**DROP FOOT AND AFOs**

1. Initial Conditions
   1. Got this idea from Saryn Goldberg’s PhD dissertation on biomechanical factors that contribute to stiff knee gait in children with CP. The first study she did was an investigation on the knee flexion velocity at the toe-off phase. She found that in the majority of cases, subjects with stiff knee gait tended to have a lower toe-off velocity than those without movement impairments.
   2. What if we considered an initial condition of ankle angle? We could determine the average ankle angle of subjects without movement impairments, and compare them to the average ankle angle of subjects with drop foot. My guess is the drop foot subjects have a substantially larger angle, and if we can determine what the minimum ankle angle is needed not to impair motion, then we could apply this to AFO development. Perhaps the ankle angles don’t necessarily have to be equal in both feet to prevent gait problems, but instead the ankle just needs to be above a certain angle. To quantify
2. Contribution of Muscle Forces
   1. Got this idea partially from Saryn Goldberg’s PhD dissertation as well, but part of it follows from the Harper paper. In Goldberg, she investigates the muscle contribution to knee flexion, and found that the initial angular velocity of the swing knee contributed the most to knee flexion. She broke the muscles (actually all the actuators) down into their individual contributions, and found that the muscles only contributed about 12 degrees to the peak knee flexion all together.
   2. This I think could go along with Harper’s paper, and stuff from Zelik’s too. Harper investigated the compensatory mechanisms when the stiffness of the AFO was decreased over time. Harper found that when the stiffness of the AFO was decreased, the knee joint extensor moments only increased in lower limb amputees. In people who were not amputees, it appeared that the knee joint moments did not increase, but the forces by the gastrocnemius increased. This is indicative of something about the compensatory mechanisms that is unknown- as in what is going on that gastrocnemius will pick up more of the weight rather than the knee-joint moment? A limitation of Harper’s paper was that she was unable to separate the contribution of the muscles from that of the AFO, and Zelik defines a way to separate them.
3. ……………