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Teaching postural self-regulation to children of 6 to 8 years of age

Learning rules to develop intelligent sitting behavior and establish proper conditions to learn

How children started to self-regulate their postural control in three lessons of half an hour, using the modular action coding system of the *Initial Alexander Technique*.

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Abstract :

According to behavioral diagnosis[1], 20 % of the children in our primary schools are classified as hyper active with attention deficit. They fidget all the time on their seats, they have difficulty working quietly and waiting turn, they interrupt or intrude on others. At the same time they are poorly organized and forgetful, distracted and do not seem to listen. These children avoid sustained effort, have difficulty sustaining attention and fail to attend to details. The gradual incapacity of the children to self-regulate their behaviors in the classroom and to establish proper conditions to learn is becoming the major problem facing education in most countries. Our main hypothesis is that helping children to self-regulate their postural control could be an elegant solution to help them establish core learning self-regulation.

1. Swanson, J.M., Sergeant, J.A., Taylor, E., Sonuga-Barke, E. J. S., Jensen, P.S., Cantwell, D.P., « Attention-deficit hyperactivity disorder and hyperkinetic disorder » ; Lancet 1998; 351: p. 429.

At the age of 6, children enter french primary schools to learn first of all to write and read. These activities are taught in the sitting position; mastering the activities require quietness, sustained attention and effort, motor control and memory. Before anything else, they call for *postural control* in sitting.

It has been established that seated hyper-activity[2] and incapacity to maintain postural control[3] is the hallmark of underachieving students. Nonetheless, children of elementary school do not receive any instruction in *conscious postural control* and *intelligent sitting*.

2. Ohashi, K., Vitaliano, G., Polcari, A., Teicher, M.H., "*Unraveling the nature of hyperactivity in children with ADHD*", Arch Gen Psychiatry. 2010;67(4):388-396

3. Tomaza, A., Malavasi Ganançab, Pontin Garciaa, A., Kesslera, N., Caovillac, H.H., "*Postural control in underachieving students*", Braz J Otorhinolaryngol. 2014;80(2):105-110

4. Marcovitch, S., Zelazo, P.D., "*A hierarchical competing systems model of the emergence of early development of executive function*", p. 6, 2009. [I strongly recommend to my reader an in depth study of this paper as I have loosely interpreted the ideas of the author (who does not dwell on postural behavior)].

According to Philip D. Zelazo[4], the modern specialist in the field of conscious control in children, "goal-directed behavior is influenced by two hierarchically arranged systems, a *habit system* that is dependent on previous experience (dependent on sensory consequences of action and on memory of sensations following action), and a *representational system* that captures (through the auxiliary of technical languages) the influence of conscious reflection on behavior and that develops over the course of school education (when children learn scientific concepts). The two systems compete to guide behavior such that the representational system can influence, and potentially override, the habit system".

"For each plan of action, activity is elicited simultaneously in both systems, and in the absence of conscious reflection (*conscious reflection* is a form of processing of information — mental calculation — in which attention is directed away from "hot" feeling states and toward "cold" representational controls), behavior is determined jointly by the two systems of guidance but primarily by the automatic response system". Placing our feet directly in mister Zelazo's footstep, our postulate is that if children are helped to reflect on the content of a representational system (by helping them to develop relational thinking), the influence of the representational system on behavior should be magnified, and may even override the influence of previous behavior. Could poor postural behavior be overcome by reasoning?

Postural behavior is for me the perfect practical test for this postulate of the emergence of conscious guidance through the empowerment of children to reflect on a higher representational system. In effect, postural behavior is determined primarily by the automatic response system (termed by F.M.

Alexander "*subconscious guidance*"[5]) and to my knowledge no effort has been made to this day to approach postural deficiency through the mere teaching of thinking with a structured representational system. If the children are successful at the end of this study, two goals should be attained at the same time:

1. a quick and efficient solution could be put forward for consideration in the difficult task of helping children to prevent and overcome school failure,

2. an incontrovertible support should be added to M. Zelazo's thesis (and F.M. Alexander's parallel thesis of *conscious guidance and control*).

I therefore proposed to teach primary school children bio-mechanical rules to self-regulate postural control in sitting in their classroom during writing lessons, in order to evaluate whether they could consciously change (through thinking with rules derived from a topological representational system) a form of behavior that is normally judged automatic. If the children were seen to be able to self-regulate their sitting position after working with a representational system, a second study would be necessary to evaluate the impact of *intelligent sitting* on the development of cognitive, intellectual and school performances.

As a teacher of **iAt** (initial Alexander Technique), my approach is to teach a language of commands based on an *analytical action coding system*[6] that the agent (the children) can employ to construct a new, intentional bio-mechanical adjustment of the body as a whole suitable for learning situations.

Trained in using self-speech geometrical commands (*representational instructions*), each child shall be able 1) to represent the postural functions of his skeletal structure and 2) to create a system of four motor intentions that prescribe how intelligent sitting is to be performed. The child will learn to consciously construct motor intentions that integrate two new postural functions: postural orientation[7] and elastic postural stabilization[8]. **iAt** combines the modular approach of postural orientation with the global approach of postural stabilization.

If the child develops the cognitive skill of intelligent sitting, three postural consequences should be observable:

- the geometry of the skeletal structure should support the weight of the body (the children should be able to sit upright with ease and for long durations),

- the mobility of the postural link system should be increased (facilitating postural stability and performance in fine motor control[9]) and,

- the agitation (deficit of motor inhibition and deficit of attention) should decrease radically.

The aim of this pilot study is only to determine if children of 6 to 7 years and

5. *The failure of subconscious guidance in modern civilization is now being widely admitted, and the consideration of this fact has led a few to the logical conclusion that conscious guidance and control is the one method of adapting ourselves not only to present conditions, but to any possible conditions that may arise*. (Alexander, F.M., msi, p. 5, 1910)

6. The representational system or *action coding system* is derived from the principles set forth by François Delsarte, the main influence of F.M. Alexander's researches on psychophysical unity. See Marsella S.C., Carnicke, S.M., Gratch, J., Okhmatovskaia, A, Rizzo, A.,"An exploration of Delsarte's structural acting system", 2006. and Zorn, J.W. (ed.): The Essential Delsarte. Scarecrow press, Metuchen, NJ (1968)

7. Postural orientation is the relative positioning of the body segments with respect to each other and to the environment in order to create a structure providing postural support: how to be supported by our bones.

8. Whole body stabilization or postural stabilization consists of using an antagonistic action strategy in order to regulate the dynamics of human postural orientation transitions: how to use the skeletal geometry to create antagonistic pulls on the muscles and other elastic tissues in order to maximize conjointly support, freedom of movement and low metabolic cost.

9. Bouisset, S., Le Bozec, S., Ribreau, C., "Adherence and postural control: a biomechanical analysis of transient push efforts", in Motor Control and Learning, Latash and Lestienne eds, 2006, p. 36.

children of 7 to 8 years of age[10] can learn a structured language of command based on a geometrical representational system and use it to change their postural control.

10. I worked with a « mixed class » with 10 children in their first year in primary school (5 to 7 years, 1st Grade) and 8 children in their second year in school (7 to 8 years of age, 2nd Grade).

The intervention shall be exceptionally short to show that the learning (if there is) is on a level of conscious control – that is devoid of somato-sensory imagery and postural conditioning–. The topological instructions or "rules" with which the children must construct their new attitude define only geometrical relationships, trajectories (between designated anatomical landmarks), imaginary lines (for ex. "the vertical line to an anatomical landmark") and spatial constraints that are not asso**cia**te**d** with specific situations, direct perception, nor sensory memory or circumstances.

