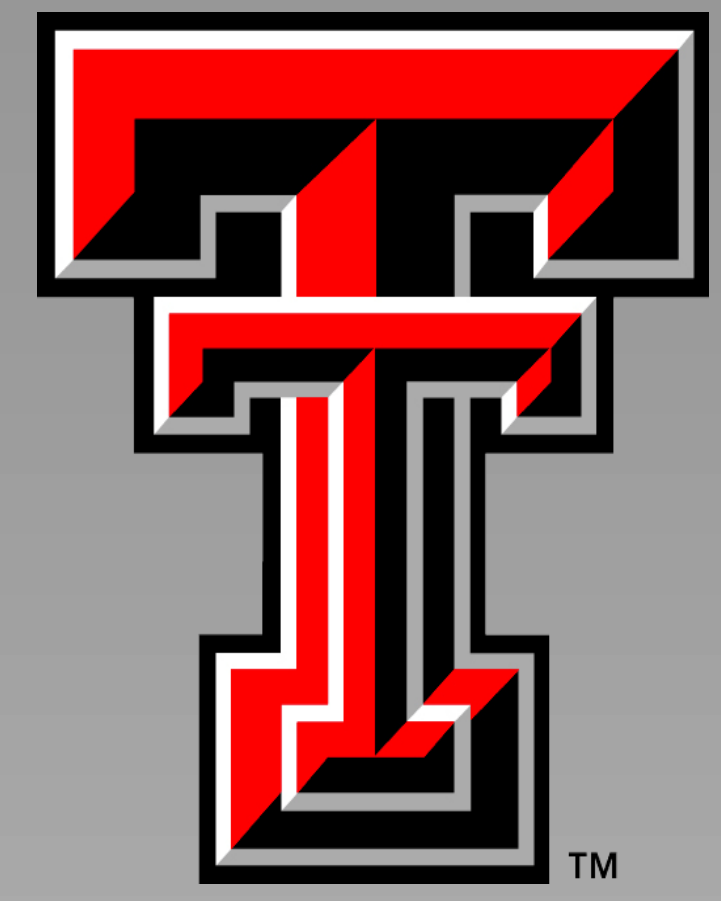




Brain Activation Patterns During Participation in Cup Stacking

Melanie A. Hart and Walter R. Bixby
Department of Health, Exercise and Sport Sciences
Texas Tech University



Introduction

Cup stacking (i.e., *Speed Stacks*) is a relatively new sport that has been highly promoted at many of the state, regional and national conventions for physical educators. Cup stacking involves upstacking and downstacking 12 cups in a predefined pattern. *Speed Stacks* makes several claims about the benefits of participating in the event. One of the claims of *Speed Stacks* is that participants are "...using both sides of their bodies and brains to develop skills..." (*Speed Stacks, Inc., 2004*). These claims are based on other brain research, but empirical evidence with the task of cup stacking is lacking.

Purpose of the Study

The purpose of this study was to empirically examine the electrical activity of the two hemispheres of the brain, as measured by electroencephalogram (EEG), while cup stacking.

Method

Participants

Participants were volunteers (N = 18) recruited from undergraduate Exercise and Sport Sciences classes at Texas Tech University. All participants were right-handed.

Task

The participants were taught the *Speed Stacks* cycle. The cycle starts with the cups in stacks of 3 – 6 – 3 and the hands on the timing mat. When the participants were ready, they would upstack the cups into pyramids of 3 – 6 – 3, and downstack the cups into two stacks of six each. Then the participants would upstack the cups into pyramids of 6 – 6, followed by downstacking into one stack of twelve. The participants would place one cup to the left of the stack and one to the right (one cup right-side up and one upside-down). Then they would upstack the remaining cups into a pyramid of 10, followed by downstacking the cups into the original stacks of 3 – 6 – 3 and returning the hands to the starting position on the timing mat.

Figure 1. The Cycle



Method

Procedures

Each participant completed three sessions:

Session 1 – Introduction and Practice (30 minutes)

Participants were introduced to the task which was the cycle (see Figure 1).

Following the introduction and a demonstration, the participants practiced the task while the experimenter provided prescriptive feedback. The last two trials were timed.

Session 2 – Practice (30 minutes)

For the second session, participants were shown a video to review the task. Following the video, the participants practiced for the remaining time and the experimenter provided feedback as needed. All of the trials were timed during the second session.

Session 3 – Testing (Approximately 60 minutes)

Participants were fitted with the EEG electrode cap. The configuration of the electrodes followed the standard electrode placement of the International 10-20 system.

