INFLUENCE OF BRAIN TYPES ON MOTOR SKILL COORDINATION

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INTRODUCTION: Brain typing has shown to be an effective method of identifying personality characteristics that would identify individuals who would be effective as managers in business or in sports in a variety of leadership roles. The Brain Type Institute founded by Jon Niednagel has been successfully involved in the brain typing of professional athletics over the past 20 years. The brain typing process involves administrating, a Brain Typing Inventory personality questionnaire developed at the Brain Type Institute based on Jung-Myers topologies (Briggs & Myers, 2001), and the responses on the 20 question brain type identifies the individual's personality characteristics and the brain type out of the 16 possible brain types on a continuum. Subsequent research on brain typing and brain activity (EEG) by J. Niednagel has lead to the association of brain types and the neural control or wiring demonstrated by an individual. The purpose of this study was to examine the influence of subjects' brain types that are associated with the polar ends of the brain type continuum on motor coordination used in selected fundamental sport skills.

METHODS: Fifteen college students at a midwestern university volunteered as subjects for this study and they read and signed an informed consent. Each subject was evaluated by an expert in personality/brain typing using a modified Jung-Myers personality questionnaire (Niednagel, 2010). The subject's brain type was evaluated as one of the 16 personality types. Then the subjects had 10 body data point markers affixed on their ankle, knee, hip, shoulder, elbow, wrist, hand, chin and forehead. After a brief 5 minute warm-up period of light jogging and stretching, video records were be taken while performing 5 free throws. Video images were collected at 60 Hz from a side view for the free throw shooting, kinematic timing and coordination variables were be determined. The free throws of 6 subjects were selected for video temporal analysis and after the analysis, then their brain types (3 group A, 1 group B, 2 group C) were identified. The x,y data point coordinates were transformed using a 2D DLT into real distances using a calibration cube, and the coordinates were smoothed using a Butterworth 2nd order digital filter with a 10 hertz frequency cut-off. Then the maximal angular velocities about the z axis for the knee, hip, shoulder, elbow, and wrist joints and the corresponding times were identified using the Ariel APASview module for the analysis of the joint coordination. Also, the ball release velocity and corresponding times were determined.

RESULTS AND DISCUSSION: A data table of the maximal joint velocities and time of occurrence was created and then the order of the time sequence of maximal velocity prior to ball release was made. To effectively integrate a free throw shooter's whole body into the shot, the kinetic link or summation of velocities must be utilized. This required the initiation of the shooting from the legs and then the individual sequentially moves the joints going up the body and concluding with the wrist/hand action on the ball at release. Presented in Table 1 are the maximal joint velocities, time of occurrence, and the order of the maximal joint velocity sequencing are shown in green shading. The beginning of the shooting movement was initiated with maximal shoulder velocities exhibited by 5 out of 6 subjects. Also, 3 out of the 5 shoulder initiating subjects demonstrated simultaneous contraction of the hip and shoulder joint actions. Subjects (C), (A1), and (A2) utilized the wrist as the last joint that provided impetus to the final ball release velocity. However, subject (B) utilized a simultaneous extension of the elbow and wrist flexion to provide final ball propulsion. None of the subjects started the propulsive movement using their knee extension to generate ball projection velocity. It was found that 3 out of the 6 subjects began their shooting movement with hip extension. In that most of the subjects initiated the shooting movement from the shoulder action, it may be that the 15 feet shooting distance was not far enough for the subjects to require significant lower extremity involvement in generating the necessary ball speed. This would result in the subjects needing to sequentially coordinate fewer segments in the shooting movement and essentially simplifying the coordination of the shooting skill.

TABLE 1. Maximal joint angular velocities, times, and order of sequencing during free throw shooting

Subject	Knee Vel	HipVel	Should Vel	Elbow Vel	Wrist Vel	Ball Rel Vel
Subj B Order	2	1	1	3	3	
Time sec	-0.0834	-0.1001	-0.1001	0.000	0.000	0.000
Variable	508.1°/s	299°/s	85.8°/s	707.3°/s	-818.2	6.1m/s
Subj *C* 1Order	3	3	1	2	4	
Time sec	-0.0334	-0.0334	-0.1168	-0.0501	0.000	0.000
Variable	-496.2	436.7°/s	144.3°/s	720.1°/s	-1228.0	7.3m/s
Subjy *C2* Order	2	3	1	4	5	
Time sec	-0.1668	-0.1502	-0.3337	-0.1001	0.000	0.000
Variable	-400.8	445.8°/s	126.9°/s	850.8°/s	983.7°/s	7.3m/s
Subj *A1* Order	2	1	1	3	2	
Time sec	-0.0667	-0.1668	-0.1668	-0.0501	-0.0667	.000s
Variable	-671.5	536.0°/s	184.8°/s	1103.4°/s	-709.4	8.0m/s
Subj *A2* Order	2	1	3	4	5	
Time sec	-0.1502	-0.1668	-0.0667	-0.0501	-0.0167	.000s
Variable	-372.7	277.8°/s	-751.2	907.3°/s	1653.6°/s	7.5m/s
Subj *A3* Order	3	2	1	4	5	
Time sec	-0.1168	-0.1335	-0.2669	-0.0334	-0.0167	0.000
Variable	-614.2	322.4°/s	169.8°/s	1249.7°/s	-1838.5	8.0m/s

CONCLUSIONS: The sequencing of the free throw shooting mechanics illustrates that the subjects with brain type C (FEAR/ESFP) are an easy going, gross motor skilled individual who initiates the movement from the shoulder joint and completes the movement with a gross, ballistic wrist / hand action, and subjects with brain type A (BCIL/INTJ) are an analytical and fine skilled individual who initiates the movement from the hips and lower extremity and then sequentially coordinates through the rest of the body linkage. Results of this pilot study using temporal sequencing of a free throw would indicate that this evaluative process is a viable means to identify fine and gross motor control related to the brain type. The analysis of more subjects of the particular brain typing groups performing a variety of gross and fine motor based sport skills is necessary to be able to arrive at statistically significant conclusions when assessing athletic motor ability and the influence of brain type on body coordination. The influence of brain type/control and motor ability has the potential to provide objective evaluative tools that could be used in athletic scouting combines for athletic motor ability assessment.

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