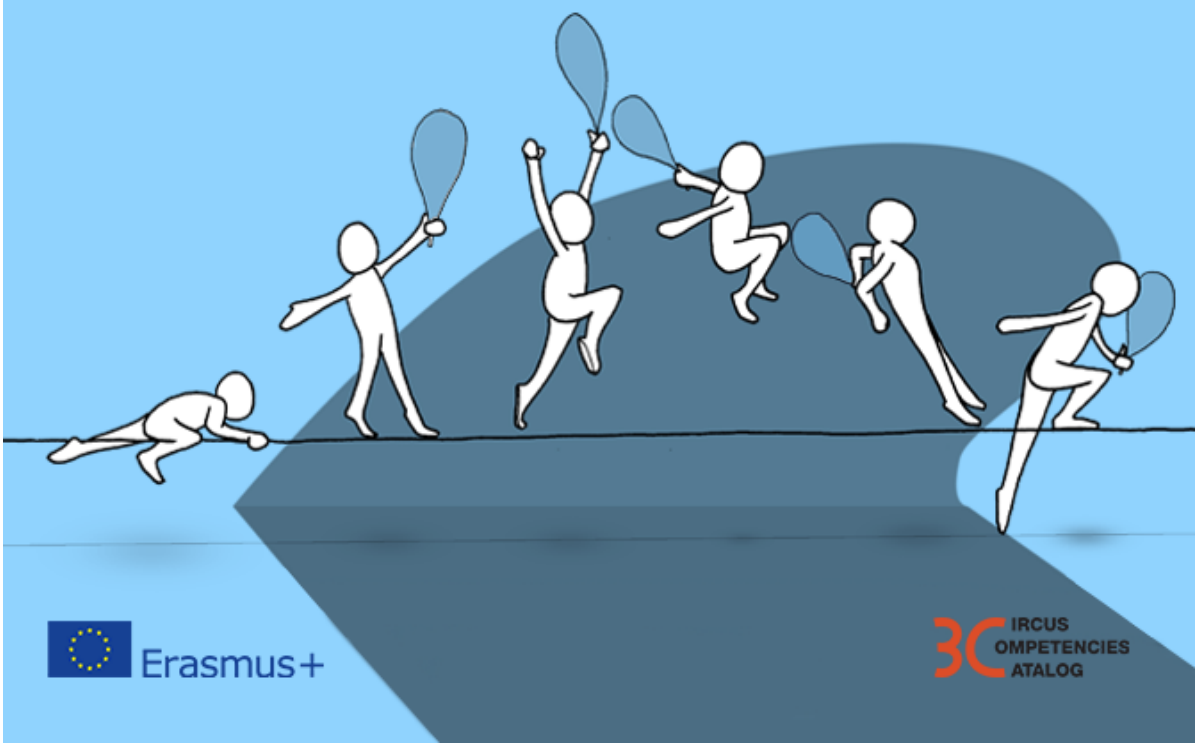
Lapo Botteri

# Motor Capacities in the Educational Circus

## Theory and practice



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# Motor Capacities' Handbook in the Educational Circus

## Theory and practice

*I dedicate this manual to Riccardo Sargentini*
*a physical education teacher*
*who in 2002 saw far... much further than me*



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# Preface

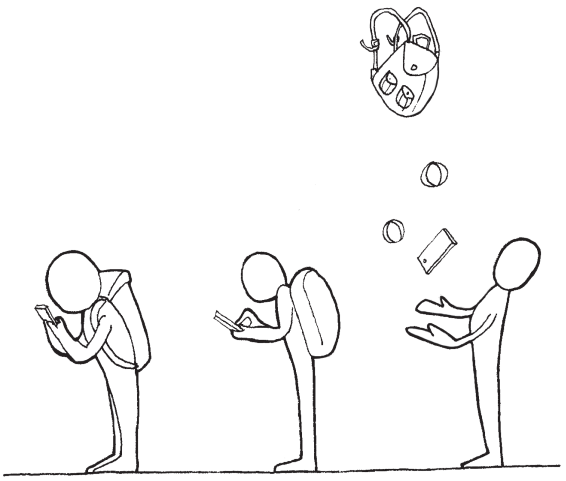
I decided to write this handbook after graduating in Physical Education and Sports Sciences at the tender age of 41 and with a rather atypical teaching career behind me.
I started teaching sports at the age of twenty, in the Karate dojo I used to go to for practice at the time, in exchange for the monthly fee payment. I fell in love with martial arts and, after completing my civil service, I enrolled in the Faculty of Physical Education and Sports Sciences of the University of Florence with the clear aim of opening my own dojo afterwards.
During the civil service, however, I met a conscientious objector from Milan who, in the long hours of waiting, taught me to juggle three balls... And that meeting would have radically changed my life!
I became more and more passionate about Juggling; in 2000 I started doing street shows, founding the company of "Giullari Fiorentini". In 2002, at the end of my show, a Physical Education teacher came to me and asked: "Would you be interested in teaching your art to my middle school kids, by any chance?". I accepted and my career as a Circus teacher started off.
From that day on it was a very fast crescendo of events, one more interesting than the other; the following year I was hired by "Soccorso Clown onlus" as a Hospital clown and I decided to leave the University to devote myself totally to the circus and street art.
In 2004 I opened the Circus School "Circo Tascabile". Besides this, over the following five years I did a bunch of things with the goal of improving my circus skills: I went to Madrid and followed afternoon courses at the Escuela do Circo Carampa, took part in a dozen European conventions, followed many artistic training courses and carried out many Circus projects, either social or educational.
In 2009 I managed to pass the audition to perform in the opera "Pagliacci" directed by Franco Zeffirelli; a wonderful experience that has accompanied ten years of my life.
Once my career as a street artist and circus teacher was consolidated, I decided to complete my cycle of studies by enrolling again at the university to finish what I had left undone fifteen years earlier.
Going back to the books was great; it was an opportunity to refresh and strengthen all the knowledge I had been using for years in my work.
The time committed to writing my thesis turned out to be the chance for a profound reflection on an academic approach to my work I have always had over fifteen years of my career, which gave me a mindset that has always proved very useful and solid.
So, in 2017 I graduated in Physical Education and Sport Sciences with the thesis "Motor skills in the ludic educational circus", text from which I took the steps for putting this manual into writing.

# Thanks

I sincerely thank all the people who have collaborated on this text, namely: Veronika Gallyas for having believed in this project; Stefano Bertelli known as “Fefo” for the general revision of the contents and the immense amount of time he dedicated to me; Massimo Piccione and Valentina Sechi to remind me that Italian is a precise and not an approximate language; Valentine the philonaut and Michele Paoletti for advice on Balancing; Luigi Miranda, Silvia Cavalletto, Siriana Meucci, Wilkie Satti and Walter Sumskas for acrobatics and surroundings; Leonardo Lombardi and Matteo Bucarelli for the difficult tangle of Conditional capacities; Craig Quat for new perspectives on Juggling; Daniele Giangreco, Alessandro Riccio, Teresa Bruno and Andrea Bochicchio for the very useful feedback on Physical Theater; Miguel Manzano for having a much clearer graphic idea of this book in his head than the author of it; Christian Poggiolesi for intra- and extra-text psychological supports and Francesco Vanni for his pearls of wisdom.
The arduous task of translating this text was completed thanks to the resolute commitment of Camilla Falcucci as official translator, Peter Duncan, Elisabetta Paoli, Jacob Weiss, Bartolomeo Bartolini and Daisy Franks for translation control and specific terminology.

# Introduction

## *What is Educational Circus*



The concept of Educational Circus is constantly evolving, but its basic idea consists in the use of circus disciplines adequately deconstructed and contextualized to transform them from pure scenic art into a pedagogical tool that can be used in the educational, motor, social and therapeutic fields. Arriving in Italy about thirty years ago, since its very outset this method has turned out being a very powerful tool for all kinds of teaching, especially the experiential and non-formal ones[1].
It is a malleable, oblique and across-the board tool, whose strength lies in its fun, engaging and non-competitive proposals.
**The main purpose of the Educational Circus is the holistic development of the individuals, as it helps them to increase and improve their personal motor capacities, their creativity and their subjective relational and emotional management capacities.**
Thanks to these features, the Educational Circus finds employment not only in the schools of Circus for kids[2], i.e. sports associations that hold stable circus courses equalized to normal motor activities, but also when we talk about elderly, special needs and social projects. At the moment, this new typology of circus is ever-growing across the nation; in fact, more and more different organizations choose to teach it. Local and national meetings aimed at students of all ages are more and more often arranged, and so are training courses for teachers.

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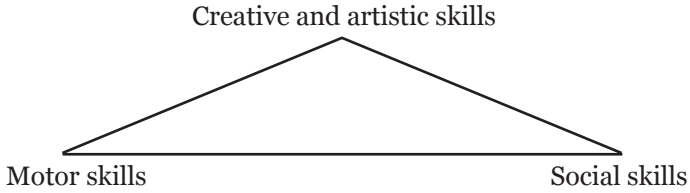
[1] S. Desanghere, *"Look at me!". The circus approach: working with children and young people through the circus arts. Stories and methods on how to deal with diversity and accessibility,* Booklet realized with the support of PEYC (Professionalizing European Youth Circuses), 2016. Available on: http-.//www.peyc.eu/wp-content/uploads/2016/03/Look-at-me_web.pdf (last access March 30th, 2017)

[2] The expression " Youth Circus schools" is used to indicate those amateur or semi-professional dimensions and distinguish them from Profesional Circus.

## *Skills in Educational Circus*

From the very first approach to this discipline, you immediately realize that it is like being faced with a vast container of heterogeneous *stimuli* - also easily intersected by various other disciplines - still maintaining its own identity.
Becoming a good level teacher of Educational Circus is neither a simple nor a quick path to go through: there are in fact various skills to be acquired and multiple teaching styles to choose from.
In almost twenty years of work in this area, I have seen various schools use very different approaches and educational choices, based on skills sometimes more linked to a sports matrix, some others to a more socio-experiential one.
After years of observation and comparison among the various Italian realities, I noticed that three fundamental capacities sets happen to be outlined and shared by all the possible variations of teaching styles.
I tried to summarize the capacities that I consider fundamental as shown in the diagram below.




*Creative / artistic skills*. Under this tag we can include any competence related to the development of creativity understood as divergent thinking, problem solving skills and imagination. The development of creativity is in fact the basis for the development of artistic skills that can be declined in the scenic representation, in the stylistic taste and in the choreographic and costume choices.

*Social skills*. These skills concern everything related to communication skills: listening, group management, relationship with individual students and the management of conflicts during Circus meetings; relationship with parents or educators and the social life connected to these.

*Motor skills*. By this definition, we point at everything related to the teaching of movement and its learning, the assessment of the skills of the subjects, the goals planning, the development of physical and mental capacities related to the acquisition and control of new skills.

## *The intent of this manual*

The teaching of physical activities has always been a benchmark in my life; after more than twenty years of my career, the study of dozens of volumes on the subject,

and a degree course in sports science, I feel I have developed a series of capacities that I would like to share with all those involved in the area, hoping to provide teachers with useful tools that they can use at the most appropriate moments in order to help them propose a well-structured and therefore efficient learning route fully satisfying the pedagogical circus principles.
The intent of this text is to present a first attempt to analyze the broad world of the pedagogical circus from the viewpoint of motor science.
**This text therefore aims to investigate only the motor aspect of the Educational Circus**, touching marginally the other two fields of expertise.
In any case, teaching circus education means teaching motor activity, and each motor discipline requires specific reference texts. Unfortunately at the moment there are not many texts dedicated to this type of activity in Italian language: national production on the subject is still in its infancy, whereas lots of books in other languages, dealing with the same topic, have already been published.
The scarce availability of sources is undoubtedly due to the fact that the Educational Circus, as said above, is still very young. Among the reasons of rare existence of insights studies, there could be instead the non-competitive component of this activity, that leaves it out from circuits of more highly performative sports and therefore the business world around those.
I believe that the pure motor activity – linked to a non-competitive aspect that is inherent to Educational Circus – is a key factor, while the lack of reference texts is a gap to be filled.

## *Who is this manual for?*

This text addresses all the people having to do with the pedagogical circus, all the graduated students in Motor Sciences, Physical Education teachers and sports operators in general, newbies of the Educational Circus, but above all those teachers who – already having a little acquaintance with the subject – want to deepen it and "formalize it". Why not, even parents, who want to enter this wonderful world, that is of great help for children and teenagers "to grow" in a broad sense.

## *The contents of this manual*

Since the topic of the theory and methodology of human movement is so vast, it is impossible to be exhaustive within a single text. Therefore, in this manual I will only carry out the analysis of the Educational Circus and the motor capacities connected to it, trying to provide a concise but comprehensive idea of those.
I will treat in a targeted and specific way topics such as sensory analyzers, body scheme, ideo-motor scheme, partial and global motor schemes, and motor capacities. I will give a brief general description of them, focusing instead specifically on what is relevant for Educational Circus: to approach this text it would therefore be better to already have a general idea of what we refer to with motor learning.

Should any reader of this text not have any knowledge in this regard, these gaps can however be easily filled, as there are many exhaustive texts[3] on the topics previously mentioned.
The basic idea of this text came to me during my study period when I noticed the inevitable analogy between basic motor skills for the development of children[4] i.e. postural maintenance skills, gross motor skills, finely discriminated skills, motor-expressive skills and the four main disciplines of the Educational Circus, namely Balancing, Acrobatics, Juggling and Physical Theater.
I summarize these analogies in *Table 1*.

*Table 1. Analogy between motor skills and circus disciplines.*

| | |
|---|---|
| Postural maintenance skills | Balancing |
| Gross motor skills | Acrobatics |
| Finally discriminated skills | Juggling |
| Motor-expressive skills | Physical Theatre |

This text is grounded upon these analogies, focusing primarily on the pre-requisites (capacities) of the aforementioned disciplines in the pedagogical / propaedeutic path of the Educational Circus that mainly aims to provide children and young people with complete motor skills and that at the same time lays the foundations for future work of specialization.
In motor education it is important to proceed step by step, first of all to create a broad, solid and flexible motor foundation for further development and specialisation.
**A good pedagogist has to give more importance to the learning process, than to the result.**
Many authors of Movement Methodology[5] texts underline the importance of adequately soliciting the nervous system of children towards the absorbing, as comprehensively as possible, of multiple *stimuli* without focusing on a specific technical outcome.
Before the age of ten, children should experience as wide a range of movements as possible expanding their motor repertoire and laying the groundwork for a developed and adaptable motility that will enable them to learn the most varied technical gestures of circus (or sport).
**This text provides and contextualizes theoretical notions and practical exercises to be proposed in the preparatory phase to facilitate the learning of new movements and lay the foundations for specialization in the**

[3] I myself always recommend these two texts that have been my guidebooks during my studies: F. Casolo, *Lineamenti di Teoria e Metodologia del Movimento Umano,*Vita e pensiero, Milano: 2002 e F. Casolo, *Didattica per le attività motorie in Età Evolutiva,* Vita e pensiero, Milano: 2011.
[4] A.R. Losavio, *Teoria e metodologia del Movimento Umano nell'Età Evolutiva*, dispense online del Corso di laurea in Scienze motorie, Università Ecampus, 2015.
[5] Among all the texts in italian language I would like to recommend J. Le Boulch, *Teoria e Pratica della Psicomotricità funzionale. A scuola con Jean le Boulch,* Armando editore, Roma: 2012.

**various circus disciplines.** It is a work mainly aimed at children from five to twelve years old, i.e. who belong in what, in the jargon, is called the "golden age" for motor learning, but the principles, stimulations, games and exercises are valid for all ages, as it is proven that we never stop learning.
I leave it to individual teachers to decide on teaching styles or methods, programming or objectives; I will limit myself to analyzing the basic disciplines and the prerequisites for this activity.
I will therefore try to deal singularly with each of the four circus disciplines in the following way:

- Description and contextualization of the circus discipline within the Educational Circus;
- Technical prerequisites and fundamental aspects;
- Implication and stimulation of the various sensory receptors;
- Analysis and implementation of the basic motor schemes for carrying out the discipline;
- Analysis and development of motor capacities related to the discipline.

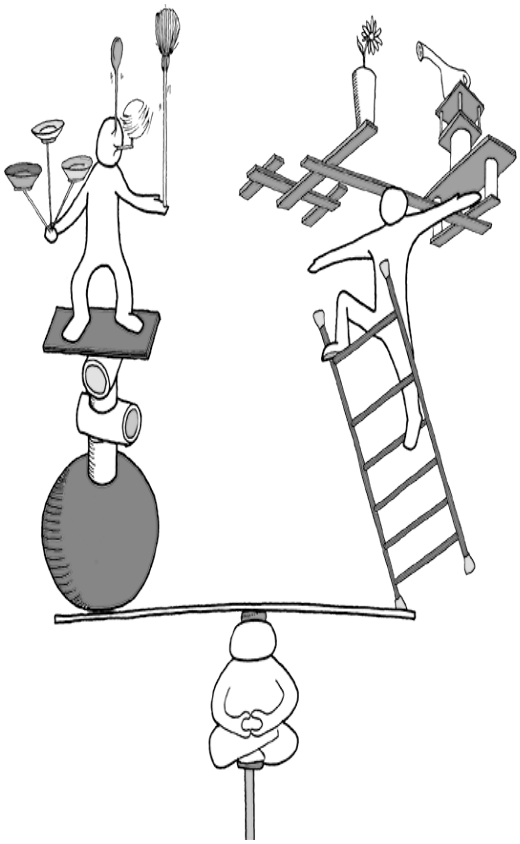
## *Exercises and Motor Games*

I have decided to propose numerous games and exercises all through this manual. I think this is useful for two reasons: formerly, to give concrete examples of how the concepts and theories reported in the text can be implemented; latterly, to provide those operators who need to expand their repertoire with suggestions for practical proposals.
All the practical proposals listed below have a decidedly analytical approach, that is, they are inserted in a very specific context to highlight or explain a specific topic; in reality, each physical activity involves various capacities and stimulates different cognitive aspects at the same time.
**Hence the proposed exercises work on the predominant component**; **this does not mean that the other capacities are not brought into play.**
Furthermore, this manual does not describe extremely detailed exercises or games; those that I will report in the following pages are mostly "sketches". I have deliberately omitted the detailed description of rules and variations in order not to overload this text with informationI do not consider fundamental, leaving the reader the chance to personalize my training route according to their intents . Therefore, please take the games and exercises you will find as creative *stimuli* and not as dogmas, still taking care not to distort the essence of the practical proposal.
It is also impossible to give clear guidelines in a work based on concrete prospectuses without knowing parameters of the real targeted group (age of the children, number of participants, workplace, purpose of the project...). If it is true that the concepts expressed in this book are across-the-board, **my goal is that of giving some hints that will be personally adapted to the various situations.**
The creation or adaptation of games and exercises are the daily bread of every Motor Activity teacher. At the end of the text, in the Appendix 1, I have inserted a paragraph

called “The generator of exercises and games”. It includes some guidelines that I often use to create new activities. The “generator” can be used as a creative training tool for operators or specifically in the drafting of a program aimed at predetermined objectives.
Happy reading and… have fun!

## Chapter 1.

# Balancing in the Educational Circus



### *1.1 Introduction to Balancing*

In the Italian Language Dictionary Sabatini-Coletti we find this definition of "Equilibrismo" ("Balancing"): "The set of balance games and the technique needed to perform them"[1]. Balancing is a motor skill and a scenic discipline. It carries a strong educational value: it educates us, in fact, to "listen to" and take care of our own body, its joint structures and muscle groups. It also helps to understand, respect and expand our limits by always putting ourselves in front of the management of our emotions through the assessment and acceptance of risk.

[1] From *Sabatini-Coletti. Dizionario della Lingua Italiana*, s.v. "Bilanciamento", on-line at the link https://dizionari.corriere.it/dizionario_italiano/E/equilibrismo.shtml (last access January 15th, 2021).

Balancing is a very broad discipline that includes and develops around the four types of equilibrium agreed upon in the world of motor activities, namely:

- Static balance;
- Dynamic balance;
- Balance in flight;
- Balance demanded.

and applies them to a large number of movements, objects and equipment.
All of the aforementioned types of balance share the same motor capacity, that is, **postural control or maintenance**. This term refers to the capacity to control the center of gravity and the position of the body segments in relation to the force of gravity; balance is therefore divided into four different types that perform four different actions.
In *Table 2* I sum up the types of balance in relation to the management of the center of gravity[2].

*Table 2. Types of equilibrium applied to the management of the center of mass.*

| **Typology** | **Capacity** |
|---|---|
| Static balance | Control of center of gravity within the support base (absence of movement) |
| Dynamic balance | Control of the center of gravity outside the support base (imbalance) during movement |
| Balance in flight | Control of the center of gravity in the aerial phase |
| Balance demanded | Control of the center of gravity of an object in relation to our body |

It is a fairly common mistake to consider Balancing a homogeneous discipline that develops solely around the use of large equipment; in reality by analyzing this discipline thoroughly, various sub-categories emerge that make it decidedly heterogeneous.
The variations of this discipline are given by the type of equipment used, or by the use of objects, or simply by the choice of movements performed only by the body of the tightrope walker.
In the following *Table 3* I sum up the various types of Balancing in the circus context based on the objects / equipment used.
To better understand this table it is essential to make a distinction between "equipment" and "objects".
By "Equipment" I mean all those equipment capable of supporting the weight of one or more balancers. There are countless pieces of balance equipment, some standard and others adapted or modified, but the first and main cataloguing that we can make of them is the one that divides them into:

- *Proprioceptive equipment*[3], that is, all that equipment that consist of an unstable base of support;
- *Non proprioceptive equipment*, i.e. equipment that restrict the support base but are stable in themselves.

[2] By "controlling the center of gravity" we mean direct control over the center of mass or its projection into space.
[3] See *Proprioceptive training*.

*Table 3. Types of Balancing act*[4].

| **Name** | **Subcategories of Balancing** |
|---|---|
| Balancing with proprioceptive tools | Slack rope, *rola bola*, walking globe, roller, unicycle, balance ladder, stilts |
| Balancing with non proprioceptive tools | Tight wire, Balance beam |
| Balancing with objects | Balancing, Contact juggling, Gyroscopic juggling |
| Free body Balancing | Verticalism, Attitude |

We must not confuse the proprioceptive work done by the human body to balance itself with the equipment used to produce its own stimulation. Human balancing is a process that is based on proprioceptive information from sensory receptors: this process occurs regardless of the type of equipment on which we balance.
The instability of the equipment is another factor which the tightrope walker must deal with. The specification of equipment rests upon the fact that some equipment are stable in themselves and therefore students are only engaged in the Balancing process of their own body, while others, unstable by nature, must be accommodated along with the aforementioned Balancing process.
It is not obvious that a proprioceptive equipment is more difficult than a non proprioceptive equipment: some tilting boards give decidedly mild *stimuli* to the nervous system compared to a taut line that is very stable but still requires a considerable capacity for balance to be covered. By "objects" instead I mean all those tools made to be manipulated. This is a distinction suitable for a general classification that however contains some exceptions: cigar boxes, for example, are juggling objects that at the same time can become Balancing equipment; a chair can be considered either an equipment tool or an ordinary object according to its use.
**We will therefore say that an equipment is something we can balance on while an object is a tool that we can keep in balance.**
*Table 3* shows how many elements of Balancing are included also in other disciplines as well as in Balancing properly; all through this chapter, however, we will only analyze balancing with equipment, as it appears to be the most widespread of the three categories of balancing and Educational Circus for the simplicity of prerequisites required to enact it and for its educational and motor value.
Anyway, it is important to say that the basics that will be described in this chapter are valid and useful for all types of Balancing when adequately adapted.

## *1.2 Approach to Balancing with Equipment*

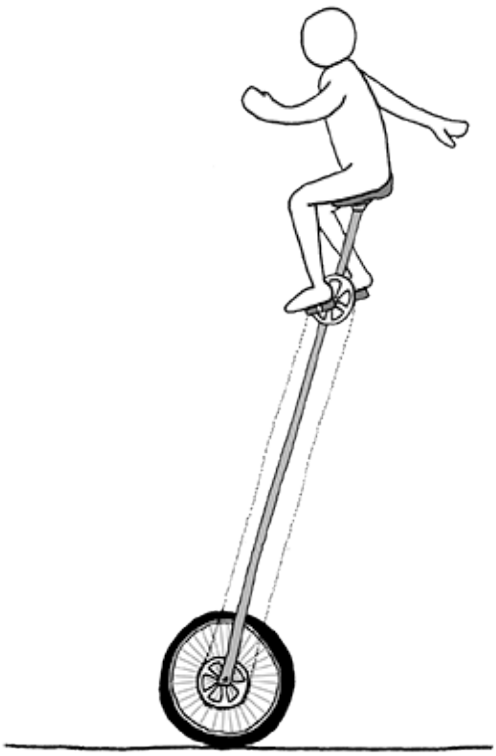
Before dealing with the aspects related to motor learning in Balancing with equipment, I consider it fundamental to talk about the basic features of this discipline that

[4] Movements that require maintaining the center of gravity within the support base in unusual postures can be considered "Balancing". In artistic gymnastics they are called "static", differentiating themselves from dynamic movements in which the maintenance of balance is a *conditio sine qua non* but the greatest difficulty lies in sequencing.

may seem secondary in the acquisition of the technique but are actually relevant in order to create a safe and learning-friendly environment.
Reminding that the main objective of this text is to create an educational path, I assert that education to this discipline passes through all the points described below.

*1.2.1 Safety in Balancing with equipment*
Preparing the space and work dedicated to Balancing requires specific attention and study for each piece of equipment.
It is important to say that safety culture affects the student's perception of safety and, therefore, affects their psychological state and consequently their learning processes: it is therefore necessary to pay close attention to this aspect.
First of all, there are two types of safety: Passive safety and Active safety.
The category of passive safety includes all the preventive measures about equipment and the environment, namely:

- *Arrangement of supports*. By "support" I mean a resistant structure capable of helping equilibrists to balance themselves in the first phase of learning; it is useful, in fact, to place some Balancing stations close to supports, also in order to facilitate the experimentation of the specific techniques of an object. The supports must be safe and arranged so as not to hinder the movements of the tightrope walker. Some examples of supports can be: holding the back used to stabilize a balance on the rola bola, a pole for the study of the pendulum with the unicycle, the sticks used to lean on the ground during a walk on the slack rope, etc.;
- *Removal or neutralization of structural hazards*. Not all spaces are suitable for Balancing or at least not for all equipment; it is important to pay attention, for example, to the sharp edges of columns or walls, to the presence of windows or glass doors, any holes in the floor or unprotected sports equipment such as baskets or volleyball nets. All of the aforementioned obstacles must be neutralized where possible, otherwise the activity must be adapted to the space by excluding all those tools that are unsafe; for instance, by choosing a rola bola or the tightrope instead of stilts or a unicycle;
- *Adequate choice and arrangement of safety or crash mats*. Crash mats



perform their protective function only if they are well chosen and well arranged. It is important to adapt the mats to the student's learning phase. For the first experiences of free Balancing with a rola bola, for example, tatami mats may not be enough: it is advisable to use crash mats at least 10 cm thick. Or, for the first tests of falling from stilts, a single Crash mat 40 cm thick and 1 meter by 2 meters in size, may not be sufficient as it requires a fairly precise fall; it is recommended to use one of 2 meters by 2 meters or, if this is not possible, to add two 10 cm thick crash mats to the sides of the 40 cm one;

- *Safe management of space between equipment stations*. It is important to prevent injuries due to the "domino" effect between stations; some objects such as unicycles, walking globes and pedal boats can escape the students' control and harmfully hit other equilibrists. An adequate distance between the stations is therefore recommended;
- *Control of the quality and state of wear of equipment*. To avoid sudden breakages, the equipment must be checked periodically both visually and manually, making sure, for example, that the axles of the rola bola have no cracks, that the pedals and the chain of the "giraffe" are intact and well adjusted or that the wire cable of a tightrope is not frayed.

Here we want to point out that, to reduce the costs of Balancing, many operators build the tools themselves. This practice can create some security problems; it would be better to make use of craftsmen and engineers who can certify the quality and strength of the tool created.

Active safety identifies all those actions aimed at preventing falls by the instructor or any responsible pupils and include:

- *Assistance during the learning phases*. By "assistance" we mean the direct physical aid of a teacher or another pupil to the tightrope walker. The assistance is used in the phases of Balancing without supports and is used to avoid falls in situations of severe imbalance. Those who have an assistance function must therefore position themselves at an appropriate distance without being in the collision direction of fall of the tightrope walker or of the equipment, prevent the students from potential imbalances and give support without interfering the work of seeking balance and also be prepared to hold the tightrope walker in the event of a sudden loss of control and consequent abrupt fall;
- *Control and management of order and discipline during work sessions*. Working in a chaotic and noisy environment does not facilitate the concentration of those who train and therefore does not facilitate their learning processes; it is therefore important to create and keep an atmosphere of tranquillity and silence during the work sessions. It is important to make the students understand that if two of them scream in a corner of the room, they might bother the whole working group;
- *Assessment in progress of the psycho-physical state of the students*. Emotional management is a very important aspect to consider when it comes to safety in Balancing (as described in the next paragraph) and it is also important to have an awareness of the current emotional state of the students to ensure they have a level of self control to prevent unexpected or impetuous actions;

- *Control of space and workstations' safety during training*. Even if the workstations are well spaced and secured at the beginning of the lesson, this does not mean that the situation remains the same throughout the training. Some students, for example, may lie down on crash mats in other stations thus endangering themselves and others, or some crash mats may be removed or moved; it is therefore important to check the safety of the environment while carrying out the work. It is also useful to accustom the students to walk away from the stations during training so as not to be accidentally hit by out of control equipment, creating special safe corridors of movement through the stations.

### *1.2.2 Emotional management of Balancing with equipment*

A teacher must also be aware of the emotional state of students and help them manage themselves when practicing Balancing.
The emotional effects on students tend to have a very broad spectrum, so much so that sometimes students experience feelings sometimes completely opposite from those of their fellows.
The high amount of adrenaline produced during Balancing exercises might create in the student a state of fear leading to performance anxiety (or "hyper-control states") that do not go well with the experimentation of physical instability due to discipline or that, on the contrary, can create states of euphoria that corrupt a proper evaluation of the personal capacities to accomplish the motor task, underestimating the risks of the situation in which they find themselves.
A good Educational Circus teacher must keep both aspects under control and manage them through a didactic progression that among other things should enhance the athletes' confidence, making them used to trial-and-error learning procedure. Improvisation is left to those with master levels only.
Balancing has, inherent in itself, a phase of risk from which no one can be exempt; during the study phase, you practice in a protected environment and with constant assistance in order to then slowly eliminate the safety elements and expose yourself more and more to the increasing difficulty of the exercise and the related consequences, that is, falls.
Only a meticulous and responsible learning path greatly reduces the physical risk which is constantly present in this discipline.

### *1.2.3 Preparation for Balancing with equipment*

*Types of propaedeutics*
The term "preparatory" in this context means "instructing first": it refers to the phase that works as an introduction to the study of a discipline. Propedeutics is a broad concept that includes several aspects: we can in fact split it into general and specific. The general propaedeutic treats all those aspects that concern Balancing in a non-specific way and creates basic capacities that facilitate the learning of all the equipment as it focuses on the prerequisites that all the equipment have in common. The general propaedeutic is divided into:

- Sensory stimulation;

- Development of special Coordination capacities;
- Development of Conditional capacities.

The specific preparatory course, on the other hand, focuses on the specific prerequisites and the preliminary capacities of each individual equipment with the aim of creating fertile ground for the study of specific techniques.
The specific preparatory course is divided into:

- Familiarization with the equipment;
- Facilitation strategies.

Since this is a text purely oriented to the general propaedeutic of circus disciplines as it is more linked to the concept of Educational Circus and less to the concept of specific technique and specialization, the aforementioned concepts will be explained in reverse order: the specific propaedeutics will be mentioned in the introductory phase during the presentation of the discipline, while the general preparatory will be described in detail in the body of the chapter.

*Familiarization with the equipment*
Before starting the actual didactic progression in Balancing with equipment, it is important to create playful-experiential moments in order to allow the student's nervous system to store as much information as possible about the physical properties of the equipment itself; this set of information will then be useful for fixing the movements whose schemes are already present in the subject's physical memory during the technical learning phases.
Weight, shape, aerodynamics, hardness, resistance and characteristics of the surface of the equipment are all very useful data that should already be present in students' memory before the direct approach to learning specific exercises: the lower the student's age, the more time to "play" with the concepts.
The types of games clearly vary according to the tools and the age group of the students. Here I propose some general activities.

Activity 1. *The genes*. Create small groups of students and arrange balancing equipment and any other objects in the center of the space, thus giving the students the task of assembling a fictional invention that includes as many Balancing equipment as possible. Machines, houses, spaceships, boats and so on can be assembled. It is important to find the time to let all the students show how their own creation works.

Activity 2. *The "conveyor roller"*. Three or more rollers are placed over the floor and a pupil will be invited to stretch out on top of them and will be rolled by moving the rollers. It is recommended to play the game on a tatami mat.

Activity 3. *Chariot race*. On special tatami lanes, children must move the pedal bike by placing their hands on the platforms, applying an alternating force from one platform to the other while moving in four-legged mode. Whoever finishes first wins.

Activity 4. *The catapult*. Each student is provided with a rola bola; pretending it is a catapult, the student will have to experiment with the various "propulsive" possibilities of the tool and launch the different objects found in the gym in various ways.

Activity 5. *The Slalom*. With cones, circles and benches we create an obstacle course that students have to travel around while pushing a walking globe; the course can be performed alone, in pairs

or small groups and the ball can be controlled with hands, feet or any other part of the body that is deemed as appropriate.

*Facilitation strategies*

The term "facilitation strategies" refers to all those strategies that aim to facilitate the learning of technical movements thanks to the constraint or slowdown of equipment. Facilitation differs from the phase of familiarization with the equipment as it has more specific purposes for preparing the actual technique; the facilitated exercises are therefore considered exercises in all respects.

Using a rola bola with the aid of a grip in the learning phase has to do more with safety than with facilitated movements, since the student has to really deal with the difficulty of Balancing as the apparatus reacts in a proper way. To facilitate a movement, we must slow it down enough to allow the nervous system to organize and manage the motor sequence before carrying it out at high speeds or in very complex Balancing situations.

Some examples of facilitated movements can be:

- Using a rola bola with the roller sunk into a crash mat to focus only on the movements of the board;
- Getting on and off a stationary or slowed walking globe;
- Trying the movements of the wire stretched on a rope fixed to the ground.

*Technical phases of Balancing with equipment*

Once we have experienced the propaedeutic with the equipment we can introduce the actual technical work. Clearly, any piece of the apparatus has unique and specific dynamics, but if we wanted to outline a technical approach common to most equipment, we can distinguish two main phases: the static phase and the dynamic phase.

The *static phase* is a real postural maintenance and the search for stabilization of the center of gravity in relation to the equipment we are on, without having to move it in space or move the body on the equipment in the case of the tightrope walker. The static phase is not a phase of stillness but of continuous research and maintenance of control of the body and center of gravity through postural adjustments.

The *dynamic phase* is characterized by the management of the imbalance that generates the movement. We can define the dynamic phase as the control and management of an imbalance of the body on the equipment or of the equipment itself for the purpose of moving. The dynamic phase is the evolution of the static one and is based on postural control linked to the speed of the desired movement; the greater the amount of the imbalance, the greater the displacement speed.

There is no doubt, therefore, that before exploring the dynamic phase we must become familiar with the static one. Approaching the dynamic phase before having consolidated the static one leads to an easy loss of control and therefore exposes the tightrope walker to a greater risk of injury or in any case to a less harmonious and functional movement.

We can insert the concepts expressed in the table relating to the types of Balancing, thus having a more complete image of the management of the center of gravity with respect to the use of the equipment (*Table 4*).

*Table 4. Types of balance applied to practice with equipment in the Educational Circus.*

| Typology | Action | Application |
|---|---|---|
| Static balance | Maintaining the center of gravity within the support base (absence of movement) | Static phase on equipment |
| Dynamic balance | Checking the center of gravity outside the support base (imbalance) during movement | Dynamic phase on equipment |
| Balance in flight | Control of body shape and therefore of the center of gravity in the aerial phase | Entry and exit phase of an implement. Stunts on or with tools. |
| Balance demanded | Control of the center of gravity of an object in relation to one's body | Combination of the previous three phases with one or more objects balanced on the body. |

## *1.3 Sensory analyzers in Balancing with equipments*

It is impossible to talk about motor activity without starting from the sensory basis. The "analyzers" are the first stage of elaboration of every environmental stimulus and therefore the basis of every programming of the reactions of an individual: without sensory information, conscious movement cannot exist. If there is no doubt that the functioning of the sensory system is the same for all human beings, at the same time, however, the quality and quantity of information transmitted by it are different from individual to individual, since it lays upon personal genetics.
The topic of sensory stimulation and learning has already been widely discussed and treated by countless experts in the sector; there are many texts about it, so I decided not to dwell further on the subject.
An important thing to emphasize, however, is that sensory stimulation is very important in the age of development but tends to be underestimated in adult individuals; on the contrary, numerous studies show that even after the developmental age, this stimulation remains important both for learning and for the functionality of the sensory systems themselves. **Regardless of the starting quality of a sensory system, an adequate work of targeted stimulations can definitely improve the capacities of an individual at any age.** It is therefore very useful for the student to understand and implement the capacities to make the most of sensory information to optimize the creation of effective and efficient movements.
As already mentioned at the beginning of this chapter, all types of Balancing are united by the skill to maintain posture; but let's deepen this topic starting from a clear terminological definition. In this context, the term "postural maintenance" means the capacity to maintain a desired position[5] for a certain period of time.
The balance and posture control system substantially coincide and correspond to the control of muscle tone, thus forming the postural tonic system. The task of the postural tonic system is to allow man postural stability, both in a static position and

[5] The difference between "position" and "posture" will be dealt with more specifically in the chapter dedicated to Physical Theater.

in movement, adapting to continuous environmental changes. To achieve these objectives the system avails itself with a complex net of resources:

- *Sensory receptors* (cutaneous exteroceptive and proprioceptive, visual, vestibular and auditory) that position the various parts of the body in relation to the whole and to the environment;
- *Higher centers* (vestibular nuclei, cerebellum, reticular formation or substance, cerebral cortex) that integrate and reprocess the data deriving from previous sources, combining cognitive and strategic processes;
- *Effectors* (oculomotor cranial nuclei from which the commands to the oculomotor muscles for visual stabilization depart, and the spinal cord from which the signals directed to the motor plates of the skeletal muscles for antigravity stability depart)[6].