Participants completed five baseline trials (30 seconds each) in which they were asked to stand quietly looking at the cups with their hands in the starting position (see Figure 2). Following the baseline, the participants performed five trials for each of four tasks:

- The cycle stack using both hands
- The cycle stack using only the right hand
- The cycle stack using only the left hand
- The cycle stack using both hands with the Mini *Speed Stacks*

Figure 2. Baseline Testing



Results and Discussion

The dependent variable was a global hemispheric measure obtained by calculating the mean of the frontal, central, temporal, and parietal lobes for each hemisphere. Means of the global hemispheric measures for the five trials for each condition (i.e., the four tasks and the baseline) were calculated. Data were analyzed using a 5 X 2 (Condition X Hemisphere) repeated measure ANOVA. The results indicated a significant main effect for condition, $F(4, 68) = 5.171, p < .05$, (see Figure 3), and interaction, $F(4, 68) = 7.736, p < .05$, (see Figure 4).

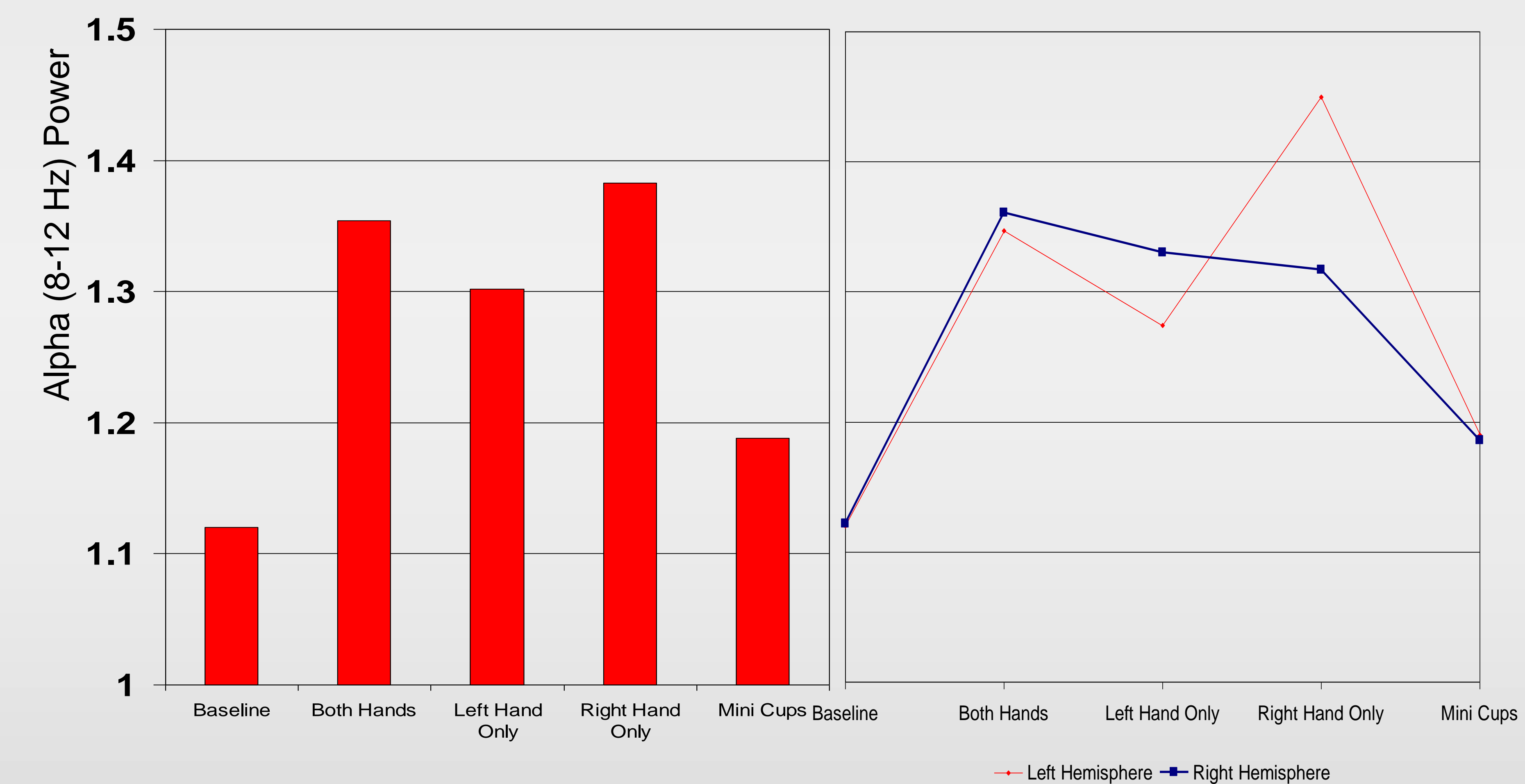


Figure 3. Main Effect for Condition

Figure 4. Condition X Hemisphere

The mean for the right hemisphere for the left-hand condition was larger than the mean for the left hemisphere. For the right-hand task, the mean of the left hemisphere was greater than the mean of the right hemisphere. For the two conditions in which both hands were used and the baseline, the means were similar for both hemispheres. The results of this study support the claim that cup stacking does result in an increased activation of both sides of the brain.

References

Speed Stacks, Inc. (2001). Cup stacking with *Speed Stacks*: See it, believe it, teach it! [Brochure]. Castle Rock, CO: Speed Stacks.