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Changes in Reach to Eat Movement Control After Intensive Training for Children with Unilateral Cerebral Palsy

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Changes in Reach to Eat Movement Control After Intensive Training for Children with Unilateral Cerebral Palsy.

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Abstract

Ya Ching Hung EdD. and Aryeh Spingarn EP-C, CSCS, EIM-Level 2 Queens College, City University of New York Department of Family, Nutrition, and Exercise Sciences, Changes in Reach to Eat Movement Control After Intensive Training for Children with Unilateral Cerebral Palsy. **Purpose:** The current study compares the effects of an intervention on children with Congenital Hemiplegia during a simple eating task using kinematic analyses. Previous studies looked at simple bimanual tasks such as opening a drawer; no studies examined the effects of intensive training on unimanual reach, grasp, and eat movement control. **Methods:** 20 children with Unilateral Spastic Cerebral Palsy (USCP) ages 4-10 (MACS level I-II) were assigned to one of two groups, Hand-Arm Bimanual Intensive Training (HABIT) or Constraint-Induced Movement Therapy (CIT). They were asked to perform the task of reaching out, grasping, and eating using their more affected hand. 3-d kinematic analyses were used to further identify three specific movement stages: Reaching, Grasping, and Eating. Assessments were given before and after the 90-hour treatment program of 6 hours a day for 15 days. **Results:** A one-way repeated measures ANOVA with a significance level p=0.05 was used. There were statistically significant decreases in movement times after training for both groups: Reach time (P=0.005), Grasping time (p=0.004), Eating time (p=0.043). In addition, shoulder displacement was decreased after training (p=0.001). **Conclusions:** Intensive trainings such as the ones in this study are effective tools at improving unimanual movement control for those with USCP.

Introduction

Hemiplegic Cerebral Palsy is a most common pediatric ailment and is classified as a traumatic injury to the brain that occurs during pregnancy, birth, or shortly thereafter until the age of three. (1) One of the most common subtypes is Unilateral Spastic Cerebral Palsy which manifests as movement impairments on one side of the body. (1) Due to the difficulty of movement kinematics for those with CP it becomes a challenge for clinicians to design and prescribe effective treatments. To date two different treatment methods have been used when dealing with this population; Hand-Arm Bimanual Intensive Training (HABIT) or Constraint-Induced Movement Training (CIT). (2)(3) The majority of studies evaluate Bimanual Coordination based on the notion that most activities of daily living (ADL's) require the usage of two hands. (3) Recent studies evaluated the effects of intensive training on different activities such as opening a drawer with either one or two hands. The goal of this study however, was to evaluate the effects of intensive training on unimanual reaching, grasping, and eating. (4)(5)(6)

Methods

- 20 children with USCP MACS Level I & 2 were recruited.
- Assigned to HABIT or CIT respectively. (2)(3)
- Tasked to Reach out, Grasp, and Pick up a cookie.
- 3-D Kinematic Analyses were used to identify these specific phases: Reaching, Grasping, and Eating along with movement times.
- Assessments were administered prior to and following the 90 hour program of 6 hours per day for 15 days. (2)(3)(4)(6)
- One way repeated measures ANOVA with p=0.05 to determine statistical significance.
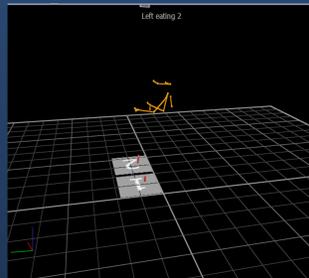
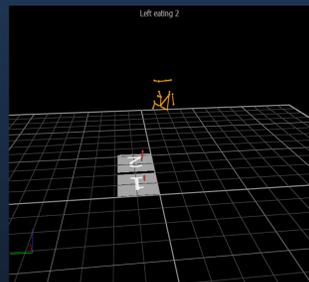## Results