Let us dwell only on the first stage that is that of the sensory receptors, and deepen the concept.

*1.3.1 Proprioception*

Let's start by treating proprioception as the first sensory afferent, as it is the main responsible for the perception of the body. Proprioception is a complex sensation given by various sensory receptors called proprioceptors; they are deep receptors and are given in four types:

- *Neuromuscular spindles*. Sensitive to stretching, they send information regarding the rapid change in muscle length that the muscle keeps after being stretched and its degree of tension;
- *Golgi tendon organs*. They are located at both ends of the fleshy part of the muscle at the transition between tendon and muscle. They are sensitive to both passive stretching and contraction and act as meters of muscle tension;
- *Joint receptors*. They are found in the joint capsules and are particularly sensitive to stretching due to changes in position, to variations in range, especially in the degrees of opening close to the joint limit;
- *Vestibular apparatus*. It is located in the ear and is composed of the saccule, utricle and labyrinth system; these sensory receptors send information to the central nervous system about the position of the body and its variations with respect to space.

Proprioceptive information informs the nervous system about the position and state of the body, essential elements for assuming and maintaining positions.

Proprioception is divided into conscious proprioceptive sensitivity which reaches the somatosensory cerebral cortex and non-conscious proprioceptive sensitivity which is instead addressed to the cerebellum.

Proprioception, as previously mentioned, can be "trained"; in practice it is possible to stimulate the sensory receptors and consequently the neurons connected to them and have as result a higher transmission speed, a better reception of the *stimuli* and a faster processing of the motor responses connected to them. To train proprioceptive

[6] For further details about Balancing see Giovanni Chetta's italian blog site, available online at the link: http://www.giovannichetta.it/equilibrismo.html

tion in an appropriate way, a special training called "proprioceptive training" was invented.
Proprioceptive training originates from the motor-rehabilitation sector and, in principle, was used to improve post-traumatic recovery. Only in recent years has the performance and preventive value of this type of training been noticed. The training is based on the use, as a support base, of equipment that create situations of instability programmed to stimulate and increase the Balancing capacity (mainly static) of the lower limbs. These equipment are called "boards" or "proprioceptive cushions" and, in recent years, an electronic proprioceptive board has also been created which has brought significant improvements to the accuracy of this type of training.
Specific proprioceptive equipment can be replaced if necessary with commonly used objects such as basketballs or sticks to be used in a gym as support bases for maintaining the person's upright position.
An additional level of difficulty can be given by the elimination of visual references, so much so that the attention is completely shifted to proprioceptive sensations.
Proprioceptive training is also very helpful for learning to manipulate non proprioceptive tools (see paragraph 1.1), whereas the other way around is of course not working: non proprioceptive equipment fail to give adequate *stimuli* in a proprioceptive training context.
Sometimes the difference between proprioceptive training and proper Balancing is very blurred, as proprioceptive training can be more complex than balancing itself.
It is therefore important to pay attention to the level of the students' Balancing capacities to create an adequate programming of *stimuli* and not choose random exercises; proprioceptive training is functional to Balancing only if used with a view to facilitating the acquisition of certain technical skills.
Training students on proprioceptive Equipment is useful for maintaining an upright position in everyday life, but if we want to focus this work on professional Balancing some examples are:

- Maintain the station erect on broomsticks resting on the ground (preparatory for the tight wire);
- Sit balanced on proprioceptive cushions (preparatory for the unicycle);
- Balancing an object on the body on a proprioceptive table (preparatory for Balancing);
- Bending on a proprioceptive table (preparatory for the handstand).

### *1.3.2 Vestibular apparatus*

The vestibular apparatus is a part of the inner ear which, instead of providing auditory information, provides information on the position and movement of the body on the three planes; in fact it is to all effects a proprioceptor. Undoubtedly, proprioceptive training stimulates this system in a functional way but there are specific training methods to strengthen this apparatus or to rehabilitate it after trauma; this specific gymnastics is called "vestibular rehabilitation"[7]. The vestibular apparatus is closely

[7] C. Vicini, D. Alpini, P. Vannucchi, *Manuale pratico di riabilitazione vestibolare*, F & F Parretti graphics, Firenze 1989.

linked with the visual apparatus, so much so that the information of both systems is integrated by the nervous system to have a more complete perception of movement in space. For this reason, exercises relating to the vestibular apparatus are normally performed first with open eyes and then with closed eyes[8]. The same rehabilitation exercises can be used as a starting point to create exercises to improve the efficiency of the nervous system during balance activities. Let's take some examples:

- Rotate the head quickly from right to left keeping a fixed point with the gaze and then repeat with closed eyes;
- Quickly move from sitting to lying position looking at a fixed point then perform the movement with eyes closed;
- Perform rotations on the longitudinal axis (pirouettes) finding with your eyes, at each turn, a predetermined fixed point, then perform them with your eyes closed.

*1.3.3 Touch*

The tactile perception of the body is given by four skin receptors and more precisely by the following:

- *Meissner corpuscles*. They are the most common superficial receptors present on the hairless skin. They are therefore involved in the reception of fine motion, as well as in the transmission of the smallest perceptible irregularities of the surface of an object;
- *Corpuscles of Pacini*. They are located in the subcutaneous tissues. They are receptors equipped with a capsule in concentric layers and are responsible for the perception of vibration and the shape of objects;
- *Corpuscles (or discs) of Merkel*. They are arranged superficially just under the epidermis. They are mainly present in the hands and lips. They are responsible for recognizing the shape and edges of objects placed on the skin;
- *Corpuscles of Ruffini*. They are located in the deep skin. They have a fusiform shape and are able to register the tension that develops as a result of the movements of the fingers and limbs.

The sense of touch gives us a lot of information on the relationship between the body and contact surfaces such as, for example, the sensation of resistance of water or air during movement and all the information of fine discrimination of the objects we use. In Balancing, touch mainly provides sensory information relating to the contact and distribution of our body weight with respect to the surface of the object / equipment used, and this is fundamental for control. Usually in Balancing with equipment this contact occurs through the feet; it is therefore advisable to focus as much as possible on stimulating their skin. This does not exclude that in certain situations we may be interested in stimulating other body surfaces, but we remain focused on the concept that in this case it is the feet that control stability. We can stimulate the feet in the following ways:

- Walking on different surfaces (hard, soft, rough, smooth or irregular) better if barefoot or with socks;

[8] All exercises must be performed in the absence of dizziness, if the phenomenon appears during the execution, the student must stop and wait for the symptom to disappear.

- Massaging them before workouts;
- Walking on ropes or small objects resting on the ground.

*1.3.4 Vision and motion control*

The global vision is given by the integration of two visual systems, the focal and the environmental (or peripheral), both of which are very important for the control of movement. By "focal vision" we mean the precision vision we use to read, to aim or to capture a detail; if we relate it to everyday life, focal vision answers the question "What is it?" an object. The "environmental vision" is very important for the direction and control of movement, because it gives us our position in space[9]. It is that vision that allows us to drive straight while we read a sign, to use a mobile phone while walking and to have a visual attention to the dangers while taking another action. If we relate it to daily life, peripheral vision answers the question "Where is it?" an object. Sight is a very useful but not essential sense for balance; let us now try to explain the relationship between these two concepts. During the learning phase of the various Balancing exercises we use as much visual information as possible; to help us manage the difficult relationship between body / center of gravity / space we especially use focal vision to "anchor" ourselves to reference points in space to improve our process of Balancing. Once we have acquired a skill, we can "relax" and free our focal vision by using only the peripheral vision to maintain the spatial references necessary to control movement.

We can therefore say that vision is a perception that helps us to balance ourselves in the most complex situations and its lack makes movements more difficult -which would also be trivial to carry out. In *Table 5* I have schematized the relationship between the use of sight and the learning phases.

*Table 5. The vision and learning phases.*

| **Evolution stage** | **Type of vision applied** |
|---|---|
| Learning phase | Focal and peripheral vision |
| Control phase | Peripheral vision |
| Mastery phase | (Possibility of) exclusion of the visual system |

We will return several times in this book to sight and its implications for motion control; later I will provide you with some exercises and contextualize them based on the topics covered.

*1.3.5 Body scheme*

The body schema is a concept expressed in 1905 by Pierre Bonnier who defines it thus "The body schema is the mental representation of the body as a spatial entity, constituted on the cognitive basis of the sensations coming from the body itself"[10].

[9] Focal vision is in fact considered part of proprioception.

[10] Quoted in *Classic Cases in Neuropsychology*, Volume 2, edited by C. Code, Y. Joanette, C.-W. Wallesch, A. Roch Lecours, Taylor & Francis, Abington (Regno Unito): 2002.

Later, Le Boulch[11] also deepened the discussion, charting the stages of the development of the body scheme as shown in *Table 6*.

*Table 6. Phases of the structuring of the body schema.*

| | | |
|---|---|---|
| Period of the body lived | 0 to 6 months | In it, the child expresses himself "motorically "through his own body, which "feels" mainly thanks to stimulations coming from the outside world. The motility is reflex and the child is totally dependent on the parent. |
| Period of the perceived body | From 6 months to 3 years | Through the exploration of his own body and that of the parent, the child begins the process of differentiation between himself and the other. The child, in fact, is unable to appreciate relationships of distances and shapes but can, to a limited extent, establish relationships above, below, to the side, inside, outside, around (all this is the result of an adequate and partial spatial-temporal structuring). These experiences are lived in the light of learning by trial and error. The objects, if small in size, are known through manipulation and oral contact, if instead of an open form they are explored and known through the introduction of the fingers. Towards the age of 3, with the emergence of the symbolic function, a rudimentary form of mental representation of an action develops ,that can be useful or motivating. This allows the child to move from a type of learning by trial and error to insight (lightning solution). |
| Period of the perceived body | From 3 to 6 years | For the child, this is a period of transition and preparation for life. It is characterized by the predominance of sensory structures which supply verbal recognition of the perceived body. In this phase the child detaches himself from the egocentric vision of the world in which his body was everything, the universal reference point through which every impression was experienced in an emotional way. Now the child, thanks to the dominance of the now mature sensory structures, brings into play the internalization function (that will allow the child to imitate) which together with the perception of their own body and its different parts constitutes an important stage for a first grasp of self-consciousness. In this period we will take care to act above all on the space-time structure that is developing during this period. The child begins to correctly perceive the shape and size of objects but is still far from a correct view of the relationship between mass, volume and weight. The social phase is still very immature and the child tends to prefer individual activities, they are not ready to assimilate large and complex regulations and the experimentation phase predominates. |
| Period of the represented body | Over 6 years | The child has reached a completely decentralized worldview, thus passing from an egocentric to a heterocentric reference;he can project on others and on objects the concept of left and right which is one of the most difficult concepts to live.The most characterizing aspect of this phase is accommodation with mental representation. By the age of 8 the child will have a greater predisposition for rules and team play. Towards the age of 10 they will gain a correct thinking about weight and towards the 12 they will take account of the volume of objects. |

[11] Reworked version from A. Cavaliere, available online at the link: https://www.neuropsicomotricista.it/argomenti/580-tesi-di-laurea/la-psicomotricita-come-unione/2760-lo-schema-corporeo.html [2014] (last access January 14th, 2021).

The body scheme in its most evolved phase can therefore be defined as the integration of the various sensory afferents (located in the right parietal cortex, which includes Broadman's areas 5, 7, 39 and 40) at a conscious level. In other words, the body scheme is the synaesthetic integration of all the previously mentioned sensory afferents, designed to create a mental representation of ourselves indispensable in programming motor sequences. We must not think of the body scheme and movements as they were two separate concepts. Even if the body scheme is indispensable for organizing the movements, at the same time it is thanks to the movements themselves that the body scheme is structured; psycho-motor development is a continuous circle of sensation / perception / organization / execution / feedback / learning, where sensations are perceived basing on the current state of consciousness of the subject. Schilder describes the evolution of the body scheme in this way:

> "Through continuous modifications of our position, we continuously build a postural model of ourselves that is in constant evolution; each new posture or movement is recorded on this plastic pattern, and cortical activity correlates it to each new group of sensations evoked by postural alterations. As soon as the relation is complete, immediate recognition of the posture ensues"[12].

The structuring of the body scheme is a natural and automatic process in the human being, but it can still be helped through specific *stimuli*. All those works that bring the attention and therefore the consciousness of the subject to their own body rather than to external *stimuli* point to this; in reality most of the exercises contained in this volume do so, especially those related to proprioceptive afferents. All those works of representation of oneself that are carried out by the teachers of the nursery school, such as "lie down on the ground and have your own shape drawn" or "dip your hands in tempera and draw with your fingers or palms of hands, are used to structure the body scheme", "look in the mirror and take a portrait" and so on. Since the body scheme is the basis of movement planning, it is superfluous to reiterate its importance in Balancing and the need for work that aims at its overall development. What I find quite interesting is to propose specific exercises that efficiently support the technical bases of this discipline. I think that Balancing requires a general use of the body scheme with regards to the concept of "holding and controlling the center of gravity" and, specifically, awareness of the influence of body segments in the variations of postures' balance.

Activity 6. *The human Jenga*. The students balance on one leg and experiment with the possible variations of attitude trying to never go out of balance. We ask the students balanced on the right leg what happens if they raise the left leg laterally? They can hold the position with muscle strength or balance with the torso or with an arm ... And if I balance with the right arm what happens? What if I help myself by crossing my left arm too? And so on.

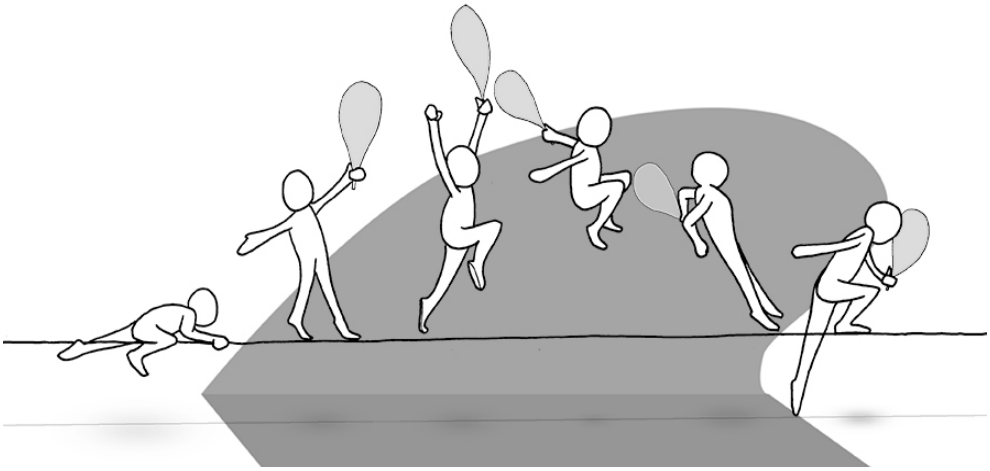
Activity 7. *The Vectors*. We ask the students to imagine vectors that start from their body, like threads that pull them from specific parts of the body such as from the hip or chin. Even though the tendency of the boys is to carry out the exercise simulating large tugs with the wires, I prefer to work on minimum forces that the students support in a constant walk with slight "out-of-

[12] P. Schilder, *Immagine di sè e Schema Corporeo*, Pgreco edition, Milan: 2019.

balance" due to postural alterations (this is the concept of "Out-of-balance" that distinguishes this exercise from the exercise provided for postures in Physical Theater).
Activity 8. *The Vectors 2*. We make the students lie down on the ground and ask them to roll slowly by starting the movement alternately from the pelvis, upper limbs and lower limbs.

Another interesting aspect related to the body schema emerged during studies on monkeys and multimodal neurons. In 1996 it was demonstrated by Ikiri that the multimodal neurons of the monkey's parietal cortex, sensitive to tactile *stimuli* in the animal's right hand and to visual *stimuli* in the peri-hand space, significantly changed their response properties following prolonged use of a tool[13]. In other words, this discovery translates in a neuro-physiological way what we commonly mean by "integrating an object" into our body scheme. This is just a hint of the vast field of study concerning the body schema. There are many specific and detailed texts treating this subject that you can find either in bookstores or on the web.

## *1.4 Development of motor schemes associated with Balancing with equipment*



### *1.4.1 The global motor schemes*

The "global motor patterns", more commonly called "basic motor patterns", are complex movements that involve multiple bone segments and vary the position of the body in space. They are considered the "driving bricks" with which the most complex motor actions[14] are built; they can also be defined as the spontaneous movements

[13] A. Ikiri, *Tools for the Body (schema),* 1996, in "Article in Trends in Cognitive Sciences" March 2004, DOI: 10.1016/j.tics.2003.12.008.

[14] Motor action is, indeed, the expression of each individual's developmental level of motor control (F. Sgrò, *Edu-exergames, I*, Franco Angeli, Milan: 2014).

that every human being has in their specific genetic background of the evolution of our race, at least in their raw form. They can be refined and evolved through various training methods. In the entire volume I will deal with all recognized motor patterns, but in this section I have decided to point the attention on the motor patterns most directly connected to Balancing.

### *1.4.2 Walking*

Walking is undoubtedly the motor pattern most practiced by the human being in general, and it appears to be a pattern of fundamental importance also in Balancing. If we analyze in detail the structure of this cyclical movement, we will see that it is made up of alternating phases of weight transitions from one limb to another without ever losing contact with the ground. This suitably adapted movement appears to be the technical basis of most balance tools; it is therefore essential to dissect it well without taking it for granted. In fact, it may happen that, especially when working on balance equipment such as a beam or tight wire, shortcomings emerge in the scheme as soon as we reduce the support base or change the rhythm of the practitioner. A good work on walking skills, especially in the Nursery and Primary Schools range, should prevent these problems and give some confidence in the control of the self on equipment.

Activity 9. *The Bassoon Witch*. It is the classic game of catcher yet performed with bean bags (or diablo in the more complex version) kept balanced on the head[15]. The witch / sorcerer must touch the other players by paralyzing them. If players drop the bean bag they are considered frozen until another player places the bean bag back on their head. If the witch / sorcerer drops their bean bag, they are all free.

Activity 10. *The various supports of the foot*. In this exercise, we ask the students to walk using alternatively the various parts of the foot, namely the heel, the inside edge and the outside edge of the foot. The alternation of the foot rests is an excellent variation of the motor pattern that helps to strengthen the joint and thus prevent injuries.

Activity 11. *Walking in slow motion*. More commonly known as slow motion, it is also widely used in the world of physical expression for its comic potential but, on a motor level, it is a very effective tool for strengthening and proprioception. Slow movements require a high dose of attention to be controlled and "slow force" to be performed; they help to create a clear ideomotor image of the movement and all the steps on one leg playfully train the practitioner's monopodalic balance.

### *1.4.3 Running*

Running is relatively little correlated with balance equipment, as the running movement is carried out on very few pieces of equipment and above all at a very high level of mastery. The important aspect of this motor scheme for Balancing at the pedagogical level is mainly the muscularization. Muscularization is used to strength-

[15] If we place the object on the head of a student, we work on maintaining the latter's upright posture during the Balancing phases required by walking. This activity is often employed by balance teachers when they ask their students to stand straight as if a thread were pulling them from above; the object on the head makes this visualization a perception.

en leg muscles with natural load: leg muscles are the main muscle groups used for controlling the tools. Running can also be used to train the general resistance of the students, but this concept will be discussed later in this Chapter (*Development of Conditional motor capacities in Balancing with equipment*). The exercises dedicated to running will not only be aimed at Balancing but also at strengthening the student. For example through the:

- Running on confined surfaces or in confined spaces;
- Running with a partner who holds us by the pelvis;
- Run in place on top of a crash mat.

*1.4.4 Jumping and landing*

The motor pattern of jumping and landing is twofold. It focuses on the use of the lower limbs to counteract the force of gravity, both in the propulsive phase (which creates the detachment from the support surface) and in the damping phase of the force-weight (during landing). Even this motor pattern, like running after all, is partially correlated with the Balancing act of the Educational Circus, as the techniques of jumping and / or landing on equipment are considered a medium / high level and require targeted preparation, while the significance of Conditional training of the lower limbs is an excellent reason to practice the scheme extensively. In the context of the Educational Circus, the capacity to land takes a more important role than jumping, as it is often used for the exit from different equipment or as a recovery maneuver for an imbalance. Training on the landing helps to increase safety in managing any problems related to the use of equipment and the loss of balance in situations above ground level; a good landing skill is therefore considered a prerequisite for Balancing. In the perspective just described, even if landing occurs more often than jumping, it doesn't make too much sense to train the two movements separately; it is better to practice both within the same exercise.

For the development of the jumping and landing scheme, I then recommend the following activity:

- Jump up and down and land on soft and unstable surfaces.
- Jump up and down and land from varying heights;
- Jump up and down and land on confined surfaces;

## *1.5 Motor capacities*

What is a motor capacity? In common language, "capacity" means "being able to do something", but in the motor environment, more precisely, it can be said that capacities are the set of psycho-physical characteristics that allow learning, execution and the control of voluntary movements. Motor capacities are divided into two main categories: Conditional capacities and Coordination capacities. As can be easily understood from the names, the first, the Conditional ones, are motor capacities related to the metabolic state of the subject and its energy production mechanisms. They are four and more precisely:

- Strength capacity;

- Endurance capacity;
- Speed capacity;
- Flexibility capacity[16].

Coordinative motor capacities, on the other hand, are linked to the qualitative aspect of movement and its efficiency, to the nervous system and its maturation and are divided into general and special.
General Coordination capacities are directly related to the movement to be acquired. They are three and more precisely:

- Learning capacity;
- Control capacity;
- Adapting capacity.

Special Coordination capacities, on the other hand, are linked to the prerequisites that make a subject able to learn new movements. They are seven and more exactly:

- Coupling and combination capacity;
- Kinesthetic differentiation capacity;
- Balance capacity;
- Space / time orientation capacity;
- Rhythm capacity;
- Motor reaction capacity;
- Motor transformation capacity.

Even if they are reported divided into groups and sub-categories, **motor capacities are all interconnected with each other and difficult to hop up separately**. In fact, when we talk about training the capacity to balance for example, we mean that the aforementioned capacity is the one most stimulated by a certain exercise; during the work, however, surely other capacity will be called into question and therefore solicited.
In this volume, as far as Coordination capacities are concerned, I will analyze only the seven special capacities as they are more transferable than the general learning of movements and contextualize them in the four disciplines of the Educational Circus, trying to create a broad adaptive and functional motor base, capable to support students in a broader and more consistent learning process.

### *1.5.1 Differences between motor capacities and motor skills*

Before facing motor capacities issues as exploited in Educational Circus, I think it is right to make a clarification on a topic that can often be nebulous: what is the difference between motor capacities and motor skills?
As we have seen, a motor capacity consists in being able to learn, control and adapt a movement, while a motor skill consists in acting out the movement effectively taking

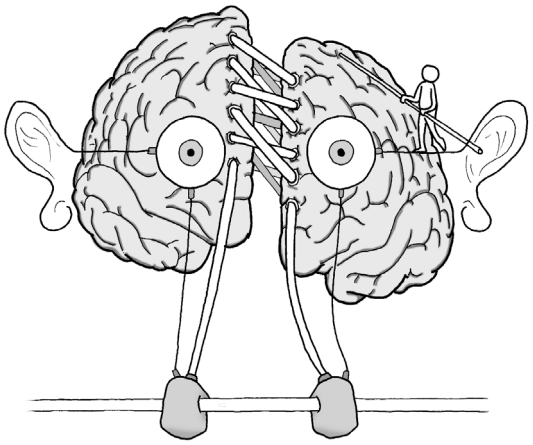
[16] The latter is discussed by different schools of thought; some authors do not include "joint mobility" in Coordination capacities but in the body's innate structural factors. We prefer instead to put it in the list of capacities as we believe that all capacities are at the same time innate and trainable (including joint mobility); the only difference is that it has a smaller range of trainability and improvement and is much more connected to development stages than the others.

environment and occurring circumstances into account, in order to optimize performance.
A motor skill is mainly based on a motor capacity, which yet is not its only constitutive dimension. An expressed skill is in fact the result of several factors at play – such as experience, the assessment of the situation and the choice of the best strategy – and of different capacities that go beyond the motor field – such as attention focus and emotion control.
We can therefore say that there is no skill without capacity but capacity alone does not make the skill!
The distinction between capacity and skill can be well illustrated by the expression "... yet I could at home": you will surely have attended or lived firsthand the experience of being able to perfectly perform a certain technique at home, and not being able to maintain the same quality of performance when environmental parameters vary (for example, inserting the presence of an audience); performance anxiety is the most classic example of worsening of technical skills due to a lack of emotional state control.
The development of a motor skill is undoubtedly very complex compared to that of a motor capacity and goes beyond the mere study of the technical prerequisites or the sensory and cognitive systems related to the acquisition of movements.
In this text I focus solely on capacities improvement and not on skills.

## *1.6 Development of Coordination capacities in Balancing with equipment*

### *1.6.1 Coupling and combining*

The two together go under the tag of "sequencing capacity", as it allows to effectively integrate various global or partial movements into a single motor action. The capacity to link and combine is very important for learning new movements, and for integrating them into pre-existing motor sequences; it is linked to the analysis of internal and external sensory *stimuli* and is influenced by the timing or rhythm of movement and kinesthetic differentiation. This capacity must be stimulated in a general way to help students learn new movements or specifically to consolidate already acquired movements. We continue with the assumption that it is the lower limbs that manage the Balancing tools, so the exercises I propose are dedicated to them. To stimulate the skill to link and combine the lower limbs in a general way we can use exercises such as the following.



Activity 12. *The crazy race*. Ask the students to run alternating three skip steps and three kick steps.

Activity 13. *The chalk run*. Students will have to pretend to have one leg in plaster and one normal; in this condition they will have to run as fast as possible for distance; at the teacher's command, magically, the leg in plaster returns to normal but ... the other one breaks!

Activity 14. *The game of the Bell*. The player must jump landing on numbers from "1" to "10" alternating mono- and bipodalic landing. While for the sequencing stimulus we have to focus specifically on a movement related to a tool that we want to improve and therefore propose: Repetitions of the movement several times until reaching a good control phase; Vary different parameters of the movement such as the speed of execution or the parameters of strength or any sensory perceptions.

Let's take an example: we want one of our students to bring a number of *rola bola* to the Christmas show. The child is seven years old and has just enrolled in the Circus course, so we decide, given the short period available, that his number will consist of an ascent and maintenance of balance for ten seconds and a descent. Starting from the assumption that the child is motivated, psychologically ready and with good motor skills, I begin to describe the technical preparation phase, assuming that I have already made the student play and have adequately stimulated his motor patterns and their Coordination capacites in an exhaustive manner. I start preparing for the technical phase by checking their posture and their capacity to balance through the use of simple proprioceptive equipment such as a tilting board or a proprioceptive pillow. Then I present the specific equipment (the *rola bola*) through exercises or games in order to make the child aware of the purely mechanical aspects of the table and the roller that make up the *rola bola*. Then I set up a safe place (a tatami mat under the roller and two 20 cm crash mats, one on each side of the child) and provide direct assistance (I put myself in front of the student to help them with my hands in the Balancing process) in the learning of the movement of ascent, maintenance and descent from the object. Gradually I decrease the aids, so I switch from active personal assistance to a chair, and when I realize that the student has good control, I first remove the chair then the side crash mats, leaving only the tatami. At this point, I reposition the side crash mats and start to vary the executive parameters as much as possible; for example, I use rollers of different diameters or boards of different lengths, ask the student to increase or shorten the distance between the feet, etc. I can also ask the student to perform actions with the upper limbs such as throwing and catching a ball or completely exclude them from the stabilization process by taking, for example, an arms crossed position.
After these activities I go back to check the execution of the basic routine that was my goal for the Christmas show and I'm sure I will notice improvements!

### *1.6.2 Kinesthetic differentiation capacity*

Kinesthetic differentiation is the capacity to perceive and use muscle tone in order to achieve the eutony of a movement; this skill involves the contraction and decontraction of the synergistic and antagonist muscles as well as that of the districts mainly responsible for action (agonists). This type of discrimination is based on kinesthetic

sensitivity, given by different types of proprioceptive sensory analyzers. All Balancing equipment requires the maintenance of a posture guaranteed by the use of a correct postural or functional tone in the appropriate muscle areas. The trunk and neck are normally employed in postural control, the lower limbs in controlling the balance equipment and the upper limbs in maintaining balance, especially during the learning phase[17]. The specific exercises of kinesthetic differentiation adapted to Balancing focus on maintaining a position with the torso and on a fluid movement of the lower limbs; we can therefore propose exercises such as the following.

Activity 15. *Doctor Bad and Doctor Good*. It is a catcher game where Doctor Bad touches the participants by plastering the touched part and Doctor Good instead heals it. In this chase game the participants are never frozen completely, they are only limited in movement; it may happen that a participant has to move with both legs in a cast, but still can continue to move and try to reach Doctor Good.

Activity 16. *The candle*. In the position of the "candle" (preferably with the arms stabilizing on the ground and not with the hands resting on the hips) the students are invited to pedal with the lower limbs;

Activity 17. *The waiter*. Students must carry an object in balance with the upper limbs (a flower stick held on the back of the hands or a diablo resting on a folder, etc.) while they move within the space either walking, running, jumping or running a gymnastics.

*1.6.3 Balance capacity*

Having analyzed all the various elements that make up the capacity of Balancing separately, in this paragraph I think it is useful to refer to the capacity to balance in the more physical meaning of the term, therefore to the ratio of center of mass and support base.

There is a state of equilibrium when the perpendicular drawn from the center of mass falls into the support base; therefore, if we want to improve the capacity to manage this phenomenon, it is advisable to work on the three elements that compose it: decrease in sensory afferents, raising the center of gravity and reducing the support base.

In reducing the support base, we are obliged to decrease the oscillations of the center of gravity if we do not want to find ourselves in a situation of imbalance, therefore the repetition of usual motor gestures such as walking, running or jumping on increasingly narrow surfaces is a training factor. To raise the center of gravity it is necessary to gradually raise the tools with respect to the ground level (always remaining within the maximum safety parameters). A gradual experimentation of height affects the management of the subject's fear during its balance. Some exercises designed to stimulate the skill to balance can therefore be:

- Walk with your eyes closed;
- Walking on a row of chairs / stools;
- Walk on Bauman supports[18].

[17] The exclusion of the upper limbs in the Balancing process is a "marker" of mastery.

[18] The Bauman supports are specific multipurpose tools for physical education.

*1.6.4 Space / time orientation capacity*

The capacity to orient space / time consists in processing the sensations deriving from sensory analyzers relating to the dimensions of space and time to orient the body and its movements. The concept of space / time is definitively linked to perceptions; if physically space is unquestionable, as it has a physical objective "size", our perception of it and our way of relating to it are undoubtedly personal. In balance this skill has a dual function: that of quickly finding points of reference to stabilize the body and that of directing the movement. We have already explained in the paragraph on visual analyzers the importance of focal vision and reference points. Here we list some games that help develop the capacity to find reference points.

Activity 18. *One, two, three and four*. Four reference points are set in the gym, one on each side and matched to a number (for example, "one" the entrance door, "two" a window, "three" a basket and "four" a back wall). It is then proposed to the students chaotic activity such as running freely, dancing, jumping, etc. As soon as the teacher calls a number, all the students interrupt the activity and fix the object connected to it.

Activity 19. *The compass*. During the warm-up phase, the students stand still in the center of the room and indicate, without moving their feet, the four corners of the ceiling with various parts of the body such as elbows, nose or shoulders.

Activity 20. *Sixth sense*. The students move with their eyes closed in the space with background music, when the music ends they all stop with their eyes closed; at that moment the teacher will ask the group to indicate a reference point, for example the entrance door.

The direction of movement makes the difference between moving randomly in space or finalizing a move to go towards a goal; the destination of the movement helps maintain the movement. During the dynamic phase of using Balancing equipment, it is important to set a point of arrival or a reference direction and establish a clear trajectory to reach one's goal. Traveling along a pre-established trajectory helps the Balancing process avoid unnecessary and chaotic movements that disperse the kinetic force and disturb the rhythm of the movement. We can say that the direction of movement gives stability to the dynamic phase as much as the reference points do in the static phase. Here are some examples of exercises to increase the sense of movement direction.

Activity 21. *The wall tap*. The students form a circle in the center of the gym, then the teacher says the number of walls that they will have to touch. At the "go" signal, the students have to perform the task and then return to the centein the shortest possible timer . The game can be varied by changing the anatomical part that touches the wall if we want to further stimulate the structuring of the body scheme.

Activity 22. *Pac-Man Tackle*. It is a very normal game of the catch that takes place by running only on the lines of the various "fields" drawn on the floor of the gym. Both the "wolf" and the "prey" can move using only those paths.

Activity 23. *Witch commands colour*. It is a "chase game" in which all the students start in a defined area (for example the circle of the basketball court in the middle of the gym) and the "wolf" that is a few meters from them calls a colour present in the gym. As soon as the colour is pronounced, the "catcher" starts and only those who find and touch the colour can consider themselves safe.

*1.6.5 Rhythm capacity*

Rhythm in the motor field can be defined either as the organization of movements along a timeline, or the capacity to insert movements into a pre-existing rhythmic structure. In Balancing the rhythm of the movements of the lower limbs manages the dynamic phase of all equipment and also the static phase of some of them. Keeping the movement rhythmic helps to conserve energy and prevents loss of control. During the learning phase in the use of equipment it is recommended to use a temporal rhythmic scan to be combined with motor acts before and, later, during the experimentation of balance. The rhythm can be punctuated by an instrument such as a tambourine or by the voice or by body sounds such as the clapping of the hands or the snap of the fingers or, finally, by a rhythm appropriated to the movement to which it is combined. It is recommended to work on the rhythm in the protected phase of learning when the students are still leaning on the supports or supported by an assistant in order to get a clear idea of the rhythmic basis of the movement before moving on to the actual Balancing phase. To stimulate the rhythm with the lower limbs we can propose exercises like the following.

Activity 24. *The Military March*. Marching like soldiers in a playful way, the students line up and follow the captain by imitating his walk or arm movements (paying attention to the continuous rhythm of the lower limbs).

Activity 25. *The Tandem*. Two students lay down on their backs with their legs bent and feet in contact, pedalling simultaneously.

Activity 26. *The Metronome*. In a circle the students mark each the same rhythm by alternately beating their feet on the ground; contemporarily, they can play other games such as freely passing a ball or other objects employing the upper limbs.

*1.6.6 Motor transformation capacity*

Motor transformation is the capacity that gives mastery in a discipline and is stimulated by creating unpredictable situations to which the subject must adapt without losing control of the equipment. It is very important to train it **only after having acquired the capacity to control movements** and it is an excellent method to consolidate basic techniques. Stimulating motor transformation on Balancing equipment can be dangerous even for experienced students, so I recommend using all possible precautions to avoid accidents and injuries. So it can be providential to reintroduce the use of crash mats or tatamis or equip students with skateboard protections such as helmets, knee pads and reinforced wristbands to support them in possible falls. Motor transformation can also be understood as the very last step before an actual performance: this is a very delicate phase of learning and it is normally the last safe stage of experimentation before working in unprotected environments. Some examples of exercises designed to stimulate motor transformation can be:

- Routes with variable surfaces (hard, soft, smooth, rough or irregular);
- Classic sports on equipment (basketball on unicycles, football on stilts);
- Unbalancing games on balance equipment (combat on unicycles).