The topological rules have to be learned at the same time the student learns how to think in activity, that is how to think various commands (motor intentions) simultaneously in order to unite them into a single motor action: sitting on a chair or walking for example.

Under no circumstances are the children to be touched, manipulated or manually guided by the teacher. The explanation of the motor intentions should be given using diagrams, basic geometry and accurate spacial language. How the body is felt from within has no place in this educational scheme: instead of being asked to evaluate how they feel, the children will be presented with the result of their motor intentions on photographs to *see themselves as others see them* [11] and to compare their postural orientation with a relational diagram of reference.

11. see the paragraph: Illustration III. *Not Seeing Ourselves as Others See Us*. (Alexander, F.M., msi, "*Incorrect conception*", p. 88)

Protocol:

18 children will participate in three lessons of half an hour, in groups of 4 to 5 children of the same age, in a room adjacent to their own classroom while the rest of the class continue their writing of reading lessons with their teacher. The lessons will take place at a three weeks interval (a holiday of two weeks took place between the second and third lesson). A fourth meeting with the **iAt** teacher will be devoted to assessment of the children new postural control.

Presentation of the work to the children

The work was presented to the children in their group as "*lessons to command themselves*". They understood that young children are commanded by grown-ups; to "grow up", they were proposed to learn how to command in their turn, starting with themselves.

They were told that to make sure that the effect of their commands could be seen by others, they would be taught how to command the geometry of their bones. I brought an articulated skeleton with me and explained the function of support that the bones can provide if the geometry of the structure is properly arranged. I told the children that by learning to command themselves they could master the construction of an efficient stack of the different parts of their body, therefore limiting muscle shortening, pain and

tiredness in sitting and standing.

At the end of the three lessons, they should be able to use their bones to their advantage in sitting and standing, showing everybody that they were behaving as well as (or better than) grown-ups.

Poor sitting habit in the classroom:

At the start of the study, all the children manifested every signs of postural inadequacy in sitting and standing. Their *postural orientation* as well as their *postural stabilization* were automatic and under-developed. They had no conscious idea or training on how to use their skeletal link system (bones). As a result, their main strategy of stabilization was through an increase in joint stiffness: they had no conception on how to sit with ease for any period of time.

Most of the time, children do not place their feet on the floor. Beyond this symptom, their lack of postural support is gross and the children try to compensate by fixing hands, elbow and even shoulders and trunk to support their spineless torso in writing or reading. When the arms and legs are not completely fixed, the extra support of the back of the chair is always necessary.

It is important to note that, in these conditions of postural orientation, the bones do not provide mechanical support for the anatomical structure of the body and the only postural stabilization left for the children is to rigidify their joints with excessive muscle shortening-contractions. On a functional level, the picture of collapse associated with rigid stabilization indicates chronic high thoracic and abdominal pressure (poor breathing, poor digestion...).

It is difficult to imagine how those children could learn with ease fine motor skills as writing or reading when their habitual experience is to stiffen their limbs on their trunk to balance in place. Further, as it is now established that poor postural control is associated with chronic pain, attention deficit and motor inhibition deficiency, we do not think that this situation could improve without outside intervention.

These conditions associated with poor postural control are less than desirable and do not allow for the virtuous functioning of the organism necessary to cope with long years of study at a desk.

The remediation: conscious guidance and control through re-education, re-adjustment and coordination

To provide an answer to the question: "is it possible to educate these young children to self-regulate the motor behavior (sitting) required for long years

of schooling?", I decided to adapt the lessons of **iAt** –provided for adults and teenagers– to the public of young children. Here is the content of the three lessons of **iAt** adapted for children :

FIRST LESSON

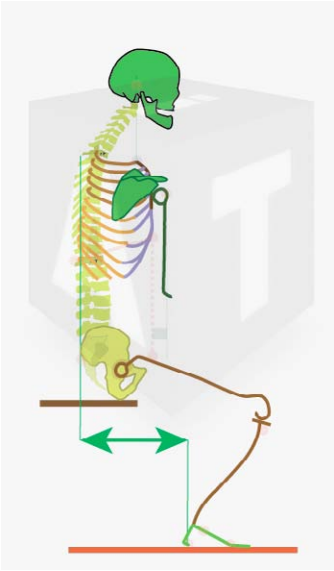
Becoming a leader
I introduced the first lesson with a question :
- « do you want to be a leader ?
And every one said :
-Yes !
-Do you want to know how to be a leader ?
-Yes, yes !
- So you need rules[12] *for that. And I'm here to teach you the rules to become a leader of your own body so that you can protect it and make it thrive. Do you know what rules are? Rules are just sentences you say to yourself to prevent doing the wrong thing. You are going to learn what and how to speak to yourself to make it a rule never to diminish yourself.* »

They didn't know what kind of rules I was teaching, but they were very enthusiastic to try.

12. Overt rules are verbal instructions that help us inhibit doing the wrong thing again and again. The recourse to a system of rules is a novel form of behavior liberating the child from the constraints of his practical (perceptual) situation. See Vygotsky, L. S. (1978). "*Mind in society: The development of higher psychological processes*", M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds. & Trans. Cambridge, MA: Harvard University Press. (Original work published 1930, 1933, 1935)

First rule :
How to command "true support" in a sitting position.

« ***in sitting: I always command four supports : two feet CLOSE to two buttocks*** ».



Two feet CLOSE to two buttocks means sitting on the front of the seat and refusing to push the feet away.

This command describes a precise topological motor intention but as well implies that the pupil is not allowing herself to be supported by the chair back, to sit far back in the chair, to cross her legs, to hold the chair with the hands, or to lift the sole of the feet. I explained to the children that the performance of the rule displays an attitude of readiness and of choice in action, the attributes of the leader of his own self.

Conscious guidance allows the children to place the buttocks and the feet in a new relationship, but it also involves *conscious control* from the very start : keeping the new position for any length of time implies that the children must develop *voluntary cognitive inhibition*.

The students discovered the placement of the feet and buttocks prescribed by self-speech but also the necessity to develop the capacity to inhibit the urge to feel "supported" and to feel "normal", that is to inhibit reverting to their habitual postural orientation guided by immediate perception.
The *game of observance* of the rule involves an (implied) rule to resist the dependence toward subjective, first person experience of support, comfort and kinaesthetic rewards.

Without detachment from "feeling guidance" there is no possibility of self-regulation empowerment.

The children were all able to perform the first rule, but only for a very short time as the intentional inhibition of kinaesthetic urges was totally new to them. I encouraged them to play at judging whether and how the others were able to keep within all the characteristics of the first rule [13]. The development of cognitive inhibition in relation with feeling states was started.

13. "*Earlier research established that a chiJd first becomes able to subordinate her behavior to rules in group play and only later does voluntary self-regulation of behavior arise as an internal function*". (Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes, p. 90)

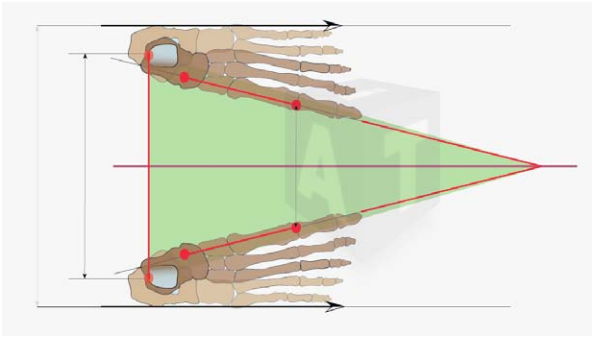
"Two feet close to two buttocks. Note that most children found it very difficult to let go of the chair with the hands".

"Two feet close to two buttocks and a snowplough.

Second rule : - first rule + "protect the ankles".

- « *I Protect the ankles*».

« *I "close" the big toes on the median line while I "open" the heels further from the median line as a snowplough*».



