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Hamill and) "	"	
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Malone (Hudson, J.1986)		•
(Kilani and Finch, 2001)	(1999)	:
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(IF sp) Initiation flexion of	-	2 2
	the spine	
Initiation flexion ()	-	
	of the shoulder (IF sh)	()
(IE el) Initiation	-	-
	Extension of the elbow	
(IF wr) Initiation flexion	-	
	of the wrist	.Dy Ball at release
Maximum Velocity	-	-
	of the spine (Mvsp)	.
(Mvsh) Maximum	-	-

			Velocity of the shoulder	
		Maximum	-	
			Velocity of the elbow (Mv el)	
(PC wr)	*	(Mv wr) Maximum	-	
			Velocity of the wrist	
			**	
Continuum	**			
			Initiation Movement (IM)	
(SPC) Shared Positive Contribution			*	
(SPC)	*		Time between IF SP and IF sh (IM spsh)	*
			Time between IF sh and IE el (IM sh el)	*
	*			
			Time between IE el and IF wr (IM el wr)	**
		•		
	:		.Segment Angle	
= SPC%	*		MV spsh –Time between MV SP & MV sh	*
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÷				
			Time between MV sh and MV el– MV shel	*
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	SPC (
:			Time between MV el and MV wr– MV elwr	**
Simultaneous (SIM)	.1		:	**
SPC shel (%)				
.%50	SPC elwr (%)	*	:	
Simultaneous Sequential Sim Seq)	.2			(PC sp)
SPC shel)			
	%50	(%)		
.%50	SPC elwr (%)	(PC sh)		*
(Sequential Simultaneous) Seq Sim	.3			
SPC shel				
	%50	(%)	(PC el)	*

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(/) Sequential (SEQ) SPC elwr (%) .4

(/) Malone et) %50 SPC elwr (%)

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(1986 Hudson, J 1999 al

(-) :

(+).Distal to Proximal (2)

.Proximal to Distal

(2)

	FT	TPT	(/)		
	SPC Shel& Elwr%		SPC Sph& ShEl		
			%		
	100&91>=50%		67&100>=50%	X	S1 TPT
	500>50%, 36<50%		63&500>=50%	Y	Release=0.26
	200&67>50%		270&200>50%	X	S1 FT
	333&80>50%		77&333>50%	Y	Release=0.30
	50&200>50%		300&50>=50%	X	S2 TPT
	100>50%, 0<50%		550&100>50%	Y	Release=0.20
	0&0<50%		-80&0<50%	X	S2 FT
	300&125>50%		-100>50%,300>50%	Y	Release=0.16
	-86<50%, 89>50%		13<50%, -86>50%	X	S3 TPT
	-150<50%, 75<50%		0<50%&-150<50%	Y	Release=0.28
	-21&-214<50%		-46&-21<50%	X	S3 FT
	-67<50%,125>50%		29&-67<50%	Y	Release=0.52
	-93<50% &117>50%		-100&-93<50%	X	S4 TPT
	33<50%, 175>50%		140>50%, 33<50%	Y	Release=0.38

(+) Proximal Distal (-) :

.Distal Proximal

(2)

TPT

(Kriegbaum and Barthels, 1996)

y x

x

.y

FT

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(2)

(TPT)

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y x

(1.5

x

Y

(2001)Courbariaus

(TPT=1.35)

Kriegbaum

(1986) Hudson

(2)

FT=1.37m (1996) and Barthels

(FT=1.38,TPT=1.35)

Kriegbaum and

.(1996) Barthels

(2)

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x

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y

(Hudson, 1986)

(FT=1.37m)

5.80)

(6.25

(2.5 2)

y x
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 SPC% () (1986) Hudson and Hills
 (1996) Kriegbaum and Barthels

Kriegbaum and ()
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 (1996) Barthels
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(2) 1.22 Kriegbaum and (1996)
 y x Barthels
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 SPC% (2)
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SPC%

y () () Kriegbaum)
 SPC% (1996 and Barthels

() y x ()

SPC%

(1986) (2) (4.4.5)
 .(1996 Kriegbaum and Barthels) ()

(13) 1.49 ()
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SPC%

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SPC%

(1.49 1.51)

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The Kinematics Sequential and Symoltanuou of Shooting for Wheelchair Basketball Player In Jordan

*Norma A.R. Eslim, Maher Adnan Kilani and Hashem Adnan Kilani **

ABSTRACT

The purpose of this study was to investigate the kinematics chain and the coordination of the segments of the upper limb for the shooting arm in wheelchair basketball, and to investigate the relationship between the shooting distance and the kinematics variables for each player from different classification class. The best (4) players from the National team of wheelchair Basketball in Jordan were representing the four classes in the functional classification system for Wheelchair basketball players. Arial performance Analysis System (APAS) used in this study, 3-D analysis done to the data collected from four high-speed video cameras. Formulas used to determine the positive contribution for the segment and the shared positive contribution for two adjacent segments sharing the same joint as their center of rotation. The most important conclusions of this study were:

- Class one used the push like pattern (Simultaneous) in the upper arm segments for the shooting arm in throws, free throw and three-point throw.
- Class two-used sequential Simultaneous pattern in the upper arm segments for the shooting arm in free throw shooting and Simultaneous pattern in three-point throw.
- Class 3 and 4 used more throw like pattern (sequential) than push like pattern (Simultaneous) but the sequencing of the Kinematic chain was from distal to proximal.

It suggested utilizing the high technology with APAS system to analyze other skills using three-dimension analysis in wheelchair basketball such as dribbling or passing in future research and to use these results as criteria for evaluation of coordination during the shots.

Keywords: Sequence Simultaneous Coordination, Wheelchair, Kinematics

* King Faisal University, Saudi Arabia, and The Hashimite University, Jordan, and Sultan Qaboos University, Oman.
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