1. The shoulder is that joint that requires a tremendous amount of mobility on one hand and a tremendous amount of stability on the other hand. (mostability)

2. The pelvis, trunk, and scapula all tie together (peltrunk-ula formula) for an understanding of function in the shoulder.

3. Function is driven by an intelligent system called the proprioceptors.

4. To turn on the proprioceptors to facilitate the reaction we want through the shoulder, we need to understand the strategy of loading before unloading.

5. The shoulder has the capacity to go through tri-plane loading as well as tri-plane unloading.

6. The shoulder goes through loading by being stimulated by what happens at the scapula.

7. In functionally analyzing the shoulder, we want to focus on all three planes and at both ends of all three planes.

8. Balance Reach Tests are designed to see what’s happening in the sagittal, frontal, and transverse planes at both ends of each plane.

9. Functional rehabilitation of the shoulder requires that we allow every part of our patient’s body to become successful to contribute to the success of the shoulder.

10. Scapular Reaction treatment is a type of rehabilitative approach that allows us to use manual therapy techniques to facilitate reaction of the scapula at the same time the hip is loading in order to get a proper load for the scapula.

11. The 3D Dumbbell Matrix, and all its possible tweaks, is one of the best ways to turn on the hips and shoulders, and get them to cooperate with each other to create mostability of the shoulder.

12. Functional transformation and how we apply it involves a great degree of trust... in ourselves, in the environment we create, what we know and believe, and in our ability to continue to learn and grown.

13. All function is capture, then release (as in the golf swing)... tri-plane loading and then tri-plane unloading.

14. Research indicates that adjustments, or specific body actions, occur prior to and initiate other body movements.

15. Research continues to reinforce the concept of function and Chain Reaction™.
OBJECTIVES FOR THE SHOULDER FUNCTIONAL GUIDE

To assimilate up-to-date information and knowledge of the shoulder and its relation to the rest of the body.

To learn how to apply effective functional techniques when testing, training and rehabilitating the shoulder.

To understand both the tremendous mobility and the tremendous stability the shoulder provides and just how it works. To understand and appreciate the functional strategy of loading before unloading and the important role the proprioceptors play in helping the shoulder.

HOW TO USE THIS FUNCTIONAL GUIDE

This functional guide can be used as a convenient summary of the program's contents to take with you after viewing. You can also use this guide as a notebook; space has been provided so that you can make notes on relevant tracts as you watch them.
THE PROPRIOCEPTORS . . .

- Over the years it has been found that function is driven by an intelligent system called the proprioceptors.

- As we understand strategies that will enhance function, it’s important to understand what the proprioceptors are doing and how to take advantage of them.

- We are finding that it’s ground, gravity and momentum that turn them on.

- Proprioceptors react to a change of something, whether velocity, compression, body slants, or other movements.

APPLICATION TO THE SHOULDER

- To turn on the proprioceptors in order to facilitate the type of reaction we want through the shoulder, we need to understand the strategy of loading before we unload.

- We need to function in all three planes to get the proprioceptors to react in a reflexive, subconscious manner, as designed.

- And so, we need to create an environment in our testing, training and rehabilitating in order to get the shoulder to react and be turned on proprioceptively before it acts upon what it wants to act upon and concentrically produces a force.
THE PROCESS IN SHOULDER MOTION - If, for instance, we want to externally rotate the right shoulder, first of all our body slant, the ground, and momentum will allow for internal rotation of the left hip. Our left leg will collapse somewhat and a tri-plane loading will occur that turns on the proprioceptors in the lower extremities. This becomes the proprioceptive stimulus that then goes up through the back to the scapula and eccentrically lengthens the muscles around the scapula. This motion on the left side will then be decelerated as we go in the opposite direction and accelerate into external rotation and the tri-plane unloading.

APPLICATION - If we take a volleyball hitter and she attacks the net from left to right, she will actually get in a position where she loads her body to jump. As she unloads and explodes into the air, if she’s effective with that explode based on the prior load on the ground, she will get to another tri-plane load that allows her to bring her body back to hit the ball. The proprioceptors are stimulated and ready to go the opposite way. As she unloads and hits the ball, she will actually go into the ground and decelerate into another tri-plane load, the proprioceptors will be stimulated again, and she can unload to prepare for whatever else is happening on the court. So, load to unload to . . . load to unload to . . . load to unload.