To learn the second rule, I introduced the use of an anatomical drawing as seen here.

I showed on a skeleton, on the drawings and on myself what we call « ***big toes*** » and what we call « ***heels*** ». We agreed to imagine a ***median line*** between the feet to place the feet correctly apart from one another in a precise triangle. The recourse to an imaginary line was readily accepted by the children.

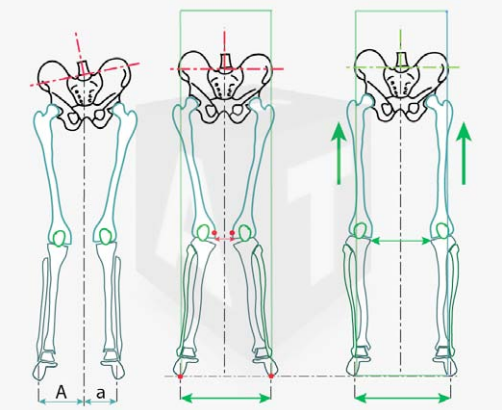
The rule "***Protect the ankle***" introduces a game of accuracy. The feeling associated with this particular geometry is even more kinaestetically strange than "***two feet close to two buttocks***". As a result, if the child guides his movements of adjustment with his sensory impression, he falls always short of the closing triangle. When the children "felt" they had reached the goal, I asked them to check on a photograph if it was really the case, if the picture of their feet conformed with all the characteristics of the model:

1. the "***exterior lines of the feet***" are parallel,
2. the "heels" are far enough from the ***median line*** so that the legs were vertical,
3. the "***big toes***" are not to close to the ***median line***.

> The only way the children can perform the disposition with any degree of accuracy is by "*wanting to be wrong*[14]".

Wanting to be wrong only means wanting to feel wrong. The feeling of the position of the feet lacks accuracy of expression and details. With the help of the mental tool I offered — the relational drawing —, the children became able to speak/think the three characteristics and, as a result, to command consciously the placing of the feet.

14. « Paradoxical as it may seem, the pupil's only chance of success lies, not in " trying to be right," but, on the contrary, in " wanting to be wrong "— wrong, that is, according to any standard of his own. » Alexander, F.M., « Constructive conscious control of the individual », 1923, p. 131.



Children have quickly learned to "cheat" their sensory appreciation to direct their ***big toes*** in relation with the ***heels*** and an *imaginary line* in order to build a solid support, consistent with the ankle joint single degree of freedom direction. It is interesting to note that in young children the act of placing the exterior line of the feet parallel to the ***median line*** creates an advantageous geometry of the thighs and legs such that the thighs are parallel to the ***median line*** and the legs are vertical in sitting and, later, in standing, as is demonstrated on this drawing on the right hand side (this is not the case with adults).

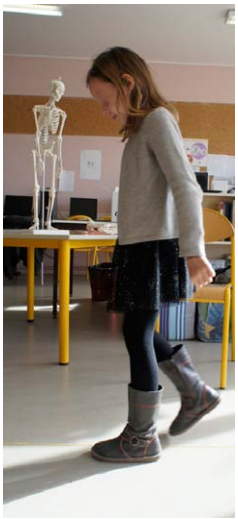
At first, in a sitting position, I asked the children to check the position of their feet by looking with their eyes and to make sure it corresponded point by point with the diagram.

Then I asked them to evaluate and tell if their feet were correctly organized without looking after placing them at will. Could they accurately predict the full resolution of the triangle without looking at their feet? They discovered that they were able to guide accurately the complex adjustment of the feet and legs only by thinking (and saying) the three different relations depicted by the diagram before performing the act.

After that, I asked the children to link the full command with a dynamic act.

They had to play a game which involves moving both feet forward and to bring them back into the first rule ("***two feet close to two buttocks***"), using their new verbal command. In that way, it was clear that the child calculated the motor intention before placing the feet on the floor, that is, in a prospective manner.

Linguistic guidance to improve spatial cognition



After that, I introduced the game of walking with the feet placed on both sides of a line commanding the second rule « ***I close big toes on the median line while I open heels away from the median line as a snowplough***».

At first, they were allowed to walk with their head down, looking at their feet. But rapidly, I instructed the performers to direct their feet consciously, without looking down.

To make sure that the rule is applied, the children were asked to say the rule first "aloud" and then "in their head" during the walk.

Each child performed the game in front of her/his peers. The latter, the eyewitnesses, were asked to observe and to say out loud if the execution conformed with the relational schema (diagram) that explained the rule n°2. They had to check that the outside edges of the shoes stayed parallel and facing forwards (parallel to the ***median line***) which is a consequence of the computation of the rule "***snowplow***" and that the toes were sufficiently far from the median line for the legs to be vertical in walking (on a front view).

They were also asked to reason and indicate how the performer could improve his execution of the rule if necessary.

I took great care in having each speaker repeat its comment on the actual state of the feet or the "order of adjustment correction" they prescribed until they employed a proper syntax[15]. I insisted on having them use a correct relational syntax: ***argument1*** (Anatomical Landmark 1) + GEOMETRICAL OPERATOR (spatial relational term) + ***argument2*** (Anatomical Landmark 2). It is a basic tenet of **iAt** that linguistic guidance is essential to improve spatial cognition. In order for children to learn and use relational thinking, they must observe, compare the actual position of the feet with the relational schema and say if the pupils walks with both ***big toes*** CLOSE TO the ***median line*** and both ***heels*** AWAY from the ***median line***, or not.

15. Representations of relations are valid when they conform to the structural correspondence principle, according to which the relations in the representation must correspond to relations in the world. The representation of a relation requires a symbol to specify the relation R, a representation of the arguments a1, a2 … an, and a set of bindings between symbol and arguments that maintain the truth of the relation. Halford, G.S., Wilson, W.H., Phillips, S., "*Processing capacity defined by relational complexity: Implications for comparative, developmental, and cognitive psychology*", BEHAVIORAL AND BRAIN SCIENCES (1998) 21, 803–865

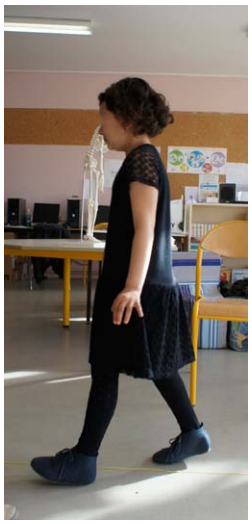
16. Edward Munnich, E. and Landau, B., "*The Effects of Spatial Language on Spatial Representation: Setting Some Boundaries*", p. 113, in Language in Mind, Gentner, D. Goldin-Meadow, MIT Press, 2003.

Science tells us that language is a powerful representational medium, a powerful tool of encoding: correct use of spatial language changes the development of spatial cognition [16]. Yet it is important to note that the language re-coded by the children [how they speak the rules to themselves] is at first totally improper and cannot provide framing structures for the encoding of events and experience.

When the children were commenting on the appropriateness of the execution of a rule, their spatial language was invariably incorrectly constructed. This is why habitual language cannot change their spatial cognition especially when it comes to reasoning with a system of rules (reasoning with more than one rule). The number of interrelationships between (mental) elements that can be kept active in reasoning (in thinking) depends primarily on the precision of the syntax used by the child. If the child "re-codes" the rule in an improper syntax "*the thing is wrong, it is too much this way*", instead of "left ***big toe*** is not NEARER ***Median line*** than left ***heel***", it is obvious that the embedment of a number of rules will become impossible, piling imprecision on imprecisions.

Accuracy of expression in spatial relational terms is not an interesting add-on to the practice of postural control, it is the center of the development of spatial cognition on which postural control rests.

