

NEGATIVE PATTERNS IN SITTING - PATHOLOGICAL OR LOGICAL?

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Bengt Engström Seating

Human behaviour in sitting is a constant change of postures. Most of what humans do in sitting is done subconsciously.

- How do we compensate in sitting, and why is it so?
- What is logical and what is considered pathological?

Many wheelchair users end up sitting with poor postures. We who adapt wheelchairs need to understand what the cause is and what is a logical compensation, or symptom. You are in this lecture guided to discover more in detail how humans compensate and how every part of the body is used to achieve sitting comfort and function.

The goal with this lecture is to make you more aware of how you yourself may respond and react on a chair's influence on your body. It will give you a better understanding of some of the various sitting patterns you see among people with disabilities. It will make it easier for you to separate pathological sitting patterns from long-term logical behaviour (compensations).

The Chair Influences Many Senses

Our body is very sensitive to positions. There are many kinds of sense organs registering changes in the body. All of them are of course important, but in sitting focus is on the ones that register the position of the body and the influence from the surfaces contacting the body. We cannot "shut off" our sense organs, they go on registering continuously. If no external (side) support is used, the body of a person who is standing is continuously in motion, a balancing motion, known as postural sway. We really do not "see" the movements of the body, but they are present all the time.

Feet are designed for standing, walking and running. The sole, the foot joints and foot muscles as well as the legs' joints and muscles register pressure and pressure-directions when the foot is in contact with a surface of support. The pressure on the sole influences the joints differently, depending on the magnitude and direction of the pressure. To maintain balance, pressure variations lead directly to muscular reactions throughout the body. When the muscles balance and stabilize the body, or its parts, we are very seldom conscious that it is happening. The muscles are automatically activated by the senses on a subconscious level. The reactions and corrections are very precise and is continuously activated. Sitting on a chair makes the feet and legs change their relation to the trunk. When standing, the centre of mass of the entire body is located over the feet, the supporting area. In sitting the centre of mass of the trunk is over the pelvis with the ischial bones as the supporting area. The smooth, balancing and correcting motion which takes place in standing is not present in sitting. The interaction between the legs and the upper body changes. When the feet are not under the pelvis their function of being sensitive "organs" for maintaining the balance of the body is "eliminated". Instead of relying on the feet for balance, we sit on the tiny ischial tuberosities. These two bones "stand" on the seat surface and since the trunk is on top of the pelvis the entire upper body balances on the ischial tuberosities.

Balanced seating requires a well-positioned pelvis. If the pelvis does not have a functional and stable position, the upper body cannot be kept in an upright position for more than shorter moments and one must use many muscles for keeping the posture. The leg's connection with the pelvis is through ligaments, joint capsules and muscles. Because of this connection, the position of the feet and legs, as well as their muscle activity, influence the position of the pelvis directly or indirectly. In most sitting

positions the tendency of the pelvis is backward rotation. This tendency can be either blocked or forced by the legs, something we do continuously. It is a natural part of sitting. Sit straight! Sit properly! Sit still!

Most of us have said this to our children, especially when they sit and eat. - But what is “proper” seating?

If we tell a four-year-old to sit properly he will probably become confused. If we don't know what it means to sit properly, how can we expect a child to know? To sit “properly” is possibly a posture that feels good - for the moment. Whenever our posture-sensing organs register something negative in a position we will re-position the body, over and over again.

Normal Desire in sitting

STABILITY	- so you can relax!
FREEDOM	- so you can move
BALANCE	- to make it easy to change between activity and relaxation
CONTROL	- so your muscles can move and/or stabilize your trunk, arms and head
COMFORT	- so you don't work too hard with your muscles
	- so pressure and shear are acceptable
	- so you can communicate with ease
	- hopefully the environment where you sit is interesting
TIME	- you don't want to sit too long!

Some Posture Compensations in Sitting

Body	Position	Result	Trunk Influence
Pelvis	Forward Sliding	Posterior Pelvic Stability	Better Backrest Contact
	Sideway Tilt	Scoliotic Spine	Blocks Collapse of Spine
	Anterior Tilt	Extended Spine	Blocks Collapse of Spine
Feet	Forwards/Leg Ext.	Higher Seat-Thigh Pressure	Better Backrest Contact
	Rearwards/Leg Bend	Better Pelvic Freedom	Assist Uprighting
	Cross-Over/Leg.Abd.	A Freer Pelvis	Better Control / Less Passive
Thighs	Crossed	Posterior Pelvic Tilt	Better Backrest Contact
	Together	Posterior Pelvic Tilt	Improved Forward Stability
	Apart	Posterior Pelvic Tilt	Collapse/Better Fwr. Stability
Spine	Symmetric	BASE for Motion	Funct. Freedom all Directions
	Asymmetric	Rotation	Extends/Blocks Spine Collapse
	Asymmetry	Scoliotic	Blocks Collapse of Spine
	Extended	Overextended	Blocks Collapse of Spine
	Combined	Multi-Directional	Blocks Collapse of Spine
Arms	Crossed on Chest	Stability	Stability/Relaxation
	Hands behind Head	Extension of Spine	Maintain Upright Posture

Reference

Engström B.; Ergonomic Seating – A True Challenge / Wheelchair Seating and Mobility Principles
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Speaker Bio

I am a freelance P.T., Lecturer and Author. Through my company "Bengt Engström Seating", founded 1990 located in Sweden, I present different types of practical seating and wheelchair seminars on a worldwide basis. I am an author of a few books about Ergonomic Seating and Wheelchair Adaptation. As a Consultant I have often been involved in product design, co-operating with various manufacturers internationally.

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