CLOSE - As we train, condition and rehabilitate, we want to fully understand function through the shoulder. Our goal is to properly stimulate the proprioceptors to allow for unloading of the joints and muscles in all three planes so we get the productive unload that our patients, clients and athletes need to be successful. We need to be able to create the right environment to make this a reality.
THE MOSTABILITY JOINT - The shoulder is that joint that requires a tremendous amount of mobility on one hand and a tremendous amount of stability on the other hand. It is a miraculous joint that allows for a great amount of excursion of motion in all three planes, but at the same time, provides the stability for us to perform multiple tasks involving pushing, pulling, lifting, throwing, swinging, and hugging. The shoulder is a great example of the need for just the right amount of motion, at the right time, in the right plane, in the right direction, for the right reason to accomplish the task at hand.

THE FULL APPRECIATION . . .
• We have to understand how the shoulder works functionally. We have to understand that the shoulder totally depends on what happens throughout the rest of the body . . . that there is an integration and Chain Reaction™ with the rest of the body.

• We have to understand the integration between the shoulder structures, the trunk structures, and the hip structures. This is called the peltrunk-ulra formula. The pelvis, trunk, and scapula all tie together for an understanding of function in the shoulder.

• The shoulder is a huge unit in reality with connections to the rib cage, sternum, clavicle, scapula, humerus, thoracic spine, lumbar spine, and into the rest of the body.

• It’s the scapula in motion at the same time as the humerus is in motion that actually gives us a biomechanical understanding of what’s happening at the shoulder joint.
TRI-PLANE FUNCTION OF THE SHOULDER - To load our shoulder in the transverse, frontal and sagittal planes, we let gravity, ground reaction, and the momentum of our body load the muscles (the scapula muscles, back muscles, hip muscles, posterior/anterior muscles) eccentrically so we can concentrically produce the force needed to get the job done.

In function, as we look at both ends of the tri-plane, we have loading then unloading going on. We load to explode, whether throwing, hitting a volleyball, or pulling something down. We have the capacity to load at both ends of each tri-plane motion. So our shoulder has the capacity to go through tri-plane loading as well as tri-plane unloading. **The shoulder does that by being stimulated by what happens at the scapula, not by what happens at the humerus.**

SCAPULAR REACTION - To get proper scapular loading, the scapula needs to be functionally stimulated as it normally would be to gain its greatest strength. In order to throw, lift, or do anything, the body will first go the opposite way (for unloading). The scapula will react to what the trunk is doing. The muscles are then stimulated, the proprioceptors let the system know what’s going on, and motion with stability occurs at the shoulder.

CLOSE - As we test, train and condition, and rehabilitate the shoulder, it's important to understand the function of the shoulder - how the scapula works, how the humerus works, how each muscle works - in order to transform that knowledge into programs of prevention and rehabilitation that create a truly effective mostability shoulder.
INITIAL THOUGHTS - When we functionally analyze the shoulder, it's important to understand how the shoulder does what it does. We want to take a look and see how it relates to the scapula, spine, hips and down to the legs. We want to create a successful environment for our clients and also take advantage of the strategy of trying to get a load before an unload. And we want to work in all three planes to see what ultimately makes the shoulder successful.

ALL THREE PLANES - In functionally analyzing the shoulder, we want to focus on all three planes and at both ends of all three planes. We want to be able to understand how mobile and stable the shoulder is for the loading and unloading it goes through.

In each plane we will want to view the motion of the hip, the eccentric lengthening of the muscles that takes place, and how effective the loading and unloading is that results.

Many times with shoulder problems, the shoulder is naturally blamed, but it's not just the shoulder's fault! It's really “the hip, through the trunk, through the scapula, through the shoulder's” fault. It’s the Chain Reaction™!

FUNCTIONAL SPECIALIZED TESTS FOR THE SHOULDER

The following balance reach tests are designed to see what's happening in the sagittal, frontal, and transverse planes at both ends of each plane. They are designed to find out where the patient is successful so that we can then build upon the success to enhance the abilities of our clients . . . to create better mobility and stability through the shoulder. The focus is on the right shoulder below and in the video. Each test is designed to use the 3D Functional Testing System to measure distance, height and in some tests, the angle for rotation purposes. The patient is asked to keep “inching” back to determine how far she can reach and still be successful in each test.
• Right Leg Balance, Right Arm Anterior Reach Test at Shoulder Height
  *Focus*: to see how successful the patient is reaching forward in the sagittal plane.

