

Walk and grow up!

The influence of gait on cognitive development



ORMESA®
• MADE IN ITALY SINCE 1980 •

GRILLO



Walk and grow up!

The influence of gait on cognitive development

Martino Avellis, PT

When we think of an activity like walking, we think of something dynamic and our attention focuses on biomechanical issues. We know the research about gait analysis. Therefore, when faced with any problem regarding walking in early intervention, we usually consider **pattern, stability and balance**.

In CP, the physiological mechanisms of the gait pattern are often altered. When patients are affected by spasticity, dystonic patterns, sensory disturbances, tendons retractions, or structured deformities, we can observe, in their behaviour, the occurrence of internal compensations (kinematic and/or postural changes). Usually, if the patients need it, we can provide them with external compensations (orthosis and/or technical aids). So, in our mindset, **technical aids provide the kids with the biomechanical support that they need in order to compensate the missing skills**.

However, we have to consider the differences between kids and adult patients. The first are **still growing up**: they associate work with “fun”, and their self-esteem is a “work in progress”. Adults, on the other hand, are mature individuals, with a consolidated self-esteem, and hearing the word “work” they immediately think about their jobs.

Several authors pointed out the correlation between the motion/locomotion and the cognitive development, which can depend from:

- Spatial perception
- Depth visual perception
- Initiative
- Social factors
- School performances

Considering the importance of motion/locomotion for the cognitive development, we should suggest walking in early intervention; and **if the children are not able to walk without help, we have to give them some aids**. Walking with an orthosis or a gait trainer can make the difference.



In particular, it is really important that the kids' posture be well stabilized during walking. This means that we need to **focus on the balance of the pelvis** (does the pelvis shift on the frontal plane or not?), on the **position of the center of gravity** (should the trunk move backward or forward?), on the **length of the steps length** (should the hips move more in flexion or extension?). All of this is only possible if the **gait trainer** is really **adjustable and complete**.

Moving in safety allows the kids to improve spatial exploration experiences, which are one of the most important elements in the relationship between locomotion and cognitive development.

According to Kermoian and Campos (1988) the **spatial seeking can be improved by movement and locomotion**. A baby searching for his or her mum's eyes, may be an example of movement, while locomotion may be interpreted as movement in space, such as walking.



Another important issue is the **depth visual perception**. As it develops, usually starting from the 4th month of age, babies shift their visual perception from 2D vision to 3D vision. They discover that the space around them is not flat. **Walking can help develop this capability** (Berenthal, Campos & Kermoian, 1992).

A lack of initiative can make the kids passive and dependent (Butler, 1991); while motion and walking can help them develop a more curious and proactive approach to reality.

That's why the **keyword in a gait trainer is effectiveness on the posture**: if it can stabilize the users' walking posture (using supports and/or an adjustable frame), it makes it easier for them to **explore the environment, stimulating and improving their cognitive skills**.

Let's consider, for example, the choice between anterior or posterior configuration in a gait trainer. When do we suggest one or the other version? Usually, we choose according to the needs of the kids.



But as we choose the right configuration, we should also keep in mind that a gait trainer can **provide an opportunity to improve the cognitive skills of the kids**. In some cases, for example, we could propose the **posterior version**, which especially **favours social interaction**, because the absence of a frame in front of the kids (something that can seem like a “barrier”), could make it easier for them to play with the other kids, to approach them, etc. If the kids are very compromised (and if the gait trainer frame allows this), we can try the anterior configuration.



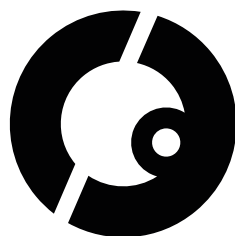
In both cases, the **modularity and versatility of the gait trainer are crucial**. As the kids grow, their clinical needs, their skills and, of course, their size and body shape change and we have to adjust and adapt the equipment to these changes, focusing on our main goal: **offering the kids the best possible quality of life**.

References

1. Kermoian R., Campos JJ., (1988) Locomotor experience: a facilitator of spatial cognitive development *Child Dev.* Aug; 59(4):908-17
2. Paleg G., Livingstone R. (2015) Outcomes of gait trainer use in home and school settings for children with motor impairments: a systematic review *Clinical Rehabilitation* Vol. 29 (11), 1077-1091
3. Marrus N, Eggebrecht AT, Todorov A, et al. (2018) Walking, Gross Motor Development, and Brain Functional Connectivity in Infants and Toddlers *Cereb Cortex*. Feb 1; 28(2):750-763
4. Wright-Ott C. (2018) Walking to Learn: The Power of Support Walker Mobility. The 34th International Seating Symposium, Vancouver (CAN)
5. Campos JJ., Bertenthal B.I., Kermoian R., (1992) Early Experience and Emotional Development *Psychological Science*, Vol. 3 (1), 61-64

Affiliation:

Martino Avellis has an affiliation with Ormesa srl (Italian manufacturer of technical aids for person with disabilities) as a full time employee (R&D, Technical and Sales Manager).



COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV GL
= **ISO 13485** =

Ormesa srl - Via A. Da Sangallo, 1 | 06034 Foligno (PG) - ITALY
Tel. +39 0742 22927 | FAX +39 0742 22637 | info@ormesa.com

www.ormesa.com