



# Propulsion in Wheelchair Basketball

Alison Nagata MSc MCSP

Lead Physiotherapist British Wheelchair Basketball

John Francis MSc

Performance Analyst British Wheelchair Basketball

PhD Student University of Worcester

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# Wheelchair basketball

- Various disabilities
- Classification is functional
- Classes from 1 to 4.5
- 14 points on the court at one time
- Chair custom to individual player. Height of chair back, straps, dump in chair, wheel position
- Wheels camber (angle) and size

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# Comparison of Push

**1 point versus 4 point player**

1 point player

T6 complete

4 point player

Above knee amputee

Rods in thoracic and lumbar

What It Takes To Win (WITTW)

Shooting

Speed and Chair Skills

Defensive Fundamentals

Tactics and Game Sense

2nd Place

1st Place

Passing and Ball Handling

3rd Place

# Speed and Chair Skills

## Why is it important?

- Improves relationship with the ball (passing, shooting, rebounding, defending, attacking)

## What are we focusing on?

- Initial Hand Position (Ready Phase)
- Optimal Pushing Technique (Push Phase)
- Finishing Hand Position (Push and Recovery Phase)
- Hand Recovery Speed (Recovery Phase)



## Ready Phase

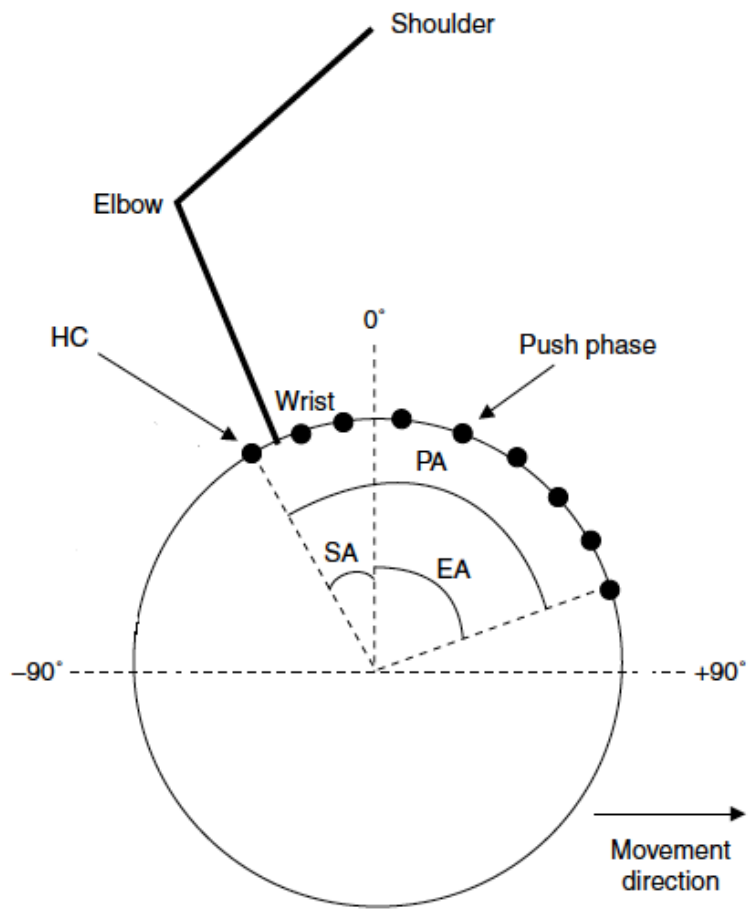


Image from: Vanlandewijck, Y., Theisen, D. and Daly, D. (2001) 'Wheelchair Propulsion in Biomechanics, Sports Medicine, 31(5), pp. 339-367.

