# Brunnstrom Stages of Motor Recovery

## Edited Video Transcript

Okay, next piece, Brunnstrom's theories, again involving reflexes. So normal neural development involves this process of reflexes being modified, rearranged, built upon, to get functional goal-directed action. Brunnstrom hypothesizes that stroke is effectively this neural development process in reverse, which means these reflexes come out as barriers. So we're going to use these reflexes, this primitive movement, to facilitate action. This is actually a quote from one of their works: “That this subcortical motion symmetry, which we can elicit based on reflex, can serve as a wedge, so that movement can be learned. We anticipate seeing this recovery proceeding from going flaccid to synergy to decoupled voluntary action.”

### Synergy Patterns Reveal Where Muscles Activate Together

So, Brunnstrom has actually defined really two important pieces: First, is looking at these synergy patterns. So these synergy patterns are stereotypical patterns of co-activation where muscles are activating together. So, we see this typical flexion pattern—the image on the top— the scapular retraction and or elevation, shoulder abduction and external rotation, elbow flexion, and forearm supination. So in the video, we saw an intro to this lab. Those are the patterns we saw. When he moved his arm, he went into abduction scapular elevation and elbow flexion. He started moving into external rotation. The opposite of that would be an extensive extension synergy at the bottom where we see protraction of the scapula, horizontal abduction, and internal rotation combined with elbow extension, not necessarily so with this.

### Six Stages of Recovery

What Brunnstrom then defined are these stages of recovery. They hypothesized that we have six stages of recovery going from flaccid to isolated joint movements. So somebody will start being completely flaccid with no voluntary movement; they'll then move into involuntary synergies. So when they yawn, when they sneeze, they may have a synergy movement of that limb. People more often seem to form the flexion synergy, but some people first form that extension synergy as their initial movements. From there, at stage three, we start to see voluntary movements. They can command that arm to move, but only in a synergy pattern. So whenever they try to move, they see that same pattern of scapular elevation, shoulder abduction, elbow flexion. [Regarding] the man in the video, right, from there… we start to see movements deviating from synergy movements outside this energy pattern. From there, we start to see moving independently of these synergy patterns. And then finally, we get true isolated joint movement—moving one joint without any of the others. So this serves a couple of useful functions in my mind. The data that I’ve read really doesn't support this being a predictive model, saying you start at one, then go to two, and then three, and then four. And then sometimes, they don't follow this order at all. The data I’ve seen show [that] about 20 percent of people follow something pretty close to this order.

### Recognize What Is New—Create the Just-Right Challenge

But what's useful is to recognize first is, “Hey that's new, that's different, this is something we can use to engage that muscle functionally.” The second piece is thinking about these synergy patterns and thinking, huh, this energy pattern is their easy movement where they're in the groove. The gentleman in the video could move in that one groove pretty well. So how do we create the just-right challenge? Not necessarily to ask them to move in that same groove. Move just outside of that groove, yeah. “Can he go out and extend a little bit? Can he move more into flexion?” And so just effectively use that synergy pattern to understand the just-right challenge [for] you.