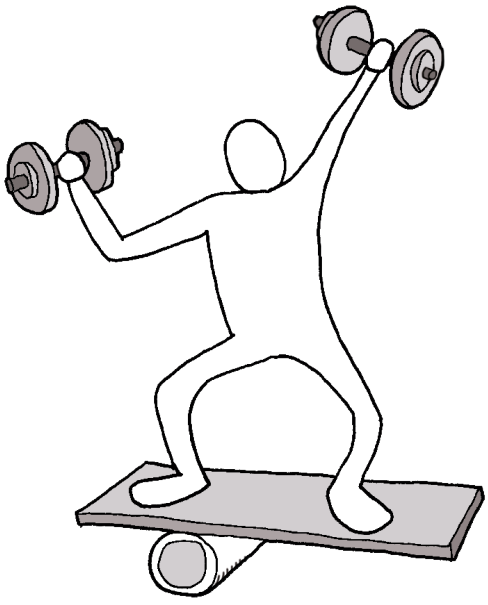
## *1.7 Development of Conditional capacities in Balancing with equipment*

First of all we state once again that the Educational Circus does not aim to improve technical performance but the didactic processes related to motor activity.
However, this does not exclude the study of the Conditional capacities linked to the specific circus disciplines observed. Physical work such as that required by Balancing should be supported by adequate physical preparation even in the age of development.
We will therefore highlight the minimum requirements to approach this physical activity in an appropriate manner.

### *1.7.1 Strength and postural tone*

So let's talk about the musculature in relation to Balancing. It is not a discipline that requires specific muscle strength capacity, but rather a high level of postural tone.
The postural tone is given by the antigravity or tonic musculature.
The postural or antigravity muscles include a very large number of muscle groups united by a similar composition of fibers, and are all muscles with a slow contractile capacity; also, they can put up very well with effort and have a mainly aerobic metabolism.
Among the numerous postural muscles there are some that manage the center of the body, that is the abdominal and lumbar fascia, and are grouped in the so-called "core" that in English means 'nucleus, center' (but in this case it can be interpreted as 'center').
The *core* is mainly composed by the following muscles:

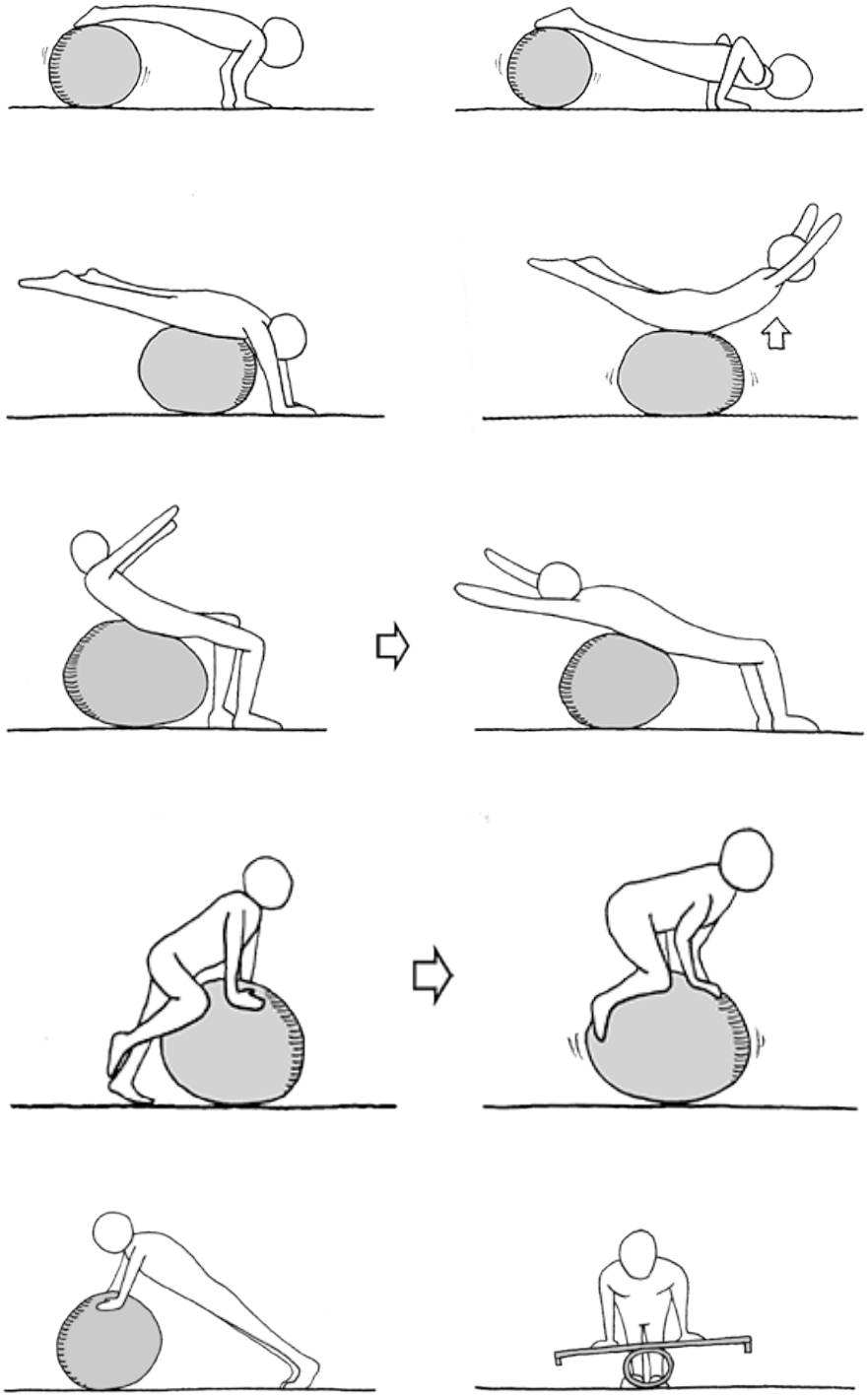
- Rectus abdominis;
- Oblique abdominals;
- Transverse of the abdomen;
- Quadratus lumborum
- Large and middle gluteus;
- Pelvic floor;
- Hip flexors;
- Tensor fasciae latae.

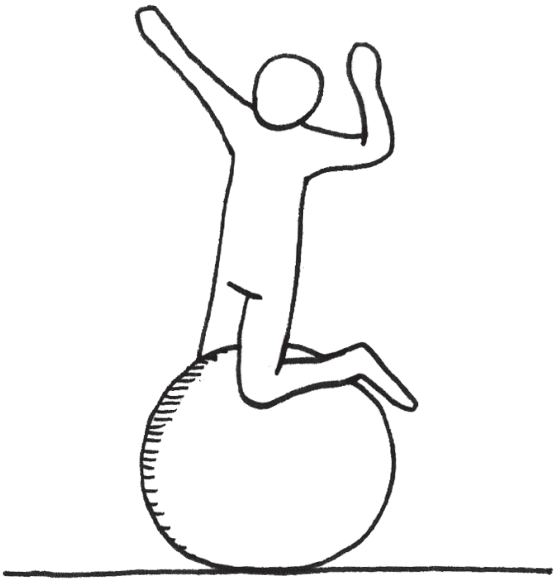


These muscles, therefore, manage the center of the body and have a triple function:

- Maintain balance;
- Transmit force from the lower to the upper body and vice versa;
- Protect the internal organs and the spine.

There is a specific training that aims to improve and strengthen these muscle groups in a functional way called "core





training" (or "functional training").
Functional training differs from analytical training in that it does not use isotonic machinery (the machines in the weight room, to be clear) but focuses on free body movements or movements with simple objects such as fitt balls, sticks or medicine balls.
Functional training focuses on the practice of global natural movements and aims to stimulate the muscle chains rather than the single ones.
Many variations of functional training based on the disciplines of reference are given.
For Balancing I propose some mixed exercises between functional and proprioceptive related to the use of the fitness ball, a very common tool with very specific potential with respect to our topic.

*1.7.2 Endurance capacity (Stamina)*
By "endurance" we mean "the capacity to extend a job over time without decreasing its quality"; endurance takes into account continuous work sessions and no recovery times.
Endurance is not a particularly stressed capacity in Balancing as the workouts can provide for variable recovery times based on the level and physical fitness of the students, thus interrupting the temporal continuity of the effort.
If we wanted to analyze the stamina in a Balancing routine we would hardly exceed eight minutes and in any case easily, even in a routine, we can insert moments of recovery. We are speaking here, therefore, of "short-term endurance"; to train on it it is advisable to practice short sessions of running, cycling or a series of rope jumps.

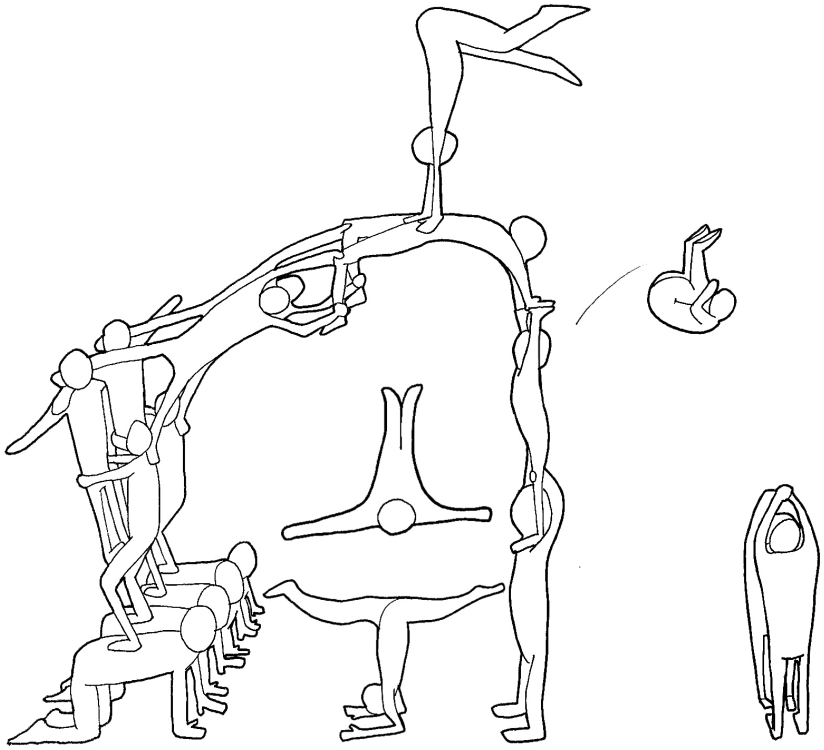
*1.7.3 Flexibility capacity*
The term "flexibility" refers to the capacity to perform movements with maximum joint range without suffering trauma.
This capacity is given by the mixture of joint mobility and muscle flexibility. Let's analyze them individually.
Joint mobility is the capacity of the joints (ligaments, cartilages and joint capsules) to make the widest possible movements without being injured.
Muscle flexibility is the capacity of muscles to stretch beyond their normal shape without being injured.

It is important not to confuse muscle flexibility with muscle elasticity that we can define as the capacity of a muscle, after an eccentric stretch, to return to its natural shape in the shortest possible time.
The factors affecting flexibility are as follows:

- Genetic components (stages of development, bone conformation and ligament laxity);
- Condition of the muscles (efficient, contracted or injured);
- Psychological components (relaxation capacity).

Flexibility is not required in the discipline of Balancing, except in the case where a student wishes to insert particular technicalities such as a split on the tightrope (but these situations are definitely outside an educational-amateur context). So its value, together with a good warm-up phase can be that of accident prevention.

## Chapter 2.
# Acrobatics in the Educational Circus



### *2.1 Introduction to Acrobatics*

The term "acrobat" comes from the Greek, and is composed of two words: "akros" ('extreme') and 'baino' ('path')[1] meaning 'extreme walk or tiptoe walk'. Acrobatics is a gross motor activity consisting of simple or complex movements all united by the involvement of the body as a whole. To be practiced, it requires a good level of global and segmental coordination and a good level of muscle strength and elasticity; it is a very important activity for children's motor development. Acrobatic movements, whose origins are lost in the history of the human race, nowadays find space in count-

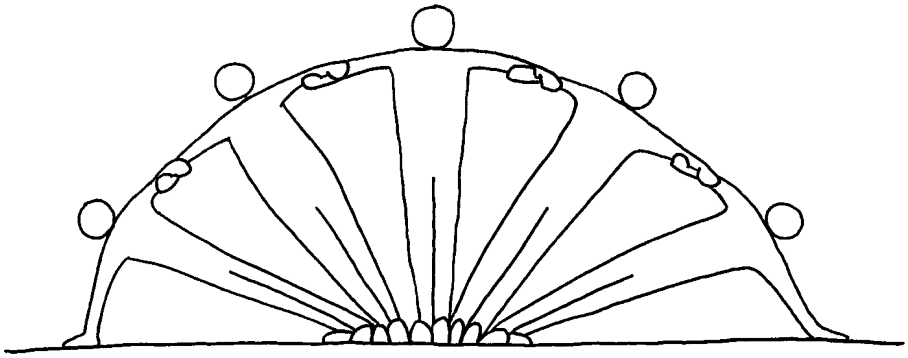
[1] *Treccani* Italian language Dictionary: "acrobata" entry, available online at the link: https://www.treccani.it/vocabolario/acrobata/ (last access January 15th, 2021).

less sports and artistic disciplines. Some of these disciplines are mainly focused on the realization of specific acrobatic techniques (such as the free body of artistic gymnastics or Parkour), while in other cases Acrobatics is combined with other arts or disciplines (such as in acrobatic rock and roll or in Capoeira). In the Circus, in reality, the word "Acrobatics" is a container that includes various disciplines, all of them embedding gross-motor movements as a common denominator. Three main types are outlined: Acrobatics on the ground, Acroportes and Aerial acrobatics. Ground acrobatics consists of dynamic movements, leaps and runs to perform jumps, rotations and overturns. This ancient discipline has become a recognized sport and takes the name of "Free Body" in artistic gymnastics and it has already been extensively treated in many manuals recognized by the international olympic committee. The Circus is a decidedly more informal environment than the gymnastics competition platforms; it requires less technical precision and leaves more room for creativity, so much so that many gymnasts after their sports career move to the "tent", to continue performing avoiding selective judgment of the jury. Acroportes is an acrobatic discipline that includes all those figures made by two or more acrobats, and is composed of a further subset of specialties including Acrobalance (mainly based on balances), Couple acrobatics (commonly called "hand-man"), Group Acrobatics (or "human pyramids") and propulsion figures (banquine). Outside of the circus world, Acroportes finds other declinations such as Acrosport and Acroyoga that respectively represent the race version and the more meditative one. Aerial acrobatics includes all those disciplines that involve the elevation of the body from the ground to hang from a tool. In Circus, aerial disciplines are numerous and always in continuous evolution; the most classic are the silks, the aerial hoop, the trapezium and the aerial rope. In this volume I have chosen to treat, among the three main circus acrobatic disciplines, exclusively Acroportes as this activity is much more common in the educational circus than the others, both for greater ease in proposing and carrying out the exercises, and for its educational and social values.

## *2.2 Social and educational values of Acroportes*

In addition to having a great educational value from a motor point of view, Acroportes also has a very strong educational value in the affective-social area. In the educational circus the more technical part of the discipline (consisting of lifts, throws and holds) is often omitted to give more space to more technically simple elements (such as balance), that require much less physical preparation and therefore are more usable by most people. This selection finds its motivations in the implicit educational values found in Acroportes which lie not so much in the development of physical strength and technicalities, but in the development of the psycho-physical and socio-relational capacities of each practitioner. In particular, I would like to analyze three fundamental aspects:

- Trust and responsibility;
- Development of physical contact;
- Enhancement of one's physicality.



*2.2.1 Trust and responsibility*

"It takes years to build trust, seconds to break it and an eternity to repair it" (Anonymous). Balancing and being balanced, supporting and being supported are factors that develop emotional control, responsibility for one's actions, a sense of trust and collaboration, but these values are not immediate, rather the results of targeted and well-executed work. In this sense, Acroportes can be a great means of structuring a group, as trust in the members of a team is the *conditio sine qua non* to successfully achieve a common goal; but we cannot assume that the group is ready or already cohesive to accept and carry out certain proposals, so how to act in this context? There are many factors to bear in mind when structuring an Acroportes learning path: what type of group is it? Do the students already know each other? Do they have a common background? Have they already done group building exercises? Are there any conflicting dynamics among them? All these questions are undoubtedly linked to issues that go beyond this text, but which in any case should not be ignored; each teacher should have methodologies and exercises to facilitate all those starting situations that are not optimal. Steven Desanghere in his text "Look at me[2]" deals exhaustively with the topic of structuring a group from a social point of view, so I recommend reading the text to deepen the concept. Instead, I list some exercises, to be proposed before starting an Acroportes session , specific for a building up group to help its members develop trust and responsibility.

Activity 27. *Motorists*. The children arrange themselves in pairs: one stays in front with closed eyes and plays the car, while the other is behind him with open eyes and plays the driver. The driver must drive the car in an open space or obstacle course without causing accidents; at the signal the boys change roles.

Activity 28. *The airbag*. Four students, opened-eyed, shake hands forming a circle. One student, closed-eyed, stands in the center: he can walk, jump, run as the four guys will protect him from any collisions with the environment or mates.

[2] S. Desanghere, *"Look at me!". The circus approach: working with children and young people through the circus arts,* [2016], published and available online at the link: *https://www.eyco.org/nuovo/wp-content/uploads/2016/03/Look-at-me_web.pdf* (last access January 15th, 2021)

Activity 29. *The rescue*. A student standing on a chair lets himself fall backwards, keeping his body rigid without being afraid as behind him there are at least six companions in two parallel misaligned rows ready to cushion his fall.

*2.2.2 Development of physical contact*

Physical contact is clearly the basis of Acrobalance and is also its strong point in the educational process; so it is worth spending some time on the subject. First of all it is important to say that, as with trust and responsibility, it is a mistake to assume that all participants in an Acroportes session are used to physical contact or enjoy it. Shared physicality involves genetic and social factors: it is a path, therefore, to be followed in stages, fostering especially young people. If their emotional situation does not support them, physical contact can be more harmful than good. In this aspect too, the type of group you work with makes a difference and the teacher's resources guide the educational process; if we do not have valid psychological knowledge it is better not to go into problematic situations that could get out of hand; therefore, in cases of students with serious discomfort, it is better to ask for advice from specialists in the sector. This text proposes exercises to facilitate a playful phase of contact with the aim of dissolving inhibitions and tensions and then evolve into a technical phase in a group without particular problems. It is therefore advisable to propose various fairly common motor games that become preparatory for our educational purposes; let's take some examples.

Activity 30. *The amphorae*. It is a "classic catcher"; there is a pupil who chases (playing "the wolf") and one who runs away: all the others are in pairs and stand arm in arm; if the student who runs away is tired or in danger, he can take a companion by the arm, thus freeing the student in couple with him/her. She/he will have to catch what was the "wolf" a moment before (the first chasing pupil).

Activity 31. *The magnet*. Students move freely in space, preferably with background music; at the teacher's "stop", students must form groups linking one to each other by a part of the body (for example feet or shoulders, etc.).

Activity 32. *Group dances*. Music and dance have always been great facilitators for social relationships. I suggest you use classical dances proposed in a playful way with the aim of establishing physical contact; you can pick a waltz, a sirtaki or simply improvised movements for couples or small groups.

*2.2.3 Enhancement of one's physicality*

Each individual is unique and special in his physical and mental particularities: however, accepting and valuing oneself is a process that for some people can be long and difficult. Being able to appreciate one's body and its peculiar characteristics in a reference group with which an acrobatic work is carried out is a great educational achievement. In teaching a physical and choral discipline such as Acroportes, we often encounter social and cultural barriers or contemporary "myths" such as that of "physical perfection" that can create embarrassment, especially for more emotionally vulnerable subjects such as children and teenagers. We are dealing with genetically determined topics, such as metabolism and physical constitution, and with culturally defined ones, as nutrition and personal ambitions. Having a kid face

all these issues requires specific psycho-emotional management skills with which an educational circus teacher is not always "technically" equipped: to help manage situations of considerable discomfort, I then recommend contacting a competent specialist. Those who teach Acroportes, however, have a powerful tool at their disposal, that can help make sense of the physicality of the participants; anyone is in fact bestowed with a specific role in the work group according to their body structure, that should therefore start being better accepted. The basic concept of this paragraph is to promote acceptance of oneself, without a judgment about how we should be, but to value one's physicality aiming at a concrete goal, that of creating acrobatic figures! Once everyone gets to be aware of the significance of their role in the group according to their own body structure, the result is an increase in the participant's self-esteem. In twenty years of teaching Acroportes in schools, for example, I have seen many social behaviors being reversed when taking account of the subjects' skills in place of their physicality; the "big" boys who may be slow and clumsy in speed sports were highly sought after for group figures to sustain other students in a pyramid, for example; or the very small students were the most requested to climb to the third level of a pyramid. How to develop this positive concept of one's physicality? Undoubtedly, all the concepts expressed in the two previous paragraphs regarding trust / responsibility and physical contact definitely help to create a suitable climate for enhancing individuals, and the teacher's ability to conduct / moderate helps a lot this cause. We can however offer specific games such as the following.

Activity 33. *The monkey and the lion*. The "lion" is a student who has to catch all the "monkeys" present in the gym, to save the monkeys they have to climb a tree (that is to climb "astride" on the back of one of their companions); if the monkey doesn't touch the ground with his feet he is safe! This game leads to having to quickly decide which of two pupils should be the base and which the flyer[3] and since there are no fixed pairs, the choice is repeated between random pairs during the game.

Activity 34. *The pope's seat*. The students are asked to divide into groups of three and have a speed race carrying the lightest of the group in the "pope's seat", that is, on the square formed by the forearms of the bases.

Activity 35. *Hide the corpse*. The students move freely in space to the rhythm of the music; when the music stops the students randomly place themselves in pairs and have to decide who is the corpse lying on the ground, and who is the killer, who has to drag the corpse onto a default point (usually outside the sidelines of a volleyball court).

## *2.3 The foundations of Acroportes*

After having talked about the very important socio-relational values of Acroportes, we will now discuss how to best prepare our students also on a technical and motor level, optimizing time, space and human resources. Before delving into the basic principles of this discipline, however, it is important to clarify the terminology that

[3] On the definitions of "porteur" and "agile" see *ultra*.

will be used in this chapter. Only through these clarifications we will be able to clearly address the basic aspects of the discipline and its key concepts: the relationships between perception and action, the movements and motor capacities most involved in this work, in order to be able to carry out a simple but effective path with our students.

*2.3.1.The roles in Acroportes*

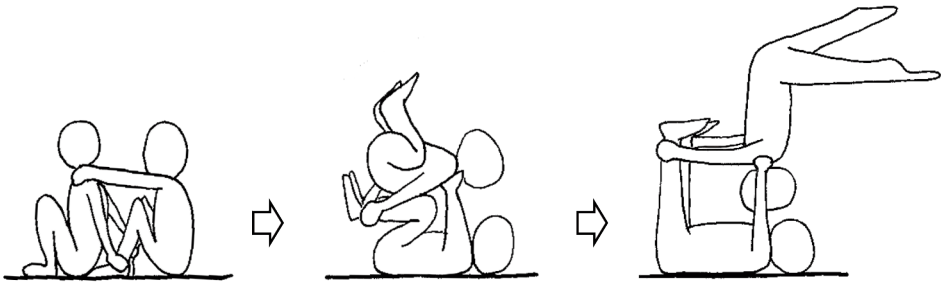
Within the Acroportes there are mainly two roles: the base and the flyer. The base or "bearer" is the acrobat who assumes the basic role of toe hold and support. Bases are usually bigger and stronger, so that they can better bear the load of the flyer pupil. The flyer or "vaulting" is the acrobat who is lifted. Usually this role is played by acrobats with more slender body structures and requires greater balance and agility. In this discipline the two roles are not always fixed: there are situations in which the roles alternate and an acrobat can be both flyer and base. In some dynamics of acrobatics in trio or in group a figure called "second or central base" can be outlined: this role consists of a base who supports a flyer while balancing on another base.

*2.3.2. The elements of Acroportes*

The fundamental elements of Acroportes can be distinguished on the basis of the type of movement. **This schematic division of Acroportes is purely utilitarian for learning and developing the prerequisites of basic movements**; it also becomes obsolete for experienced acrobats who tend to blend various movements together during the setting up of a performance.

*Figures and transitions*

In this context, "figure" means a certain position or encoded movement. The "transitions" are instead a set of movements that serve as a junction between one figure and another. Two figures can be joined together by various transitions; the choice of transitions is determined by factors such as technical skills and the chosen playing style. In the educational circus, the phases of entry and exit from a figure can be considered transitions, in which normally the base maintains a position that works as a support base for the *climbing flyer*. The concept of figure-transition-figure is a classic and basic approach to Acroportes; the experienced acrobats of contemporary circus have far exceeded the use of this scheme for stage representations, but this approach always remains a valid learning model for beginners. The figures of Acroportes are innumerable, thus I propose a generic and certainly non-exhaustive classification based on the preponderant element that distinguishes the figures.

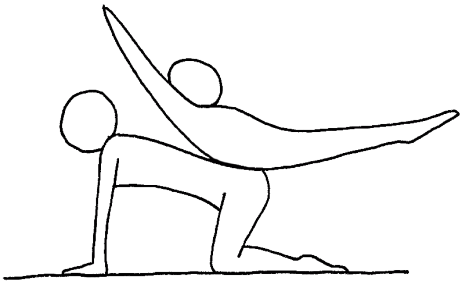


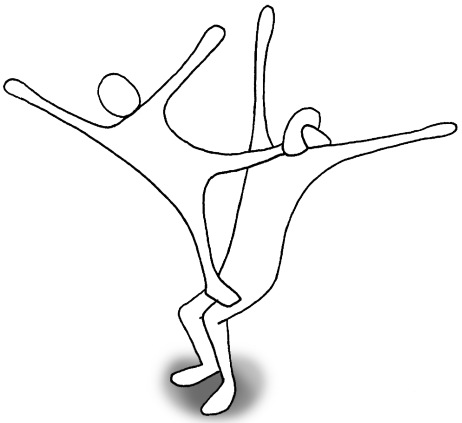
*The balances*. Most of the figures in Acroportes are based on the "balancing" of one or more acrobats on top of others; a balance is considered *bound* when there are one or more grabs in aid or *free* in the absence of aids.

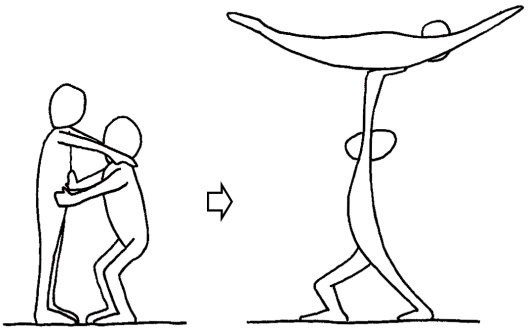
*The counterbalances*. The term "counterbalances" includes all those figures in which two or more acrobats create an equilibrium based not only on the control of their own center of gravity, but on the resultant of more centers of gravity in relation to each other.

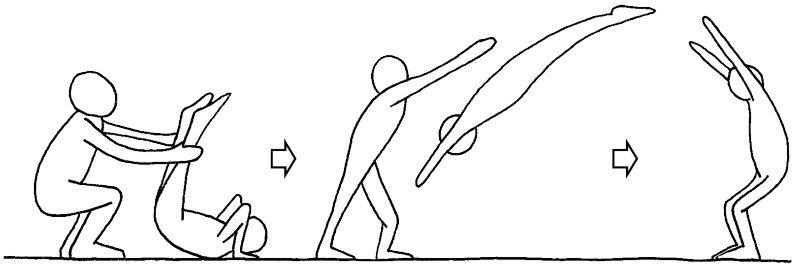
*The lifts and lowerings*. By "lifts" we mean all those movements performed by the base whose purpose is to raise the center of gravity of the flyer without interrupting physical contact with them. The "lowerings" are the opposite movements of the lifts, in which the base controls the center of gravity of the flyer during their lowering.

*The launches*. Throws differ from lifts in that there is a loss of contact between flyer and base. They are much more complex figures both technically and in terms of the use of strength. They are usually performed by multiple bases who launch a single flyer.

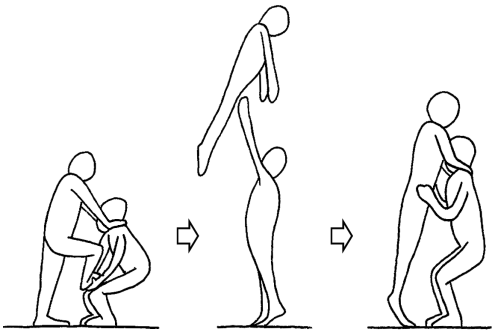








*The catch*. After a throw, a jump or a dynamic movement of the flyer, the base grabs them balancing or lifting them; the grips differ from the lifts in that the flyer has an aerial phase in the absence of contact with the keeper.



*2.3.3.The fundamental concepts*

*Holding*

The term "holding" concerns the phase of maintaining a position both in the static phase and during a (passive) movement; this state is a basic component of this discipline. During the hold, the acrobat enacts a type of isometric muscle contraction to keep the relationships between the bone segments fixed. To simply explain the concept of holding and balancing I always use the example of the stick and the rope: I take a stick and a rope of the same length and try to balance both objects on the palm of the hand, bringing attention to the fact that a rigid object is easily balanced, while a soft object absolutely not: the flyer body must be rigid as a stick for the base to balance it with ease.

*The balance and the counterbalance*

The verb "to balance" means "the act of balancing something (i.e. in a way that it does not fall) or balancing oneself (i.e. in a way that they do not fall), putting something (i.e. in a way that it does not fall) or putting oneself in balance (i.e. in a way that they do not fall)"[4] and the action of "adjusting the weight of a body so that it stays in balance".

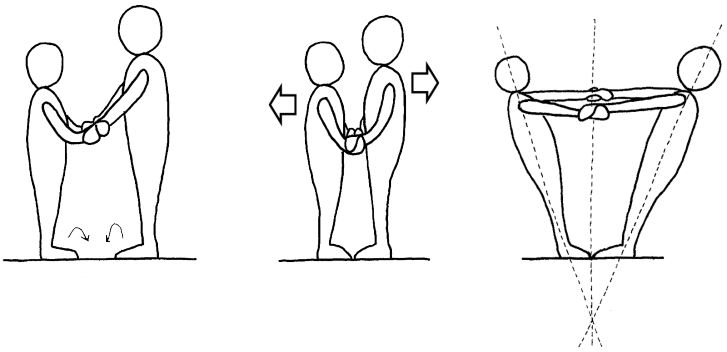
The definition of "to counterbalance" is instead "to balance by placing a weight on the plate of a scale equal to that placed on the other plate; therefore, balance a weight or load, placing a load of approximately the same weight on the opposite side[5].

**As for our area of interests, balancing refers to the balancing of a body while counterbalancing refers to the balancing of two or more bodies in relation to each other**.

In Acroportes the bodies of athletes have often different constitutions and weights; in fact, as we have already seen, we speak of base and flyer. The laws of physics provide us with elements to understand and exploit this situation. Let's analyze, for example, the following position: two acrobats, facing each other, with their toes touching, holding each other by the hands. In the just described position the two acrobats are balanced since their respective centers of gravity fall into the support bases (their feet). But if both extend their arms unbalancing themselves backwards ("triangle" position), the new unstable position can lead to a fall. In this case, in order for the

[4] From *Sabatini-Coletti. Dizionario della Lingua Italiana*, s.v. "Bilanciamento", on-line at the link https://dizionari.corriere.it/dizionario_italiano/B/bilanciamento.shtml (last access January 15th, 2021)

[5] From *Dizionario della Lingua Italiana Treccani*, s.v. "Controbilanciare", on-line at the link https://www.treccani.it/vocabolario/controbilanciare/ (last access January 14th, 2021).



new system of forces created by the two acrobats to be counterbalanced in itself, the acrobats' weights must be equal.
The **fulcrum** is represented by the two acrobats' feet touching each other and if we traced an imaginary line through the space between the acrobats, perpendicular to the point of contact of the feet, we would have represented the so-called **"balance axis**". Finally, the **force arm** here consists of the **distance of the center of gravity of each athlete from the fulcrum**. The weight of the acrobat is now composed of the **specific weight of the acrobat multiplied by the length of the force arm**: the lighter the acrobat is, the heavier he / she would become as further his center of gravity gets from the fulcrum and, on the contrary, the heavier the acrobat is, the lighter she/he would become the closest she/he gets to the fulcrum.
Acroportes is, therefore, a discipline that tends to seek and maintain the balance of the masses involved and to counterbalance the force of gravity and the constraining (or "normal") reaction force rather than the dynamism and explosiveness that instead characterize free body gymnastics.
This purpose is clearly reflected in the type of exercises and movements that constitute its fundamentals and that are characterized by an ongoing refinement in the use of strength and the mutual listening component between the subjects.

*The speed of execution in counterbalances*
The lower the technical level of the subjects involved in the exercise, the more time and attention the counterbalancing process requires: the imbalance caused by sudden changes in posture, both of the flyer and the base, is one of the most common mistakes of beginners. The slow movements allow a gradual adaptation of the position of the couple / group to changes in balance, making it easier for the base to process weight compensation movements. Therefore it is advisable to start with slow and mindful movements both for the ascents and her/his variations of figures, and for the descents.

*The search for the balance between "base" and "flyer"*
In counterbalances and in some balances, the main work of the flyer consists in achieving and maintaining postures, as seeking balance is almost entirely up to the base. In counterbalances it is the base who decides the length of the arm of the flyer

force to balance their weight. If the flyer makes frequent postural adjustments by constantly changing their center of gravity, it becomes much more difficult for the base to manage the counterbalance of the couple[6]. There are various balance figures in which the flyer is not supported by the base but is simply resting on them and balances themselves; in these cases the role of the base becomes passive and their task becomes that of keeping their position as stable as possible; the flyer carries out the balancing work and, at the motor level, this dynamic is considered proper balancing and follows all its training methods. During an Acroportes figure it is therefore very important to understand and explain who is in charge of managing the balancing process and who, on the other hand, must keep themselves as solid and stable as possible[7].

*The various types of lifts*

The lifts are intended to raise the flyer to perform a figure (usually a balance), there are various types of lifts; the most common are the following:

- Strenght lifting;
- Dynamic lifting;
- Lifting with joint levers.

The lifts are considered "strength", when the movement is performed entirely by the musculature of the base which can make use of global preparatory movements or use only the contraction of the muscles responsible for the lifting. These movements, as the name implies, require a large conditional availability and are rarely used in educational circus contexts.

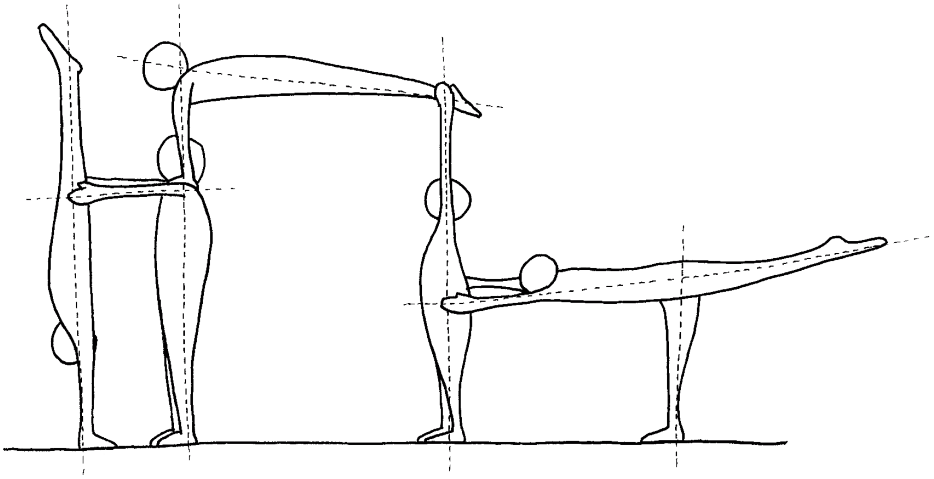
Dynamic lifts, on the other hand, use the synchronized preparatory movements of both the flyer and the base and are usually jumps and leaps. This type of movement greatly reduces the muscular effort of the base but requires a shared technique and excellent *timing*[8].

The lifts based on the joint levers created by the body of the base against that of the flyer are a decidedly economical way from a conditional point of view to perform a certain task; unfortunately they are used in a small number of figures in the discipline.

*Bone alignment and weight unloading*

In most of the Acroportes figures in which there is no counterbalance, the base supports the weight of the flyer in its entirety on their body, making both centers of gravity fall into the same support base. In this process, the role of the base can be active by personally controlling the center of gravity of the flyer or passive, providing the flyer with a solid base of support on which to balance. Regardless of the role assumed during the performance of the figures, at the muscular level this maintenance phase is managed by the isometric contractions of the base, which stabilize the bone segments opposing the postural variations that would otherwise occur due to the effect of the load received. To facilitate the base task in managing these situations, we must

[6] See the paragraph about Holding.
[7] See the paragraph about Balance.
[8] See the paragraph about Timing.