# Push Phase

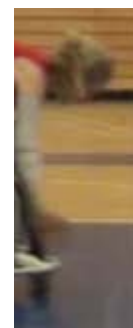
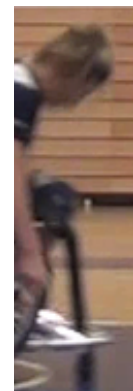
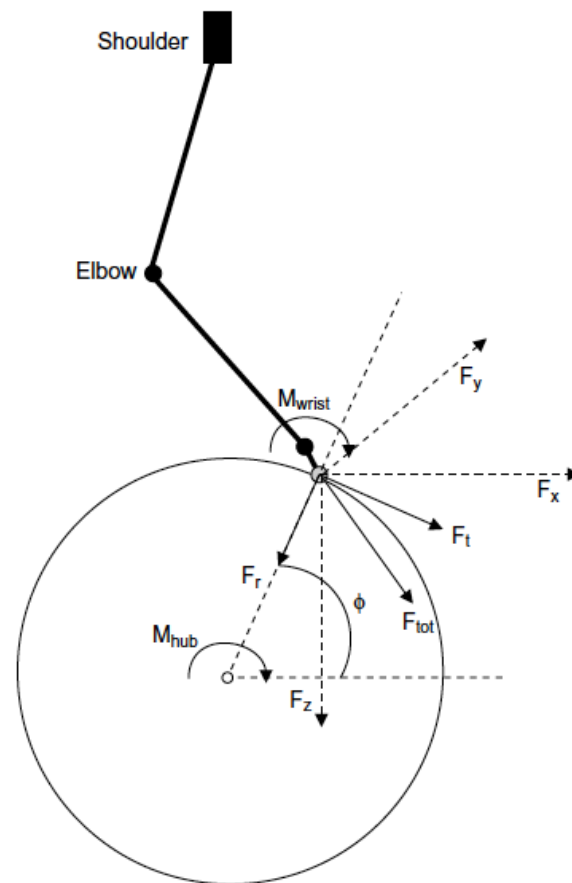
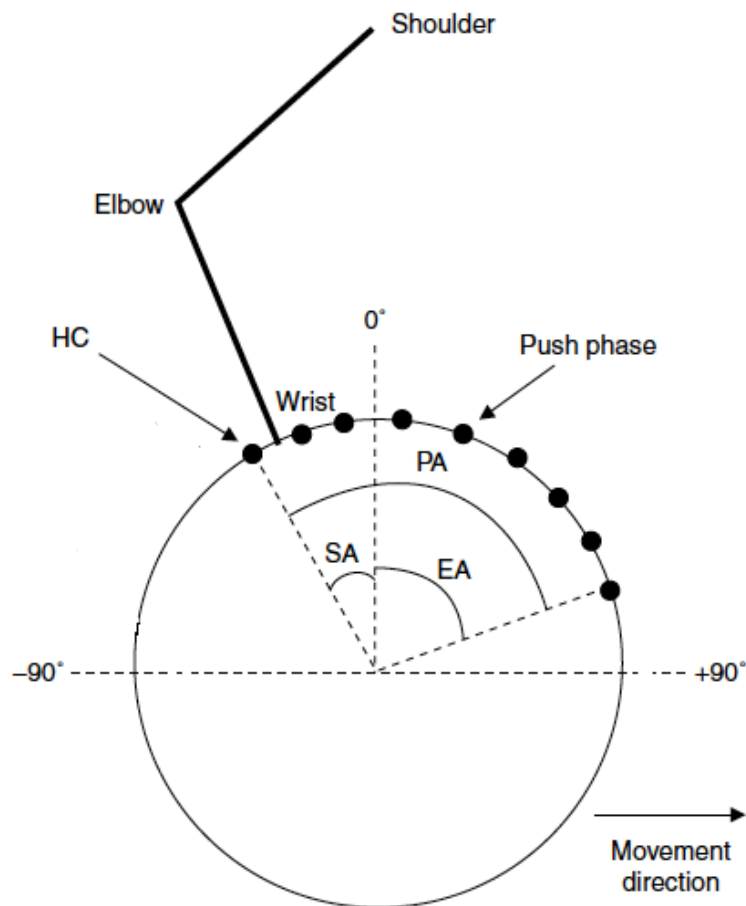
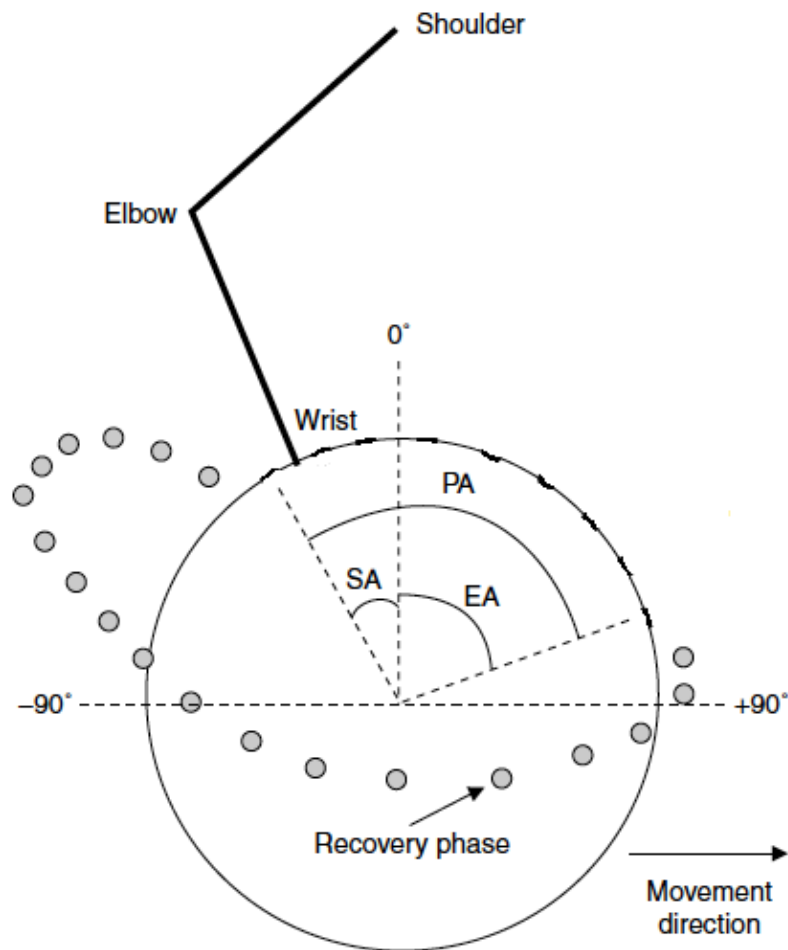