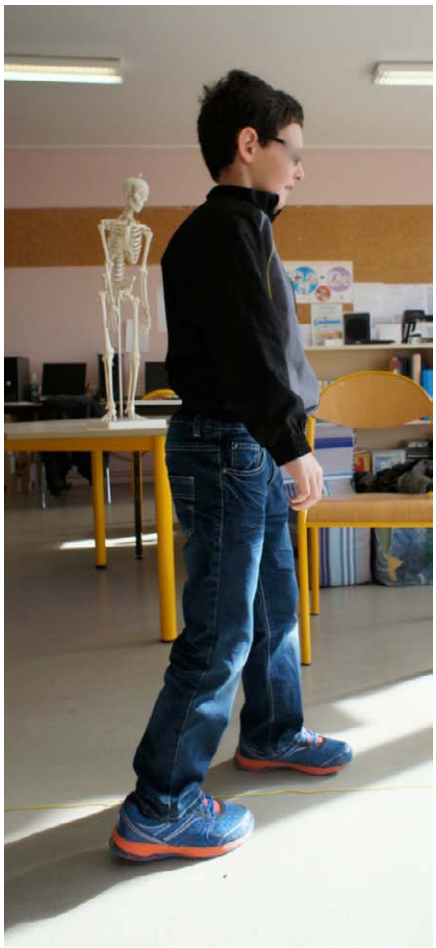
> The language the children speak influences the way they think. In other words, the children will develop relational thinking only in proportion to their linguistic capacity to process adequate (spatial) relations.



It is therefore essential to provide the children with linguistic guidance, that is help and situations in which they can implement the proper syntax of spatial language. Our children are not trained at producing or re-coding (spatial) relational information. Yet with proper linguistic help, it is surprising how fast they can improve their understanding of relational knowledge and compute easily numerous spatial functions.

From this, we can predict that linguistic guidance to improve relational constructions in postural control should enhance their cognitive capacity to reason (to use relational thinking) in other domains as mathematics or

language learning. This falls beyond the scope of the pilot study but should be examined in the second experimentation.



After a while, all the children started to command their movement without looking at their feet, using the geometric representation to command their motor intention without the assurance of feeling right as well. This fact is to be linked with the following quote: "*if I was ever to succeed in making the changes in use I desired, I must subject the processes directing my use to a new experience—the experience, that is, of being dominated by reasoning instead of by feeling, particularly at the critical moment when the giving of directions merged into " doing " for the gaining of the end I had decided upon. This meant that I must be prepared to carry on with any procedure I had reasoned out as best for my purpose, even though that procedure might feel wrong. In other words, my trust in my reasoning processes to bring me safely to my " end " must be a genuine trust, not a half-trust needing the assurance of feeling right as well.*" (Alexander, F.M., uos, "*Evolution of a technique*", p. 22)

SECOND LESSON:

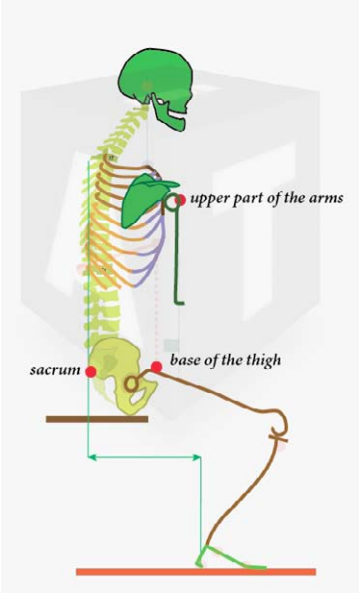
It was a surprise to discover how well the children had memorized the first two relational commands. I was happy to listen to them telling me how they had kept controlling their peers, telling them when they forgot to implement rule 1 and 2 and how they could resolve the problem. As Vygotsky remarked, controlling consciously another person's behavior with instructions is a necessary step in learning self-guidance and control: "*Through repeated experiences of this type, children learn covertly (mentally) to plan their activities. At the same time they enlist the assistance of another person in accordance with the requirements of the problem posed for them. The child's ability to control another person's behavior becomes a necessary part of the child's practical activity*". (Vygotsky, L.S., "Mind in society", p. 29).

As a result of their experience, their progress in conscious guidance was already visible.

Third rule:

« *I sit with 4 supports : two feet* CLOSE *to two buttocks* » *and* « ***heels*** AWAY FROM *the* ***median line*** *while* ***big toes*** CLOSE *to the* ***median line*** » *and «I pull the* ***sacrum*** FORWARD (TOWARD *the* ***knees****) to bring the* ***upper part of the arms*** JUST FORWARD *of the vertical of the* ***base of the thighs*** ».

Firstly we established the anatomical landmarks « ***upper part of the arms*** ».



"The landmark « ***upper part of the arms*** » is on the head of the bone of the arm at the upper end, in the front of the body, on the bump when the ***eyes*** [***interior***] ***of the elbows*** are facing each other" (I did not mention that it is called "greater tuberosity" or "trochiter" in anatomy).

I pointed it on the skeleton, on my body and on the diagram (a printed relational schema). Then, the pupils pointed with their finger where they thought the ***upper part of the arms*** was on their own body; when this was not correct, I pointed on the exact spot with a stick.

Then, we tagged the « ***base of the thighs*** » . "To find it when you are sitting, you must put a finger on the middle of the knee, and "cut" the thighs in two until the trunk is stopping you. Where the point of your finger rests, we will call the ***base of the thigh***" (upper part of the femoral bone, middle of the *intertrochanteric line*).

And last, we established what we would call the « ***sacrum*** ». "There is a bone called sacrum, but for us ***sacrum*** will not be all the bone but a special point on it, a bony bump placed on its geometric centre". I showed it on the skeleton, on a printed diagram and on myself, and I explained a way to find it easily with a verbal sentence[17]. Then I allowed the pupils to point their finger where they estimated it should be. Again, I corrected each child when necessary (circa the second *median sacral crest*). A majority of pupils found the ***sacrum*** point without need of correction; this is rather surprising as most

17. Verbal memory is in every way more stable than kinaesthetic memory. If the child is trying to remember the sensation of the designated point, his sensory appreciation at the time of encoding is certainly going to interfere. This is why in **iAt** we always give a verbal search procedure to find the location of the anatomical landmark.

adult students point too high after the same explanations.

Self guidance and control

I instructed the children to explore the command « I pull the ***sacrum*** FORWARD toward the ***knees*** until the ***upper parts of the arm*** are ON THE VERTICAL of the ***base of the thighs***". I explained on a drawing what is a "vertical line to a point" and I used a stick to make the idea more concrete for the smaller children of the group to understand.

In order for this exploration to happen, I instructed them first to pull the ***sacrum*** BACKWARD from the ***knees*** and exaggerate the movement. Then, second, they were to command a new pull on the ***sacrum***, but FORWARD this time TOWARD the ***knees*** until the ***upper parts of the arm*** were SLIGTHLY AHEAD of the VERTICAL of the ***base of the thighs***.

The important thing was to make a movement in order to organize the command. I hammered home that the command we were using refers to a movement and not to a "position". There is no such thing as a "correct position".

It is also decisive to understand that the movement of the ***sacrum*** forward is not organized by a feeling of the [correct] position of the ***sacrum*** relative to the legs. On the contrary, the motor intention is commanded by a relational structure that cannot be felt: the child cannot get a direct sensory information about the position of the ***upper part of the arm*** because its future position is relative to an imaginary line (the vertical line of the ***base of the thigh***). It is impossible to feel an imaginary line. The children were not even looking in the direction of their thighs when exploring the movement. This is proof that they all worked with a mental representation of this vertical devoid of kinesthetic memory.

Directing a movement with a relational schema is what we call "*conscious guidance and control*" in iAt.