• Right Leg Balance, Right Arm Anterior Reach Test at Shoulder Height (left foot next to right but not touching)
  *Focus*: to take away the counterbalance and allow the right hip to do more work.

• Right Leg Balance, Right Arm Overhead Posterior Reach Test
  *Focus*: to test the other end of the sagittal plane. Is she able to extend through her hip to load her abdominals to load the anterior chest wall to load her arm in the sagittal plane?

• Left Leg Balance, Right Arm Medial Reach Test at Waist Height
  *Focus*: can she load through her hip in the frontal plane?

• Left Leg Balance, Right Arm Medial Reach Test at Waist Height (right foot next to left but not touching)
  *Focus*: to prevent the patient from using the transverse plane to cheat the frontal. How does she do now loading her hip?

• Right Leg Balance, Right Arm Overhead Medial Reach Test
  *Focus*: to look at the quality of the patient’s motion at the other end of the frontal plane. Can she load the right hip when she has to go through full abduction of the right shoulder to bring it back into adduction?

• Left Leg Balance, Right Arm Posterior/Lateral Reach Test at Shoulder Height
  *Focus*: to assess external rotation in the transverse plane and the resulting load

• Right Leg Balance, Right Arm Posterior/Lateral Reach Test (to same side)
  *Focus*: to test the right shoulder’s ability to load off the right hip in the transverse plane.

**RESULT** - we know where the patient is successful in all three planes through the hips and can build a training and conditioning and/or rehabilitation shoulder program appropriate for our client.
INTRODUCTION - Functional rehabilitation of the shoulder requires that we allow every part of our patient’s body to become successful to contribute to the success of the shoulder. Once we find successful opportunities through the feet, knees, hips, and all the way through the trunk, we can attend to the scapula itself, and whether it is getting the proper loading. Due to many different influences, the scapula often does not load properly.

SCAPULAR REACTION - This type of rehabilitative approach allows us to use manual therapy techniques to facilitate reaction of the scapula in the same direction the hip is going in order to get a proprioceptive load for the scapula. We want to guarantee a normalized proprioceptive load.

TREATMENT/EXERCISES: SCAPULAR REACTION
1. The patient puts their right foot forward and moves their right arm forward and back at their side, in a swaying motion. They reach down and reach back up. Functional manual techniques are used to drive the scapula up as the patient loads for shoulder flexion.
   PURPOSE: To test for good hip flexion in the sagittal plane and when satisfied, to help drive the scapula up to facilitate the eccentric load.

2. The patient puts their right foot back and moves their right arm down as before, but then takes the arm all the way up, as they would if serving a volleyball. The manual technique here will clear the scapula and drive the scapula down for an eccentric load as the patient comes overhead with their arm. Then the arm will come down to hit and back up to load.
   PURPOSE: To first of all see if there is good hip extension along with the back extension, and if there is, help load the scapula at the other end of the sagittal plane, i.e. eccentric load for concentric flexion of the shoulder.

3. The patient will sway their right arm back and forth in the side-to-side, or frontal plane. The scapula will manually be driven down in the frontal plane as the patient comes down into adduction to load.
   PURPOSE: To check to see if the scapula is rotating properly at the same time the patient is loading in the frontal plane with their hip. This is often necessary because the posterior interior capsule gets tight because of posture, gravity and other reasons.
4. This is the same as the previous exercise, but the patient finishes way over head with their right arm loaded into abduction in the frontal plane. Manual facilitation will mobilize the scapula through the medial border and bring it up in the frontal plane.

**PURPOSE:** To check on how the hip loads and can the scapula elevate in the frontal plane to load the shoulder properly so the patient can be successful when they pull their arm down in adduction.

5. The patient places the left foot forward and reaches across the chest with the right arm and pulls it forward, as you would if hitting a backhand in tennis. The scapula will be driven around the corner with manual therapy as the patient loads into internal rotation in the transverse plane.

**PURPOSE:** In the rotational plane, is the patient getting good arm motion, good scapula motion, and good internal rotation of the left hip? Driving the scapula will help the patient to load so that there is a strong unloading, i.e. external rotation.

6. The patient places their right leg forward and reaches back with the right arm to simulate a forehand in tennis. Manual therapy will help drive the scapula back through the transverse plane.