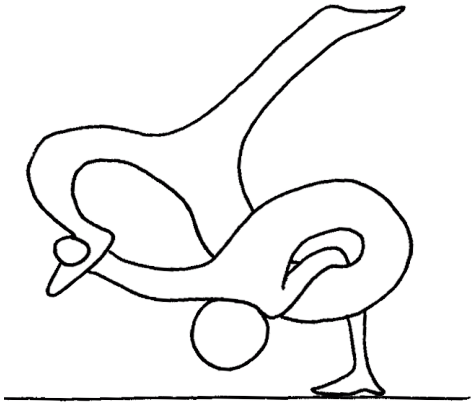
make use of some basic but very functional concepts, especially in environments where conditional capacities are not at performance levels. The concepts of "bone alignment" and "weight unloading" are based on the principle of minimum muscle involvement necessary for managing the load and the physiological capacity of the bones to bear weight thanks to their anatomical structure and correct alignment of the same. This concept is extremely clear in maintaining normal upright posture: when we are standing still we unload the weight of the body on the skeleton and the muscular effort required is decidedly reduced.
This position allows us to maintain an upright posture for a long time with minimal fatigue. When we bend our legs, on the other hand, the weight of the torso weighs on the quadriceps muscles that quickly become fatigued. During the performance of Acrobalance exercises there is a tendency to lose this natural segmental alignment and to compensate by using muscle contractions to counteract the force of gravity. Body angles contribute to the correct unloading of weight when the load-bearing body segment is at an angle of 90° or 180° with respect to the support surface. Bringing the students' attention to this principle is one of the fundamental elements of this discipline to avoid early fatigue and muscle trauma.

*The timing*

Another very important element of this discipline that we are going to analyze is the "timing". The word "timing" means the moment shared by the couple or group that is carrying out the Acroportes exercise and indicates the time of entry, transition or exit from a figure. This element has a dual function, both choreographical and technical. As regards the *choreographic function* of *timing*, it must be remembered that, in groups work, Acroportes at the didactic level is divided into the entry phase, the maintenance phase and the exit phase. The *timing* should make choreographies and transitions from one figure to another harmonious and coordinated.
From the point of view of the *technical function timing* aims to synchronize the movements of the flyer and base allowing not to waste the kinetic energy created by the preparatory movements (jumping, rolling or fast movement) exploited by the

base, in order to optimize their strength work. The *timing* input is a conventional signal that can be given by both the base and the flyer to synchronize the movements according to the type of figure being played. In the basic levels the *timing* is marked by handshakes as a starting signal of a synchronized movement but at the highest levels the *timing* is given by a common breath, flyer and base inhaling and exhaling together, synchronizing the moment of the push. They will inhale to load the figure and then exhale in the moment of thrust as it happens in weight lifting.
In addition to the aforementioned technical / scenic values, timing also has a "developmental value" of cooperation between individuals;this concept reminds us of the educational power of this discipline, of mutual listening, non-verbal communication and contact.

*2.3.4 Unusual postures and body scheme*
Acroportes, as opposed to balancing, requires the nervous system to prepare, assume, maintain, manage and evolve unusual postures compared to the *praxie*[9] it is used to.



Unusual postures are all those positions that make the perception of one's status difficult due to the upheaval of the classical reference points of the body scheme. The inverted (or overturned) posture, that is, "head lower than the pelvis" is the most striking example of this problem. In fact, when the unprepared student is in an inverted position, the student almost immediately loses the concept of projective and often also subjective right and left, making the ideomotor programming of movements very difficult. You will find useful exercises for the development of unusual postures in the paragraph dedicated to space-time orientation.

*2.3.5 Mental representation*
Acrobatics in general and therefore also Acroportes requires students to perform movements and assume unusual postures compared to daily *praxie* so a common mistake in the presentation of this discipline is to assume that students have a clear mental representation of what they are about to perform. The mental representation (also called ideo-motor scheme) is given by the cognitive ability to organize a sequence of actions necessary for the execution of a movement. Before programming a sequence of movements, therefore, we must have a clear idea of the purpose of the aforementioned sequence, otherwise the organization of the actions will be inappropriate and ineffective. Having a clear mental representation and an effective assem-

[9] By "praxia" we mean the coordination of the movements that make up a particular act. (source from *Dizionario della Lingua Italiana Treccani* s.v. "prassia" entry, on-line at the link https://www.treccani.it/vocabolario/prassia/ (last access January 14th, 2021).

bly scheme of the figure to be composed by each member of the group facilitates and speeds up learning in Acroportes. In my teaching experience I have had the opportunity to encounter different methods and tools to achieve this goal; I list a few:

- Show drawings, videos or live examples of the desired figure, paying close attention to the movements of entry and exit from the figures;
- Dismantle the overall figure into parts, and let the students try out those particularly complex movements or holds and then reinsert them in the figure.

After the students already have a wealth of individual positions we can propose some exercises to stimulate the aforementioned concepts in a playful way. For example the following.

Activity 36. *Walking around the pyramids*. Prepare drawings / photos with the figures to be made and arrange them on the ground in positions. Cyclically, the students will go around the various stations and, without explanation and direct help from the instructor, they will have to assume the positions shown. This work requires the instructor to make a preparatory choice that makes the proposed figures safe and accessible, linking them with the specifics of the group and comparing the number of students with that of the acrobats in the figures.

Activity 37. *Random pyramids*. The students move freely in space to the rhythm of music. When the instructor interrupts and says, for example, "groups of five people with six hands, two backs, four knees" the students create a random group but of the required number and place only the parts mentioned by the instructor on the ground. Once the pyramid has been created, and possibly compared the different achievements of the groups, the music resumes and in the next heat the instructor varies the indication of the number of components, body parts and amount of supports.

Activity 38. *The Tetris*. We define a space and one at a time the children enter and assume an acrobatic position; the aim of the game is to form a human pyramid without guidelines from the teacher who only plays the role of director to avoid accidents. It is better to start with low numbers of students like four or five before trying large numbers, also because often maintaining the holding time of the positions can be very tiring, the director must be careful about safety.

Activity 39. *The ambassador*. The students are divided into two groups who work on two tatami bases separated by a curtain or a matt; each group chooses in rotation an ambassador who will go to the teacher to look at a pyramid represented on a sheet (or digital medium); each ambassador will have to explain the pyramid to their group and execute it. When the two groups are ready, the *curtain* is removed and the two pyramids are compared.

## *2.4. Sensory analyzers in Acroportes*

### *2.4.1. The vestibular system*

The discipline of Acroportes is linked to this sensory system in a different way than the Balancing act discussed in the previous chapter; if on the one hand the movement times of the bodies are on average slower, the movements wider and the balances more stable than when working with equipment, on the other hand this discipline requires more atypical movements such as rolling, inversion and flips over, as already discussed in the paragraph dedicated to "unusual postures". The training proposal of the vestibular system described in the chapter dedicated to balancing, therefore, is

effective in preparing students for part of the Acroportes work but requires some specific additions aimed at stimulating the vestibular apparatus for the aforementioned movements. In the paragraphs dedicated to the motor scheme of rolling and the capacity to orient space / time some exercises useful to this purpose will be outlined.

*2.4.2. Proprioceptive training*

While proprioceptive training in balancing is mainly aimed at maintaining an upright position, in Acroportes the positions to be maintained are much more numerous and heterogeneous and their correct stability directly affects the actions of flyer and base. The proprioceptive work, therefore, must not only be aimed at the feet but at a wide range of parts of the body that can be used to lean on or carry; this need opens up a very creative perspective on the structuring and presentation of the various proprioceptive *stimuli*. The same principle that we have seen applicable in balancing, or the use of specific tools as support bases that create a high situation of instability, can also be adapted to the multiple positions of Acroportes. In this context, however, we will find ourselves having to face a challenge due to the fact that the parts of the body used as support bases are various and of different shapes, therefore difficult to inscribe in a proprioceptive table. Although there are large proprioceptive boards on the market, unfortunately they still have a high cost. An alternative to be taken into consideration, after a careful evaluation of the single case we are working on, is the creation of unstable surfaces that can be obtained by superimposing tatami mats on soft mattresses or by distributing the body supports on multiple proprioceptive boards at close distances. The use of proprioceptive balls and fitness balls also have considerable utility in this type of training. Some examples of proprioceptive training adapted to Acroportes are:

- Maintain the "candle" position on a soft matt;
- Maintain the position of the "wheelbarrow" with feet resting on a backrest and hands on a fitness ball;
- Maintain the "bench" position with your hands resting on a proprioceptive table and your knees on another table.

*2.4.3 Perception of weight between touch and proprioception*

An important kind of perception in this discipline is that of the weight of the companions on one's body, from which the concept of unloading weight is acquired and developed. This perception is the result of the processing of tactile and proprioceptive sensations due to the deformation of muscles, joint structures and skin due to the pressure exerted by other bodies on ours. This sensitivity also plays a fundamental role in this discipline and, through its stimulation, effects of improvement are produced in the capacity to perceive in a more acute and precise way the bodies with which we will come into contact during work and therefore manage them with the appropriate technique. A valid support for the development of this perception can be the motor patterns of crawling and rolling. In addition to the exercises described in the following paragraph: "Global movement patterns in Acroportes", we would like to point out some proposals for exercises and games that stimulate touch and the perception of weight.

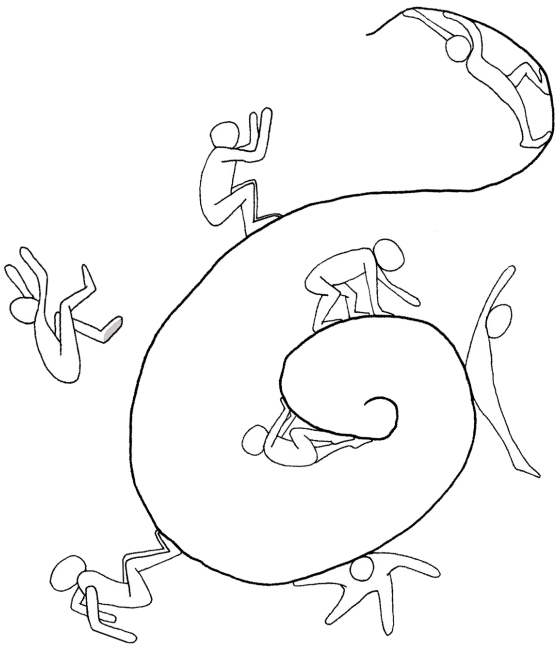
Activity 40. *Sant'Antonio chain*. Students in a row -or in a row lying on the ground on their backhave to pass mattresses one onto each other with the use of their arms and legs.

Activity 41. *The lifter*. The students arrange themselves in pairs. Each member of the couple in turn lifts the other for a few seconds while remaining in place. Each turn the student is asked to experiment with a new form of lifting.

Activity 42. *The medicine ball*. Ask the student to find five different ways to carry a medicine ball from one point of the gym to another.

## *2.5. Global motor schemes in Acroportes*

Acroportes is a discipline that more than other activities is based on generally acquired and left behind global motor patterns (such as slithering and crawling), typical of childhood that are quickly set aside in favor of more dynamic patterns (such as walking and running). In this chapter,anyway, we will not deal with walking and running as they are already efficiently described in Balancing and we will dedicate ourselves to all the other dynamic motor patterns, deepening them adequately. The peculiarity and charm of Acroportes is precisely the rediscovery of a set of movements and positions that are part of our motor "baggage" set aside after childhood which, if properly practiced, stimulate a global development of motor capacities thanks to the complex organization of evolved gross-motor movements originating from the most basic motor patterns.



### *2.5.1 Slithering*

Slithering is the first human motor pattern; it usually appears around the age of eighth month but it is quickly substituted by the upright position and by walking. It is normally rediscovered later in the age of motor games and sometimes occurs in daily life where it is needed to get under obstacles and hindrances. As previously mentioned, Acroportes is one of the circus disciplines that benefits most from the development of this scheme as the benefits derived from the practice of this movement

perfectly match the requirements of the discipline. In fact, crawling stimulates the tactile sensitivity of areas not mainly delegated to touch, promotes muscle building with natural load and the management of bodyweight without availing oneself with hands or feet. Furthermore, slithering involves the programming of a dynamic counter-lateral movement that requires a good level of motor organization which, more than other motor schemes, refers to the stimulation of various special coordination skills such as motor sequencing and kinesthetic differentiation.
The specific development proposal in relation to the Acroportes discipline can focus on exercises such as the following.

Activity 43. *Slither under your teammates*. It can be proposed in two different pattern: the student who is meant to be caught positions themselves in a way that allows the companions to slither under them to free them; a dance exercise in pairs is arranged, in which one student takes a position that allows the other to slither between him and the ground progressing in space and alternating the two roles.

Activity 44. *Slithering with objects in balance*. Once on the ground, a fairly stable object such as a diablo or a spinning plate rests on one student's body; the student is asked to move freely in space or along an obstacle course without letting the object fall down. Both ventral and dorsal versions can be experienced.

Activity 45. *The earthworm race*. All the participants stand on a line, lying on the ground face up. At the start, using only their legs, they have to crawl as fast as possible until they reach a finishing line.

*2.5.2. Move in a four-legged (crawl)*
Moving in four-legged means moving on all four limbs, i.e. resting on hands and feet. This motor pattern is subject to at least two variants:
- Quadrupedia with support of the knees on the ground;
- Quadruped without contact of the knees to the ground.

Personally I use the first variant with the infancy / primary school kids (always paying attention to the hardness of the support surface to avoid any trauma to the joints) and the second in the subsequent stages. It is important to keep in mind that not all children "crawl": some of them in fact move from the sitting phase straight to the standing position, but the quadrupedal in any of its aspects has a very important function. Crawling, in fact, like slithering, is a complex form of walking that stimulates the core muscles and the infra-hemispheric communication of the brain, so it should not be taken for granted and its training turns out to be always significant. In Acroportes we refer to crawling in the resting-on-the-knees version, which corresponds to the figure of the "bench". The position of the bench is fundamental for most of the Acroportes figures up to the first level of primary school (and furthermore); having a good familiarity with this scheme creates trained acrobats, resistant and able to maintain the position in a stable and prolonged way. To promote the acquisition and awareness of the scheme, children can be asked to:
- Crawl by dragging or pushing a weight;
- Crawling while someone holds you from the pelvis;
- Crawl with an object balanced on the pelvis or between the shoulder blades.

### *2.5.3. Swing / Roll*

Swinging consists in making oscillations with the body without performing a complete rotation while in rolling you perform 360° rotations on your axis. Rolling is linked to contact with the floor but is also the motor base of much more advanced gestures linked to rotation on the various axes such as overturns (transverse axis), pirouettes (longitudinal axis) and "wheels" (sagittal axis). As in crawling, rolling develops the proprioception and tactile sensitivity of the body but adds to it a global and segmental control that determines rotation, gives *stimuli* to the vestibular system and implements capacity for spatial orientation. It is advisable to explore this scheme as much as possible and propose a high number of variations to increase stimulation to the nervous system and adaptation of the body scheme. I propose three examples of useful exercises for Acroportes.

Activity 46. *Rolling in pairs holding hands.* Two companions lying on the ground in a prone position, arms outstretched, give each other their hands and staring at each other's eyes, roll together. By paying close attention to the fixity of the gaze, this exercise greatly helps spatial orientation.

Activity 47. *Roll in a row of companions lying on the ground.* A line of Students stretched out on the ground is created; in turn, the first in the row rolls over their teammates and then positions themselves at the end of the row. It is recommended that everyone assume an extended position with their arms extended next to their ears. The arms gathered at the torso and / or the bent legs can create discomfort due to the support of the elbows and knees in sensitive areas of companions.

Activity 48. *Rolling uphill.* You have a soft mattress which, thanks to its capacity to deform, allows students to roll uphill, as long as the climb is slightly sloping. In addition to being an exercise in sensitization and vestibular stimulation, it also involves excellent muscle strengthening.

### *2.5.4. Jumping / landing*

The jump in Acroportes is often a way for the flyer to "enter" some figures. We are undoubtedly talking about precision jumps with precise trajectories and sensitive and restricted landing bases; such a jump requires, beyond mere strength, discrete awareness of distances for a precise landing. As in Balancing, landing offers an advantage even in the event of unexpected loss of balance; a good balancing capacity in the aerial phase and a wide confidence in types of contact with the ground can save acrobats from various injuries. Some exercises useful for developing these capacities can be the following:

- Jumping from various heights and landing on small or unstable bases (soft mattresses or proprioceptive pillows);
- Jumping from various heights and landing standing on surfaces that are hard at first and then gradually softer;
- Jumping from low heights and landing with one leg.

### *2.5.5. Climb*

The motor pattern of climbing, even if apparently it does not seem connected with Acroportes, after a more in-depth analysis reveals some interesting points in common with it. First of all, climbing creates familiarity with height and the manage-

ment of emotions aroused by this. A recurring situation in students who play the role of flyer in the "pyramids" is the fear of height and the feeling of emptiness around them (acrophobia). On the one hand, this may be due to the instability of the human structure that supports them, on the other hand to a lack of confidence with the height or to the possible inability to manage the fall or, finally, to the continuous concern of hurting the partner or the companions. If knowledge of the "jump / land" scheme is enough to manage the fall, to climb it is necessary to become familiar with the elevation. Climbing onto the bodies of other acrobats is the most common way, in the educational circus, for the flyer to get into position in the figures; we can in this case talk about a balanced and correctly weighted climbing. The climbing pattern has various declinations, in relation to Acroportes we are most interested in the one related to the combined counter-lateral movement of the limbs and the use of holds and supports. The exercises that can best adapt in this context are:

- Use of climbing walls (scarcely found in spaces intended for physical activity in schools or in public facilities);
- Passages between squares in the Swedish framework;
- Back exercises. The backrest is a much more common tool than the other two tools, it is quite commonly found in all places used for motor activity, so I decided to deepen the subject by proposing three exercises dedicated to the use of the backrests.

But here are some exercises specifically useful for climbing.

*Activity 49. Follow the tracks.*With the paper tape, mark the degrees of a wall bar creating a path; the student will have to place the chest in front of each paper marker.

*Activity 50. Move the ring*. Arrange two containers on top of a wall bar, one empty and one with a ball, the student will have to reach the top of the wall bar and move the ball from one container to another.

*Activity 51. Traffic on the wall bars.* In this game, two groups are formed: one climbs and positions itself on the left side of the wall bars and the other on the right side. At the instructor's signal, the two groups must exchange places, moving only on the backrests without ever touching the ground.

## *2.6. Coordination capacities in Acroportes*

### *2.6.1. Coupling combination capacity*

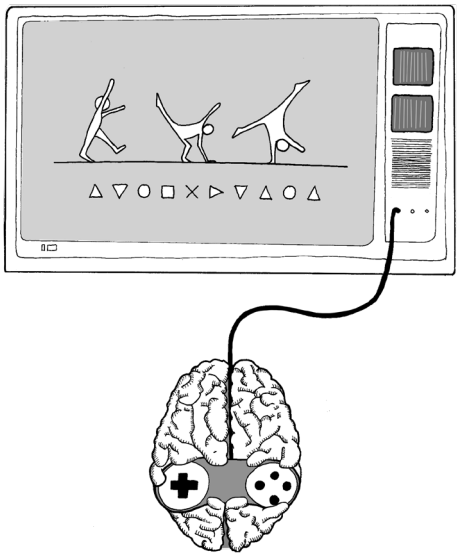
In Acroportes, application of pairing can relate both to the realization of individual figures and the transitions between one figure to another. It is therefore important to train on this in order to increase the generic capacity to sequence movements and, specifically, to improve every figure we want to develop. To improve this capacity in a generic way, we must rely on the movements already acquired by the subjects and propose sequences of a certain complexity. I will bring you some exercises, where the attention must be paid to the motor sequences and not to the single movements, that can be simplified as needed.

Activity 52. *Jumping from a trampoline* (or directly from a standing position) onto a mattress. During the jump phase, reach a certain position ( stretched out, squat or pike) keeping it in the air as much as possible without concentrating on a perfect landing (it also stimulates kinesthetic differentiation).

Activity 53. *Overturns*. Perform the following combination of three movements: flipped forward, straight jump with 180 ° rotation, flipped backwards.

Activity 54. *Sequence of jumps*. Perform the following sequence of jumps: "brush" jump, crop, pike. Instead, when we decide to work on improving a specific movement, within possible limits, it is worthwhile: to repeat the movement several times until you get to a good control phase; to vary different movement parameters such as speed of execution or strength or any sensory perceptions.

Let's take an example: we want a couple of our 10-year-old students to bring a basic Acrobalance figure such as the ventral plank on the base's feet to the end-of-year show, and we want to be sure that the couple has no problems with performing in front of the audience, at least on a motor level. If we analyze this figure, it is composed of a starting position, a lifting and a holding, so how do we approach the learning and consolidation of this motor sequence? First we need to make sure that the physical prerequisites are there, that is, check if the base can stretch their legs well in this position, if their legs are strong enough to withstand the transition of the weight of the flyer and if their back can stabilize the position. Then we check if the flyer has the trained muscles to keep the transition and hold in question. After that, we explain the figure well by demonstrating it with other already experienced acrobats. We then train the flyer by falling on a mat while maintaining body tightness and balancing a mattress or tatami with the legs stretched out to the base lying on the ground. Let us try the figure with assistance until the couple can easily do it alone. Once we get to this stage we can start trying some variations such as asking the two acrobats to perform the figure as slowly or quickly as possible, trying it on a soft mattress or with ankle weights or blindfolded. After this experimentation with the various parameters of the figure, the execution will be safer and more effective, helping the students to present it in emotionally more stressful environments than in the training gym.



*2.6.2. Kinesthetic differentiation capacity*
This capacity, described in the previous paragraph, helps us to choose the right strength in the various muscle groups used in a movement and the quantity or quality of that force; contextualized in the Acroportes, it is used to manage the alternation of holding moments (isometric contraction) with dynamic movements.

The kinesthetic differentiation also manages the alternation of muscle relaxation and contraction phases. During the training phase it is necessary to shift from moments of contraction to moments of relaxation or dynamism in a short time; excessive rigidity as well as excessive relaxation in inappropriate moments affects the execution of a figure.
The kinesthetic differentiation must, therefore, be adequately stimulated to let the subject gain a conscious control of the muscles and exploit an excellent performance during the work sessions.
Below I list some exercises that I consider useful to this goal.

Activity 55. *Hard / soft biscuits*. The students are invited to lie on the ground and they are told to pretend to be "biscuits". When the biscuit comes out of the package it is hard and in this phase the children are asked to become as rigid as possible while the teacher touches the children and checks their degree of tension. When the biscuits are soaked into milk they become very soft and, in the same way, children are asked to relax -their degree of "letting themselves go" is anyway always monitored. The exercise goes on alternately taking another biscuit out of the package and so on.

Activity 56. *Run and stop*. Students are left free to run around the gym to the rhythm of music (it is better to choose cheerful and very rhythmic songs). When the music "stops", the boys must stop immediately, maintaining the position they had at the time of the interruption. This game (in addition to stimulating reactivity) stimulates a very fast muscle contraction that blocks the dynamic phase developed by a fast movement.

Activity 57. *Stick falls*.The student, in an upright position, lets himself fall from a backrest or a table, backwards, onto a mattress while maintaining the extended position.

### *2.6.3. Balance capacity*

Balance is a basic component in Acroportes, so much so that the boundary between this discipline and balancing is often blurred. We must not approach Acroportes as a homogeneous activity from the point of view of balance; flyer and base have decidedly different roles and, therefore, their physical preparation and the methodology of soliciting this skill should be different.
The types of balance called into question in Acroportes are varied; they change according to the figures and roles[10]. To clearly analyze the topic I have summarized the main categories in *Tables 7* and *Table 8* starting from the role of the acrobat engaged in figure, the type of involvement and the type of balance requested.
As shown in the tables, during the execution of an Acrobalance figure, depending on the role of the acrobat, the balance capacity of each should be trained in a targeted manner; it follows that, after having proposed a work to develop the basic balance free body[11] that is valid for all students, we should propose different training according to the role.

[10] As already said, this classification works as a general guideline that tries to include as many figures as possible but it will hardly be totally exhaustive.
[11] See balancing capacities in the Balancing chapter.

*Table 7. Types of balance and status in flyer work.*

| **Figure** | **Status** | **Type of balance** |
|---|---|---|
| Transitions | Active / passive | Static / dynamic balance or postural maintenance |
| Counterbalances | Passive | It is not considered balance but postural maintenance |
| Balances | Active / passive | Static balance or postural maintenance |
| Lifting | Active (dynamic) / passive (strength and joint) | Dynamic balance or postural maintenance |
| Launch | Active / passive | Balance in the aerial phase |
| Catching | Passive | It is not considered balance but postural maintenance |

*Table 8. Types of balance and status in base work*

| **Figure** | **Status** | **Type of balance** |
|---|---|---|
| Transitions | Active | Static / dynamic balance |
| Counterbalances | Active | Static balance |
| Balances | Active / passive | Delegated balance or postural maintenance |
| Lifting | Active | Static / delegated balance |
| Launch | Active | Static balance |
| Catch | Active | Static balance |

*The flyer*

The flyer has three main functions:

- Maintaining a position (held) in a passive manner, delegating the pursuit and maintenance of balance to the base. This "non-action" is beyond the capacity to balance flyer;
- Balance proper in all those situations in which the base merely acts as a support base and does not implement any grip that somehow constrains the flyer. In these cases, the flyer balances itself according to the classic canons of bal dancing on non proprioceptive objects (the base must become a support base as stable as possible);
- Research and maintenance of static / dynamic balance during some transitions, entries and exits from the figures.

In the vast field of entrances, exits and transitions there are some movements in which both the flyer and the base are called to balance each other before the realization of a figure. A possible fourth function linked to the balance by the flyer is the management of falls due to any errors during the execution of figures[12].

Therefore, excluding the latter case, the exercises useful for increasing the ability to balance the flyer are the following.

Activity 58. *Walking on supports*.Arrange supports (wooden blocks) on the floor, creating a path raised from the ground. Students must walk on the supports and complete the path without touching the ground with their feet. The distance between the supports should almost correspond to the maximum length of the physiological stride of each student and it is possible to provide

[12] I already hinted at this in the paragraph on "Landing in basic motor schemes".

multiple paths, with different distances between the supports, to adjust the step according to the height of the student.

Activity 59. *Rigid body oscillations*. The student, controlling the core and keeping the erect position, feet steady and legs straight, moves the body up to the limit of equilibrium, slowly describing a circle with the center of gravity.

Activity 60. *Get on a chair*. The student places one foot on a balance beam or a chair and lifts up with the body straight, keeping on one foot and bringing the other foot in contact with the support one without however loading it with weight. The exercise is repeated with the other foot in support. An additional difficulty is to slow down as much as possible the up and down movement or to constrain the arms.

*The base*

Assuming that we have already stimulated the base in the work of unloading weight and bone alignment, we move on to focus on the capacity to balance, as often bases find themselves in situations of demanded balance in which they must manage the center of gravity of the flyer , in addition to efficiently controlling one's own. Adequately stimulating the base to this task complicates the situation a bit; we should therefore find objects that are bulky and heavy enough to accustom children and teenagers to hold and balance, but it is not easy to safely undertake this task within the courses dedicated to them. In professional circus schools I have seen base practicing with balancing ladders or loaded barbells, but this example is difficult to implement in educational circus courses; how can we therefore create a gradual training in this context? If we work in mixed groups, an excellent idea is to train the base with children of much slimmer body structure than the flyer prototype; by decreasing the load we can increase technical and neuromuscular learning, and then gradually increase the weight. Or we can use gym items like fitness mattresses or rollers.

### *2.6.4. Space-time orientation capacity*

*Space*

In this discipline the concept of space has an orientation value of the acrobat since the spatial references, challenged by the maintenance of unusual postures, are those called most into question in the processes of movements organization and transitions planning from a figure to another. We already mentioned this when talking about the fundamental requirements in Acroportes (paragraph on Unusual Postures); now I will provide some examples of exercises designed to accustom the nervous system to the disturbance of the reference points.

Activity 61. *Walking with the head flexed*. Ask the students to flex their heads to one side and then walk or run or simply move on a path. It is recommended to alternate the flexion side in order not to over-strain the neck.

*Activity 62. Quadrupedia in reverse*. The students assume the quadrupedal position without the support of the knees on the ground and, looking between the legs, they must move in space by moving backwards. Specific motor paths can also be proposed.

*Activity* 63. Walking upside down. The students rest their hands on the ground and their feet on the wall. They are asked to try to hold the position and then to experiment with the lateral shift.

*Time*

In the learning and study phase of Acroportes, this ability helps us to develop the concept of the *timing* of movements. The *"timing"* is, in fact, an instant of shared time that is defined vocally by a teacher or a pupil. You can also use agreed preparatory movements or, again, if you work in pairs, you can use handshakes or breaths. The work on *timing* therefore requires mutual listening and observation that function as a basis for the synchronization of technical movements. It is important to say that this concept of *timing* is beyond the capacity for rhythm which manages a different time structure.

This concept will be explored in the next paragraph. I am now giving you some useful exercises to develop the concept of *timing*.

Activity 64. *The four cantons*. All the students stand inside circles put on the ground, except for one that remains outside. Exchanging glances, two students have to change circle, at the same time keeping the "free" companion from getting into one.

Activity 65. *All together*. A small group of participants (maximum ten elements) arrange themselves freely in the stationary space. They have to start moving and then stop all together without any signal. The exercise can be repeated several times.

Activity 66. *Throws and group catches*. The goal of the game for the group is to throw a mattress (variable type based on age and number of participants) and take it back, without verbal agreement. This game leads to a sharing and synchronization of the lifting, throwing and catching movements and can be evolved by changing the indications on the specifics of the throw to be performed (an interesting variant consists in making it rotate on the transverse plane and longitudinal axis).

### *2.6.5. Rhythm capacity*

The classic Acroportes itself does not have a marked and stable rhythmic structure, rather it develops in an alternation of static figures connected by transitional movements. In Acrosport, on the other hand, a mandatory rhythmic structure is followed, given by the soundtrack chosen for the presentation; this dynamic is also found in some more contemporary Acroportes routines.

So the concept of rhythm in couple acrobatics is closely linked to a precise temporal scan only if we use musical pieces during the performances which in this case create a rhythmic structure within which the acrobats move and to which they must adhere. In this rhythmic structure the moments of *timing* functional to movement and choreography must be inserted.

In addition to listening to each other and achieving a rhythm shared by several acrobats, having a good capacity to listen and adapt to musical pieces is a good starting point for this *timing* work. In this regard, some exercises to develop this capacity could be the following.

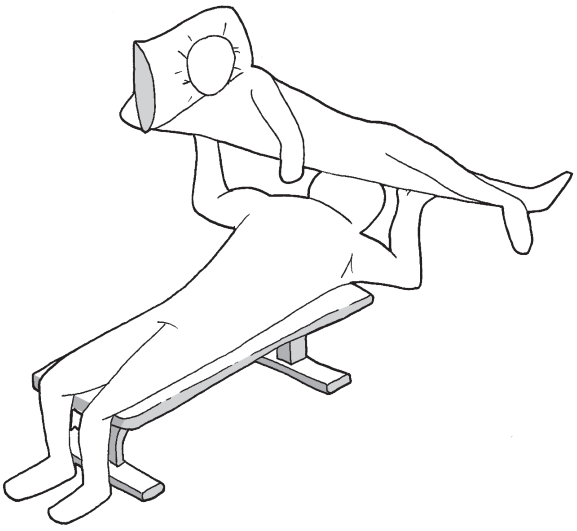
Activity 67. *Shake it*. Two students stand face to face and, in sync, perform a clap of hands on their thighs and the movement of waving both hands in a direction chosen from right, left, above the head or in front of the legs (without previously agreeing) . The sequence of movements is repeated rhythmically until, by chance, the two students wave their hands in the same direction; in this case, after the beat on the thighs, the two students give each other a "double five".

Activity 68. *Walking tied together*. In pairs or groups the pupils tie their ankles one with the other (or shoelaces) and must first move in straight lines then freely in the space coordinating with each other.

Activity 69. *One, two, three, I fall.* The students arrange themselves freely in the space, the instructor counts "one" and everyone takes a step, so to "two" and "three". After the third step everyone lies down on the ground for a moment then gets up and the exercise resumes from the beginning. After a first phase guided by the instructor, the students manage the exercise independently by synchronizing, possibly with the help of their own voice or music.

## *2.7. Conditional capacities in Acroportes*

We can say that the main conditional capacities of Acrobalance are strength and flexibility, so we will focus mainly on the study of these two capacities. As already mentioned, the development of conditional capacities is a very complex job that takes into account many variables.



It is impossible to have certain technical results in Acrobalance without adequate development of these capacities, on the other hand, planning and implementing effective and safe training cycles is a task that requires a lot of preparation. Normally, in the circus schools that train high-level students, the physical preparation part is taken care of by specialized operators, who are able to bring the students in targeted and timed training but, if the technical purposes are not the main objective, a basic knowledge of the topics is sufficient to propose a safe and effective job.

On the market there are numerous very exhaustive volumes that explain the various training theories and methodologies so, if you are interested in increasing your knowledge on the theories of development of conditional capacities, I refer you to the text by Jürgen Weineck which I believe is among the most useful studies on the topic[13]. I will contextualize the application of these capacities in a work aimed at wide-ranging circus students, giving basic understanding and work tools that I hope will allow them to be efficient in inclusive Acroportes proposals, without getting too deep into technical goals and related training theories.

[13] J. Weineck, *L'allenamento ottimale,* edited by P. Bellotti, Calzetti & Mariucci, Torgiano (PG) 2009.

*2.7.1. Strength capacity*

Strength can be defined as the ability of muscles to sustain resistance thanks to their tensive capacity.

The development of strength is a complex subject linked to a multiplicity of psychophysical factors.

Excluding all psychological aspects and remaining purely on the motor field, the factors that influence the capacity for strength are:

- The type of fibers that make up a muscle (white, red, mixed);
- The volume of the muscle;
- Energy resources linked to muscle fibers;
- Correlated coordination capacities (contraction / decontraction of agonist, antagonist and synergistic muscles).

Each of the aforementioned factors could be studied in depth, but this is beyond the scope of this manual; the reader is therefore referred to the numerous texts on the market relating to performance sport and body building that deal with this topic on the market.

When we read texts on this topic we must pay close attention to which age group they are aimed at.

Many of them extensively describe the development of strength in adolescent and adult subjects or to all those subjects who have passed the phase of *proceritas secunda* ('prepubertal period'), it is in fact after this phase that the body is ready for a programme of work of the various muscular districts for a real strengthening.

The purpose of this paragraph is to stimulate mainly the fourth factor, that is the correlated coordination capacities, as it is the most suited to our goals.

*Development and use of strength in work with children and young people*

It is important to say that the work of the Educational Circus with children and young people proposed in this text serves mainly to develop and support the neuro-muscular system during the learning of movements that are however related to a certain level of strength for their execution.

The main objective of the work on strength is therefore, in this context, **the neuro-muscular adaptation**, that is to stimulate the students in order to obtain an optimal interaction between the nervous system and the muscles and not the hypertrophic development of the muscle groups.

All the ideas of exercises and games that we will report have in fact this purpose.

*Neuro-muscular adaptation*

This term refers to the work performed by the nervous system in controlling the various muscle districts used in the performance of strength work. Neuro-muscular adaptation works mainly on two aspects: intramuscular coordination and intermuscular coordination.

Intramuscular coordination is the capacity of the various fibers that make up a single muscle to contract effectively.

Intermuscular coordination is the capacity of the nervous system to effectively recruit multiple agonist muscle groups into a movement.

*2.7.2. Strength classification*

The classification of strength is a very controversial discourse in the world of sport; there are various categorizations based on the various scholars who have expressed theories related to the use of this ability.

In the following pages I will try to give an overview of the various classifications of force that can serve as an orientation to the less experienced in the subject.

I will start with the most objective classifications related to the type of muscle contraction and the time of application to then deal with the application of force to the workload.

*Type of contraction*

In this context, by "muscle contraction" we mean that process of intracellular modifications of the skeletal muscles which leads to the variation of their length, thus expressing a certain amount of force. The first distinction we will make of strength, therefore, is based on the type of contraction of the fibers of a muscle which can occur in an *anisometric* or *isometric* way.

*Anisometric (or dynamic) contraction*

It is the most classic meaning of force, in which a muscle expresses it by varying the length of its structure, in a concentric way (shortening) and eccentrically (stretching). This type of contraction handles most of the force movements. To train this type of muscle contraction I use the functional training already described in Balancing but, if we want to contextualize this method in the context of Acroportes, we will choose different types of movements that are not exclusively aimed at increasing the *core* muscles but are they also widen those areas responsible for lifting loads such as the brachial biceps / triceps and the quadriceps / hamstrings.

Some basic not isometric strength exercises of Acroportes are:

- Squat (or maximum squat);
- Bending on the arms;
- Abdominals with 90° legs.

*Isometric (or static) contraction*

The isometric force develops when a muscle opposes a load while maintaining its length unchanged during the effort; this contraction is the type of force that generates what is called "holding" in jargon, and is an essential component of this type of activities. To develop this type of strength it is therefore advisable to propose all static holding exercises with natural load or with the addition of small weights, maintaining the chosen positions even for medium-long periods. It is important to remember that isometric strength develops and is maintained in precise angles with this type of training, so a base who must maintain his flyer semi-squat will have to train that precise angle for considerably longer times than those used in *routines*.

The most classic holding exercises are the following.

Activity 70. *The wheelbarrow*. Leaning back position with arms extended resting on the hands. The feet are raised off the ground with the help of a chair or a beam, which is of such a height as to align them behind the shoulders. If we maintain the position in the static phase, we work mainly on the isometric hold of the abdomen, if instead we choose to have the students move

in space in this position (with the help of a partner who supports the feet) we also stimulate the shoulder muscles.

