting and gait exercises. However, the load during standing pushing and pulling exercises will be limited due to the small base of support in the sagittal plane.

Wide Stance: In this stance the feet are placed wider than shoulder-width which provides greater stability laterally and in the frontal plane. The wide base of support is appropriate when training trunk/core stability in the frontal and transverse planes.

Narrow Stances: There are several narrow stances (closer than hip width) that are primarily used for balance challenges. These create more instability in the frontal plane and they are listed here from most stable to least stable in the frontal plane. **Feet Together** – place heels and toes touching one another. **Semi-Tandem** – from the feet together position move one foot is slightly ahead so that the heel of the front foot is beside the big toe of the back foot. **Full Tandem** – place one foot directly in front of the other so the back of the heel of the front foot is touching the toes of the back foot. **In-Line** – from the full tandem position step the front foot forward about a foot. Now, once you kind of move into this narrow position, obviously, we are much more unstable laterally.

Lunge Stance: From a hip or shoulder-width stance step one foot forward as if you were performing a lunge. A good way to gauge the proper stepping distance is to have the person get into a half-kneeling position so that both knees are flexed to a 90-degree position. Mark the spot where the front foot was positioned and use that as the stepping distance. This stance provides good sagittal plane because there is such a wide base of support front to back. This is appropriate for standing pushing and pulling exercises such as a chest press with cables or bands.

Kneeling Stances: There are two primary kneeling stances which can be used effectively.

Half-Kneeling – In this position the back knee and toe are on the ground while the front knee is flexed at 90 degrees with the foot flat on the floor. The front foot is typically positioned at hip or shoulder width but it can also be placed into an in-line position with

the back leg which will greatly reduce the frontal plane stability. In the half-kneeling position, the hip musculature is activated to a greater degree in order to create stability. If people are uncomfortable with their knee on the floor you can always put a foam pad or exercise mat under that knee in order to cushion it. This position is appropriate for a wide variety of movements such as chops, lifts, vertical and horizontal pressing, and horizontal pulling movements. These can be performed bilaterally or unilaterally. **Full or Tall Kneeling** – In this position both knees are on the floor with about hip-width apart and feet behind. Toes can be either dorsiflexed or plantar flexed. There is less sagittal plane stability compared to the half-kneeling position due to the smaller base of support in the anterior/posterior directions. This makes it less appropriate for horizontal pressing and pulling exercises but it can still be used for vertical pressing, front and lateral raises, arm curls and others. The hip muscles, especially the gluteal muscles, are activated to a greater degree in this position in order to help stabilize the pelvis and trunk.

Floor Positions: There are many floor positions that can be used for core stability such as prone, full supine, supine with knees bent and quadruped (or tabletop) positions.

Arm Movement Patterns: Another strategy to add variety and address specific functional components is to change the arm movement patterns. It is through these different arm movement patterns that we can facilitate a lot of different multi-dimensional and core work. Especially in combination with different stances.

Bilateral Movement: In this movement both arms are moving in the same direction at the same time such as doing arm curls with both arms, chest press both arms, shoulder raises

both arms, etc. With barbell and most machine movements this is the usually the only option.

Alternating Movement: In this movement one arm performs a complete repetition at a time before the other arm performs a repetition and this pattern is repeated. Both arms are loaded at all times.

Reciprocating Movement: In this movement both arms are being moved simultaneously but in opposite directions. For example, during a dumbbell bicep curl, when one arm is flexing the other arm is extending and vice versa. This requires a little bit more coordination and control than doing either bilateral or alternating.

Unilateral Movement: In this movement one arm performs the movement while the other arm rests and is unloaded. Unilateral loading creates an imbalance that is necessary to challenge the core in either the frontal or transverse plane. Performing unilateral overhead shoulder press, for example, creates a frontal plane challenge while performing unilateral horizontal rows (in standing) creates a transverse challenge. These types of imbalanced movements mimic many activities of daily living such as carrying groceries in one hand.

Bilateral Opposite: In this movement the arms move in opposite directions at the same time but doing opposite work. Performing a cable chest press with one hand while performing a cable row with the other hand is an example of a bilateral opposite arm movement. As one arm presses the other arm simultaneously pulls.

Being able to manipulate such a wide variety of variables – load, repetitions, distance/height, speed, tempo, stance position, arm movement pattern – enables the ability to regress and progress movements in purposeful and meaningful ways for the betterment of the client by creating an

almost endless number of combinations. With these variables it is possible to focus more specifically on core stability or motor control or power or balance or any other factor. Changing these variables is also helpful to keep clients engaged and excited about their exercise program so that they do not get bored with it.