**PURPOSE:** To check to see if the scapula is being loaded by the same side hip. To help, the scapula will be driven back through the transverse plane to clear it for an effective eccentric load . . . to prepare for internal rotation.

**CLOSE** - After stimulating the scapula to respond through manual therapy, we want to create a home exercise program that will reinforce stretching as well as strengthening components to help the shoulder feel stronger and more stable to do the things it wants to do.
PHILOSOPHY - In order to create mostability, we have to get the shoulder to react. We can’t get the shoulder to have to act upon things; it has to react to what’s going on in the environment. This has to happen proprioceptively through the entire Chain Reaction™. We have to get the feet to talk to the knees, who talk to the hips, who talk to the spine, who talk to the scapula, who talk to the humerus and the other muscles in the shoulder.

3D DUMBBELL MATRIX - One of the best ways to turn on the body is to use this exercise matrix to three dimensionally turn on the hips, turn on the shoulders, and get them to cooperate with each other to create mostability of the shoulder.

DEMONSTRATION OF THE 3D DUMBBELL MATRIX
Examples from “3D Dumbbell Matrix” by Gary Gray, PT

FOR DETAILED DEMONSTRATION OF THESE EXERCISES AND MORE,
CONTACT:
Functional Design Systems - 866-230-8300
functionaldesign.com

EXERCISES FROM VIDEO
• Basic 3D Dumbbell Matrix
  The basic matrix consists of using dumbbells and first of all taking them shoulder to overhead in the sagittal plane, then in the frontal plane, and then in the transverse plane. Next, the movement is waist to shoulder in the sagittal, frontal, and transverse planes. And finally, we want to take the dumbbells from knee to overhead during lunges in all three planes, with right leg lunges first, then left leg lunges.

• Single Leg 3D Dumbbell Matrix
  The basic matrix is tweaked as the exercises are done on one foot with the other foot next to and toe-touching. First, the right foot is used through each plane, then the left foot. The objective is to get more reaction and swivel in the hips to turn the back and tummy muscles on.
• Tweaked Jump Lunges
  - The movement of knee to overhead in each jump lunge in each plane. So, the weights are placed in front of the knee and then taken back up overhead. This is done first of all with the right leg, then the left.
  - Next, the jump lunges are done in each plane with the weights taken to the side of the hip, then overhead. First with the right leg, then the left.
  - And finally, the lunges will be done with the weights rotated to the side you lunge to, then taken overhead. Again right, then left. These lunges will power the hip muscles through the trunk into the scapula and give the shoulder the proprioceptive opportunity it needs to create the mobility and stability it desires.

• Jump Lunges with Overhead Tweaks
  - The lunges are done in each plane taking the weights overhead in the sagittal plane during each of the lunges. First to the right side, then the left.
  - This time the lunges are done taking the weights overhead each time in the frontal plane the opposite way of each lunge. Part of loading is unloading, and that becomes the load for the other side. So, to experience this reaction through the hips and shoulders, taking the weights overhead and opposite allows for this reaction stimulus.

CLOSE - There are lots of tweaks and variations to the 3D Dumbbell Matrix: movement that will allow for real loading to the shoulder to give it the input it needs in all three planes to achieve the functional mobility and stability it requires.
TRUST - Functional transformation and how we apply it involves a great degree of trust. We have to trust ourselves to create the environment to help the patient, client or athlete. We have to trust what we know, what we believe, but we also have to be sensitive to our doubts, to some of the things we don’t understand. We have to continue to learn and try to expand our trust. We have to seek to understand function, how everything is put together, how our body gets from one position to another. Trust has its foundation in our transformation of understanding.

THE RELEASE - In the game of golf, the release and what precedes it are very important. The understanding of release in function and its correlation to trust, letting go, and transformation are very important.

The release is one of the most subtle and difficult parts of the golf swing. It’s the most difficult part to grasp and to put into practice . . . This release is made possible by proper coiling and cocking in the backswing. The swing thought here is that the full natural release of our life to God like the release of our swing in golf can only be achieved by letting go and allowing ourselves to feel the experience of freedom and power that is so readily available to us. The power is already there. It just needs to be recognized and tapped.