Activity 71. *The invisible chair*. Position with the back in contact with the wall, legs semi-bent and thighs parallel to the ground. This exercise makes us recall the act of sitting in an "invisible" chair.

Activity 72. *The spoon*. Starting with the body lying on the ground in a prone position, legs and shoulders are lifted off the ground and the only contact with the ground is that of the buttocks, that become the only support base.

*Execution time*

A second distinction can be made, based on the speed of execution of a muscle contraction. In this paragraph we will describe the variations in time of application of the force with respect to the standard time: according to this parameter we talk mainly the *explosive* force and that at *low speed*.

*Explosive and explosive-elastic strength*

First of all, let's clarify the differences between these two types of strength.

Explosive strength expresses the greatest possible amount of strength in the shortest possible time.

Explosive-elastic strength is meant to express the greatest possible amount of strength in the shortest possible time by adding a preparatory movement that activates the elasticity of the muscles to increase power.

It is very difficult to distinguish these two types of strength, as explosive work normally makes use of preparatory movements that exploit the elasticity of the muscles. Let's take two examples from athletics: the departure of a sprinter from the blocks is an example of non-elastic explosive strength while a triple jump is a clear example of explosive-elastic strength.

In Acroportes the explosive-elastic strength is much more common, as practically all the jumps are managed by this mixed type of strength, therefore also the throwing of the bearers.

To develop this type of strength we can use simple natural load exercises such as the following.

Activity 73. *Squat / jump / squat*. Starting from a squat position, jump up synchronizing the movement of the arms and land back in place returning to squat.

Activity 74. *Rebounds*. To make a sequence of linked jumps, it is optional to overcome an obstacle (plyometric exercises).

Activity 75. *Push-ups carousel*. Two acrobats lie prone on the ground. Acrobat A rolls towards acrobat B who in the meantime performs a push-up (using it as a push) to jump over acrobat A in a horizontal position, parallel to the ground, landing on hands and feet again. The exercise continues without interruption with role exchanges.

*Low speed (or slow) strength*

Really, slow force is a development method used to strengthen muscles and prepare them for other types of work (commonly used to increase explosive strength), but

in Acroportes this type of strength is also used in specific exercises. Therefore, working on this type of strength is a complimentary stage also in the context of the educational circus. If we combine the concept of "slow strength" with functional training, the result is a series of exercises with natural load or with small weights that reproduce the motor gestures of Acroportes performed at low speeds. In addition to the development of strength, slow work leads to an increase in awareness of technical movements. The work aimed at improving this type of conditional capacity is carried out by performing some classic exercises (such as squats, or maximum squat, pushups and lunges) but with slow execution times: ten seconds to get to the end of the eccentric phase and ten seconds to complete the concentric phase.

*Load percentage*

After having classified the various forms of strength based on the type and time of contraction, we can talk about the percentage of strength applied to a movement. To deal with this topic, I refer to the classification of strength formulated by Dietrich Harre[14] a researcher in the field of training who theorized the first classification of the various types of strength which was later expanded by subsequent studies up to a fairly complex classification that I report below. According to the maximum load capacity that an individual can lift, therefore, different types of force applications are outlined according to the functional needs of the various movements.

In this classification the declination of this capacity with the other two conditional capacities clearly emerges, that is, resistance and speed. The classification that is explicit here is not official, there are various theories relating to the percentages of the load that still have quite minimal differences between them, so it is mainly intended to be an example and does not want to contradict any training theory currently in use. Types of strength in relation to the workload:

- Maximum strength 85% -100% of the workload;
- Sub-maximal strength 70% -85% of the workload;
- Resistant strength 40% -60% of the workload;
- Explosive strength 75% of the workload;
- Fast strength 20% -60% of the workload.

*Maximal strength*

Maximal strength is the greatest amount of strength a subject can voluntarily express; this type of strength is used for very few repetitions of movement, usually the various fitness tests report from one to three repetitions of movement; this type of force has a mainly low application time.

*Sub-maximal strength*

The sub-maximal strength is often considered together with the maximal strength, as it approaches the maximum load that an individual can lift, also expressed in slow medium times and in a few repetitions (four to ten repetitions).

[14] H.D. Harre, *Teoria dell'Allenamento. Indicazione di una metodica generale di allenamento*, Società Stampa Sportiva, Roma: 2005.

*Resistant strength*
The term "resistant force" means a strength work that can be continued for a certain amount of time and which consequently requires a lower load, usually for this type of force we speak of twenty-fifty repetitions based on the percentage of load. The standard time of application of this force is considered.

*Explosive strength*
As we have already said, this type of application consists in recruiting the greatest possible strength in the shortest possible time, and in fact it does not include the maximum load that the body supports; this strength can be used for a low number of repetitions (six to ten repetitions).

*Fast strength*
Fast strength applies to low loads, and can have high repetitions (between ten and twenty repetitions) depending on the load percentage, remaining in a short time duration parameter.

### *2.7.3. Strength capacity in Acroportes*
Acroportes is a very heterogeneous discipline due to the various techniques and roles it includes. Consequently, the types of force and muscle contractions that the discipline requires can be manifold. Unlike other sports activities, in fact, in Acrobalance different types of strength alternate in the same routine. I propose a table that summarizes the types of force in relation to the acrobatic movements previously cataloged (*Table 9*).

*Table 9. Figures and types of force applied to Acroportes.*

| **Figure** | **Type of contraction** | **Time of application** |
|---|---|---|
| Transitions | Dynamic contraction | Variable |
| Balances | Isometric contraction | Constant |
| Lifting (force or dynamic) | Dynamic contraction | Fast |
| Launch | Dynamic contraction | Fast |
| Catch | Dynamic contraction | Slow |

In this table I have deliberately excluded the load percentages as they are far too subjective and situational to be included in relation to Acroportes, but it is important to say that every time a base performs a forceful movement in a routine there must always be a discrete load margin.
For this reason, in the educational circus we rarely work with pairs of equal weight, but we prefer to combine very light flyers with respect to the build of the base.
Maximum strength movements must be left for strengthening sessions, under the supervision of a coach who also manages assistance during the movement to avoid trauma and injuries and in any case fall outside the scope of our educational path.

*Strength development methods*
Now that we have seen the classifications of strength and its applications to the Acroportes figures we will devote ourselves to the basic guidelines to understand how to develop this ability in order to support our students during the didactic path. The

basic methodological lines I suggest are generic and must be taken as a mere starting point for structuring a work fitting the various reference groups. Proposals must be well adapted. Let's take an example, when we work on strength (or rather on neuro-muscular adaptation) with small children the dynamics are clearly different from those found in more adult subjects, in fact the little ones have much softer bodies with less conditional performance, but much more resilience.
It makes no sense, therefore, to work on the precision of execution of a squat with a five-year-old child, but we cannot ignore the risks that an incorrect squat can have on a teenager's knees, especially when under load! It is clear that each age group must have different strength training!

*Movement games*
When we prepare children for Acroportes, we must prepare ourselves for a playful job that keeps motivation to move very high and into which to insert the movements that we consider useful.
We will therefore propose physical games oriented to those strength movements that we want to develop such as jumps, bends or isometries. Some examples may be the following (to which other traditional games such as sack racing or tug-of-war can be added).

Activity 76. *The boxes*. The children bent over themselves form a "box" from which something will come out; the instructor will give the input to unfold the box by saying, for example, "many monkeys come out of closed boxes" and the children will move around the gym running or hopping like monkeys .

Activity 77. *The saber*. All the children in line wait for the instructor to pull out their invisible saber; if the blow of the saber reaches the height of the head everyone must lower themselves (by performing a squat); if the blow reaches the ankles everyone must jump.

Activity 78. *The leap frog*. In pairs and jumping in turn, the students have to travel a certain distance; the jump is performed by leaning on the partner's sacrum which during the partner's turn acts as a support base maintaining a position with legs extended (or slightly bent) and the back bent forward.

*Fighting games*
To develop strength in elementary or middle school kids in a practical and fun way, the use of wrestling games is recommended. Wrestling games are excellent exercises to stimulate isometric or dynamic strength with medium / low application; from these games we can draw very interesting *stimuli* also for physical contact, emotional control and respect for the rules. In my career I have encountered a lot of resistance by teachers and educators towards this type of game, but personally I think it is unjustified. If wrestling games are clearly explained and carefully managed, they are not at all detrimental and do not have a higher accident rate than any other physical activity. The fighting games I avail myself with most in my work are the following.

*Activity 79. Discard the gift*. A student lies down in a crouched position with their back on the ground, a partner must "unwrap" them by forcibly moving his limbs away from the center of the body towards the floor. Once the limbs touch the ground they cannot be moved anymore.

Activity 80. *Roll the stone.* A student lies prone with their limbs flexed close to their torso and is called to hold the position as long as possible. The other pupil has to try to overturn them.

Activity 81. *Samurai struggle.* Two students stand side by side facing each other in a semi-squat position. They give each other the same hand (for example the right) and put the outside of the same foot in contact (which must necessarily be on the same side of the hand): from this position, pulling or pushing, they must unbalance the opponent without losing balance. The first one who lifts a foot loses.

*Analytical movements*

When we begin to "condition" a work group it can be useful to accurately explain the movements to be performed under natural load such as squats or bending in an analytical way, that is, demonstrating the movement with the utmost attention by the students and observing them carefully during the execution. This method should be used with caution because it is very boring, especially with younger subjects, but it has the advantage of accurately acquiring movements that, if performed poorly, can lead to stress and damage to students' bodies.

*Route to stations*

A path to force stations with natural load is the optimal development methodology to develop all types of force, and it is also a perfect method for the work contexts in which operators in our sector are usually found, as it can be proposed without specific tools. An example of a path could contain the following stations:

- First position Spoon[15];
- Second station Slow bending on the arms;
- Third station Invisible chair;
- Fourth station Jump / squat / jump / squat.

All the stations are held for one minute until the instructor's signal; all the pupils pass through all the four stations with a very short pause (20-30 seconds).

This is a course designed for high school students in excellent physical shape and already at a good level of training; the scheme clearly needs to be suited to the group you work with.

### *2.7.4 Flexibility capacity in Acroportes*

I have already introduced this capacity in the chapter on balancing, but unlike this latter discipline, flexibility in Acroportes is a decidedly essential skill;in addition to preventing injuries, it increases the physical capacity to perform and maintain certain figures, both on the part of the flyer and the one of the base.

Having a good back arch and torso flexion with straight legs, a good shoulder opening angle and proper bone alignment in pike positions are just a few examples of pre-requisites for the most common Acroportes exercises. It is crucial to devote adequate time to stimulating this capacity, carving out moments specifically dedicated to the students' stretching. But when exactly to do it during the lesson?

I fully adhere to the school of thought that incorporates flexibility exercises after the workload and not in the warm-up phase. Improving muscle flexibility and joint

[15] See the paragraph titled "Isometric (or static) contraction".

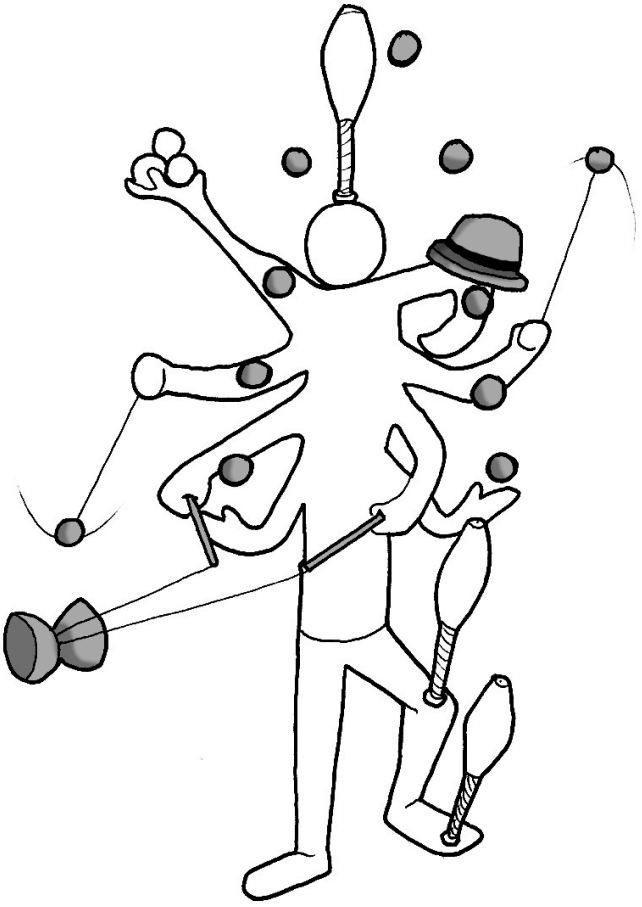
mobility before working on high-load technical figures increases the risk of injuries, so I manage my work sessions in this way:

- Warm-up phase;
- Strengthening or technical phase (depending on the training cycle);
- Flexibility phase.

A good warm-up can be performed through vascularization exercises such as running or jumping a rope followed by medium-low intensity exercises, free body or with equipment, without however straining excessively the muscle-tendon and joint system.

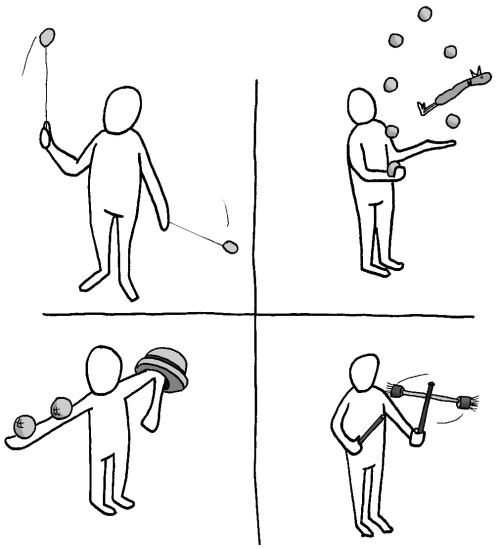
Stretching and breathing exercises are left at the end of the course. Specific positions of Acroportes are preferred without neglecting practice on general flexibility.

## Chapter 3.
# Juggling in the Educational Circus



### *3.1 Introduction to Juggling: What is Juggling?*

Answering this question could take a long, long time... Several contemporary jugglers have discussed and philosophized a lot on the question, so much so that at the moment there is not, and perhaps never will, a single definition of this discipline! I will give a basic definition mostly focusing on the purely motor aspect that this manual deals with: we can therefore say that the term "Juggling" commonly means "the skill to handle objects" or – said in a way a little more contemporary – "to harmoniously control one or more objects in space and time". This generic definition



indicates an extremely vast discipline that gathers within it a wide range of actions, all however united by the skill to perform finely discriminated movements that can involve the body as a whole even if the primary task is carried out by hands and fingers. Analyzing Juggling in detail on a motor level would require a very broad discussion, given the enormous variety of exercises that constitute it and the high amount of motor capacities and capacities put into play. Here we will try to give some guidelines, bringing out as many points of connection as possible between juggling's technical gestures and generic motor capacities, each time choosing the exercise or the most illustrative object in this regard. We will start by providing a classification of the different types of use of Juggling objects and styles of play, trying to describe and list them through a sort of common vocabulary in order to clarify as much as possible the terms of comparison of the following paragraphs.

3.1.1 *Classifying Juggling* Juggling can be classified according to the type of use of the object and the type of relationship between the object and the body of the juggler, or according to the purpose of the practice. As for the distinction based on the type of carry-over objects (*Deepening 1*), we refer to the classification that Stefano Bertelli exposes in his thesis "Analysis of the motor gesture in Juggling".

*Deepening 1. What is juggling*
Taken from S. Bertelli, "Analysis of the motor gesture in Juggling" (unpublished university report made during the course of studies in Motor Sciences, Faculty of Medicine and Surgery, University of Rome - Tor Vergata, ay 2009-2010), on licensed by the author.

We aim to outline the various disciplines that go under the name of Juggling. Some macro-categories can be deduced from the different specializations that are added to them. We will refer to those branches that we consider classic in a certain way or in any case interesting for the purposes of our research, but it must be taken into account that the discipline of Juggling is in itself vast and constantly evolving.
We can therefore define the following four macro-categories: Throwing Juggling, Rotating Juggling, Balance Juggling and Contact Juggling.

*Throwing and catching juggling ("Toss Juggling").* It is fundamentally based on the throwing and catching of objects by supporting a certain rhythm in a cyclical action with possible variations in time and space duration. Several tools can be used, such as – to make some examples – the classic balls, clubs, rings, knives and burning torches.

*Rotation juggling ("Spinning, Swinging").* This type of Juggling is based on the rotation of objects around certain axes; the juggler's ability to keep the rotation active and determine its trajectory

is crucial, in order to trace the movements of the object. We can observe a differentiation based on: Objects rotating by means of the body and Objects rotating by other objects. It goes without saying that in both cases the tools perform rotations around the body and that the main source that provides the movement is always the body; the distinction mentioned above only refers to different typology of objects, standing the concept that rotation juggling implies a rotating object. Let's now look at the common objects for both subclasses.

| **Rotating objects around the body** | **Rotating objects by means of other objects** |
|---|---|
| Bolas, then, kiwido | Diablo |
| Spinning balls | Flower stick |
| Sticks | Devil stick |
| Meteor | Yo Yo |

The most complex part of this discipline consists in managing the trajectories of objects, since in the rotation phase the objects accumulate energy of inertia, and this makes it difficult to control their trajectory.

*Balance juggling*. In this case the fundamental part consists in keeping one or more objects in balance on the various parts of the body. This discipline shows limitless combinations (imagine all the ways objects can be balanced on others): let's leave all the possible variations and complexities behind. In fact, the balance juggling has no canonical tools or objects except perhaps the saucers, but any object that has such a weight that can be lifted and placed in balance is a balance object (This category of juggling coincides with the required Balancing act described in Chapter 1 [Editor's note]).

*Contact Juggling*. Contact Juggling consists in the ability of the person who performs it to manipulate objects in contact with the body; such contact is essential and cannot be ignored; obviously there are also situations in which the object is detached from the body for a short time. Contact juggling, like almost all other types, can be performed with any object that allows it to be performed. Standardized or recognized objects are available on a large scale to carry out Contact Juggling. The following are more or less used: Contact Juggling Balls (acrylic and silicone), Clubs, Rings, Hats and Staff. Contact Juggling undergoes a great distinction based on how contact is made with the body: Rolling on the body (Body Rolling) and Manipulation. The former avails itself with those techniques in which the object rolls in a controlled manner on various sections of the body, giving the technique a fluid aesthetic as if the object were magnetized with the body. The latter consists precisely in manipulating a number of variable objects with the use of the hands. In most cases they are acrylic spheres of various sizes that when manipulated create figures of remarkable scenic effect. Known to all is the magician who rolls a dollar on the knuckles of his hand.

The subdivision we have reported above is indicative, as many objects have a mixed use and can shift from one category to another during the same game routine or within an educational route.

The stick can, for example, be used in rotation around the body, in contact or in throwing and catching sequences; spheres and balls can be manipulated, thrown and caught, rolled on the body and balanced on specific points. In addition to the distinction relating to the use of objects and the types of their movements, Juggling also has considerable variables based on the purpose of the practice. Juggling can in fact be practiced for the following purposes: amateur, professional and educational.

*Amateur juggling*. All those jugglers who practice for fun, for meditation or to develop attentive skills, in any case all those who play for recreational and social purposes, fit into this area.

*Professional juggling*. All jugglers who aim at a scenic/theatrical performance of the discipline are included in this set. There are various types of playing styles and performance possibilities; broadly we can describe the three main strands of professional juggling: technical juggling (focus on the trajectories of tools), comic juggling (elements of theater and clowns) and physical juggling (elements of Physical Theater and dance).

*Educational juggling*. It differs from the other two areas in that it focuses on educational and learning processes rather than technical results; in this perspective, Juggling is not the goal of the educational path but the tool.

## *3.2. Fundamental elements of Juggling*

Beyond the various classifications and purposes, Juggling still has some essential elements that form a lexicon common to all jugglers (*Table 10*).

*Table 10. Juggling Terminology.*

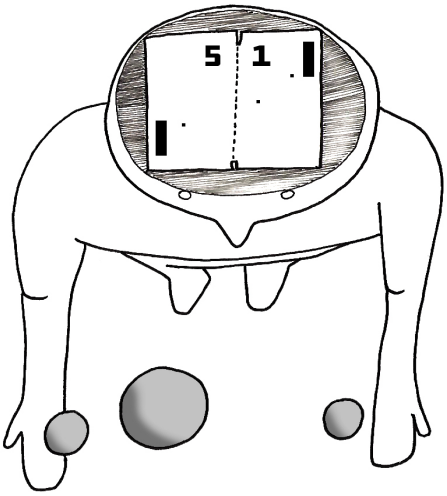
| Term | Description |
|---|---|
| Trick | Generic term common to all Juggling variants, a trick can be composed of single movements or combinations of movements depending on the type of objects used: a stick trick consists of a single movement, while a trick with three balls includes a sequence movements that move all objects at least once. |
| Pattern | Typically refers to throwing objects and indicates a sequence of fixed movements that can be reproduced in a cyclic manner. |
| Flash | A term used only in Throwing Juggling and refers to the performing of a complete turn of a pattern by throwing and catching all objects once. The flash is usually used in two ways:<br>- In the teaching phase, to understand if the student has a clear mental representation of the scheme they are studying even if they still do not have the technical capacity to keep it constant;<br>- By high-leveled jugglers who score and try to overcome their records using four ranking modes: flash (perform one full loop of the pattern), qualify (perform two full laps of the pattern), counting the possible highest number of catches in a pattern, by timing the holding time of a pattern. |
| Routine | A trick sequence creates a routine. We can therefore define a routine as a fixed sequence of tricks with predefined beginning and end. A routine can include transient connecting movements between one trick and another . |
| Drop | This term refers to the fall of an object during the creation of a trick, pattern or routine. |

## *3.3 Juggling and Neuroscience*

In recent years, thanks to discovery and implementation of new technologies in the study of the human brain, numerous researches and studies on the effects of juggling at the neuronal level have been published, reporting very interesting results. The following examples deal only with Throwing Juggling, defined as "complex oculo-manual activity", and it is shown that the practice of this activity not only develops grey matter in the brain, but also creates a significant increase in white matter. It is assumed that the occurrence of these effects is due to the fact that, being "throwing

juggling" a kind of activity that involves both limbs in a complex programming of Coordination and rhythm, this favours a dialogue between all the lobes of the brain simultaneously, for long stretches of time and at high intensity. Clearly these effects of neuronal development are linked to the principles of neuro-plasticity and therefore are temporary; only a long-lasting and continuous training over time tends to maintain certain results stable. Even if at the moment the practical benefits given by the aforementioned modifications of the brain tissue are not yet clear, there is no doubt that a neuronal increase can hardly worsen the functionality of an individual. For those wishing to deepen the topic, I report three of the most important studies carried out on the subject in a note[1].

## *3.4 Juggling and mental representation*



Juggling is undoubtedly the circus discipline most linked to the mental processing of the gesture and also the least instinctive. Especially if we are talking about patterns with throwing objects, the calculations of trajectories, the balances and combinations of movements require a great deal of precision to be part of the nervous system. This precision translates into clear perceptions of the body scheme and the ideo-motor scheme of the movement, as well as the various coordinate capacities involved in its realization.

### *3.4.1 Juggling and ideo-motor scheme*

Like any sequence of movements, a trick / pattern must first be understood, then programmed and finally realized. It is therefore essential to have a clear and solid mental image before experimenting with the scheme by defying gravity.
Learning by imitation of a trick is a very limited method, especially in throwing juggling: the motor sequences of juggling are in themselves very complex tasks at the level of the nervous system; with observation alone it is therefore extremely difficult to notice and acquire the small, fine Coordination movements that make up most of the play patterns. Faced with such a motor task, people without ade-

[1] B. Draganski, C. Gaser, V. Busch, et al., *Neuroplasticity: changes in gray matter induced by training*, in "Nature" 2004; 427 (6972): 311-312 doi: 10.1038/427311a.; J. Boyke, J. Driemeyer, C. Gaser, et al., *Training-Induced Brain Structure Changes in the Elderly,* in "J Neurosci" 2008; 28 (28): 7031-7035. doi: 10.1523/JNEUROSCI.0742-08.2008; J. Scholz, M.C. Klein, T.E. Behrens, et al., *Training induces changes in white-matter architecture*, in "J Cogn Neurosci" 2012; 24 (8): 1664-1670. doi: 10.1162/jocn_a_00240.

quate mental preparation use spontaneous and pre-established gestures that do not effectively reflect the functional movements of the trick. For this reason, a basic understanding of the sequence to be performed (in time and space) is a basic assumption in most cases.

*3.4.2 Ideo-motor approach to throwing juggling*

To clarify the concepts presented so far on a practical level, I will give an example comparing the method of Dave Finnigan called "Three steps juggling" to the method devised by Craig Quat called "Five steps juggling". Both methods aim at newcomers to juggling and deal with the basic scheme called "cascade". It can be done with different objects but usually the first to be involved are the scarves or the balls. Finnigan in his book "The Complete Juggler"[2] proposes a method based on the analysis and practice of throws that is summed up in three phases (or steps), namely:

Phase 1. Repetition of a throw of a ball from one hand to the other;
Phase 2. From the starting position with one ball in each hand, swap the position of the two balls with asynchronous throws;
Phase 3. From a new starting position with two balls in one hand and one in the other, swap the position of the balls with asynchronous throws to end up with the distribution of balls in the opposite hand compared to the starting position.

This method focuses on the didactic progression linked to the increase in the throwing technique but does not take into account the work aimed at acquiring the ideo-motor scheme of the cascade. Quat revisits Finnigan's work, completing it by adding two preparatory exercises prior to the three classic steps; therefore the phases of his method are the following:

Phase 1. Two reference points are fixed on the floor (with plastic or wooden circles or with tape). One ball is initially on the floor, and other two are held in the trainee's hands, one each: the trainee put down one of the ball and get the one that was originally placed on the floor, then repeat the movement with the other hand;
Phase 2. With a circle and a ball in hand, the student throws the ball from hand to hand repeatedly and passes the circle without throwing it. The focus of the exercise must be placed on keeping the heights of the ball throws as constant as possible;
Phase 3. Repetition of a throw of a ball from one hand to the other;
Phase 4. From the starting position with a ball in each hand, swap, with asynchronous throws, the position of the two balls;
Phase 5. From a new starting position with two balls in one hand and one in the other, swap the position of the balls with asynchronous throws to end up with the distribution of balls in the opposite hand compared to the starting position.

[2] D. Finnigan, *The Complete Juggler: All the Steps from Beginner to Professional,* Jugglebag, USA: 1991.

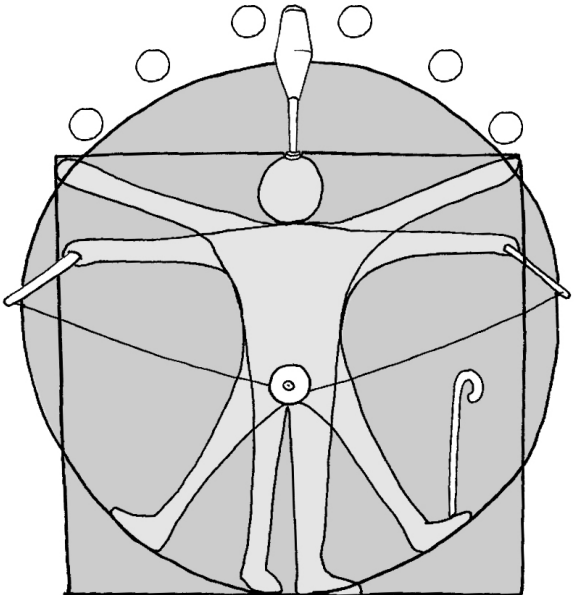
The first method is considered linear and based on the gradual increase in difficulty, the second is considered non-linear and based on the prerequisites before moving on to the actual technical phase. As we can see in fact, the last three phases of Quat are the same as Finnigan but the first two phases added by Quat have a very specific intent. The first phase creates a clear ideo-motor pattern of the rotation of the balls carried out by the hands, completely neglecting the trajectories that will be considered in the next phase. The second phase brings attention to the symmetrical work of throws performed alternately by both hands, analyzing the trajectories and trying to prevent the movement of "right hand toss / left hand passes": those are usually very spontaneous in beginners, though unfortunately absolutely inappropriate in the learning phase of the cascade scheme. Other exercises that help create the ideo-motor scheme of Juggling tricks are the following.

*Helped by an assistant*
This jargon exercise is called "shadow juggling" and requires the presence of jugglers who, placing themselves in front of the subject in the learning phase, helps them to slow down the falling time of objects by blocking the apexes of each throw. Let's take the example of the three-ball cascade: the student starts with two objects, one in each hand, and the assistant with one. Students pass the object from their hand onto the assistant's free hand while the latter drops the object held in the other hand, perpendicularly, into the hand of the student who has just thrown. Repeat the throw with both hands several times. This exercise can be used for most three-object-patterns. Getting familiar with the ground and being assisted are the two basic elements of the cascade pattern and are used for the first approach to Juggling: the work of visualizing the patterns accompanies the juggler throughout their journey. Even a medium-high level juggler needs to have means to understand the patterns before trying them.

*Using the siteswap notation*
The *siteswap*[3] notation is an alpha-numerical system to measure the time's trajectories of the objects in the air and the time of their shifting from one hand to another. Although not very complex, the explanation of this exercise is beyond the scope of this manual and therefore I refer to the web, where you can find various sites that give a decidedly exhaustive explanation[4]. Recently it has become possible to use digital simulators of *siteswap* schemes (applications available on the Internet that allow you to enter different parameters: number of objects, hand movement, height of throws, number of jugglers, rhythm, etc.). By way of example, some of them are mentioned in the footnote[5].

### *3.4.3 Juggling and body scheme*
The perception of one's body is a component of great importance in Juggling, especially when the technical level rises, as the execution of the motor gesture of a

[3] *Siteswaps* are arrangements of any Juggling figure proposed , in 1985,by three Americans and an Englishman (Bruce Tiemann, Bengt Magnusson, Paul Klimek and Mike Day), all of them passionate for Juggling and / or Maths.
[4] See Thomwall's site: https://thomwall.com/siteswap-fundamentals/.
[5] iJuggle© 2018, Juggling Lab juggling animator© 2019 e Juggledroid© 2020.



trick only in the frontal space of the juggler is quickly abandoned to make room for more complex movements that develop three-dimensionally around the whole body. This work necessarily requires an adaptation of the tricks to one's body structure: the calculations relating to the path of the moving object are not enough, we must necessarily integrate the sensory information on the position of the body in space during execution. Undoubtedly a good knowledge of one's own body allows a more efficient programming of the ideo-motor scheme of the technical movement. We can consider "errors" related to the perception of the body scheme all those throws that collide with the body or all those erroneous trajectories due to an inaccurate positioning of the limbs during the release phase of the objects. For example, one of the most common execution errors that we can observe in "body throws"[6] occurs when, despite a correct programming of the launch, an incorrect perception and consequent positioning of the arm both result in an out-of-pattern launch; just as it might happen if the impact of the club against the thigh or back affects the execution of the movement, leading to a wrong throw.

Several exercises can help develop a right perception of one's own body scheme. Those related to Juggling can give different hints such as:

- Massage all the accessible parts of your body with a ball or club or other objects;
- Throw a scarf and make it land on chosen parts of the body (better if unusual such as pelvis, ribs, calves or buttocks);
- Make fake throws with an invisible object from one hand to the other using complex trajectories around the body as much as possible.

## *3.5 Juggling between lateralization and ambidextrousness*

It is necessary to talk about the relationship between lateralization and ambidextrous processes during the work of Juggling; as this is an Educational Circus manual, this aspect is fundamental and requires a specific insight. Juggling is an important activity to be proposed to students since an early age, due to the previously men-

[6] Throws that develop around the body.

tioned neuronal development properties, and it is also an activity that helps the development of the lateralization process by imposing the choice of one dominant hand over the other in some essentially technical aspects. In addition to helping lateralization, Juggling also stimulates ambidextrous incisively, that turns out to be a very important skill not only in high-level juggling, but in everyday life in general, as it increases the functionality of an individual beyond their circus vocations. **We must be careful in combining these two types of work correctly and propose them in the right phase of development so as not to hinder the learning and lateralization processes of the students.** The adaptation of the didactic proposals of the circus arts to the specific age group of the students is not an issue dealt with in this work but for the present topic we must make an exception. In fact, *Table 11* lists the evolution stages of lateralization and the consequent Juggling proposals. Now let's talk about the most common objects of the Educational Circus, some of them are lateralizing predominantly, such as the yo-yo, the *spinning* ball and the spinning plates, while others require a certain dose of ambidextrousness, such as the *pois* and the *flower stick* and all throwing items.
During the use of the objects considered ambidextrous, however, the more complicated exercises are usually performed by the dominant hand: provided that a specific work on the non-dominant limb is not carried out, we can set up a lateralizing work with objects that tend to be defined as "ambidextrous". For example, with handkerchiefs (object widely used in the age group between five and seven years), we can propose exercises such as:

- Two scarfes thrown with one hand;
- "Columns" formed by three scarfes in their asymmetrical version (*siteswap*).

To understand when to propose a type of exercise compared to others, we can consult *Table 11*.

*Table 11. Human lateralization divided by biological age groups and consequent proposals for Juggling in the Educational Circus.*

| Biological age | Evolution of lateralization | Didactic proposals |
|---|---|---|
| Up to 5 years | The child has not yet started the lateralization process; ambidextrous situation | No restrictions in particular; exercises that require ambidextrousness can easily be proposed. |
| From 5 to 7 years old | The lateralization process begins; the child expresses their laterality | It is a very sensitive phase; forcing ambidextrousness can threaten the lateralization process. It is advisable to work with lateralizing and ambidextrous objects in a proportion of 2:1. |
| 8 to 12 years old | The laterality acquisition phase is consolidated | It is possible to start a more technical work with objects by returning to propose even more specific and technical ambidextrous works than before. |
| Over 12 years old | Lateral dominance is now well established; ambidextrousness can be safely developed. | Advanced Coordination exercises and specific training on the non-dominant hand can be proposed to reduce the technical gap between the two limbs and improve ambidextrousness. |

## *3.6 Sensory Analyzers and Juggling*

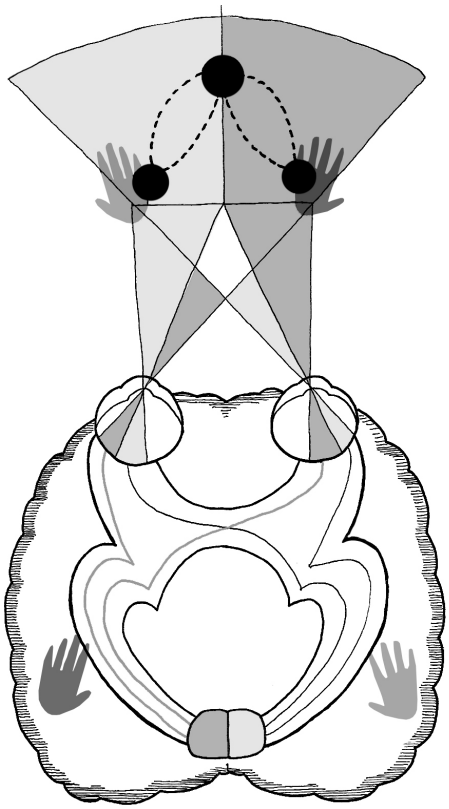
Together with the mental representation of game patterns, sensory analyzers play a fundamental role in Juggling. I will describe the analyzers mainly solicited by specifying their direct implications in the control of motor gestures.

### *3.6.1 Visual system*

The visual system is a sensory system of considerable importance when we talk about either objects to be thrown or those without direct eye contact, although it is undoubtedly not the only system operating exercises[7]. In fact, its exclusion makes it almost impossible to launch or control many objects and makes it difficult to manage all the other global movements, especially in the learning phase. Compared to other disciplines, training of the visual system in its focal and peripheral aspects is of strategic importance in Juggling and, for this reason, I will now enter the subject in detail.

*Focal vision*

The focal vision system is used as a reference point in the learning phase of a new juggling technique. Following the object with an active and attentive vision is needed to check whether its direction reflects the desired motor program, that is, the exact position in space, as well as its precise angle (in the case of clubs, for example). This is all very useful information for the nervous system to perform the gripping action or to start a new recovery program. Part of this visual information, once the technical capacities of throwing / controlling / catching or retrieving the object have been refined, will be delegated to other sensory systems, such as peripheral vision and touch, which for this reason require equally specific training attention. It should not be assumed that the focal vision system is always well trained; nowadays the eyes are subjected to a strong flat screen stress and bombarded by excessive color *stimuli*. These states of stress can lead to states of dysfunction, in some cases even serious: for this reason it is advisable to focus attention on specific exercises for ocular focus. In 1920[8] William Bates explained



[7] See the paragraph dedicated to Coupling and Combination Capacity in this chapter.

