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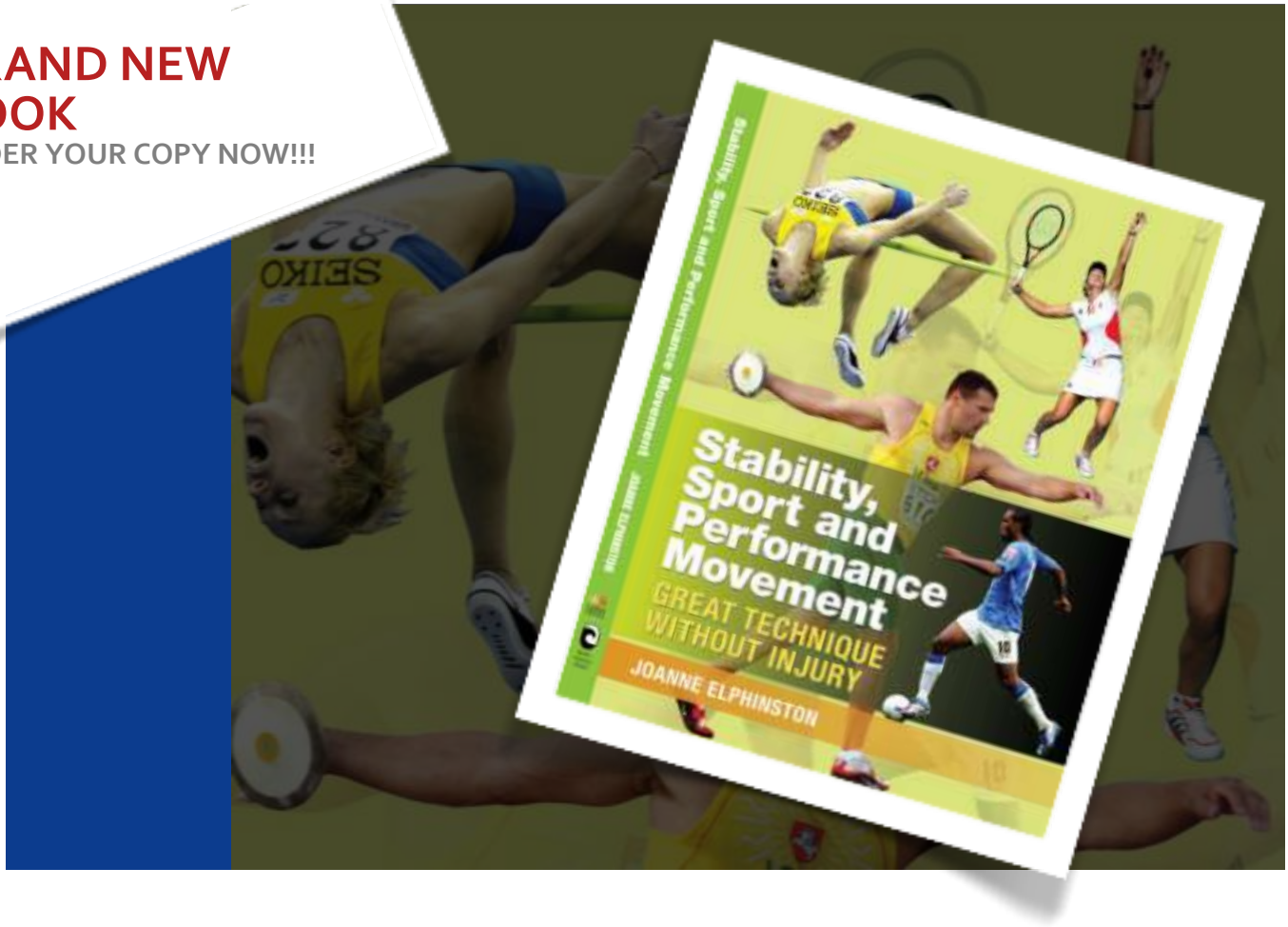


STABILITY, SPORT & PERFORMANCE MOVEMENT

GREAT TECHNIQUE WITHOUT INJURY

by Joanne Elphinston

An athlete must create and control forces. Ideally they will use the muscle patterns and kinetic chain sequencing which minimises effort and localised stress on specific body structures, while maximising the result. The effectiveness of their movement links their risk of injury and their performance.

"Stability, Sport and Performance Movement: Great Technique without Injury" presents a testing and training programme for technical development and injury prevention in sport. It was written in response to requests from athletes, coaches, physiotherapists and fitness professionals for a resource that would help them to understand the anatomy and training of functionally stable movement in a clear, relevant and logical way.

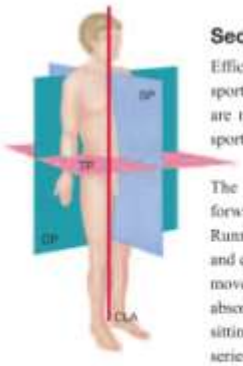
The book establishes the link between movement, muscle patterns, force management and injury, and addresses functionally stable movement as the result of interplay between a variety of factors including functional mobility, balance, proprioception and neuromuscular coordination.