It is truly amazing to witness the degree of precision that children — otherwise affected by faulty sensory appre**ciat**ion— can process in their movements when self-directing with conscious control. According to the faulty sensory appre**ciat**ion theory, they should not be able to command such a movement with accuracy; still according to the faulty sensory appre**ciat**ion theory, if they succeed in executing the adjustment, it means that they are

not guided by their sensory appreciation but by an other means of guidance (conscious guidance).

I asked the children to tell the difference between their habitual sitting organization and sitting with the ***third rule*** (***rule 1 + 2 + 3***). For this purpose I took photographs before and after each child thought the command of ***rule 3***.

They all noticed the new length in stature and the new shape of the back. They found that they looked taller and stronger with the third rule, while they did not feel that way at all.

Once again, when they had to say which picture looked better, I insisted on the fact that they speak the command aloud with the correct syntax to differentiate verbally the two photographs: "the picture with ***sacrum*** FORWARD so that the ***upper part of the arm*** is JUST FORWARD OF the VERTICAL of the ***base of the thigh*** looks better!".

Every child managed to perform ***rule 3*** with ease. Their ability to execute a combination of several movements guided by a system of rules in order to produce a whole movement entirely new to them (the *unknown*) was markedly greater than the one habitually displayed by adult students in my lessons.

Each child explored ***rule 3*** in sitting and later in walking. Usually, when the pupil walk, her ***sacrum*** is not directed consciously so that the ***upper part of the arm*** is always backward relative to the vertical of the ***base of the thighs*** (even if she tries –employing her kinaesthetic sense— to put it more forward in space).

Upper part of the arm is BACKWARD relative to the vertical of the base of the thigh.

Upper part of the arm is JUST FORWARD relative to the vertical of the base of the thigh.

I first asked them to walk without advocating any organized conscious order (without explicitly relating the anatomical landmarks between each other) and I took instantaneous pictures at the moment when they placed the foot forward in walking.
After being prompted, the children were able to compute the function [***upper part of the Arm*** JUST FORWARD OF VERTICAL of the ***base of the thigh***] and to tell in observing a photograph that they were not walking with ***Rule 3*** (in the first picture, the ***upper part of the arm*** is BACKWARD relative to the ***base of the thigh***).

When looking at a photograph, children do not readily compute the verbal order to judge the relational arrangement of the anatomical landmarks; it is necessary to provide linguistic guidance to help them "see" with the rule, that is to employ the relational thinking depicted in the relational diagram.

After that, I asked them how they could produce new photographs that comply with ***Rule 3***. I had again to provide a lot of linguistic help for them to say that "the ***sacrum*** needed to be pulled FORWARD more [toward the ***knees***]" in order to bring the "***upper part of the arm*** NEARER THE VERTICAL of the ***base of the thigh***". They all tended to think in a direct manner: "We need to pull the ***upper part of the arm*** FORWARD" (forgetting the necessary link between ***upper part of the arm*** and ***sacrum*** with the "***sacrum***" as the prime mover).
It is only by viewing the photographs resulting from the correct order that they discovered and accepted that the unique solution to the psycho-mechanical problem is to think ***sacrum*** FORWARD to bring ***upper part of the arm*** JUST FORWARD OF the VERTICAL of the ***base of the thigh***: it is the same order verbatim than the one they used in sitting.

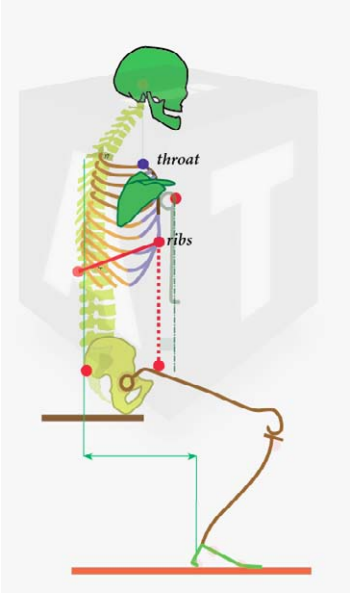
When a child is thinking successfully a system of rules in a particular activity (sitting), that does not mean that she will readily employ the relational rules in a different action (walking) in order to solve a similar problem; on the contrary, confronted with the same problem in a different setting, she will revert to thinking in a direct way. In conclusion, children need renewed linguistic guidance to think (reason) in a relational way.

We can see on some pictures that some children loose the first part of ***rule 3*** ("protect the ankle") because they don't have enough experience of uniting scores of rules together in their command ; more practice is required otherwise the global action tends to fail to incorporate this action unit.

Yet it is amazing how these young children are directing their activity with a conscious geometrical motor intention; you may also note how intent the children are: during all the lessons they displayed the same commitment and the same eagerness at learning how to command themselves despite the difficulty of the lessons.

THIRD LESSON :

Fourth rule:



In sitting,

- I command 4 supports: two feet close to two buttocks, with
- I pull ***heels*** away from the ***median line*** while I close ***big toes*** to the ***median line*** and,
- I pull the ***sacrum*** forward to bring the ***upper part of the arms*** over the vertical of the ***base of the thighs*** and,
- I pull the ***ribs*** behind the ***upper part of the arms*** and,
- I pull the ***throat*** away from the ***heels***.

The fourth rule introduces two new commands that guide the adjustments of the postural link system and which purpose is to expand the trunk: in the words of F.M. Alexander, they represent the ***antagonistic pulls*** of the torso.

First part of the fourth rule:

I taught the children where the anatomical landmarks that we call « the ***ribs*** » can be found. I showed the bony ribs on the skeleton and labelled two points on the front of the bony ribs with the same name. They showed no reluctance is employing the same name to signify two related yet different concepts ("as a brother and a sister do have the same family name"). The word "***ribs***" when used in a command has a technical definition, while in normal speech it keeps it's common meaning. For the purpose of the written explanation (in the absence of the context), I will use the word "***ribs***" to designate the anatomical landmark (a point on the front of the costal arch) and the "bony ribs" to refer to the bones themselves.

I first asked them to notice what was happening to their backs when:

- the ***Upper Part of the Arm*** was kept near the VERTICAL LINE of the ***base of the thigh*** and
- they pulled the ***ribs*** either forward or backward relative to the VERTICAL LINE of the base of the thigh.

They noticed that, when they pulled the ***ribs*** IN FRONT of the VERTICAL LINE of the ***upper part of the arms***, their back was arching forward; the opposite happened when they pulled the ***ribs*** BACKWARD of the VERTICAL LINE of the ***upper part of the arms***.
I asked them to tell me where they should pull the ribs in order for their back to lengthen? They knew the answer, but we had to work to express it with the correct syntax : "When the ***upper part of the arms*** are just FORWARD OF THE VERTICAL of the ***base of the thighs***, the ***ribs*** have to be pulled ON THE VERTICAL of the ***base of the thighs*** for the back to lengthen completely.

In order to help the youngest, I asked them to cross the forearms in front of them in order to facilitate the adjustments of the ***upper part of the arms*** IN FRONT OF the VERTICAL of the ***base of the thighs*** AND of the ***ribs*** ON the VERTICAL of the ***base of the thighs***.

In that manner they soon became proficient at pulling the ***sacrum*** TOWARD the ***knees*** in order to bring the ***upper part of the arms*** JUST FORWARD OF the VERTICAL of the ***base of the thigh*** AND the ***ribs*** ON THE VERTICAL of the ***base of the thighs***. This essential antagonism between the movement of the ***ribs*** and the movement of the ***sacrum*** on the one hand and between the movement of the ***ribs*** and the movement of the ***upper part of the arm*** realizes the condition of *antagonistic muscular actions* alluded to by Alexander as the cause of general coordination [18].