[8] W. Bates, *Perfect Sight Without Glasses [The Cure of Imperfect Sight by Treatment Without Glasses]*, The Central Fixation Publishing Company, s.l. 1920. Download on www.iblindness.org/ebooks/perfect-sight-without-glasses/ (last accessed January 16th, 2021).

his method in a book entitled "Perfect sight without glasses", clearing the way for many other methods and exercises that have been added to the preventive-rehabilitative vein of sight. Avoiding entering into technical discussions on the matter, I mention three exercises taken from Bates' work, that in my opinion are helpful enough at improving focalization of an able-bodied individual:

- Maintaining the head still, slowly rotate eyes as wide as possible, focusing on the objects in the surrounding space;
- Focus alternately near and distant objects in short spans of time;
- Repeatedly throwing and catching an object with one eye closed (then switching eyes).

*Peripheral vision*

It is the vision that sets us and guides us in space but, in the world of Juggling, it is also the form of vision that helps us to manage objects once we have acquired a good familiarity with the technique needed to control them. Freeing our gaze (focal vision) from objects helps us to move correctly in space while "juggling", avoiding any obstacles, and also opens up the possibility of relating to other people such as during *passing*[9] exercises or during a show, offering us the capacity to interact with the public. Peripheral vision like focal vision also decreases under stress or lack of use. Some exercises to keep it active are:

- While staring at a point in front of us, we raise our index fingers and place them in the center of the field of view; without losing the reference point with the focal vision, we move the index fingers to the sides and try to follow them until they leave our visual field;
- Throwing and catching one or more objects while reading something or looking a person in the eye;
- While throwing one or more objects, move your head and observe distant and near objects.

### *3.6.2 Touch*

Speaking of touch, in Juggling we mainly intend to refer to the mechanoreceptors of the hand since they represent the instrument at the base of the practice of Juggling, especially for beginners. For *Contact juggling* jugglers, the discussion extends to the back of the hand, forearms and all other parts of the body delegated to control the object. In this discipline the sensitivity of the skin stores a lot of information used for motor programming, the execution of the gesture and the relative *feedbacks*, for example the surface of the object (which can be mainly rough or smooth, determining its grip and which in turn influences the moment of release) or the exact position of the object given by the resultant of its center of gravity on the fingers, which is decisive for the accuracy of the launch, rolling or Balancing. Sensory stimulation of the hands helps the nervous system to receive more information on the characteristics of the object. Some examples of this stimulation can be:

- Massage the hands;
- Dip your hands in containers full of seeds or plastic balls;
- Handle sensory tactile balls[10].

[9] Exchange of objects between jugglers while performing coded schemes.

[10] "Sensory tactile balls" are soft or hard plastic balls with irregular surfaces.

## *3.7 Juggling and motor schemes: throwing / catching*

It is the main reference scheme of this discipline as it is the only one that is really related to the capacity of juggling; even the above scheme in this context needs a thorough discussion. Let's start with the analysis of the motor gesture; usually when in the motor manuals we talk about "throwing" we refer to the throws of the main sports such as athletics or baseball-namely, of static global motor pattern[11]. In Juggling, the "basic throw" is a segmental pattern given by a rotation of the forearm, usually on the frontal plane, while the body tries to maintain the upright position as much as possible.

In classical juggling, the more technically complex throws (such as Albert[12], Tomahawk[13] and some throws going around the torso or under the legs) become global movements that require a variation in the overall attitude of the body. The involvement of the lower limbs, commonly present in the aforementioned sports throws, does not match much with the fast and repeated throws of classic juggling schemes; the synchrony between upper and lower limbs would in fact become impossible when using a large number of objects and in any case tiring and destabilizing when working with a smaller number of objects. So the motor pattern of throwing in Juggling finds a very peculiar declination, almost unique in its kind.

While writing this text, I was enlightened by the fact that Juggling is one of the very few activities requiring the participant to manage both the throwing phase and that of taking one or more objects. In other sports, usually, only one of these two actions is performed.

Apart from rhythmic gymnastics, that presents the same motor dynamics applied to a single object, or the dribbles of basketball, that however develop on the rebound, the only other examples of activities with a similar type of motor management of objects are the various "batting" movements in some ball sports, such as tennis, volleyball or table tennis, even though they are linked more to the "throwing / hitting" conceptual scheme than that of "throwing / catching".

Given this observation, practicing the classic motor pattern of throwing and catching at an early age appears even more useful for facilitating eye-manual coordination. When we apply the classical meaning of motor pattern to Juggling, the most useful type of throw to implement should be the one that explores the vertical direction, even if any type of throw helps to develop the functional body-object-tone relationship, involving therefore very interesting neuro-physical stimulation.

Among the exercises listed in the section dedicated to movement patterns[14], I recommend the study of these following.

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[11] See Chapter 3.

[12] The "Albert" throw is a trick that consists in throwing the club after having passed it through the legs- without raising them at all- from front to back, holding the club by its pommel.

[13] By "Tomahawk" we mean a throw that is performed above the head with the back slightly arched and the elbows raised at face level; the clubs are passed from one hand to the other always remaining above the head.

[14] See Chapter 3.

Activity 82. *Precision throws upwards*. It is an exercise that can already be introduced to younger children (about four years old) and consists in choosing a target point on the ceiling and trying to hit it with a ball (preferably a soft ball such as the tennis ones). Throwing and catching can be done either with one or two hands.

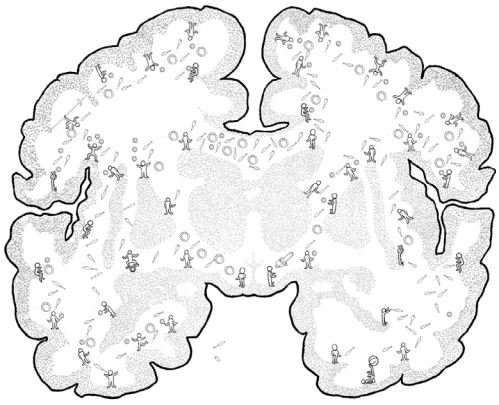
Activity 83. *Throw-action-catch*. Students are asked to perform a vertical throw and during the flight phase of the object perform one or more actions (clap hands, touch the head, touch the ground, shake hands with a partner, etc.) and then catch the object thrown. The variation options with one or two hands are also valid in this exercise.

Activity 84. *Throwing and catching with one hand*. The prerequisite of this exercise raises the minimum age level of the students to whom it can be proposed. In fact, it is difficult for a child to be able to perform it correctly before the age of six or seven. It is a good exercise to become familiar with new objects or with throws around the body and to improve ambidextrousness. In the latter case, the optimal sequence to repeat is: throw / catch (with the right hand); throw / catch (change hand); throw / catch (with left hand); throw / catch (change hand), etc. To improve the gesture, it is possible to suggest to students to pay attention to catching the object thrown with the least possible noise, cushioning the grip by extending the arm downwards.

## *3.8 Juggling and Coordination capacities*

### 3.8.1 *Coupling and Combination capacity*

"Coupling and Combination" is the Coordination capacity that predominates in all types of Juggling, as its movements are complex sequences of actions to be performed with meticulous precision. This capacitiy also manages all the throws and catches of Toss juggling; in fact, as Francesco Casolo[15] explains, oculus-manual coordination is the combination of a motor gesture (the throwing and catching of an object) with a visual stimulus (the apex that the object should have according to our motor program). Throwing and catching an object must be considered as components of a single motor program and not two distinct movements, since, if the object is thrown with the intention of a subsequent catch, the motor program is structured accordingly.



To be more precise, throwing-and-catching an object is a movement mainly guided by proprioceptive afferents: it is possible to juggle with no visual analyzers, as I previously explained[16], but only at master levels. The "blind"[17] performances in the

[15] F. Casolo, *Lineamenti di teoria e metodologia del movimento umano,* Vita e pensiero, Milano, 2020.

[16] See chapter about sensory analyzers in Balancing.

[17] With closed eyes.

throwing juggling are extremely limited, as the view works as a spatial reference to execute a throw and as an executive control of the movement in order to adjust the grip of the object. We can therefore conclude by saying that throwing juggling is a complex motor activity that is based on proprioceptive programming, but in its execution it needs visual feedback to incisively support the implementation of the movements. Multi-object throw patterns are a sequence of single tosses and draw coupling (synchronous patterns) or combination (asynchronous patterns) exercises. In turn, throwing paradigmas can be performed simultaneously with other exercises, such as the use of the unicycle or other balance equipment, or with other juggling or Balancing exercises and then coupled or combined again. It is therefore necessary to underline the importance of stimulating this capacity in an effective and targeted manner in this educational context.

*Improve combinatory capacity*

Having a wide range of movements to couple or combine, it is difficult to outline a cut-crossing training methodology, since each movement needs special attention. As described for the previous disciplines, we can stimulate the general sequencing capacity that lays the foundations for all types of gestures and a specific one linked to a single gesture or to the coupling of several related gestures. The general capacity in this context, suited to the finely discriminated motor skills of the hands, can be developed with so called "Coordination games"; I will list some of them.

Activity 85. *Chinese morra in solitaire*. There are all three Chinese morra figures ("stone", "scissor" and "paper"), only we play alone with both hands. We decide what hand will always be the winner executing the sequence of rock-scissor-paper, while the other hand (the one that always loses) must follow the sequence of scissor-paper-rock. Hands throw the figures down at the same time.

Activity 86. *Target Shooting*. One hand makes the gesture of a gun with thumb, index and middle finger, the other the target, creating a circle with index and thumb at the same time, then quickly they change roles and off we go.

Activity 87. *Aerial geometries*. The trainee needs to outstretch arm and couple the hands at the sternum level: simultaneously one hand draws a square in front of the body and the other a line (horizontal or vertical). The hands draw the lines with the same rhythm and at the end of the first cycle (made by a square and four lines) they meet again at the starting point.

If we wanted to draw up some basic lines for the improvement of the specific capacity of coupling and combination, we could work like this:

- Individually perfect the gestures before pairing / combining them;
- Vary the execution parameters of the gestures as much as possible during the pairing / combination phase.

Some other variables are:

- Type of objects (run the same pattern with balls / rings / clubs, or run a diablo routine changing the object model);
- Speed of execution (execute the schemes or the routine adapting them to quite different kinds music);

• Amplitude of the movements (increase and decrease the amplitude of the movements or perform them in confined spaces);
• Exclusion or alteration of some sensory information (juggling with gloves or with poor visibility conditions).

*3.8.2 Kinaesthetic differentiation capacity*

The fine coordination to be achieved in an adequate way requires an efficient kinesthetic differentiation, just like gross-motor movements, even if the amount of force applied is undoubtedly less. Since these are small amounts of force, the eutony aspect of the gesture is often neglected and, as a result, there is usually an excessive use of force or a lack of relaxation of the muscle groups used in the movements.
The aforementioned effects mainly result in early fatigue and an increase in muscle/ joint trauma related to the activity performed as well as a sense of rigidity and executive disharmony. It is therefore important to dedicate time to the activity of delivering small amounts of force into precision movements.
Analyzing in detail the application of kinesthetic differentiation in juggling, I highlight two significant uses: the selection of the muscle areas involved in a motor gesture and the differentiation of muscle tone in the muscle areas.
The *selection of the muscle districts involved in a motor gesture* consists in the capacitiy to mainly involve the muscles involved in the throwing and catching movements, leaving other districts relaxed: this behavior helps to prevent fatigue and smoother movements.
The *differentiation of muscle tone in muscle groups* consists in effectively managing two or more motor situations that require different uses of strength. It is a very useful capacity to an expert juggler, but also found in everyday life whenever two actions are performed simultaneously.
Let's take an example directly from the Circus world: the Balancing of an object on the body (a sphere on the head) and the fluid and rhythmic movement of the arms (juggling with three balls). In this exercise the application of forces is decidedly different: while the neck and the back carry out postural maintenance work with a purely isometric contraction, the upper limbs carry out a cyclical movement of a dynamic nature.
Another case can be found in those movements that are both dynamic but with decidedly different strengths such as juggling two balls on one hand and *contact juggling* with a ball on the other limb: the more we are able to manage the two types of force, the better the result of the execution.
If we enter the world of advanced *patterns* we will notice that most of them include different throws during their realization thus requiring a different strength tone for each throw, making them exercises of some difficulty. How to train the various types of kinesthetic differentiation?
In *Table 12* is an analysis of the different uses of the kinesthetic differentiation capacity in three areas of Juggling and I propose some exercises leading to elicit and improve the differentiation. The types of differentiation have been listed according to an increasing degree of difficulty.

*Table 12. Types of application of kinesthetic differentiation in Juggling*[18-19].

| Type of differentiation | Motor gesture | Improvement exercises |
|---|---|---|
| Activate only the muscles involved in the movement | Juggle a pattern | • Throw an object, quickly relax the upper limbs and catch it<br>• Alternate training phases with relaxing ones, taking care of muscles' most overstretched areas<br>• With eyes closed, view and perform movements without objects, bringing attention to the muscles involved in the movement (ideo-motor training) |
| Differentiation between isometric activation and dynamic activation | Juggling with balanced objects on the body | • Isolation of body parts<br>• Moving with objects balanced on the body<br>• Performing common actions (eg. Drinking a glass of water, writing) with objects balanced on the body |
| Differentiation of force in carrying out actions | Juggling and/ along with performing motor gestures with different demands for strength | • While juggling with one hand, perform an action with the other hand (e.g. scratching your nose, snapping your fingers, etc.)<br>• While juggling with one hand, perform a force action (eg lifting a weight) with the other hand<br>• Juggle with three objects of distinctly different weights (eg a 50 g ball, a 120 g ball and a 200 g ball) |

*3.8.3 Balance capacity*

This capacity is not particularly solicited by Juggling and is not essential in its realization, any more than it is necessary to have a good balance to stand or walk as throwing / catching in this discipline is not considered a destabilizing gesture. So with regard to the motor bases of the pedagogical circus, the work on balance in juggling is considered not basic. At high levels, however, there is a relationship between postural stability and efficiency in keeping objects in the air, especially in endurance work. If we analyze the study of a key technique such as keeping the five balls in the air for a relevantly long time (over a minute), the relationship with the centering of posture changes. Good posture helps to organize movement in an optimal way and to economize all those energies otherwise used to control the body axis during exercises. The Gandini juggling[20] advice, in fact, to train on one leg and then change the support limb. By reducing the support base in training, the capacity to balance is stressed and the body is placed in an unusual and more unstable posture. Returning to the usual support base during the performance, the nervous system is in a comfortable situation. If we extend the Gandini concept to the theory and methodology of training, it is convenient, after having reached a good level of competence in the specific technique, to train the schemes on a proprioceptive board to adapt the movement to a sense of instability and have great benefits, later on, when we will practice it in a much more stable balance.

[18] Isolation is a mime technique that stabilize a body segment while the rest of the body moves.

[19] This and the next are exercises usually proposed to expert jugglers: when addressed to children or newbies, you just throw one object continuously.

[20] Gandini juggling is a Juggling Company founded in 1992 (www.gandinijuggling.com/en/the-company, last accessed January 16th, 2021).

*3.8.4 Space-time orientation capacity*

We have already seen how orienting oneself in the space-time dimension is fundamental for organizing movements; now we will analyze the relationship between this capacity and the management of objects, and the calculation of their trajectories through the planes and axes. In the description of the relationship between this capacity and Juggling, fundamental concepts emerge such as:

- Correct perception of the planes,
- Orientation of the movement,
- Evaluation of trajectories.

*The correct perception of the planes*

Having correctly assimilated the perception of the planes and the reference axes of the various movements of Juggling is of great help in the learning phase of the various *tricks*, from the simplest to the most complex. Let's take an example.

The diablo is an object that requires a good observation of the plane and axis of reference from the first phase of study; the first exercise that is explained regarding it is acceleration (actually a base condition for all tricks).

In the basic acceleration the diablo rotates on the frontal plane and on the sagittal axis with respect to the juggler; a clear perception of the correct alignment of the object axis with respect to the sagittal axis of the juggler prevents imbalances and slowdowns.

The same principle applies to *backcrossing* with clubs; if you do not have a clear perception of the movement plane (always the front one), the object is out of the ideal position for gripping.

Confusion in recognizing planes undoubtedly has worse effects in the use of *pois* and staffs that, losing their alignment, hit the juggler. Greater precision in the perception of the planes reduces execution errors due to the correct alignment of objects with respect to the body and facilitates the progression of learning.

Juggling is an excellent activity for developing perception, but this activity requires adequate preparatory training for each step of learning: it is then advisable to propose simple exercises where the goal is not technical acquisition but spatial perception.

Activity 88. *The military path*. With Crash mats and tatami mats or with the walls of the room or with obstacles in general, we create a passage that requires precise movements on the three planes. To have good results, it is advisable to make the passageway challenging by creating the narrowest passages possible by asking the students not to touch the passage with their body, in order to train them about the precision of the movement.

Activity 89. *Swings*. Using an object as long as a staff – 1.2 meters (preferably in plastic) a rope or directly a *poi,* the students are asked to perform rhythmic and precise oscillations along the three planes of movement.

Activity 90. *The leap of the cowboy*. It is a jump rope exercise that consists of rotating the rope over the head (transverse plane), then moving it downwards on the longitudinal axis up to the height of the ankles and jumping over it, finally bringing it back to the starting position. A variant can be the one with the passage of the rope to the right and left, but it is more complicated as it requires an arms-crossing.

*The orientation of the movement*

We have already described the implications of the visual system for Juggling in the paragraph dedicated to sensory analyzers: now we relate this implication and spatial orientation to a movement that involves a change of position or direction in space during the execution of a *trick*[21].

When we move and make changes in direction, the sense of sight is the main sensory analyzer involved.

We have already analyzed this dynamic in Balancing, but Juggling presents different situations and, consequently, different use of the two visual systems.

In Balancing, for stabilization after a complex movement (for example a pirouette) we use the focal vision to find reference points and settle in. If we decide to combine the control of some objects with the aforementioned movement it is assumed that we must run it with great ease as we are adding another difficulty.

Considering that focal vision will be mainly engaged to the control of objects, we should therefore be able to unusually manage all gross motor movements with the aid of peripheral vision only.

Peripheral vision, for the execution of a change of direction, must be supported with work that integrates and also strengthens proprioception and the vestibular system.

Some examples of exercises can be:

- Rotate 90°-180°-360° with eyes closed and check the correct arrival position;
- Follow the lines of the playing fields while reading a book;
- The instructor positions himself in front of the student with the palm of one hand open in front of him and a ball in the other hand. The student is asked to point to the ball with a finger and at the same time to fix the palm of his hand with his eyes. At the start of the exercise, the instructor begins to move one hand, then the other and then both; then starts to move in space, while the student tries to maintain the finger-ball and gaze-palm connection.

*Evaluation of a trajectory*

The concepts of space and time as well as to accustom and move in space is also needed to calculate the trajectories of objects.

The Treccani Encyclopedia defines the "trajectory" as the "line on a plane or space whose points represent all the positions occupied by a moving material point"[22].

In addition to launching precisely, the space / time orientation helps us to estimate the movement of an object and consequently to catch it.

The calculation of a trajectory has a greater use in the recovery of objects thrown by other people, as the nervous system has no proprioceptive references of the beginning of the movement as it happens in launches made by ourselves, and must find all the necessary information for gripping using the visual system only.

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[21] To give some examples we can mention a diablo throw with a pirouette or a 180° rotation under a club's *backcross* throw.

[22] *Treccani Italian Language Dictionary*, "traiettoria" entry available online at the link: https://www.treccani.it/enciclopedia/traiettoria/ (last access January 16th, 2021).

Getting the eye used to the motion of objects helps being more and more able to evaluate its trajectory; we talk about intuitive and not cognitive computing that the nervous system performs in fractions of a second, therefore in an automatic way.
To improve the perception of the trajectory of objects we can avail ourselves with exercises such as the following.

Activity 91. *Playing with balloons*. It is a very simple exercise given the very poor aerodynamics of the object. It is normally used in work with very young students or in case of some disabilities. It consists in keeping a balloon in the air for as long as possible just by hitting it without grabbing it. You can experience it in single work, in pairs or in groups.

Activity 92. *Counting the steps*. This game has two versions. In the first, a distance hypothesis is made (for example, "ten-step throw"): the throw is performed and then the actual number of steps is checked. The second version works the other way around: first the throw is performed and then the number of steps away from the object is assumed.

Activity 93. *Recovery competition*. All participants line up on a line, with the same object in their hand (for example a ball). The race consists of covering a defined span of space by throwing and catching the object: at the start everyone throws their ball at the distance they prefer: whoever retrieves the object remains in the race while whoever drops it returns to the starting point. The winner will be estimated either on the distance traveled after a certain number of jumps or as the first one to cross the finish line.

*3.8.5 Rhythm capacity*
If the capacity to combine represents a building block of Juggling, rhythm is its structure, especially when it comes to *Toss juggling*.
The throws and catches, in fact, must be inserted in a precise rhythmic organization so that the pattern is stable and well executed. A-rhythmia in execution (assuming it is not intended) is a symptom of poor control in the application of force or in the precision of trajectories.
**It is important to specify that each pattern has its own rhythm**, different from all the others; understanding the rhythmic structure of the individual patterns helps to learn and perfect them.
The rhythm of a pattern is the time ratio that elapses between the throws and catches of all the objects involved; this is an objective fact, but its realization can be declined in personal adaptations by increasing or slowing down its execution.
To explain this I will compare the ratio of the length of the throws to the ratio between the notes of a song. Each song has a relationship that makes it unique and goes beyond the speed of execution.
In other words, if I take for example "O bella ciao" I can sing it slow or fast, but as long as I do not alter the relationship between the notes the song remains recognizable.
The same concept applies to the launch patterns: I can perform them slowly or fast, but they will always remain the same as the identity of the scheme is not given by its execution speed but by the duration ratio between the launches.
Juggling therefore requires a sense of the *general* rhythm that is needed to learn the patterns and a *specific* sense that helps maintain each pattern.

In small jugglers it is useful to develop a sense of general rhythm and then transpose it into the specific relationship with objects. Being able to listen, acquire and reproduce various rhythms are the fundamental elements of this skill.
This is why in the play phase during training it is important to include moments dedicated to rhythm. Some examples of games to be made can be the following:

- Move to the rhythm of a tambourine or the clapping of the teacher's hands;
- Standing in a circle, each one in turn creates a body percussion rhythm[23], and the others play it;
- Propose moments of free movement or dance on a mainly rhythmic piece of music (electronic music or percussion).

On the other hand, when we decide to develop the specific rhythm of the Juggling it is important to include the use of objects and a specific rhythmic context. Some useful exercises for this are the following:

- Eliminate one or more objects from the schemes and insert sounds in their place. The most classic example of this exercise is the cascade pattern made with a single ball, replacing the other two with claps on the thighs. The sequence of movements will then become: throw (right), hit (left), hit (right), throw (left), hit (right), hit (left) and so on[24];
- Juggling with sound objects (Russian balls with a hard shell and seeds or rice inside are a good example of this type of object). In this way the novice juggler has a sonorous feedback of the holds sequence according to the played scheme;
- Juggling along with the music adapting the rhythm of the *pattern*.

*3.8.6 Reaction capacity*

This capacity determines the shortest possible time employed by a subject to process a response to a certain stimulus: the motor response, in this case, is composed of three phases:

*Phase 1.* *Identification of the stimulus*. Before reacting to a stimulus it must be perceived and then processed. Sensory analyzers play a decisive role in this phase: the degree of sensitivity and training of the receptor in question (usually visual or tactile) and the subject's capacity to focus attention, that is, to eliminate unnecessary *stimuli* to focus on the key *stimulus*, is very important;

*Phase 2.* *Programming of the motor response*. Once the stimulus is perceived, the brain processes the most adequate response to it. Depending on the complexity of the response, times change considerably: if a *stimulus* is associated to one single movement (simple response), the programming time will be decidedly shorter than when choice is among several movements (complex response). In this phase, factors such as the degree of automa-

[23] By "body percussion" we mean the production of sound through the percussion of one's own body.

[24] It is advisable not to train newbies with this exercise, since they do not yield a mental stable pattern yet. First they need to gain and consolidate a clear basic ideo-motor scheme, then they can develop variations.

tion of a movement, and the compatibility of the response[25] become very relevant, as well as a good level of space / time orientation and kinesthetic differentiation capacities;

*Phase 3.* *Execution of the motor response*. After selecting the motor program, you pass to the mere execution of the gesture; this phase is mainly influenced by Conditional capacities.

The capacity to react comes into action when we are asked to make extremely rapid movements.

Not all Juggling movements require a good reaction capacity to be performed. Throwing and catching an object is not directly related to the capacity to react, not if the motor program is well executed: this capacity comes into play when the subject notices an error in the execution and hence has to start a particularly fast recovery process.

To go more specific, think of jugglers playing with a single diablo and launch it, as an example: after the throwing movement, they realize that the object is out of the desired position; once the error is detected, all attention is directed to the recovery of the object. If the launch is high enough and not too inaccurate they will have enough time to program the comfortable recovery action, but if they realize that the object will land ten meters away, they will have to be as quick as they can to catch it: according to their capacity to reaction the recovery will be successful or not.

In the case of the diablo, reaction is mainly driven by an assessment about the trajectory of the object detected by the visual system, but there are some cases in which it is touch or spatial perception that regulate this capacity.

Examples are objects that drop from positions beyond the visual control of the juggler such as a ball balanced on the head or a hat rolling along the spine.

Also, this capacity should be trained in a *general* way to develop a degree of responsiveness suitable to all situations of daily life and in a *specific* one to support the technical work of the Circus.

It is important to say that we cannot stimulate the capacity to react without stimulating the Conditional capacity of speed, as it is its physical component.

The following exercises help empower muscular "layout" as well as neurological. They are all related to the visual system as it is involved in most of the throwing movements in juggling. A general stimulation can take place through games of "reflexes", for example the following.

Activity 94. *The gunslinger*. All the students arrange themselves in a circle: one occupies the center and becomes the gunslinger. The gunslinger can turn around, pick a student anywhere in the circle and shoot them. When the gunslinger shoots her/him, the teammate crouches and the two teammates next to her/him start a shooting duel. The first of the two who shoots eliminates the other, the circle narrows and the one who had crouched before becomes the new gunslinger.

[25] The meaning of "response compatibility" can be illustrated by the following case: if a left-handed person has to perform a fast movement with his left hand the stimulus is compatible, if instead he has to perform the same movement with his right hand the *stimulus* is felt as incompatible.

Activity 95. *Grasping the staff*. Two pupils come face to face. One holds a stick by the ends in a horizontal plane and the other places his hands open a few centimeters above the staff. The staff is dropped without warning and must be caught before it hits the ground.

Activity 96. *Slaps on the hands*. Pupil A stands with his arms bent and palms facing upwards at approximately the height of the breastbone, Pupil B places his palms on top of A's, who must move his hands quickly and strike B's backs before she/he retracts them. The exercise is repeated in the same way until A hits B; if A misses the target, roles are changed.

For the specific stimulation we have to analyze the motor gestures involved. The exercises below are specific for ball retrieval:

- The student throws a ball with his eyes closed and opens them as late as possible to catch it;
- A pupil stands up with a partner behind him; the partner holds a ball in each hand and, with his arms stretched over the other's head, leaves the balls without warning; the student must catch it on the fly;
- The student stands with his eyes closed and waits for the throw; a companion throws an object and, after it has passed its apex phase, gives the signal screaming "Take it!": the student opens his eyes and tries to catch it.

*3.8.7 Motor transformation capacity*

The "motor transformation" consists in effectively adapting a movement to an unexpected external stimulus without interrupting it.

Often in juggling the occurrence of unexpected factors requires a rapid readjustment of a movement.

An interesting example of the use of this capacity intervenes when using multiple throwing objects.

Let's take the three-ball cascade pattern: we start by keeping the balls in the air according to the chosen pattern. As soon as one of them goes off, the trajectory of the recovery process begins.

Motor transformation is the capacity that allows us to adapt the realization of the pattern in order to include the recovery movement without losing control of the other objects.

The transformation of the movement in the recovery phase differs according to the severity of the error to be recovered and is divided into simple and complex.

In the simple transformation, the variation of the throw-catch movement of a limb is enough to retrieve the object, without having to change the whole scheme.

In the complex transformation, the recovery of the object involves the throwing-catching movement of a limb and the management of the scheme in its entirety. In addition to modifying the normal movement of the limb, we must also modify some parameters of the motor pattern such as rhythm or position in space.

It is important to say that we as teachers can prompt this capacity only when we are sure that our students have achieved a good control of the movement to be changed as during the learning phase certain *stimuli* can be ineffective and counterproductive. Once this reserve has been dissolved, we can propose specific exercises to im-

prove the capacity for transformation, that as previously reported must be specific for each movement.
The ones I propose later concern the cascade with three balls, but can be adapted to other various movements.

Activity 97. *Juggling with crazy balls.* Rigid balls with a double center are created by opening a large ball and putting inside a smaller one: then trainees try to juggle according to a scheme chosen before.

Activity 98. *Vietnam.* While a pupil juggles the instructor or the other pupils try to make him drop objects by throwing sponge balls at him.

Activity 99. *Combat.* This exercise is usually performed with clubs but balls can be used if preferred. It is an "all against all" game in which a group of jugglers begins to juggle simultaneously in a circle, and, moving in space, try to make the other jugglers' objects drop without losing their own. The winner is the one who can keep on juggling. (It is advisable to ban physical contact and authorize only contact on objects!).

### *3.8.8 Motor capacities and "recovery" of an object*

By "recovery" / catching we mean the motor action of grasping an object outside the pre-established pattern before it touches the ground (*drop*).
We can say that the recovery of an object is the constant action that a juggler relates to throughout his career; therefore I decided to dedicate a paragraph to it at the end of the chapter on Coordination capacities and Juggling.
Recovery is an instinctive action for all jugglers but, on a motor level, how is this capacity managed and how has it to be described? capacity to react or that of motor transformation?
Several capacities take part in this complex action.
In the diagram (*Table 13*) I propose my analysis of motor capacities that make up the capacity to retrieve an object during a Juggling movement, their effects on recovery and related errors.

*Table 13. Motor capacity and control / recovery of an object.*

| **Movement errors** | **Causes of errors** | **Delegated motor capacity** |
|---|---|---|
| Inaccurate movement in the throw of an object | Wrong evaluation of the object's trajectory | Spatial-temporal orientation capacities |
| | Incorrect application of strength | Kinesthetic differentiation capacity |
| Recovery error | Wrong design of the motor recovery program | Reaction capacity |
| | Delay in the activation of the motor recovery program | Reaction capacity |
| | Insufficient executive speed of the motor recovery program | Quickness capacity |
| Fall of other objects (if any) | Loss of control of the pattern | Motor transformation capacity |

## *3.9 Juggling and Conditional capacities*

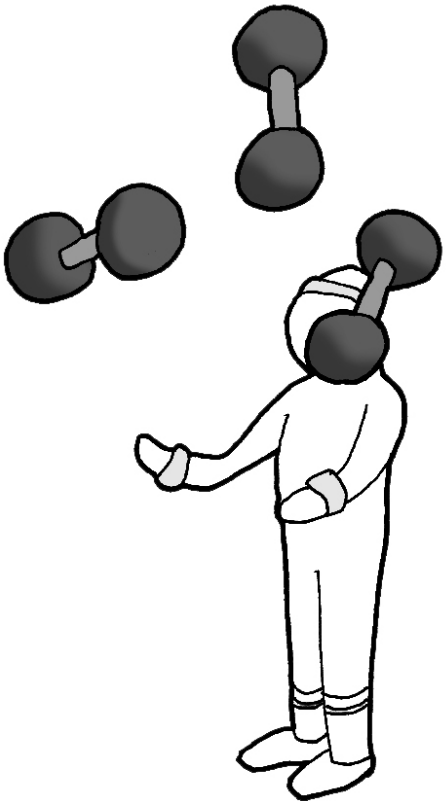
Juggling, especially with regard to the Educational Circus, does not require large Conditional capacities to be practiced. This is the feature that makes it accessible to people of all ages and physical conditions. Things are different if we talk about jugglers of a certain level who undergo targeted and constant training, since it is important to focus on the Conditional capacities that help them have a good preparation and prevent injuries that might lead not unfrequently to chronic degenerative diseases. So let's analyze every single capacity and contextualize it to Juggling.

### 3.9.1 *Strength capacity*

Given the weight of the objects used, Juggling hardly falls within the parameters of a discipline that deals with various types of force, but it definitely has to do with strength somehow.

An example of explosive-elastic force can be that of a very high throw of a club or, in the case in which very heavy objects (such as stools or bowls) are used, we can speak of "opposition to force".

Despite the not relevant applied strength in this discipline, it is important to emphasize that a good muscle tone of the shoulders and upper limbs (or of other muscle groups stressed in specific exercises) helps to reduce the stress from prolonged training on load of tendons and joints. A teacher should then not neglect strength practicing (resistant and explosive-elastic) for students who, even at an amateur level, decide to devote themselves to juggling exercises with a certain consistency.



### 3.9.2 *Speed capacity*

"Speed" is a generic term referring to the capacity to move in space covering an as long as possible route in an as short as possible time, but this term is inappropriate in this context. In Juggling, in fact, we mainly talk about "rapidity" as this capacity manages the rapid movement of the limbs involved in the action of throwing and catching and not "speed" as the center of gravity of the juggler does not make any (if not minimal) movements.

Rapidity in the Educational Circus is not a capacity as required as one might think: good movement planning and the right amount of strength do most of the work,

the rest does the practice. It is in fact shared among jugglers the feeling of time "slowing down" when you become familiar with a movement. Rapidity is, therefore, a fundamental component only for some recoveries or a minority of usually very technical movements in the basic levels a high degree of speed is not required as a three-object cascade takes place in a reasonably slow time from the point of view of Conditional capacity.
What I want to say in this paragraph is not to leave out the exercises to improve this capacity, but to not focus on speed as a panacea to increase the technical capacities of the students.
The specific exercises to stimulate speed have already been described in the paragraph dedicated to the capacitt to react.

*3.9.3 Endurance capacity*
We have already said that by resistance we mean "the capacity to prolong a movement over time without deteriorating its effectiveness".
In practice this capacity in Juggling manages the training time available to a student before his throws become inaccurate; it is therefore a specific resistance and develops mainly with training, but there are some side aspects to keep in mind.
Here is a list of the main factors that influence this capacity temporally:

- *Accuracy of the gesture*. The clearer and more precise a juggler's movement is (I am referring to space-time precision), the less energy dispersion there will be. If gestures are not precise, they require a lot of corrective work that will shorten endurance;
- *Eutony of the gesture*. Each gesture should be energetically precise, that is, involve the right muscle tone for being enacted; even if the gesture is space-time precise, it must still be performed with the application of the most effective force possible;
- *Relaxation skills*. In addition to the concept of eutony, it is important to take into consideration the relaxation of both the involved muscle groups and those not involved in the movement;
- *Breathing capacity*. It is directly related to the concept of relaxation, if a juggler does not breathe smoothly and efficiently, the supply of oxygen to the muscles will decrease and they will tire in less time;
- *Muscle tone*. As already described in the paragraph on strength, muscle tone is not a *conditio sine qua non* for performing individual movements, but it goes without saying that a trained musculature can extend the working time compared to an untrained one.

All these factors have already been discussed in the various paragraphs of this Chapter, so we already have the tools to recognize them, analyze them and stimulate them appropriately, and in this way help our students to train in a qualitative and quantitative way. Besides studying, practice remains the best endurance training.

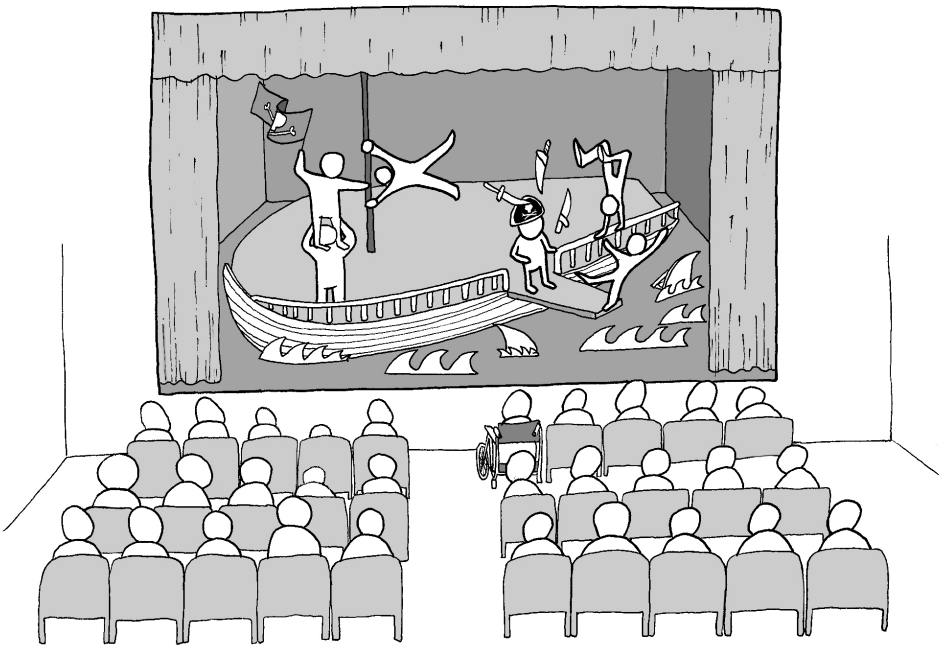
*3.9.4 Flexibility capacity*
Also for this capacity what was said at the beginning of this section applies, that is, it is not a fundamental prerequisite for juggling.