Fig. 2. Definition of forces (N) in wheelchair propulsion.  $F_r$  = radial component of  $F_{tot}$ ;  $F_t$  = tangential component of  $F_{tot}$ ;  $F_{tot}$  = total force;  $F_x, F_y, F_z$  = global reference frame;  $M_{wrist}$  = wrist torque (Nm);  $M_{hub}$  = hub torque (Nm);  $\phi$  = point of force application referenced with respect to the horizontal (°).

# Recovery Phase





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# Basic overview of Muscles

## Push phase

- Anterior deltoid, pectoralis major, infraspinatous
- Pectoralis major and infraspinatous involved in stabilisation on the joint but subject to fatigue. Teres minor and subscapularis may increase
- Biceps and long head of triceps
- Latissimus dorsi and subscapularis for reposition in recovery

## Stop

- Elbow flexors and extensors
- Shoulder flexion and extensors – Latissimus dorsi , triceps
- Rhomboids lower traps
- Use of abdominal

## Turn

- Each shoulder working in opposite direction

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# Considerations on Demand of Shoulder

- Eccentric , Concentric and Isometric Use of Muscles
- Repetitive Action
- Disability - use of abdominals, hip function, contractures.
- Technique
- Chair design

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# Shoulder Issues

Sophie Carrigall – 1 point player

- Shoulder subdeltoid bursitis
- Biomechanical issues with chair, scapula control lack of abs and hip flexor contracture

Amy Conroy – 4 point player

- Shoulder pain – tight thoracic spine, elbow flexors and weak abdominals, stiff radio ulnar joint

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# Take Home Points

- Wheelchair basketball propulsion significantly different within different classes.
- Wheelchair basketball has the challenge of start, stop and turning for demands on the shoulder.
- Shoulder issues linked to significant weakness, stability, stiffness in other parts of the body.
- Further research needed that is specific to Wheelchair basketball propulsion and also looking at stopping and turning.



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