Although the purpose of the study was to see if children were able to improve their postural control in sitting, I already knew that to consolidate the result in time they needed to learn an infinitely more complex task: that of directing themselves in walking. In walking, the complexity of the task changes because the pelvis is not stabilized in space by the chair. If the child does not practice ***rule 4*** in walking or even standing, the rules will not be in place every time he/she prepares to sit, so that his/her sitting attitude will be inappropriate to start with.

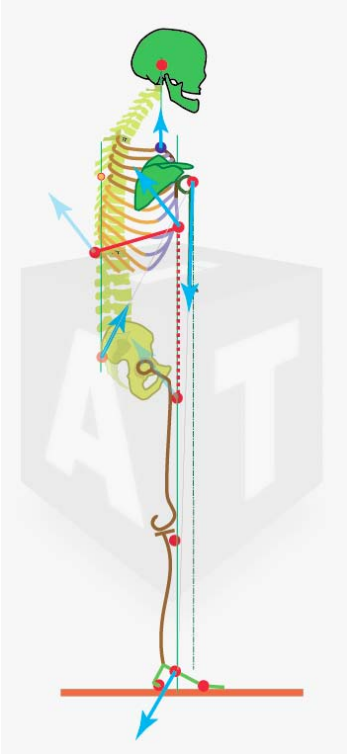
First part of the fourth rule in standing

We started with a new game. Carrying a book under the armpit, between the arm and the side of the bony ribs, in a standing position, the children explored the effect of the command of two opposite movements : « I pull the ***ribs*** (front of the ribs) IN FRONT of the VERTICAL of the ***upper part of the arms*** » and « I pull the ***ribs*** (front of the ribs) BEHIND the VERTICAL of the ***upper part of the arms***, all the while keeping the book PARALLEL to the ***median line*** ». The orientation BEHIND (or IN FRONT) again refers to a third person perspective in which the observer is looking at the side of the body of the agent: the child must "see in his mind the effect of his movement as if he was someone else looking at himself from the side").

I explained that in order to protect themselves they needed to command the pull of the ***ribs*** BACKWARD [AWAY FROM the ***knees***] BEHIND the VERTICAL of the ***upper part of the arms*** and ON THE VERTICAL of the ***base of the thighs***. They were quickly able to repeat the same movements without the book, yet they had to explore how to pull the ***ribs*** BACKWARD without collapsing the

18. For instance, the conscious controlling of the movements of a particular muscle or limb, as practised by athletes and others, is of little practical value in the science of living. The specific control of a finger, of the neck, or of the legs should primarily be the result of the conscious guidance and control of the mechanism of the torso, particularly of the antagonistic muscular actions which bring about those correct and greater co-ordinations intended to control the movements of the limbs, neck, respiratory mechanism, and the general activity of the internal organs. (Alexander, F.M., msi, 1910, p. 147).

sacrum BACKWARD at the same time (I reminded them that «*I pull the* ***sacrum*** *FORWARD (TOWARD the* ***knees****) to bring the* ***upper part of the arms*** *JUST FORWARD of the vertical of the* ***base of the thighs*** » was the last rule we had learned three weeks earlier).



First part of the fourth rule in walking

I explained to the children that in walking we would think of the rules when we set foot on the floor (the front foot in walking forward). The relational diagram seen here has only one leg because the other one (the back leg) is trailing behind. This diagram is portraying explicitly the rules when setting foot on the floor; "*I pull the* ***sacrum*** *FORWARD (TOWARD the VERTICAL of the* ***knees****) to bring the* ***upper part of the arms*** *JUST FORWARD of the vertical of the* ***base of the thighs****", & I* pull the ***ribs*** BACKWARD [AWAY FROM the ***knees***] BEHIND the VERTICAL of the ***upper part of the arms*** to set them ON THE VERTICAL of the ***base of the thighs*** and ON THE VERTICAL of the ***instep.***

Such placing of the [front] foot *throws the limbs and trunk into that pose in which they may be correctly aided by the force of gravity* as requested by Alexander [19] in his first book.

It took a long time to enumerate the rules, yet, when they were properly understood by the children (properly related to the relations on the diagram), those needed no time to start "*trying them out*". This lead to a great number of errors -- which were properly commented on the photographs -- but the children were not in the least abated by their "mistakes" (mostly ***sacrum*** BACK and AWAY from the ***front knee*** and ***front knee*** away FORWARD from the ***sacrum***) and they kept working to produce the "good pictures" they wanted to see.

The game I proposed was to oppose our new series of commands during a greater duration: the first command – «*I pull the* ***sacrum*** *FORWARD (TOWARD the* ***knees****) to bring the* ***upper part of the arms*** *JUST FORWARD of the vertical of the* ***base of the thighs*** »– must be kept active while the second command – «*I* pull the ***ribs*** BACKWARD BEHIND the VERTICAL of the ***upper part of the arms*** »– is given. (This means that in walking, the front ***knee*** is not thrown FORWARD away from the ***sacrum***, but kept AS CLOSE AS POSSIBLE to the VERTICAL of the ***instep***).

When the ***sacrum*** is pulled forward to bring the ***upper part of the arms*** JUST FORWARD OF THE VERTICAL of the ***base of the thighs*** (final part of ***rule 3***), in the standing position, the movement called "I pull the ***ribs***" *starts at the ankle and changes the curvature of the spine (Alexander, msi, p. 167)*: very importantly, this combination of movements lessens the curve when the ***ribs*** [20] are pulled backward relative to the ***upper part of the arms*** and against the forward pull of the ***sacrum***. This introduces the essential antagonistic actions of the ***sacrum*** (pulled FORWARD) against the ***ribs*** (pulled backward) and of the ***ribs*** (pulled backward) against the ***upper parts of the arm*** (pulled forward). The effect of the antagonistic pulls is to lengthen the lumbar and thoracic spine and the stature.

19. "From what I have now said, it will be quite evident that the primary principle involved in attaining a correct standing position is the placing of the feet in that position which will ensure their greatest effect as base, pivot, and fulcrum, and thereby throw the limbs and trunk into that pose in which they may be correctly influenced and aided by the force of gravity. The weight of the body, it should be noted rests chiefly upon the rear foot, and the hips should be allowed to go back as far as is possible without altering the balance effected by the position of the feet, and without deliberately throwing the body forward. This movement starts at the ankle, and affects particularly the joints of the ankles and the hips". (Alexander, msi, Notes and Instances, p. 167)

20. A little consideration will show that any alteration in the spine must necessarily affect the position and working of the ribs. [...]. We see that by increasing the thoracic capacity, and so increasing the distance between the ends of these ribs, *we are applying a mechanical principle which by a reverse action tends to straighten the spine.*. [emphasis added]. (Alexander, msi, "Notes and Instances", pp. 181-182, 1910)

Children walking with an appropriate system of rules.

I demonstrated again and again to the children that, when the ***ribs*** are pulled IN FRONT of the VERTICAL of the ***upper part of the arms*** or IN FRONT of the VERTICAL of the ***base of the thighs***, the back is arching forward, shortening the spine, pulling the hips forward and throwing the weight of the body upon the front of the foot. In these conditions, the anatomical structure provide very little support and the muscles are shortening.

On the contrary, when the ***ribs*** are pulled BACKWARD relative to the VERTICAL of the ***upper part of the arms***, to stay ON THE VERTICAL of the ***base of the thighs***, with the ***sacrum*** pulled forward so that the ***upper part of the arms*** are JUST FORWARD of the VERTICAL of the ***base of the thigh***, the (lower and middle) back is lengthening, *with the weight resting chiefly upon the rear of the foot and the hips allowed to go as far back as possible*, that is, opposed to the ***sacrum*** pull FORWARD to keep the ***upper part of the arms*** just forward of the vertical of the ***base of the thighs***.