A full chapter is dedicated to the testing of these factors in order to establish baselines for training, and this is followed by four fully illustrated chapters of progressive, integrated exercise which show the user how to develop sound patterns from beginner level through to high level.

For the sports medicine professional, the book provides insight into why an injury may occur, how to identify potential for injury, and methods for addressing problem areas for both prevention and rehabilitation. A chapter on application of the principles to specific patient presentations provides additional guidance.

For the coach and fitness professional, the book explains how technique is dependent upon multiple factors, and how simple testing can identify key issues which can be dealt with in order to progress technique safely and effectively. A testing list for a selection of sports is provided.

The book's content is relevant across all age groups, from junior level to veterans. The author's identification of recurrent patterns in elite level sport led to investigations on the development of patterns in children and adolescent athletes, and as a result the book provides a comprehensive chapter on developing effective movement in our young future athletes for physical education teachers and professionals working in junior sport.



Securing the Planes of Movement

Efficient movement maintains motion in the most direct plane for the objective. Some sports, such as sprinting, weight lifting and cycling are predominantly uniplanar, i.e. they are most effective when the gross movement is limited to one plane. Multidirectional sports such as tennis and football require control in multiple planes.

The *sagittal* plane (SP) is the forwards and backwards plane. Running, classic Nordic skiing and cycling represent sagittal limb movement. Allowing the spine to absorb the motion of a horse when sitting to the trot, or performing a series of back flips as a gymnast, demonstrates spinal sagittal motion. The movements of the sagittal plane are flexion (forward motion in the trunk, bending in the limbs) and extension (backward motion in the trunk, straightening in the limbs).

Neutral spine.

Extended spine.

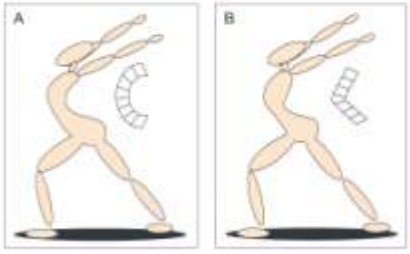
Flexed spine.

If you consider the address position in golf, two common postural errors are seen. Some golfers flex their spine, making it appear rounded. The CLA is bowed outwards, and if the golfer then rotates, he will increase the stress on his lumbar discs. Other golfers collapse their CLA inward, making it appear as if they are sticking their bottom out. This position closes the joints in the spine, and rotation causes further compression of the joints. Both postures are collapses of the CLA in the sagittal plane. A neutral spinal position will disperse the load over multiple joints rather than focusing load on isolated structures.

Rotation will be strongest around a firm axis. This principle applies in sports which require rotation *within* the body, e.g. the golfer, the tennis player or the sprint kayak paddler, or for athletes who require rotation of the body in space, such as divers, gymnasts, hammer and discus throwers. Rotation around a firm CLA prevents the introduction of other planes of movement, maintaining technical movement and influencing consistency, accuracy, power and efficiency.

Note the even curve of the spine, indicating that each segment is moving equally and no one part of the spine is under excessive stress.

Transversus abdominis and multifidus normally activate regardless of the spinal position you need in your sport, whether this involves forward, backward, side bending or rotation movements. This makes sense: you need segmental spinal stability in all of these positions. Sports such as gymnastics require extreme spinal mobility, but transversus abdominis and multifidus must still support the joints throughout the full movement to make the movement optimally even and fluid. Although the overall position of the spine no longer looks like neutral, each joint is supported within its "neutral zone". This means that each joint has a range of motion which it is physiologically designed for. Moving beyond this zone increases stress on joint structures and injury risk. If TrA and multifidus are working effectively, they will support these joints in their neutral zone even in these dramatic positions.



A: Each spinal segment contributes evenly to the movement, giving the appearance of an even curve. Force is shared across many joints.

B: One spinal segment is moving more than the others, focusing forces in that area.

about the author
Joanne Elphinston BPhty MA MCSP

Joanne Elphinston is performance consultant, international lecturer and physiotherapist working with elite and professional athletes.

A recognised lecturer and consultant on technical movement enhancement for performance, injury prevention and rehabilitation, Joanne works with elite athletes in a wide range of sports, as well as professional dancers and musicians. Drawing from backgrounds in applied biomechanics and motor control, philosophy and psychology, Joanne addresses movement from a multimodal and holistic perspective.

A former coach herself, Joanne has one foot planted in the medical and the other in the training aspect of athlete management and development. This gives her a unique understanding of the challenges in sport from both perspectives, and an ability to build bridges between the two areas in her teaching, writing and consultancy.
Joanne's detailed approach to movement has led her to work for the past eight years with professional contemporary dancers on dancer development, physical preparation and performance enhancement. Other performing arts clients include musicians from the BBC National Orchestra of Wales and the Welsh National Opera.

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