Jim Sheard & Wally Armstrong, "In His Grip, Foundations For Life and Golf"

RELEASE AND CAPTURE - To appreciate release in golf, we have to appreciate capture in function. Capture is tri-plane loading. The release in golf is evidenced by us hitting the ball the way we want to hit the ball. It takes place after the tri-plane load, or tri-plane capture. We want to capture the force, the eccentric load at the right point, that will allow for full release or unloading. The release in golf happens at transformation, at the top of the golf swing. We have to appreciate and understand what happens at the pelvis, trunk and scapula that allows for a complete capture and full tri-plane load.
The key to any type of function is to understand where transformation takes place, because that’s where release takes place. The important part of transformation is what happens before it. Are we allowing the body to be loaded in all three planes in order to allow the right tri-plane function, the right tri-plane motion to occur?

**THE SICKLE EXAMPLE** - Harvey Penick, the famous golf instructor, understood function in golf and the **Chain Reaction™** that occurs from the ground up through the feet, hips, scapula, shoulders, and down to the elbows, wrists, and hands. He would use the sickle as a type of golf club so that his students would understand where the capture and release come from to create a balanced swing. Basically, the golf swing is most critical at both ends where the tri-plane loading occurs. So, we want to take advantage of release based on capture.

**THE SICKLE DRILL** - The idea is to line up golf balls in a perpendicular line in front of you as you prepare to swing the club. Then, as you would whack weeds with a sickle in a pendulum fashion, do the same with the golf club attacking the balls. Hit one, step forward, keep swinging, hit the next, and continue until you have hit each ball. The idea is to get the feel coming through and coming back, just as you would the sickle. Load and unload, capture and release.

**SUMMARY** - All of function is capture and release. If done properly in the environment created, we can trust the transformation that ensues. The actual productive force is the result of transformation, the result of turning the muscles on, the result of the proprioceptors stimulating eccentric lengthening and loading within the body. And in golf, this process of capture and release, loading and unloading is very evident.
INTRODUCTION - The shoulder is another tough joint, as we've seen, that has to move yet possess stability. To really understand it will allow us to help a lot of people. One of the challenges to understanding it is finding more information or research that will help us from a functional standpoint.

ANTICIPATORY POSTURAL ADJUSTMENT - This is a concept that comes out of motor control research. It really is Chain Reaction™ from a functional standpoint. If you have an intention to move your arm, for instance, there are things that are going to occur before that, described as postural adjustments. And those adjustments are in anticipation of something. So, you’re not going to move your shoulder until something happens down below . . . in your trunk, hips, or legs for example.

The question becomes, where does this anticipation come from? The shoulder doesn’t all of a sudden decide to arbitrarily move, and become the only thing that moves.

RESEARCH ARTICLE
In this article, subjects reached down and sometimes picked up an object, sometimes they did not pick up anything, sometimes they did this at a slow speed, sometimes faster. This is very functional in focus. What they found was:
1. When they looked at the muscles in the hips, back and legs, many of those muscles initially decreased their activity, then very quickly (in milliseconds) after the arm was moving, the activity in those muscles increased rapidly. This equates to the control of the loading of the muscles prior to unloading.
2. They saw the acceleration or movement of the lower leg, thigh and pelvis significantly before the arm began to move. This supports other movements as a necessary precursor to the arm movement.
3. When they attempted to reexamine what the role of those adjustments was, they came to the conclusion that those adjustments were the actions that actually initiated the arm movement.
ADDITIONAL THOUGHTS

• The research we seek is often not as pure as an isolated musculoskeletal research article. We get into a lot of the neuromuscular, motor control theories. It’s nice their studies reinforce what we see and intuitively have known for years.

• As rehabilitation specialists, we still find it hard to get outside our box, to expand our horizons. For example, if we saw how important the scapula and surrounding muscles were, it should have been obvious that if they needed to provide mobility and stability, then so does everything from the ground up that has to support those muscles.

• It is difficult for us to isolate our specific studies (like a strength study or a stability study) because the body is so integrated. We have to understand that there is a sophisticated system going on that involves the proprioceptors and nervous system working to control the muscles, bones, and other structures. And most of it is subconscious.

• Often, we have to accentuate the motions, even greater than in normal functioning, to really turn on that system. We have to functionally understand this to create that motion and environment for the patient before they cut back to a point both functionally and effectively. This was demonstrated in the Rehabilitation segment of this video.

CLOSE - If we have a situation where we know the shoulder is that dependent on everything down below, it is really our responsibility to understand enough about function, and enough about integrated isolation to be able to utilize the hip and the foot and the knee as a friend of the scapula and the shoulder. And to know enough about tweaking to accomplish what will benefit our client.