When applying the first part of ***rule number 4*** (***Rule 1 + 2 + 3 + 4.1***), the children discovered the basis of *mechanical advantage*. It is more appropriate to say that they constructed mechanical advantage as they commanded simultaneously three antagonistic pulls in the torso [21]. To explain it simply, postural orientation (support of the skeletal link system or *coordinated support*) and postural stabilization (elastic stabilization due to muscular lengthening contraction or *antagonistic pulls*) are a consequence of the rules applied to the bones: the ***sacrum*** is pulled FORWARD in a direction opposite to the pull of the ***ribs*** (front of the ribs) pulled BACKWARD while the ***upper part of the arms*** pull the top of the torso FORWARD opposite to the ***ribs***.

When the bones are consciously directed in such a geometry, body support flow through the stack of the bones and elastic stabilization is the result of the pulls effected on the contractions of the muscular system by the bones.

Second part of the fourth rule:

After that, I explained how to find the point (the anatomical landmark) we call « ***throat*** » (top of the manubrium sterni, just beneath the supra sternal notch).

"It is a point on the top of the bone that marks the center of your chest; it is in the center of the front of the chest, it is on the top of the bone and

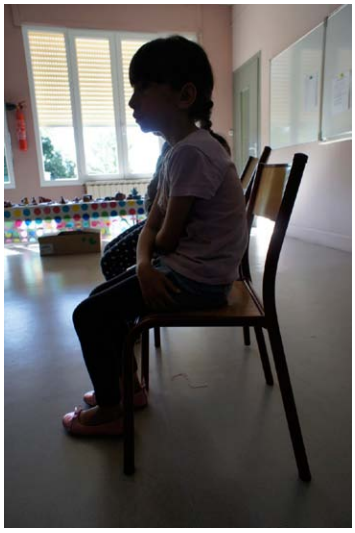
not on a soft part" (top of the sternum). I showed it on the skeleton, on a printed relational diagram and on my body while repeating the verbal search instruction, and then I asked them to put the tip of a finger on their own "***throat***". When necessary, I corrected each child by repeating the verbal explanation or by pointing with a stick if they still could not use the verbal guidance.

I explained the second part of the rule: « I pull the ***throat*** away from the ***heels*** (and the ***heels*** away from the ***throat***) ».

To explore ***rule four***, and help the children maintain the previous commands it is made of, I asked them to cross the forearms in front of them. In that way, it was easy for the children to keep:

1. the ***upper part of the arms*** on the vertical of the ***base of the thighs***,
2. the ***ribs*** backward relative to the ***upper part of the arms***,

even when adding the new command to change the adjustment of the ***throat*** relative to the lower ribcage and spine. Due to the antagonistic action between the lower part of the ribcage and it's upper part, commanding a movement of the ***throat*** backward (away from the heel) will tend to bring the ***ribs*** forward (from the vertical of the ***upper part of the arms***); if the ***ribs*** are maintained in the correct adjustment –backward relative to the vertical of the ***upper part of the arms***– , the pull exerted on the ***throat*** will change the geometry of the upper ribcage and spine, thereby lengthening all the muscles attached between the front of the upper ***ribs*** and the lower ***ribs***. This command in effect changes the shape of the upper part of the ribcage by increasing the tone in the deep upper back muscles (in particular the splenius capiti between 7th cervical and 6 thoracic, semispinalis and multifidus) and deep erector muscles (longissimus thoracis, spinalis thoracis and of course the serratus anterior); the children are of course not aware of the change at this level.



I asked them first to command a movement of the ***throat*** toward the ***heels*** (without explicitly saying I pull the ***throat*** FORWARD and DOWN toward the ***heels***) and second, to command a movement of the ***throat*** [backward and up] AWAY FROM the ***heels*** while keeping the previous part of rule four alive (I pull the ***ribs*** BACKWARD relative to the VERTICAL of the ***upper part of the arm*** to rest ON the VERTICAL of the ***base of the thighs***).

I asked them to control their peers to see if they were "loosing" the previous rules when applying the new adjustment: the "control" was always between an instantaneous photograph and a printed relational diagram so that the children could "materialize" the geometrical relations between the points. This again was a way to provide linguistic guidance and make sure that the children were employing the proper syntax to describe (and command) the

adjustments required. The improvement in the employment of relational language was much more marked in the group of the older children than in the group of the younger ones.

After a short while, all the children were able to command rule four with ease in seating, standing and walking with the forearms crossed. I even asked the 7 to 8 years of age to command rule four without crossing the forearms, which they succeeded in doing.

All the work in standing and walking soon had an effect on the manner of use of the children in sitting. Even when the geometric disposition was less than perfect (see photograph with the ***upper part of the arm*** not reaching the VERTICAL OF the ***base of the thighs***), the children were benefiting from the lengthening contractions of low intensity they had practiced earlier on in standing and walking. See how this young girl appear poised and at ease when sitting with ***rule 4***.

Compared with my adult pupils the children appeared at ease when commanding these many rules together. The new feeling produced by the lengthening of the muscles did not seem to affect them much beyond their first reaction: "*I feel all tense and awkward now that I am so tall!*".

FOURTH LESSON: EVALUATION DURING SCHOOLWORK

The last lesson was not a lesson in the proper sense of the word. I did not go in the school to teach the children any other rules of behavior but to check if and how they could remember and implement the rules.

The meeting took place in children's classroom with all the children and the teacher present. I declared I was only taking part of the lesson as an observer, pointing to the camera that I was carrying with my drumstick [21]. The pupils were instructed to continue doing their work as usual under the supervision of their teacher. They were reading, writing, raising the finger up to ask a question, doing everything children are supposed to do in their classroom (and more, being noisy, agitated as usual...).

21. The children were used to see me with a drumstick ; sometimes I would use the stick to make an imaginary line more concrete; some other times, I used the stick to touch an anatomical landmark on their body to correct their wrong selection.

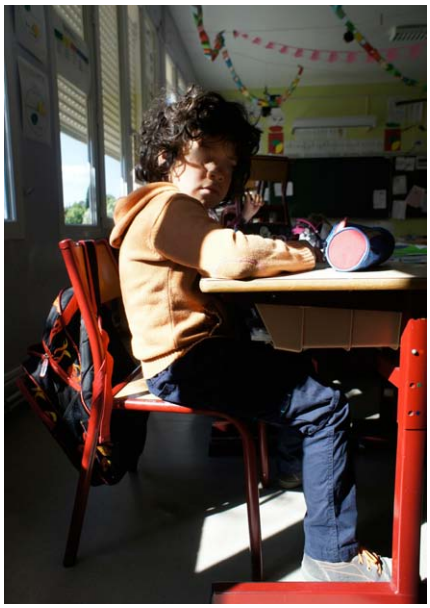
I went around to see and talk personally with each child in turn. I followed the same sequence every time. I started by taking a picture of the child and then asked him/her thee questions in a very low voice. After getting the answer, I took another picture of the child and showed the two pictures –before and after– to him/her so that they could see for themselves the change that they had self-produced in using the rules.

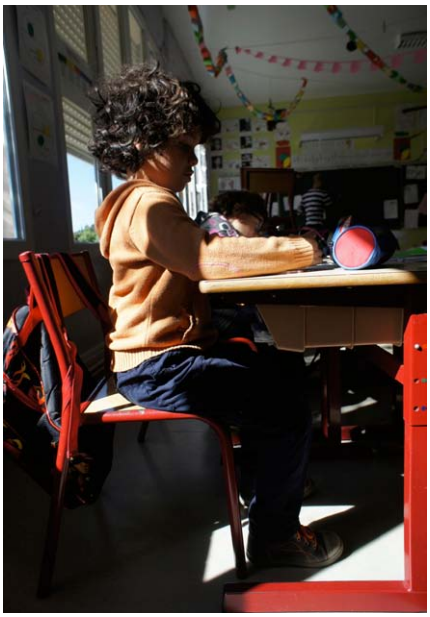
Here are the three questions:

1. *do you remember the rules of behaviour that you commanded in our lessons?*

2. *Are you commanding yourself with the rules now?*

3. *Could you command yourself now with the rules while continuing to do your work –reading or writing as the case may be–* ?