Only some specific movements require a special flexibility to work for most of the subjects, who are not endowed with a remarkable natural fluency.
We are talking about very technical movements such as *contortion*[26] or *backcross*[27], which require targeted preparation for the shoulder, elbow and wrist joints.
For most of the movements, therefore, flexibility together with an adequate warm-up, especially of the torso and upper limbs, is above all a good prevention for injuries related to reiterated and intense practice.
To learn more about the subject, consult *Appendix 2* by doctor Francesco Vanni at the end of this volume.

[26] By "contortion" we mainly mean performing a trick or pattern in completely unnatural positions that require great flexibility, such as juggling three balls on the left side stretching out the left arm and the right arm behind the back with the right hand leaning on the left side.
[27] Literally it means "to pass behind" and indicates all the throws that start from the back of the body.

## Chapter 4.

# Physical Theater in the Educational Circus



### *4.1 Introduction to Physical Theater*

The term "Physical Theater" generally refers to that type of representation that finds in the actor's body the main vehicle of communication to express the dramaturgical contents, giving the use of the voice a not necessarily core role and thus distinguishing itself from the theater of prose. Étienne Decroux, one of the greatest historical exponents of Physical Theater, explains the hierarchy between voice and body with these words:

> "The actor uses two vectors that are his own and that he blends or alternates during the stage action. One concerns the vocal faculties, the other the bodily faculties. These two modes of expression, which seem to develop in a distinct and parallel way, are not however equal. While the body can express itself independently from voice, the latter needs to access the expression.

> The breath of the exhalation, the vibration of the vocal cords and the articulatory gesture – essential for the act of phonation – are of a physical nature. Without their contribution the voice cannot show itself. The body is the essence of the actor"[1].

The discussion on the definitions, classifications and currents of Physical Theater is broad and complex, and above all goes beyond the intent of this manual which focuses on the expressive-motor component of this discipline, that is, on the skill to use voluntary movements at the aim to convey communicative contents. I will therefore analyze in a general way the actor of Physical Theater, more commonly called "physical actor", trying to state what I believe are the main capacities to have to practice this discipline, providing a starting point for those wishing to deepen the knowledge in the future topic and at the same time outlining the guidelines for an educational process that can be transferred outside the context of the stage performances. Deepening the figure of the physical actor, the two words that make up the expression "physical actor" are immediately highlighted. As for the term "actor", the Treccani Encyclopedia defines this figure as the "interpreter of a dramatic action staged"[2]. The actor refers us to the world of theater, dramatization and therefore, inevitably, of communication.
The term "physical" refers us to that whole world of gestures and actions, to the effective use of the first tool we have at our disposal, that is, our body. This word therefore leads back to a bodily root connected through objective links to motor capacities and basic movements.
This path will therefore be divided into two main strands: communication capacities and motor capacities.

## *4.2 Physical theater and communication capacities*

The purpose of this chapter is to highlight the fact that Physical Theater compared to the other three disciplines previously described has a closer relation with the emotional and communicative sphere, that is estabilished and recognized since the amateur teaching phase. If in the other three disciplines the motor aspect is predominant at least in the initial phase, in the Physical Theater the physical-mind components are essential and perfectly balanced with the former. To deal coherently with a path of Physical Theater, it is therefore necessary to go into concepts not previously treated.
What I am going to do is to give a sketch of those communication capacities related to Physical Theater that I consider basic.

### *4.2.1 Communication*

Communicate is a word that derives from Latin and means "to share".

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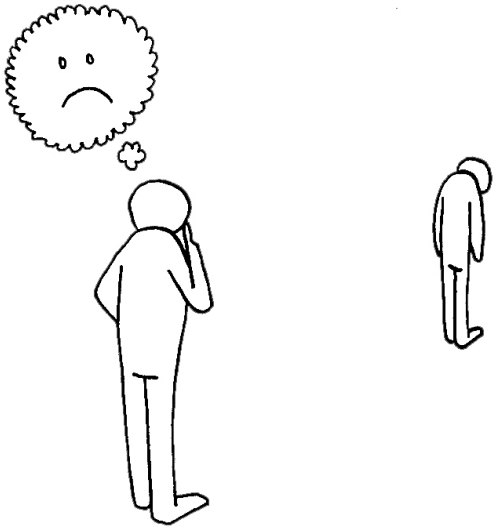
[1] Y. Lebreton, *Étienne Decroux. La statuaria mobile e le azioni*, Titivillus Mostre Editoria, San Miniato (PI): 2015.
[2] *Italian language Dictionary Treccani*, entry "attore", available online at the link: https://www.treccani.it/enciclopedia/attore/ (last access January 15th, 2021).



Human beings are recognized as social animals, capable of relating to their peers and creating complex social groups within which the skills of relationship and communication are the basis for active participation in processes.
Communicating is also a motor action that can display itself in a voluntary or involuntary way but cannot be avoided: our gaze, our posture and even our postural tone are signals that are received by our peers and are a subtle but powerful form of communication.
"We can decide not to speak but we cannot decide not to communicate"[3]. This sentence sums up the essence of this paragraph: the innate and inevitable capacity of the human body to communicate. As we know, direct interpersonal communication is composed of three main communication levels: the verbal, the paraverbal and the non-verbal, that act in a parallel or synergetic way.

*The verbal level* occurs through the use of language, both written and oral, and depends on precise syntactic and grammatical rules. Verbal communication is composed of two elements: the "signifier" that is the sequence of letters and their related phonemes, and the "meaning", that is the concept at an extra-linguistic level. For example, the words "house" (English language) and "casa" (Italian language) have two different signifiers but the same meaning. The verbal channel has the advantage of being very precise and explanatory in the information it conveys, but it has as a prerequisite a common knowledge of the codes used by the interlocutors and this aspect can limit its usability (properly in the case of different languages or even dialects).

*The para-verbal channel* mainly concerns the tone of the voice, its volume, the rhythm of words, and also includes elements such as pauses or the prolongation of certain sounds and other sound expressions, for example, clearing one's throat or making sounds. This channel can create a subtext to verbal communication, and at times can be more incisive than the signifier to convey a meaning.

*The non-verbal channel*, on the other hand, is that part of communication that includes all aspects of a communicative exchange that do not concern the conceptual level of the message and that occurs without the use of words through diversified channels, such as facial expressions, looks, gestures and postures. Unlike the verbal channel, it requires hardly any shared codes and is much more immediate, even though not suitable at (or "at the expense of") of conveying complex information.

[3] F. Casolo, *Il corpo che parla*, V&P, Milano: 2012, p. 28.

*4.2.2 Communication in Physical Theater*

Once the three communication channels have been highlighted, let's contextualize them in the Physical Theater. We start from the concept that if during a face-to-face dialogue it is impossible to eliminate the non-verbal component, it is instead possible to eliminate the use of the word and focus only on the physicality of the communicative exchange. This is the type of exchange and awareness that lies at the basis of Physical Theater.

Our society mainly focuses on verbal communication that is, in fact, the type of communication channel that receives the most attention from public training institutions and the media. Neglecting the other two channels, therefore, when we decide to create a learning path centered on the awareness and use of non-verbal channels, we must realize that we are triggering a long and complex process that lies rooted in a human attitude not adequately appreciated.

In years of work I have experienced that an excellent passage from verbal to non-verbal communication is, in fact, the intermediate channel, that is the para-verbal one, which can practically be represented by the use of invented language (or "grammelot"[4]) and by onomatopoeia. This gradual passage, in addition to outlining a didactic progression, also creates a certain emotional security by addressing in a thoughtful way the change of communication tools.

This work, in fact, combines the use of voice and sounds with a form of communication that seeks to transmit relatively simple meanings, using non-coded signifiers and thus shifting the attention to the non-semantic (conceptual) communication channel. Working on the para-verbal channel, in fact, the inclusion of non-verbal communication is spontaneous (in any case it does not become the focus of the work), since it concerns elements such as body energy, communicative gestures and facial expressions.

Some helpful activities to stimulate this form of communication can be the following.

*Activity 100. The rumorist.* An actor (pupil or teacher) improvises a dumb routine of daily life such as having breakfast, getting up in the morning or cooking; another actor produces the sounds of their actions.

*Activity 101. The news.* One actor improvises a newscast and another actor improvises a translation of it into an invented language.

*Activity 102. Oioioi aiaiai.* The pupils in pairs choose one of the two sound sequence each; from that moment on, the one who picked "oioioi" can only say that and the other one can only go with "aiaiai"; using only these they will have to initiate a discourse, as complex as possible. Other students can join the group, having them to say "eieiei" or "uiuiui", etc.

*4.2.3 Mirror neurons*

How does non-verbal communication work at the neural level? In the last thirty years, the famous mirror neurons have been discovered: they are responsible at a physiological level for the capacity for empathy and learning by observation. To

[4] In Theater, it is the emission of senseless sounds but similar to real words or speeches in order to obtain a comic or farcical effect.

deepen the subject, I asked doctor Christian Poggiolesi – a psychologist specializing in hypnosis and Ericksonian psychotherapy – to write a small essay on this topic. I refer you to it, together with the texts cited there (*Appendix 3*, in this volume).

## *4.3 Non-verbal communication in Physical Theater*

Non-verbal (or physical) communication accompanies a child from birth, the first form of non-verbal communication is the tonic dialogue between mother and child from the first days of life; theirs is a communication made up of different muscular tones that express need or rest. From the tonic dialogue onwards, our communication passes through the body; remember that the human being is the only mammal that has developed a series of very complex muscles whose sole purpose is communication, that is, the mimic-facial muscles. In addition to being a theatrical technique, non-verbal communication, together with the para-verbal one, is highly cross cutting in everyday life.
We can therefore highlight three main benefits from increasing this capacity:

- *Increasing our communicative efficiency*. According to several linguists, 90% of human communication occurs on a non-verbal level; increasing awareness of the silent messages we send helps to improve the effectiveness of our communication in all social contexts we may find ourselves;
- *Communicating with those who do not speak our language*. Non-verbal communication helps us to interact with all those categories of people who do not use our verbal channel such as, for example, small children, foreigners or the disabled;
- *Being a tool of self-awareness*. If we increase awareness of the non-verbal messages that we put in the environment, we automatically get in touch with some emotional states on a non-cognitive and unconscious level; therefore our body can become a "book to read" to increase our introspective capacity.

Having ascertained the importance of increasing non-verbal communication capacities and its social implications, let's now analyze what it consists of.
We can divide physical communication into four categories (to each of which we will dedicate a specific study): eye contact, facial expressions, postures and communicative gestures.

### *4.3.1 Visual contact*

Eye contact is, at all effects, a form of non-verbal communication and has an important influence on social behavior. The expression was coined in the English language around 1960 and included in the current vocabulary as a definition of a fundamental channel of communication of social and emotional information in both voluntary and non-conscious form.
The meaning and modalities of eye contact can have different meanings depending on cultures, religion, and social groups; in Asian cultures, for example, maintaining direct eye contact with an older person or with a member of the upper class is considered a form of aggression or rudeness; in many Western cultures this behavior has the opposite meaning.

Psychologist Beverly Palmer points out how eye contact plays an important role in courting: it is in fact significant to display how appealing someone else is to us[5]. These are just some examples of the communicative features of gaze: we will return to talk about the topic in the paragraph dedicated to the sensory vision analyzer.

*4.3.2 Facial mimic*

Facial gestures are voluntary or involuntary contractions of the facial muscles, designed to transmit emotions. It is therefore necessary to speak first of the emotions and then of the facial expressions that represent them.

The word "emotion" comes from the Latin "emovère" ('pull out'), move towards the outside but, beyond the definition, what exactly is an emotion?

The psychologist Paolo Legrenzi defines emotion as "a complex pattern of changes on a physiological excitement level, cognitive processes, feelings and various behavioral reactions that the subject uses in response to a situation that he considers essential to maintain his balance"[6]. In evolutionary terms, the main function of emotions is to make the individual's reaction more effective to situations in which an immediate response is required for survival, i.e. a reaction not originated from cognitive / conscious processes. Emotions are therefore defined as complex and at the same time coordinated systems that include[7]:

- Physiological responses concerning respiratory and cardiac alterations;
- Instrumental motor responses (such as running away or attacking);
- Expressive motor responses regarding alterations in facial expressions (also including gestures and voice);
- Set of pervasive aspects and closely related to the subject's experience responsible for severe mood modification.

Emotions play a relational function (communicating one's psycho-physiological reactions to others) and a self-regulating function (understanding one's psycho-physiological modifications). According to the American psychologist Paul Ekman, each emotional state is characterized by actions, neuro-physiological manifestations and specific psychological counterparts[8]. Furthermore, each emotion would correspond to a pattern of activation of the peripheral system and of the central nervous system of its own[9].

The emotion of fear, for example, is characterized by certain behaviors (flight or freezing), by negative psychological sensations (fear for one's own safety), by the activation of some responses of the autonomic nervous system (increased heart rate) and by a specific neural substrate. Ekman pointed out that facial expressions and emotions are universal and the same for the whole world, claiming they have

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[5] B. Palmer, quoted in M. Kearl, *Psychology of Attraction*, in "AOL Health", november 2008 (last access August 2009).

[6] P. Legrenzi, *Fondamenti di Psicologia Generale. Teorie e pratiche*, Il Mulino, Bologna: 2014.

[7] Legrenzi, *Fondamenti di Psicologia Generale…*, cit.

[8] P. Ekman, *Te lo leggo in faccia. Riconoscere le emozioni anche quando sono nascoste,* Editore Amrita, Giaveno (TO): 2008.

[9] J. Panksepp, *Affective Neuroscience: The Foundations of Human and Animal Emotions*, Oxford University Press, New York: 1998.

a biological and not a cultural origin. He then identified some expressions that he defined as "primary emotions": a unique and universal facial expression is associated with each primary emotion[10]. I summarize in the following table the primary emotions and their physiological and expressive effects (*Table 14*).

*Table 14. Primary emotions and facial expressions.*

| **Emotion** | **Origin** | **Facial expression** |
|---|---|---|
| *Anger* | It is generated by the frustration that can manifest itself through aggression. | Frowning, brow is creased with vertical wrinkles since eyebrows are lowered and get closer; the gaze is fixed and the eyes may appear bulging; the lips can assume two basic positions: shut closed, with straight or lowered ends or open, tight, with a squared outline as in the cry. |
| *Fear* | It is an emotion dominated by instinct that has as its objective the survival of the subject in a dangerous situation. | The eyebrows rise and get closer; the eyes are very open; the mouth is open and the lips are slightly stretched or stretched backwards. |
| *Sadness* | It usually originates from a loss or an unfulfilled goal. | The inner corners of the eyebrows are raised; the uncovered skin under the eyebrow forms a triangle with the inner corner up; the inner corner of the upper eyelids is raised;the ends of the mouth are folded down or the lips tremble. |
| *Joy* | It is the positive mood of those who believe sufficient of their desires are satisfied. | The mouth can be closed or open, the teeth visible or nonvisible; cheeks raise; "crow's feet" comes out in the eye area. |
| *Surprise* | It arises from an unexpected event, followed by fear or joy. | Arched and raised eyebrows; raising of the eyebrows brings about long horizontal wrinkles on the forehead; the eyes are wide; the jaw drops and lips and teeth are open. |
| *Contempt* | Feeling and attitude of lack of esteem and disdainful rejection of people or things, considered to have no moral or intellectual dignity. | One of the far ends of the mouth gets narrow and raised on one side of the face only. |
| *Disgust* | Emotion that arises from a feeling of repulsion towards an object, a kind of food, a behavior or a person. | The upper lip is raised; the lower lip is raised and pressed against the upper lip, or lowered or slightly protruded; the nose curls up and the cheeks are raised. |

With "secondary emotions" instead we mean those combinations originating from several primary emotions (also called "frame of mind") and that develop with the aging of the individual and with social interaction. They are: happiness, envy, shame, anxiety, resignation, jealousy, hope, forgiveness, offense, nostalgia, regret and disappointment.
We can speak of a "frame of mind" as the sum of several primary emotions.
In the case of secondary emotions the reading of the facial alterations is more

[10] Ekman, *Te lo leggo in faccia…*, cit.

complex because the peripheral physiological responses that are activated in relation to the different facial expressions do not lead to univocal results as for the primary emotions. It appears that specific individual emotions correspond each to single facial expressions but at the same time that secondary emotions often overlap and are not clearly distinguishable and separable from each other[11].
Beyond this important description and subdivision of primary and secondary emotions, to prepare students for a work on Physical Theater it is important to propose a work of observation, recognition and reproduction of all emotions, as students will learn how to manage them in time in real life, also. In the Physical Theater there are several games and activities having to do with the enactment of emotions through facial or more broadly physical expressions such as the following.

Activity 103. *The elevator*. A shelter about one meter high is created (usually using a mattress) and a group of three to four students are asked to hide behind the shelter in a squatting position. The teacher will give a context such as "on my birthday" or "when I was locked out of the house" and at a sound command (for example a clap of hands) the students will have to leave the shelter already in a fixed body position and with a clear facial mimic conveying the emotion suiting the subject, and to stand still until the instructor gives the signal to return to the shelter. The activity is repeated three or four other times with the same group,then the group changes.

Activity 104. *Stealing an emotion*. Students line up in rows of four or five:the person in front of each row has to choose a definite emotion and represents it using mainly facial muscles. They first look towards the audience, then at the teammate at their side, who at first has a neutral face then copies the expression of the first person and so on until the end of the line.

Activity 105. *Emotion with object*.A student is said to pick an object and enact a short silent piece of play that implies a change of emotion; the plot must not be explained in advance, if ever later or guessed by the companions. For example, a girl takes a nice evening dress, she looks at it and wipes it, she tries it on then suddenly changes her mood and folds it up and puts it back... the party is next Saturday!

### 4.3.3 *Postures Emotions*

Emotions do not find facial expressions as the only means of conveyance but are also experienced and transmitted by the body through changes in posture. Let's now discuss the concept of posture starting from its definition. There is a double interpretation of the term "posture". Some schools of thought use it as a "subjective and personal connotation of the position due to the character component, the emotional state and the body experience of the subject", while the word "position" indicates the mere analysis of the anthropometric relationships of the body and the relative cataloguing; for other schools of thought , instead, the two words are synonymous. I personally lean toward the distinction between posture and position. In this perspective, posture tells a lot about a person. Various scholars have analyzed and theorized the various types of personality and its relationship with posture. Here below I report the observations of the well-known psychotherapist Alexander Lowen who describes five types of characters and the corresponding postural aspects (*Table 15*)[12].

[11] Ekman, *Te lo leggo in faccia*..., cit..
[12] A. Lowen, *Il linguaggio del corpo,* Feltrinelli, Milano, 1978.

*Table 15. Postures and character aspects of Alexander Lowen.*

| **Posture** | **Attitude** | **Character aspects** |
|---|---|---|
| *Folded* | The body is bent over, shoulders are hunched, chest is sunken and head bowed forward. The feet seem to have little contact with the ground and the legs are so thin that they require the knees to stiffen in order to support the body. | Characteristically,they are people who have a great inner emotive emptiness,probably due to a scarce maternal emotional care received during childhood and are people who tend to depend on others, even if this weakness is masked through an extremely freestanding attitude. |
| *Split in two* | Characterized by a thin body with very contracted muscles, feet turned outwards, the arms yield without showing signs of life and the face seems to have been cemented by its stillness. | Temperamentally, they are people with very low self-esteem who have repressed their feelings since childhood, because they felt rejected as human beings. Even when engaged in romantic relationships, individuals who assume this posture pretends to behave as if they were very sentimental persons, but in reality they are not. |
| *Inflated* | The upper body part is much larger than the lower one, the chest is swollen, the neck tense, the pelvis stiff and the legs seem disproportionate to the body. | Temperamentally they are people who deny their feelings about them a lot, in the sense that they really reject their existence and prefer the idea of being able to control everything and everyone. Often they reach important positions in the social sphere,but they need to exercise their dominion over others,even if in the end they turn out to be dependent on the people they submit. |
| *Submitted* | Their body is flattened, so to make them seem bigger, shorter and stockier.Their neck is short and thick and their head seems to hide between the shoulders; their pelvis looks retracted and the buttocks are contracted. | They usually have a very childish temperament, since they think that they can be loved and accepted only by behaving as others would like them to. They usually develop good muscles to keep their anger under control, but their biggest fear is that it springs out vehemently all of a sudden. Often they are full of hatred towards their boss or towards those who have a higher social position than theirs. |
| *Stiffness* | The body is well proportioned, the head high, the neck stiff, the back straight and the chest swollen. This is the typical posture that soldiers take. | They are excessively straight-forward individuals, not very open to external *stimuli* and with a detectable inability to empathize. Keeping their chest swollen indicates their rigidity.Probably during their childhood they were kind of emotionally unrecognized by their parents and this caused them a deep sadness. |

I mentioned Lowen not so much to enter into the merits of his studies, but to give an example of how posture is a personal attitude derived from a bodily experience and from a previous emotional life that manifests itself through muscular tensions. We can say that on a conceptual level, perfect posture is an ideal body structure that optimizes the capacity to resist the force of gravity and the capacity to perform

actions in an endoergonic manner, but in practice the perfect posture does not exist in real life: only actual "versions" displayed individually are given.
In fact Lowen, through his classification, illustrates the main and most common features of "paramorphism"[13] in people.

*The neutral posture*
What is neutral posture?In the theater environment this term indicates the ideal posture previously described, that is, biomechanically perfect and without any emotional feature[14] coming from the actor's private experience. Clearly the neutral posture is an unattainable limit concept, which functions as a point of reference for a personal research work. The work on the "neutral", therefore, can be summarized on a biomechanical observation of the body trying to find the most functional and least communicative dimension possible. The French mime and pedagogue Jacques Lecoq speaking of the neutral posture says: "Working the movement starting from the neutral gives essential points of support for the acting that will come later on..."[15].
The work on the "neutral" is the basis of a physical actor, who before getting on stage must conceal as much as possible their subconscious inner feelings, minimize postural connotations and raise and convey consciousness on his acting gestures to the maximum degree.
By working on the posture we inevitably influence the body scheme; the relationship between these two elements is neither simple nor predictable nor, above all, inherent in the didactic and educational work proposed in this volume[16].
The discussion on neutral posture in Educational Circus does not presume to deal with Posturology – that is, the complex discipline analyzing man's posture and the painful pathologies that can derive from bad postural habits –, or other disciplines related such as Neuropsychophysiology, Kinesiology, Orthopedics and so on.
This work's goal is educational and doesn't concern the body's rehabilitative aspects. However, I can confidently affirm that the body scheme includes the awareness of posture, and that a work aimed at becoming aware of one's posture, without any claim to modify it, is useful to incentive a reflection on one's physical attitudes and the way they affect non-verbal communication.
In the Educational Circus we playfully propose activities designed to make students aware of their personal posture and the physical messages it conveys and then proceeding step by step towards a postural "connotation cleansing" that aims at a functional "denotative-neutral" communication. This work is useful to prepare students to a path of listening to their own body and to an introspection that opens up to interpersonal communication and results, in addition to improving scenic communication capacities, of great applicability in daily life.

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[13] Paramorphism is a functional postural alteration that affects soft tissues (ligaments, muscles, etc.): it is reversible and self-correcting.
[14] In this sense, the expression "neutral posture" coincides with the term "position" used in Physical Education manuals.
[15] J. Lecoq, *Il corpo poetico: un insegnamento della creazione teatrale*, Controfibra, Milano: 2016.
[16] To know more: F. Scoppa, *Posturologia e schema corporeo*, in "New Hand Therapy and Rehabilitation", year 3, number 4, october-december 2001.

There are various activities that help getting conscious of the various postures; especially if we look in the manuals of theatrical exercises we can find a rich repertoire; for convenience here are my three favorites.

Activity 106. *Walking with different emotions*. After showing the emotional postures, we combine an emotion with a walk and ask to reproduce it in space. It is important to choose emotional situations that the students know well and of which they can find elements in their own experience. For example, if we are to make eight-year-old kids walk in disgust, we will propose that they walk as if they are going to throw up and not as if they are completely drunk.

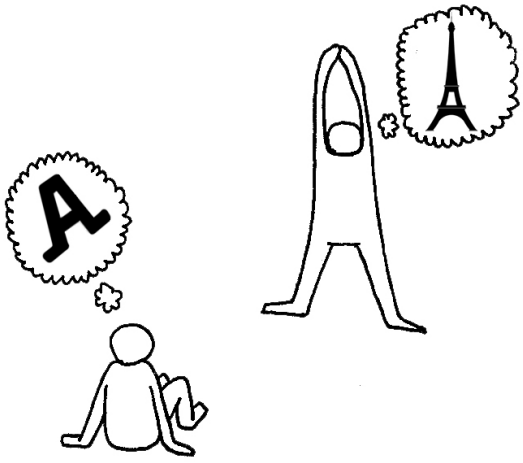
Activity 107. *Wave-Stop-Go*. At the word command "Wave!" the students begin to move their back in a fluid way creating a "wave" effect from the pelvis towards the head; at the verbal command "stop" the students quit instantly, maintaining the "move" they have gained that far; at the command "go" the students begin to move, therefore experimenting with walking in a definitely unusual posture.

Activity 108. *Anthropomorphy*. We ask the students to move around by imitating an animal and slowly we ask to reduce the animal component of the movement until we have a human movement, still slightly resembling the starting animal's features.

### *4.3.4 Communication gestures*

Communicative gestures are real movements whose goal is communication. They can be either intentional or accidental, across-the-board or tightly related to the punctual situation. There is a cataloguing proposed by the psychologists Paul Ekman[17] and Wallace V. Freisen who distinguish the following types of communicative gestures:

- *Emblematic gestures*. They are conventional gestures linked to a culture or a reference group that shares them and decodes them (for example, the gestures of sports referees, greeting signs, etc.);
- *Illustrator gestures*. Their function is to strengthen their meanings or replace the words themselves (for example, to mimic an object);
- *Regulatory gestures*. They regulate and strengthen the verbal flow (for example, attention and *feedback* signals, nods, facial expressions);
- *Gestures indicating emotional state*. They are spontaneous gestures linked to the emotional flow such as anger, joy etc.;
- *Gestures of adaptation*. They are used to adapt to situations and are unconscious.




[17] For more information, visit the Paul Ekman International website: www.ekmaninternational.com/paul-ekman-international-plc-home/research.aspx.

Apart from the regulatory gestures, all the others can function as "words" for the physical actor. Observing them, understanding them, acquiring them and using them is one of the main communication skills of this discipline, especially if contextualized at the educational and social level. Some games and activities designed to raise awareness of the usefulness of expressive gestures are shown below.

Activity 109. *The boss's car*. This activity-game is based on a simple children's song with minimal lyrics that say "the boss's car has a hole in the rubber": the song is repeated by replacing a word with a gesture each time.

Activity 110. *The news for the deaf*. This exercise works exactly like the grammelot news but instead of sounds the translator uses gestures.

Activity 111. *Dialogue*[18]. Two actors stand in front of each other. A piece of music and a plot outline are picked, on which they improvise a dialogue of gestures: the gestures can be performed for the actor herself/himself, or the rule could be that of performing only a gesture towards the other actor. For example, if we play romantic music and choose the scenario "first date", the first actor could put on an elegant shirt while the other one combs his hair... Then again the first could make nervous gestures with his hands and the other could comfort him with a pat on the back.

## *4.4 Proxemics in Physical Theater*

When we observe the communication between two people in the same place, the observation of the physical space in which it occurs brings with it significant information. "Spatial behavior" is the most direct non-verbal signal and it can be "measured" in terms of distance and orientation; analyzing the movement of the body within an environment and the distances it assumes from others can help us understand some aspects of a person's personality, emotional states and interpersonal attitudes[19]. Proxemics, as defined by the American anthropologist Edward T. Hall[20] who coined the term, is the first attempt at a technique of reading spatiality as a communication channel by observing the use that individuals make of social and personal space. According to Hall, for the human being the boundary of one's body does not correspond to the biological one, constituted by the skin, but rather is defined on the interpersonal distance or the distance that the person puts between himself and others: a distance that "speaks" about intimacy of the relationship between interlocutors, relations of dominance and social roles.
Hall distinguishes four types of distance[21]:

- *Intimate distance* (from 0 to 45 cm approximately), typical of intimate relationships; allows you to touch, perceive the other person's smell, breath and emotions;

[18] This activity was inspired by my participation in the Morganti-Takagi Whuppertal theater method workshop (Pistoia, 2010).
[19] For further information see: www.igorvitale.org/2014/03/03/comunicazione-non-verbale-il-significato-della-prossemica/ and also www.lacomunicazione.it/voce/prossemica/.
[20] See E.T. Hall, *La dimensione nascosta. Il significato delle distanze tra i soggetti umani*, Bompiani, Milano: 1968.
[21] Hall, *La dimensione nascosta... cit.*

- *Personal distance* (from 45 to 120 cm approximately), typical of friendships; in it the glances are extremely close but it is not possible to perceive the smell of the other;
- *Social distance* (from 1.20 to 3.60 m), typical of less personal and more formal relationships in which physical contact is mostly excluded; colleagues, customers, people with whom we want or need to interact can enter this area;
- *Public distance* (over 3.60 m), typical of public circumstances in which you generally do not know other people and this leads to an accentuation of movements and an increase in vocal volume.

As Hall himself points out, these measures are not to be considered universal,as they can vary according to the cultural and socio-environmental characteristics of the context in which the interaction takes place[22].
Knowing "philosophies of space" other than one's own means knowing how to estabilish relationships with individuals who maintain them and is a capacity at the basis of efficient communication, just as it is useful, at the stage-theatrical level, to recreating symbolic situations of the communication.
The concept of space as a scenic instrument will be taken up and deepened in the paragraph dedicated to space-time orientation.

## *4.5 Communication between capacities and skills*

Up to now we have analyzed the single elements that make up the communication and highlighted the developmental lines for the capacities related to those.
We have already defined communication capacities as something essential to properly and efficiently express oneself. For example, for the mime the communication capacities lays in the technique of showing non-existent objects with the use of the body or for a clown the use of facial mimic muscles to recall an emotion and so on.
But it is well known that a capacity does not make a skill, skills must be finalized and adapted to the communicative context, that is, they must be used with intelligence to move from effective communication to efficient communication. This concept calls into question the use of emotional intelligence.
The development of this communication skill is the best goal that we can achieve in an Educational Circus path, as the Transferability of communication skills from circus to daily life means the increase of one of the most important *life skills* of contemporary society.

### *4.5.1 Emotional intelligence*

Emotional intelligence is an aspect of intelligence linked to the capacity to recognize, use, understand and consciously manage one's own and others' emotions.
Emotional intelligence was first addressed in 1990 by professors Peter Salovey and John D. Mayer in their article "Emotional Intelligence". They say, about emotional intelligence:

[22] See M. Argyle, *The body and his language*, Zanichelli, Bologna: 1978.

> "Emotional intelligence involves the ability to perceive, evaluate and express an emotion; the ability to access feelings and / or create them when they facilitate thoughts; the ability to understand emotion and emotional knowledge; the ability to regulate emotions to promote emotional and intellectual growth"[23].

The topic of emotional intelligence was dealt with in 1995 also by the American psychologist Daniel Goleman in the book "Emotional Intelligence", translated into Italian in 1997[24]. Intelligence is the tool that improves the human ability to adapt to the environment.
In the case of emotional intelligence, understanding one's emotions and guessing what others are feeling is a fundamental adaptive factor. Goleman indicates six characteristics that distinguish those who are knowledgeable, aware and make use of emotional intelligence[25]:

- *Being self-aware*. This allows you to produce results by recognizing your emotions and thoughts;
- *Being able to control oneself*. Is the capacity to use one's feelings for an end;
- *Being motivated*. The ability to discover the deep reasons that lead to action;
- *Being capable of empathy*. The capacity to insight feelings, aspirations and emotions of others to get in touch;
- *Social abilities*. The skill to be with others and to perceive the movements that occur between people;
- *Decision making skill*.

*4.5.2 How to develop emotional intelligence*
This ability is developed with conscious work, focused on the specific skills of observation, awareness of verbal, para-verbal and non-verbal communication, with the acquisition of competences useful for communicating one's thoughts, in the development of intuition[26].
The use of emotional intelligence on a physical level is a stage subsequent to the awareness of emotions, so I recommend, first, to perceive, analyze and become conscious of the various emotions and only later to master them as means of communication. Although it may seem counterintuitive, the work on emotions in Physical Theater, especially with children, first passes through a verbal phase.
Personally, I try to work as much as possible in the development of this type of intelligence with my students. Within a program of a motor activity such as the Circus, the moments I use to focus on emotional intelligence nourishment are the following:

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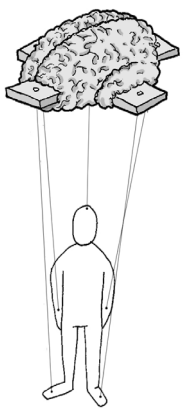
[23] P. Salovey, D.J. Mayer (edited by), *Emotional Intelligence*, in "Imagination, Cognition and Personality", vol. 9, n. 3, 1990, pp. 185-211; P. Salovey, D.J. Mayer (edited by), *Emotional development and Emotional Intelligence: educational implications*, Basic Books, New York: 1997.
[24] D. Goleman, *Emotional Intelligence*, Bantam Books, New York: 1995 (it.transl. Intelligenza emotiva, Rizzoli, Milano: 1997).
[25] *Ibidem*.
[26] For further information see: www.strategiedellamente.it/intelligenza-emotiva/ and www.igorvitale.org/2014/03/20/definizione-delle-emozioni-primarie-o-di-base-come-riconoscere-le-emozioni/.

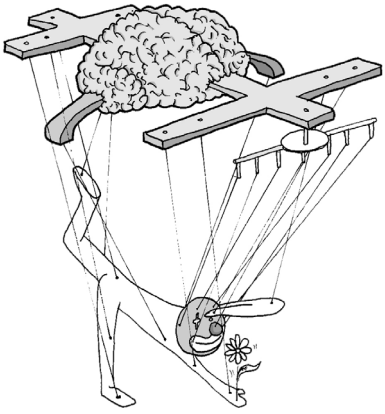
- *Creative appeal*. Each lesson starts with the children seated in a circle; along with calling attendance, I always propose a new topic to add to the answer, so if the outline is "animals", after being called, the children will reply: "I'm present today and my favorite animal is the horse". This exercise can range from ice cream flavors to the story of little funny episodes from life. Personally, I have never used this game for deep introspection, as I do not have psychological grounds to manage a possible recall of traumatic memories; I have always confined myself to stimulating the awareness of pleasant emotions;
- *Artistic feedback*. In my lessons I always dedicate a lot of space to creation as I believe that creative skills must be trained like any other skill. After a creative session, all the students (or half a group in class, in the case of large groups) present their work to all the classmates; in a nutshell, they take turns saying what impressed them most (positive feedback).
- *Conflict Resolution*. If we want to use conflicts to stimulate emotional intelligence, it is important to use very specific methodologies that go beyond the mere definition of rules. The expression "conflict resolution", in fact, refers to a series of communication techniques designed to make participants understand the point of view of others in order to achieve a satisfactory mediation for both.

It is not easy during a Circus class to carve out time to devote to this aspect, but undoubtedly, the time spent in mediation for problem solving is well spent.
Conflict mediation is a subject as interesting as it is complex: several exhaustive volumes on the subject are available, to which I refer[27].

## *4.6 Physical theater and motor capacities*

If the aspect of the communication requirements is clear and delineated, the same thing does not exist for what concerns the aspect of motor capacities in Physical Theater: it is in fact very difficult to focus on the motor needs of a physical actor, as the range of their actions is potentially infinite, going from technical to daily movements in any possible areas.
So what is the contribution of motor capacities to this type of discipline? Yves Lebreton quotes his answer from Étienne Decroux:





[27] D. Noyè, *Gestire i Conflitti Interpersonali. Dal confronto alla collaborazione*, Tecniche Nuove, Milano: 2017.

> "Copeau would have liked the actors to know how to move and then to move. But how can we make the actors move if they haven't learned the science of body movement?"[28].

This phrase opens up a vision of the actor who is agile, handsome and aware of their movement skills. The actor thus becomes a multifaceted figure capable of being an acrobat, juggler, mime or whatever else they need to be to enact the scene (to play). But whatever technique the actor chooses to use, it must be mastered with excellence and ease to be put at the service of the stage representation.
The three previous chapters do not come into conflict in any way with the physical preparation of a physical actor, on the contrary they can be used as bases or ideas for the structuring of a broad and inclusive work. The root of the physical actor's work does not lie in specializing in a discipline, but in the study and preparation of the body as an expressive tool; in this perspective, therefore, the various physical disciplines become a *support* to the communicative intent and not an end.
Having previously treated many aspects of the composition of human movement, in this chapter **I will only enumerate those aspects of human movement that find a specific application in Physical Theater; everything that is not described in this chapter you can read in the one dedicated to acrobatics**, a discipline historically very connected and similar to Physical Theater.