Figure 1.1 Pre-test Reach
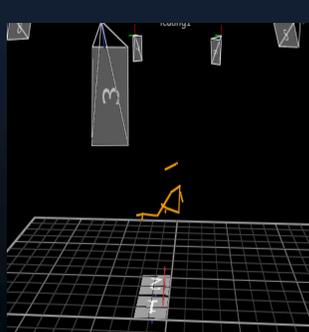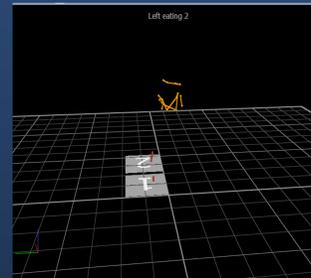
Figure 1.2 Pre-test Grasp
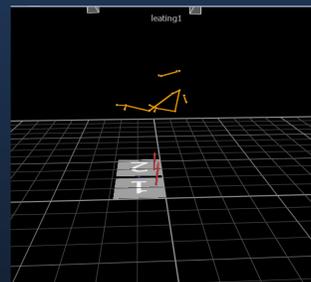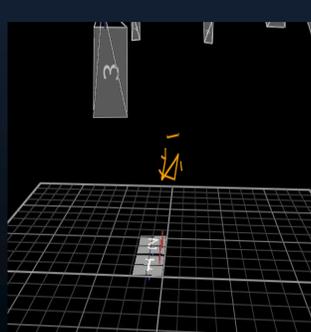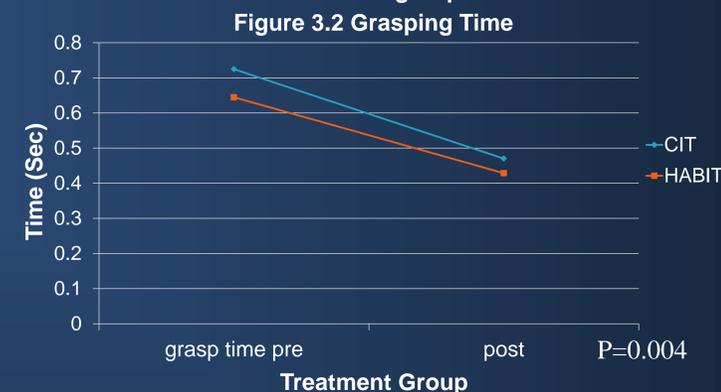
Figure 1.3 Pre-test Eating

Figure 2.1 Post-test Reach

Figure 2.2 Post-test Grasp

Figure 2.3 Post-test Eat

Results (Continued)

Figure 3.1 Reaching Time
P=0.006

Figure 3.2 Grasping Time
P=0.004

Figure 3.3 Eating time
P=0.043

Figure 3.4 Shoulder Displacement
P=0.001
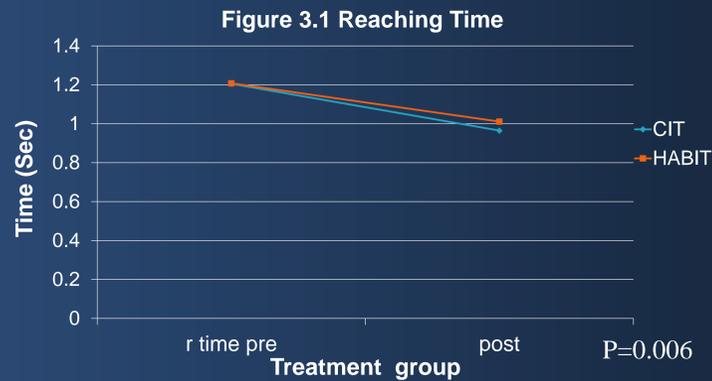
Discussion

Our hypothesis was: That based on the treatment protocol that both HABIT and CIT would show improvements but, the HABIT group would show the greatest reductions in changes of reach to eat movement control. However, studying the data we noticed the greater changes in Reaching time; that is the time it took to reach for the cookie placed in front of them, for the CIT group; a reduction from 1.2s to approximately 0.85s with a p=0.006. Grasping time for the affected hand was also significantly decreased in both groups 0.72s to 0.48s CIT and 0.65s to 0.45s with a P value of 0.004. The overall eating time was particularly interesting, both groups started at similar time approximately 1.34s with a significant decrease 1.25s and 1.16s respectively with a P=0.043. Similarly, there were significant changes in shoulder displacement times 133s to 91s CIT and 119s to 84s HABIT with p=0.001. The results are indicative as to effectiveness of this type of intervention for both CIT and HABIT groups what remains to be seen is how long these improvements last.

Conclusions

Based on our statistical findings we can conclude that our model for the 90 hour intensive training 6 hours per day for 15 days can play a very important role as a treatment tool for improving unimanual movement control. Providing clinicians with an important therapy tool to aid in the treatment of those with USCP.

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