The answers to the three questions were the same for the 18 children. To the first one they answered "yes". To the second question, they said "obviously not". This is because they all understood that commanding the bones is for everyone to see; as they had learned to see themselves as others see them and as they were not commanding their bones, they knew they looked shortened and pulled down. To the third question, they all said yes and I gave them three seconds to implement the command before taking the photograph.

As long as I stayed with the child, a short time usually, the child continued his schoolwork and kept directing himself/herself with the rules. Yet, when I left to ask the three questions to another child, I could see sometimes that the previous child did forget to continue to apply all the rules when her main task became more (or sometimes less) stimulating. Nevertheless, it was obvious that some of the coordination had been retained by the children after being reminded of the rules.

The change in use of the anatomical structure was striking even for me who was used to their capacity of conscious coordination. After more than three weeks of delay since their last lesson, they still were able to consciously direct and control their postural control notwithstanding being in the midst of the normal class activity.

I stayed with a pupil during a long french exercise after he had implemented the rules. When the questions he had to answer in his exercise became more complex, my presence was not enough to prevent him returning to his habits of poor support, poor motor inhibition (he started to fidget again) so I showed him he was not directing himself (self-regulating) with the rules anymore. He seemed surprised as if he had not been aware of the change. Just being reminded was sufficient for him to organize his postural control anew; he regained his quiet and was able to answer the question of the teacher.

The atmosphere in the classroom began to change as more children began self-regulating with the rules. The teacher commented later that he had never seen something like it. When the energy of the children is not dissipated in agitation, it seems to acquire a different quality all together. The new behavior of the children was evidence that they had learned something that was helping them to learn.

I feel very lucky to have been able to work on a conscious level with all the children. The experience has been very rewarding as all of them showed tremendous and wholehearted commitment to learn. I must admit that it has been the greatest surprise to me with the fact that all the children without exception were able to improve their habitual use to a great extent.

CONCLUSION:

After the three lessons, all the children demonstrated that:

children of 6 to 8 years old can learn and memorize relational instructions (the language of command of **iAt**),

- they can relate the relational instructions to a printed diagram of geometric relations between bones (confirming the fact that they were using visuo-spatial memory in processing actions performed by others or in guiding their own actions),

- they can use these geometrical representations to guide their postural behavior, effectively forming motor intentions without somato-sensory content,

- they became able to speak overtly this language of command– with a considerable amount of linguistic training– in order to describe the postural activity of other children, and, as a result, were improving their employment of verbal commands and geometrical representation covertly (self-speech and self-imaging) as conscious guidance of their postural behavior,

- they were able to process these rules to control (evaluate) and command without error the disposition of other individuals, and,

- they also became proficient at using the same verbal rules to inhibit somato-sensory urges and psycho-motor impulses.

The linking of the full system of commands [to comply with the rules] in one action was more difficult for the youngest children (especially two of them that were less than 6 years old). They could only implement the full system of commands with their forearms crossed in front of them.

The retention of the language of command and of the rules of execution was very high as tested three weeks after their last lesson. Jeando Masoero met one of the young children (from a group of 6 to 7 years) three months after the experiment during the school holydays and told him that he had seen the photographs he was on. "*Which photographs?*" did he ask. "*- the ones in which you were using the rules*". As soon as Jeando had said it, the child ordered himself into a very striking representation of the rules (Jeando could not find fault in his performance, meaning that all the rules were properly executed) and kept it for three long minutes.

All the children were eager to learn a language of command, to practice cognitive inhibition games, to "*become the master of their own mind and body*". Their interest in the "mechanics" of their mental and physical activity never abated despite their repeated "failure" at first to master the execution of the rules and despite the strange feelings they experienced because of the new

postural orientation they were performing. All the children reported that they had "instructed" their parents, brothers or sisters to employ the rules. Long after the "experience" finished, the children kept asking me when we would start again.

The teacher noticed that when the children were covertly employing the language of command, they were much more stable (less agitated mentally and physically), "calm and collected" [22] and ready to work, than a few minutes before.

22. THERE can be little doubt that the process of reasoning tends to develop more quickly and to reach a higher standard in a person whose attitude towards life might be described as calm and collected. (Alexander, F.M., ccci, p. 129)

LIMITS OF THE STUDY:

Age limit for the processing of embedded rules

For two of the children who were the youngest of the classroom, it was difficult to coordinate much more than two commands on their own. As soon as a third rule was added, they were not able to retain the first one and started to work with the second and the third command without realizing that something was amiss. This seems to be related to an age limit. It would be interesting to investigate the reason of this apparent incapacity of younger children: is it a problem of memory or a problem of processing and execution of a number of rules?

Our evaluation tools were limited

During the project, I only used photographic evidence of the progress of the children in conscious postural control. This is suitable to establish that the children were able to use self-speech to modify their postural orientation. Yet, it is clear that this is not sufficient to establish scientifically our hypothesis that children can learn conscious guidance and control of the postural mechanism at the age of 6 to 8 years of age and that the new postural behavior has an impact on their cognitive capacity; this remains at the stage of prediction. I hope nonetheless that this study might serve to stimulate the interest of some scientific laboratory to pursue this exploration further with proper means of experimental confirmation.

The usefulness of self-regulation knowledge depends on meta-comprehension

The fact that the children did learn a language of command that enabled them to change their postural control does not imply that they did learn why or when implement this kind of decisions in their social life. When I came into their classroom on the fourth day, they were still acting WITHOUT conscious guidance and control. They needed the prompt, "*could you command yourself now with the rules?*" to take control of their background activity (postural behaviour).

After three lessons, they did not realize what this knowledge is for, when to employ it or what help it could give them to learn by enhancing their

attention and their capacity to think in a relational way. Their *object knowledge* was correct, but their meta-comprehension (when, what for, in what circumstances they should use it) was not.

I think it is not reasonable to expect children to build "on their own" meta-knowledge about when to use what they have learned. They certainly did not develop autonomously strong rules of employment of their new means of self-regulation. It is also clear that they are not going to receive strong social incentive in their family or school as no one has any idea of the link between postural control and cognitive success.

Toward an involvement of the school teacher

This means that to bring **iAt** successfully as a self-regulatory tool for the children, their teachers must be involved to provide:

- regular incentives to employ their newfound guidance and
- explanations about the usefulness of the technique.

The teacher could institute an "if =>then" principle governing conduct in a particular area of activity: "*you are now going to study a difficult lesson or to solve a complex problem; before that would you command yourself with the rules?*"

In this study, the school teacher was not part of the study. He did not know the rules or how to implement them – he knew less than the children at the end of the work. He was certainly not a good "model" of motor behavior for his class. This would need to be changed in the future.

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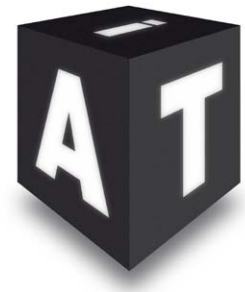

INITIAL ALEXANDER TECHNIQUE
Self-regulate your posture and movements

Teaching postural self-regulation to children of 6 to 8 years of age

Learning rules to develop intelligent sitting behavior and establish proper conditions to learn

September 2015

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