*4.6.1 Sensory Analyzers in the Physical Theater*
Often in traditional and contemporary theater there is a tendency to neglect the importance of sensory afferents both for the actors and for the audience.
Conversely, there is a way of doing theater called "Teatro de los sentidos"[29] which instead aims to investigate the dramaturgy of sensory language, trying to break the barrier that separates the actors from the audience through a structured stimulation of the senses.
Beyond these two stylistic extremes, I believe it is important to stimulate the senses of physical actors, not only to react adequately to environmental *stimuli* but also to activate that process of physical memory that unites sensations with an emotional experience. In the field of sensory analyzers, as for the other motor components contextualized in the Physical Theater, it is crucial to solicit and provide the greatest number of inputs possible to expand and strengthen the functionality of the perceptual system and to increase the capacity to analyze the sensations that they will be transformed into perceptions.

*4.6.2 Visual system*
As we have observed previously,the visual channel is one of the most significant means through which content can be conveyed and communication activated. For an actor, gaze represents a basic tool for communicating one's intentions to the public or to other actors; consequently the physical actor has a use of the visual system, partly similar, and partly different from the other circus figures previously analyzed.

[28] Lebreton, *Étienne Decroux… cit.*
[29] Located in Barcelon (Spain); for further information check the link: http://teatrodelossentidos.com/ (last access January 17th, 2021).

Clearly all the principles enunciated regarding orientation, control and precision of the movement remain valid also in this context, but the main peculiarity of the use of focal vision in physical expression is precisely the implication of vision functioning as a means of control and communication within the scenic space. Therefore, it becomes important to stimulate this capacity to use this communication medium in a dramatic way using specific exercises to raise awareness of the potential of both focal and peripheral vision. Focal vision is used to direct the viewers' attention to a specific point or to convey emotions and can be trained with an exercise like the following.

Activity 112. *Command a person through gazing*. The actor gives orders to their partner just by staring at them, therefore availing themselves with the visual channel only, trying to make their partner perform increasingly complex actions with no words. It starts with simple movements in space and then moves on to changes in posture and specific actions such as standing on one leg, sitting down or moving an object. The actor who commands can only give expressive positive or negative *feedback* about the way the actions are carried out, without ever using the voice channel.

Peripheral vision is needed to have control over the stage space and what goes on there; undoubtedly, focusing our gaze only on the actions we perform precludes us from observing the other staging actors, and, for those who improvise, from noticing the several interactions clues coming from the audience.
To develop peripheral vision we can use activities such as the following: the second one in particular is very complete and combines the two visual systems.

Activity 113. *Four eyes*. As we stare at a point in front of us, we must describe the objects we have at the edge of the field of view.

Activity 114. *The sergeant*. An actor stands up in front of a line of companions who,looking them in the eye, walk forward up to a predetermined line. When the actor catches their gaze and keeps eye contact for a moment, the sergeant sends them back to the starting point. The goal is,in fact, to prevent even a single teammate from reaching the finish line.

### *4.6.3 Auditory system*

The auditory system has a dual application. It works for the setting of ourselves in the space, and it is in fact thanks to the auditory afferents that the actor can perceive people or actions even outside his visual field (what is called the "sound landscape" is nothing more than the mental representation of the surrounding environment, created by the analysis and integration of all the various sound information that we can process). But an active and effective capacity of hearing, as well as orientation in the space, greatly helps scenic presence and the interaction with the different elements around the actor. Once the importance of this sensory afferent is highlighted, it becomes logical to stimulate it with appropriate activities, of which I report some examples.

Activity 115. *The guard dog*. An actor gets blindfolded and sits in the middle of a circle formed by their teammates, with an object placed on the ground in front of them (for example a ball). In turn, the companions must approach the actor and steal the object, without making a noise. If the actor hears them and correctly indicates with a finger the direction from which the noise is coming, they must return to the starting point.

Activity 116. *Sound walk*. A blindfolded actor is accompanied by a companion who guides them in a public space such as a garden, a bar, etc. The blindfolded actor will be able to interact freely with the environment, focusing on the perceived acoustic *stimuli*.

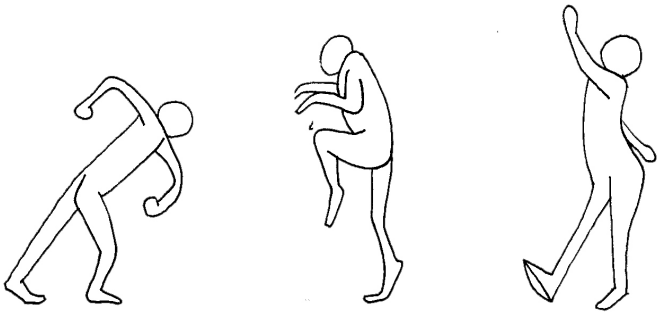
Activity 117. *Call my name*. A group of students is divided into pairs; one closes their eyes and the other, calling their partner by name or by a nickname in the case of homonyms, must make them move in the space without colliding with the other participants.

These activities can also be related to the capacity to orient space-time but, given their close link with the auditory system, I think it is more appropriate to address them in this paragraph.

## *4.7 Basic motor schemes*

When Jacques Lecoq describes the motivations of dramatic acrobatics, he speaks of the basic motor schemes in these terms:

> "A child comes out of his mother's body with a rotational movement; before crawling or walking, his first contact with the ground is caused by a movement of the head that makes him do a side somersault. My goal is to make the actor rediscover this freedom of movement, which prevails in the child before social life imposes other, more conventional behaviors"[30].



This quote brings back to my initial observations about physical versatility, the ability to calmly master all movements; to achieve this goal, however, adequate work on all basic motor schemes is required.
This work rediscovers the mere motor nature of physical theatre in a Herbertist perspective[31], that implies that the practice of movement brings back to general functionality and not to specific objectives.
Having already extensively described motor patterns one by one, I am about to make a bare list of the main variations to encourage the adaptation and improvement of all motor patterns,except that of "swimming"[32] (*Table 16*).

[30] Lecoq, *Il corpo poetico*... cit.
[31] I refer to the approach of the French pioneer of Physical Education Georges Hébert (1875-1957) who followed a natural method of physical education for the complete development of the motor skills of the person, through the use of gestures typical of the human species.
[32] Swimming is often not included in the Physical Education manuals among the basic motor schemes, not because it is not recognized as such, but because it follows a pedagogy and a practice delegated to specialized facilities and teachers that make it a branch of study in its own right.

*Table 16. Possible variations for training basic motor schemes.*

**To Slither**
- In different positions (ventral, dorsal or lateral)
- With different propulsive mechanisms (using only the arms, legs or only the torso)
- On different surfaces (linoleum, wood, carpet or various mattresses)
- With objects balanced on the body
- With different inclinations
- To the rhythm of music (speed variations)

**To Swing and to Roll**
- On soft surfaces (mats)
- On inclined planes
- While keeping a fixed point with your eyes
- Blindfolded
- On other people's bodies
- In tightness (without touching the ground with hands and feet)

**To Crawl (move in a four legged)**
- In different positions (ventral or dorsal)
- In different directions (forward, backward or sideways)
- On different surfaces
- On inclined planes
- In obstacle courses
- With objects balanced on the body
- To the rhythm of music (speed variations)

**To Walk**
- On different surfaces (various types of mats)
- On unstable surfaces (proprioceptive tables, rola bola, etc.)
- On small surfaces (beams or supports)
- On inclined planes
- In different directions (forward, backward or sideways)
- Varying the support of the foot (forefoot, heel, internal or external side)
- Varying the posture of the body
- Theatricalizing
- To the rhythm of music (speed variations)
- With eyes closed
- With an object on the head

**To Run**
- Same *stimuli* as walking (planes, surfaces or directions)
- Varying the space (spaces free or occupied by obstacles)
- Varying the duration (for example, 5-10-15 minutes);
- By varying the speed
- With loads on the limbs (anklets, wristbands or harnesses)

**To Jump / to Land**
- With various attitudes of the body (extended or tucked)
- Jumps of obstacles while standing or running (with one or both legs)
- Vary the shape of the jump (in height, length and precision)
- On soft surfaces (mats)
- Jumping or landing on narrow support bases or from different heights
- Jumping while throwing or grabbing objects
- Surface angle variations
- Variation of the rhythm of movements
- Variation in the dimensions of the grips / supports
- Insert pauses between movements
- Climb with your eyes closed

**To Throw / to Catch**
- One/two handed throwing/catching
- Throwing/catching on the move or after a stunt
- Throwing/catching precision
- Throwing/catching objects of different weights, shapes and textures
- Throwing/catching from unstable or small surfaces

## *4.8 Coordination capacities in Physical Theater*

Unlike basic motor schemes, Coordination capacities have specific and important applications in Physical Theater; we no longer speak of non-specific preparation for movement but of certain contributions to the control of movements with precise communicative purposes.
The only exception is constituted by the coupling and combination capacity that, due to its clear root of motor control, falls within the category of basic motor schemes.
To propose *stimuli* for the aforementioned capacity, valid for Physical Theater, you can take for example the activity proposed in the chapter dedicated to Acroportes; all the other capacities, on the other hand, need individual study.

### *4.8.1 Kinaesthetic differentiation capacity*

Muscle tone is an important discriminant in non-verbal communication; the transition from contract to decontract, from rigid to fluid and from fast movement to stasis are all actions that have a communicative meaning.
It is therefore important to have trainees improve control and gain consciousness of kinesthetic differentiation while performing expressive actions in order for those to be transformed into proper stage skills later on.
Kinesthetic differentiation is also the basis for movements of isolation of parts of the body. For instance, the difference between the tone of the muscles that stabilize and block the unaffected joints and the one of the muscles involved in the movement is by no means a foregone conclusion: on the contrary, it requires a long study and targeted teaching to achieve good results.

Activity 118. *The marionette*. It is an activity concerning motor dissociation. We compare our body to that of a puppet that is moved by the puppeteer and we move each part of the body independently; an example could be the following: the head makes lateral flexions;to one side, the arm is outstretched and circles are drawn in air by the tips of the fingers; to the other side, the elbow is raised at shoulder level letting the forearm oscillate in the frontal plane; one leg swings on the lateral plane with the knee raised to hip level.

Activity 119. *Statues and sculptors*. In pairs the students alternate in the role of the statue and the sculptor; the statue remains neutral until the sculptor manipulates it giving it a shape that it must maintain; at the change, "statue" and "sculptor" are reversed.

Activity 120. *The art gallery*. It is the moving version of Statues and sculptors. The students run and, at the "stop", they stop on the spot. The teacher passes by and manipulates them as if they were pieces of wax giving them shapes like statues. At the "go" signal, the students resume running and, at the "one" signal, they return to the place and position that their first "statue" had. The exercise continues by increasing the number of positions and statues alternating between the calls of the statues already made and the "stops" to create the new statues (it is advisable not to create too many statues).

### *4.8.2 Balancing capacity*

Balance is a basic capacity in all motor activities, but in Physical Theater it is undoubtedly important for all those movements that require effective stasis or for those dynamisms that are unexpected. The walk of the mime, the clown balancing

on a rope on the ground or an actor who plays and moves on tiptoe require a well-structured capacity for balance.
Balance in itself is also functional to stage expression as a body in certain positions expresses a certain emotional tension, referring to the posture discourse previously done, a good balance capacity therefore supports all the more complex movements performed during maintenance of unusual or emphasized postures. Undoubtedly, you can use the exercises that we have described in the paragraph on balance capacity in Acrobalance, as it is more similar to Physical Theater as a type of work without tools.
But in my experience as an artist I happened to work with the actor and trainer Jean Méningue[33] who, during the training of the clown, proposed Aikido[34] exercises based on moving with slightly bent legs and on rotation to develop that feeling of grounding in the terrain proper to martial arts. Even if this training does not properly develop the capacity to balance (as it lowers and does not raise the center of gravity by choosing an easier position), it can be a good strategy to sensitize the actors to the use of their own center of gravity. Tai chi chuan is another training much practiced by mimes as it brings attention not only to the awareness of the movements but also to the shift of the center of gravity and requires frequent balance on one leg.

*4.8.3 Space / time orientation capacity*
I have already talked about the importance of space in communication in the paragraph dedicated to proxemics; now I would like to go more specifically on how to increase the perception and therefore the use of space.
Different subjects can perceive the same space in different ways, so we can say that if physically and objectively space is given as one, the ability of a subject to move in a space is completely subjective.
When it comes to the representation of Physical Theater it cannot free itself from the stage space (i.e. the space in which it takes place), so the spatial perception becomes a tool that allows us to understand and make the best use of the physical space available.
We therefore try to bring attention to space from a workplace perspective, proposing targeted exercises such as the following.

Activity 121. *The raft*. A square or rectangular space is outlined and compared to a large raft on the sea. If they do not want to sink, the participants in the exercise must arrange themselves equally in the raft. The exercise can be proposed in a static way (where each participant enters the space and occupies a position without moving) or in motion (where all the participants move simultaneously in the raft trying to predict the movements of the others so as not to overload an area too much). In this second version it is advisable for the teacher to cyclically stop the exercise to bring the group's attention to its distribution in space.

Activity 122. *My enemy*. All participants in the exercise are asked to secretly choose a person and give him the role of enemy. At the start of the exercise, everyone must move trying to keep the maximum distance from their enemy. This exercise creates a chaotic movement of people in which each participant must maintain their goal by adapting to the movement of others.

[33] To know more: /www.meningue.com/.
[34] Aikido is a Japanese martial art practiced both with bare hands and with sidearms.

Activity 123. *The magic circle*. A circle is defined by drawing it on the ground (for example with a piece of chalk), then a human circle is created that is positioned about one and a half meters outside the one outlined. In turn, the participants start "neutral" from their position up to the edge of the marked circle. As soon as they enter the second circle they have to invent a physical magical effect (an itch attack, a severe stomach ache, an incredible joy, etc.). The exercise can also include a verbal addition of sounds or words. The magical effect ends when you leave the circle and the subject returns to neutral. Those who have just performed the exercise will choose a partner to take the place of and so the turn is passed.

Once we have explored the concept of the use of space at the stage instrument level, we can devote ourselves to the concept of "communicative form", that is, shifting attention from the use of space relative to movement and concentrating on the communication that derives from it.
I was lucky enough to work (albeit very briefly, in 2012) with the writer and director Firenza Guidi[35]. She set up a very interesting work on space and communication, outlining three different spatial zones:

- Zone 1. The personal zone is that in which an actor acts or moves for themselves all the actions carried out in it are defined as "intimate";
- Zone 2. The interpersonal friendly zone is the one in which the actions are dedicated to people close to the actor;
- Zone 3. The public area is where people are far from the actor.

Here are some exercises I have drawn from these issues.

Activity 124. *The three zones*. The exercise of the three zones consists in performing an action such as singing a song and relating it to the three zones (in this case in zone 1 I whisper the song, in zone 2 I sing it normally and in zone 3 I yell it out loud). This gradualness can be adapted to any action.

Activity 125. *Social spaces*. Arrange the participants in two rows; at the first command of the conductor, one row approaches the other with free choice of distance, each actor will then choose how close to approach the chosen partner, free is also the reaction of those who receive the approach, the second actor can choose whether to stay still, move away or get closer. Below the conductor will add emotional complexities giving themes, such as "seduction"; again one row approaches the other with free distance and free reaction.

### *4.8.4 Rhythm capacity*

Rhythm is one of the fundamental aspects of both verbal communication, through the rhythm of words, and of physical communication, through the rhythm of actions. Having a good awareness of the rhythm of actions allows for more effective physical communication. Even in Physical Theater, rhythm is distinguished between a sense of general rhythm and a sense of specific rhythm (see the paragraph dedicated to Juggling). It is important to emphasize that Physical Theater performances often take place with the use of music, so it is important to establish a solid link between movement and rhythmic-sound structure through specific games or targeted exercises.
Here are some examples of rhythm exercises both in general and specifically useful for Physical Theater.

[35] To know more: http://elanfrantoio.org/it/about/firenza-guidi.html.

Activity 126. *Beating in a circle*. All the students in a circle clap their hands one at a time, maintaining a constant rhythm; the more the group becomes experienced the more the pace quickens. This exercise is more related to listening to the work group than body percussion, which instead focuses more on the subjective rhythm.

Activity 127. *Combine different movements in a common rhythm*. After starting to clap hands on the thighs in unison, the next movement consists of a spontaneous choice between the four previously agreed movements (for example, hands up, down, right or left). Thus, the beat on the thighs alternates with a "random" choice between these four movements. When the students make the same spontaneous choice (after repeating the tapping on the thighs), they give themselves a high five and the exercise resumes with their own sequence. The aim of the game is to maintain a constant pace for the duration of the exercise, despite possible variations in movement.

Activity 128. *Exercises in style*. Students are asked to create a very simple mime routine of about one minute (such as, for example, waking up in the morning and getting ready to go out). It is first performed without music, then a series of distinctly different musical pieces are proposed (classical music, hip hop, heavy metal and ska, for example) and the students are asked to adapt the routine to the music.

### *4.8.5 Reaction capacity*

This capacity in Physical Theater finds greater use as training for the improvement of two main aspects: general reflexes and attention capacity.

With regard to generic reflexes, having no particular movement to automate is important to stimulate the capacity to react quickly to unexpected situations (complex reaction capacity) as in this way we accustom the nervous system to quickly find effective motor programs.

Attentional capacity is linked to the qualitative level to the complex reaction capacity, as it is a *conditio sine qua non* for detecting the stimulus to be reacted to, but it is also linked to the quantitative level of attention. In the theater an actor on stage must always remain as attentive and concentrated as possible even for very long times and act quickly, if required, after the aforementioned periods of inactivity.

To stimulate the capacity to react, we can use the exercises described in the paragraph dedicated to the generic reaction skill of Juggling or use one of the following.

Activity 129. *Zen shot*. Two actors stand in front of each other; whoever takes (A) leaves his arms at his sides and whoever runs away (B) places his arms outstretched, angled 45° in front of the body. B gives the go signal and A, when he wants, tries to grab B's wrists. A has only one stroke and cannot pretend, he can only choose when to leave. Once the grabbing movement has been made, regardless of whether it was successful or not, we restart from the starting position and wait for the new signal from B. After five movements the roles change.

Activity 130. *The walk*. A group of actors move freely in space; some actors have a sponge ball in their hand and have to throw it without warning into the visual field of another actor who has to catch it and then throw it back to someone else (this exercise is also useful for training peripheral vision).

Activity 131. *Ninja*. All the actors are in a circle with one hand in the center in contact with each other; on three everyone screams "ninja" and jumps back as far as possible assuming a martial stance with their hands in full view. At this point the instructor appoints a student who must try to hit the hand of a partner who in the meantime tries to dodge, if the limb is hit it becomes

unusable and is carried behind the back otherwise it remains in play. The action continues clockwise starting from the second pupil after the one named. The game ends when the hands run out or after a previously agreed time.

Every time I talk about attentional capacity in the theater, I can't help but remember the video of Odin Teatret's *training*, where the actors swung at each other with rods to train their concentration at the height of the face or ankles. The shots were clearly delivered with maximum speed and power and the minimum of predictability... Undoubtedly the effects of this training have helped to grow one of the most famous Physical Theater companies in the world[36].
This is a good example of what professional actors can do and, at the same time, **a good example of what not to do in an Educational Circus course**!!!

*4.8.6 Motor transformation capacity*
The implication of motor transformation capacity in Physical Theater is interesting. In short, motor transformation is the capacity that allows you to adapt a motor action to an unexpected stimulus without interrupting it.
Here, the concept of unexpected stimulus acquires a different meaning; if in motor-sport activity an unexpected stimulus can be constituted by a change of trajectory of an opponent or by the loss of the ball by a partner, in the Physical Theater the unexpected stimulus can be represented by other events such as, for example, the reaction of a volunteer (in the case of street artists) or the routine variation of another actor or a scenic unexpected event (in the case of theatrical performances).
Motor transformation is part of an actor's skill to improvise; more specifically, it is the capacity to vary an ongoing movement with respect to unexpected changes in the physical and emotional environment during the performance of a performance.
If, sportingly speaking, this capacity only concerns the motor aspect of the action and does not involve the purpose, in Physical Theater the border is not so clear; an action, in fact, without being interrupted can change its shape and intention and this requires emotional as well as motor intelligence.

Activity 132. *Transforming a movement*. The pupils stand in a circle. A pupil reaches the center of the circle and proposes a movement they repeat continuously without interruptions and variations. After a few moments, the student moves in front of a partner, continuing to repeat their own movement. The partner first begins to imitate the movement and when they have assimilated it, without interrupting it, turns and goes to the center where they develop their own variation on the movement received, thus creating a new movement. As before, the student goes to one of the classmates keeping this "new" movement and passes it on. The exercise continues alternating the "received" movements with the variations created by each in the center.

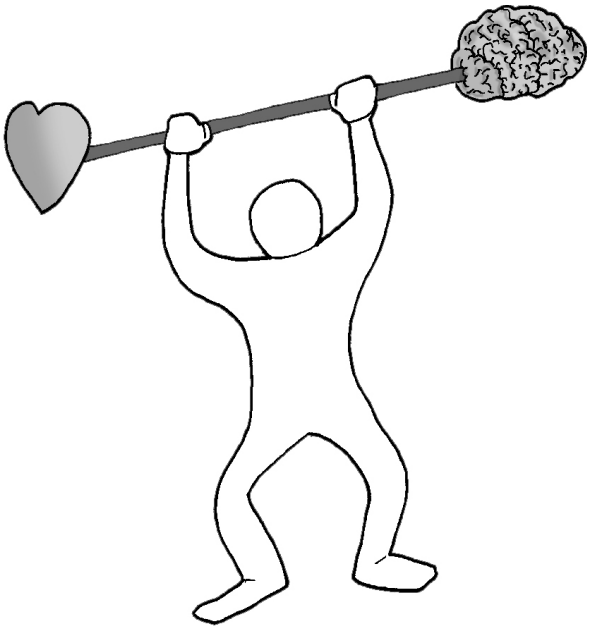
Activity 133. *The mirror*. Two actors come face to face, one represents a person (A) and the other the image of themselves reflected (B) in an invisible mirror. A will start to move slowly and B will have to imitate A's movements as precisely as possible. Here, in this exercise, B is transforming their movements as they do not have a precise motor program but only movement

[36] About the Dutch company Odin Teatret and its founder Eugenio Barba check: www.odinteatret.dk/about-us/.

hypotheses that must be checked and corrected at every instant. It is one of the most classic theatrical exercises.

Activity 134. *Slow motion combat*. Assuming that the students are already familiar with slowed movements, to stimulate their capacity for transformation I will have to propose an exercise with unexpected *stimuli*; what better test bench than an MMA[37] ring where every shot is allowed! In practice, students in pairs or groups fight each other in slow motion, adapting to dodge or receive the blows of the opponents without ever stopping their body until the end of the round. I have already dealt with slow motion in relation to balancing walking, but here the exercise takes on a different connotation.

## *4.9 Conditional capacities in Physical Theater*



Even for Conditional capacities it is difficult to highlight a performance aspect. If we do a global functional analysis of a physical actor, the need emerges for a multifaceted profile and as open as possible to the acquisition and control of a very wide range of movements that make him ready and adaptable to as many scenic situations as possible. Therefore, the principle is that the more trained and performing the body, the greater the possibility of choosing and performing complex and evolved movements.
I would just like to reinforce the concept that a physical actor should have a body "culture" comparable to that of an athlete, only with different purposes. Even if the Educational Circus does not aspire to train professional physical actors, combining this type of work with a concept of appropriate physical preparation is certainly an added value on the educational level.
The discourse changes decisively in the case of professional actors who are preparing for actor performances, as they need a very careful physical preparation.
Having said that, I believe that all Conditional capacities are very important and at the same time non-specific for this type of discipline.

[37] *Mixed Martial Arts*.

*4.9.1 Strength capacity*

Developing a good degree of functional muscle tone is useful for having an athletic body, ready for the widest range of movements and above all resistant to the various injuries that can occur in physical work.

Clearly in this training perspective it is better to choose a type of explosive and resistant strength (which has more applications in a stage work) than a type of massive or fast strength.

I believe that functional training is a valid choice for this type of discipline and certainly more affordable for everyone (see the paragraphs on functional training in Balancing and Acroportes).

If you work with children and young people it is however advisable, even for Physical Theater, to use physical games, rather than carrying out training sessions properly so-called; the movement and wrestling games (see the chapter on Acroportes) previously described are an excellent example of this.

*4.9.2 Endurance capacity*

The qualitative duration of a series of movements extended over time is directly correlated with the time required by the stage performance; in other words, if a physical actor decides to present a *performance* of thirty minutes they must train to resist the same fatigue load for much longer, or train for the same duration at higher fatigue loads.

This principle is valid for professional actors. In the Educational Circus, however, I consider it useful to address this concept, even if resistance might not be always constitutive of a performance. I in fact often train children with aerobic work sessions, adjusting the type of work according to age, current physical capacities and the motivation of the students.

In the Educational Circus, the actor's *performances* hardly exceed ten minutes, but even in the performances with medium / low muscular effort, resistance is still important in order not to run out of energy, however crucial for the quality of movement.

An untrained body easily gets under stress, the main symptoms of physical stress are: muscle weakness, transient respiratory failure, cramps, profuse sweating and decreased attention capacity.

Therefore it is advisable to physically prepare students by increasing the capacity of those metabolic mechanisms that produce energy such as lung capacity and aerobic metabolism through long-lasting and low-intensity workouts such as running, swimming, cycling or all those types of related movements that they accustom the body to a prolonged effort lasting longer than the stage time.

*4.9.3 Speed and swiftness capacity*

I have already dealt with the issue of the need to increase speed in the paragraph dedicated to motor reaction capacity through the proposal of specific exercises, but how to behave with regard to speed?

Undoubtedly the capacity to perform shots and small runs is a useful motor baggage for a physical actor, while the need to cover large distances in a short time is rare.

We can therefore propose games and exercises to stimulate this capacity in a playful way such as the following.

Activity 135. *The flag*. Arrange the students in two rows and number them in a mirror image; in the center of the two rows there is the "flag holder" holding a handkerchief in their hand; when the flag carrier calls the numbers "3" for example, the two students with this number will have to run as quickly as possible to get the handkerchief; the first who takes it without being reached behind by the opponent wins a point for their team.

Activity 136. *The relay*. Arrange the students in two or more teams of equal elements, delimiting a portion of space for each team with markers, then put half of a team on one side of the marked space and the other half on the other side; at the start, the first student of each team must travel through the competition space as quickly as possible and touch the hand of the teammate who in turn will retrace the field in reverse to touch the third teammate and so on, until the end of the group. The winner is the one who ends first.

Activity 137. *The circle of the staff*. Arrange in a circle a variable number of children spaced more or less two meters from each other; all the students hold a staff resting on the ground in vertical balance with their hand, at the command all the students leave their staff to grab that of their partner on the right (or left, it is important to clearly decide the direction before the command to avoid clashes!) before it hits the ground.

### *4.9.4 Flexibility capacity*

To begin the discussion on flexibility in Physical Theater, I find it very useful to quote Étienne Decroux again: "the fulcrum of the actor's body is the trunk, focusing on the mobility of the spine means directly intervening on the biological link that unites the body to the mind"[38].

In the discipline of Physical Theater, flexibility is useful not only to prevent injuries, but also to increase motor capacities, given the principle that the more elastic a body is, the greater its capacity to move.

With a view to functional flexibility, therefore, rather than mere stretching sessions such as those proposed in Acroportes and Balancing, in Physical Theater it becomes interesting to consider Yoga or Pilates sessions, activities that give flexibility and general harmony.

[38] Lebreton, *Étienne Decroux... cit.*

# Conclusions

Writing this book was for me first of all an introspective journey: that made me live again and analyze almost twenty years of career from a new viewpoint. During the writing of this work I was lucky enough to have a lot of friendly people around me who supported, criticized and gave precious suggestions. It was an experience that first of all enriched and consolidated myself, and I sincerely hope that my work will help other operators as much as it helped me.

I am conscious that the working "philosophy" I have described is not always feasible in reality, due to problems of space, time, materials and a thousand of other possible variables. However, this must not discourage or demotivate the operator in this sector, as I think we must always try to achieve the best results with the means available; clear guidelines, objectives and methodologies can only lead us there.

What I wrote is an interpretation and a mixture of my University studies and fieldwork memories and practical experience in the area.

I do not mean to state specific theories or dogmas, and I defer to future changes that Motor Sciences will be able to improve as scientific research goes on.

The claim of this work could however be that of starting a constructive debate within the current group of European Educational Circus teachers over the issues I raise here.

# Appendices

## Appendix 1
# The generator of exercises and games

All the exercises and games in this volume are concrete examples of the application of some theories and concepts of Neurophysiology – which I refer to from time to time while illustrating the activity.
I have learned, modified or invented the aforementioned activities / games in twenty years of working in this sector and over time I have learned to make them fit perfectly with my teaching style.
I would like to think that the readers of this text use them as cues or as a starting point to structure their own personalized work, without feeling obliged to stick to my explanations if they do not consider them appropriate, thus making all the necessary changes without, however, never lose sight of the true nature of the exercise.
Having a very wide range of exercises / games suitable for every situation is always a winning key in our work, also because students must be presented with freshness and passion;automated repetitions do not elicit the desire to participate!
In this paragraph I propose my way to create new activities / games, which I find very inspiring since based on "randomness".
You need first of all a probability "generator": I myself always use dice, numbered from one to eight., but it could be anything whatsoever (drawing numbers from a plastic bag, having an odds wheel to spin...).
Assume we want to invent a game that stimulates a basic motor scheme and a Conditional ability using a Juggling object.
In this case I use a table with three columns: in the first column I put all the motor schemes, in the second column the circus objects and in the third the Conditional capacities. An example could be the following.

| | **Motor scheme** | | **Circus objects** | | **Conditional capacities** |
|---|---|---|---|---|---|
| 1 | To Slither | 1 | Scarves | 1 | Sequencing |
| 2 | To Swing / to Roll | 2 | Balls | 2 | Kinesthetic differentiation |
| 3 | To Crawl | 3 | Rings | 3 | Balance |
| 4 | To Walk | 4 | Clubs | 4 | Space/time orientation |
| 5 | To Run | 5 | Hats | 5 | Rhythm |
| 6 | To Land / to Jump | 6 | Flowerstick | 6 | Reaction |
| 7 | To Climb | 7 | Diablo | 7 | Transformation |
| 8 | To Throw / to Catch | 8 | Spinning plates | 8 | Withdraw the nut |

Having defined the grid, I roll an eight-sided dice three times and at each roll I check the corresponding row from the table. Let's say that I get a "3", a "7" and a "2", I will have to invent an exercise / game that involves the scheme of crawling using a diablo that stimulates kinesthetic differentiation. From this random combination, to give examples, the following games were set up.

Example I. *Diablo gran prix*. All the participants are standing in line after getting into a four-legged position, and have a diablo in front of them; at the start they have to move like quadrupedals making the diablo roll along a previously established path; the winner is the one who arrives first.

Example II. *The good dromedary*. All the participants pretend to turn into dromedaries: they get on all four legs with a diablo balanced on the pelvis – representing the Bedouin; their purpose is to move without dropping it.

Example III. *The inseparable ones*. In pairs, the students get into a quadrupedal position and share a diablo with their hips or shoulders. Participants have to go through the whole route without dropping it.

This example refers to the generic creation of a game: if necessary we can have a known parameter. If, for example, I already know that I want to use diablos, I will roll dice only for pulling motor patterns and Coordination capacities.
This method can be expanded by adding other categories to the table such as the number of participants or the age range.
I report a sample below.

| | **Number of competitors** | | **Age range of participants** |
|---|---|---|---|
| 1 | In solitaire | 1 | 3-5 |
| 2 | In pairs | 2 | 6-7 |
| 3 | In trio | 3 | 8-10 |
| 4 | In four | 4 | 11-13 |
| 5 | In five | 5 | over 14 years |
| 6 | In group | 6 | seniors |

## Appendix 2

# Injuries of the juggler: some food for thought

*doctor Francesco Vanni*
*physiotherapist, chiropractor*

## *Introduction*

Specific studies concerning injuries that may occur to jugglers are not up-to-date. I will therefore try to give elements to think over, drawn from my experience as a juggler first and a therapist later. Juggling must be considered a sporting activity in all respects as it involves physical and mental skills that are constantly exercised in order to improve them. In my experience I have often seen that especially beginners concentrates on the artistic aspect and underestimate the physical aspect of Juggling,with the consequence of developing postural vices and wrong training *routines* that can compromise health beyond the *performance* itself. Juggling is not, in most cases, a competitive sport, but the amount of time spent training can be compared to that of a professional one and the repetitiveness of the gesture in people who have, for example, postural dysfunctions, can lead to more or less serious problems. That said, juggling can be described as an activity with a low risk of injury compared to other sports activities, but no "official" definition have yet been provided.

## *Acute traumatology*

Since juggling is not a contact sport, its traumatology is linked to the body-object relationship. Tools such as clubs and rings,for instance, because of their constitutive features, can lead to injuries of a traumatic nature in almost any part of the body. The most involved sections are hands, head and face ; injuries can be encountered ranging from mild blunt trauma to more serious problems in the event that the "juggled" object hits more delicate areas such as the eye.

## *Chronic problems*

In any physical activity, repetitive or sudden movements can lead to an overload of anatomical structures such as muscles, tendons and joints, especially if the body is not sufficiently able to adapt to the gesture. Lack of adaptation can be caused by various structural, chemical and emotional stressors that can influence the neurological response. An altered neurological response can show itself with the reduction of muscle activation and coordination, with the reduction of balance and, finally, with the reduction of reflexes. The consequence will be a weaker, more vulnerable body, that is, unable to adapt to external forces. The general ability to adapt ourselves to the environment is crucial in terms of accident prevention as well as being the basis for the survival of every living being.

Given the complexity and breadth of the subject, I will focus only on a few aspects that may be an inspiration for those wishing to expand it later. First of all, it is essential to understand the concept that the human body is a whole entity where each segment is connected among others: an ankle problem, for example, can lead to a series of chain events that can compromise a hand. You should never look for the problem only in the zone next to the painful part, unless there is a direct and punctual trauma. Chronic pain is often caused by "adjustments" the body needs to enact because of complications arousen far from the injured area. Structural factors that can cause injuries include restrictions on joints or soft tissues (e.g. muscles and muscle bends) and excessive mobility in structures that should be stable. In general, in therapeutic terms the movement must be "simply" recreated in areas of the body that should move and areas that should be stable must be reinforced as these two extremes can lead to compensations and consequent postural changes of the subject. As far as Juggling is concerned, it is important to stabilize the neck, shoulder blades and lower back in particular. An unstable core or shoulder blade will inevitably lead to inadequate anchoring which will compromise the biomechanics of the upper limbs. This can lead to both shoulder and arm problems and lower back problems due to excessive strain. By "core" we mean the cube located in the abdominal part formed by the front and side abdominals, lumbar muscles behind, diaphragm above and pelvic floor below. Training the core should be the starting point of any physical activity. On the other hand, it is important to take particular care of the mobility of the cervico-thoracic junction, of the shoulders and of the thorax to ensure that other structures are not overloaded and to facilitate the posture of the juggler I describe below.

## *Posture of the juggler*

If we take into account the "cascade" with three or more objects, we can notice an opening postural attitude of the juggler: extension of the spine (especially cervical), open shoulders, externally rotated arms and upward-facing forearms. Nowadays we see more and more postures that tend to an inverse attitude, that is to a general closure and internal rotation.
This can be due to an incorrect and sedentary lifestyle but not only... Juggling itself could help in part, but people with this posture who approach juggling must be aware of the fact that they will have more difficulty adapting to the opening attitude that facilitates the athletic gesture of the juggler with the consequence of increasing the risk of overload joints of the neck, shoulders, elbows and wrists.

## *Conclusions*

In conclusion, I advise all jugglers not to underestimate the physical aspect of juggling and to seek professional advice from a sports doctor if they want to engage in constant and prolonged training. It is important to accompany specific training with the tool with targeted and personalized training without tools (a pre-warm-up) and any postural corrections which, in addition to improving technical performance, will reduce the risk of injury.

## Appendix 3

# Mirror neurons: empathy and communication

*dr. Christian Poggiolesi*
*psychologist*

In the nineties of the last century a group of researchers from the University of Parma discovered the existence of a group of neurons with very particular characteristics in the macaque premotor cortex and later in humans.
These neurons, renamed "mirror neurons", have the ability to respond both when a certain behavior is performed in the first person and when it is observed, performed by others. In other words, taking a glass to my mouth and observing someone else performing the same action activates the same kind of neurons in my brain. That is, when I observe an intentional action carried out by another person, the same motor program necessary to carry out the action is activated in my nervous system as well. This mechanism allows us to understand the intentions of others, to see things from the point of view of the other; as the Indian neuroscientist Vilayanur S. Ramachandran says, mirror neurons "are neurons that create a virtual reality simulation of another person's mind, empathizing with the other person" (in Hinman-Thomas-Ramachandran 2012).
According to Ramachandran, this means that mirror neurons constitute the neural basis of learning by imitation and therefore indirectly of the development of various human cultures (*Ibidem*).
Over the years, the presence of mirror neurons has been discovered in other areas of the brain, involved in functions that go beyond motor functions, such as proprioception, touch, nociception and empathy. Neurons with "mirror" properties are in fact found in the frontal, parietal and prefrontal lobes, as well as in the insula, the amygdala and the gyrus.
One field in which the discovery of mirror neurons has had a considerable impact is that of empathy and non-verbal communication. The Italian neuroscientist Giacomo Rizzolatti says "Man is a social animal, and his survival also depends on his ability to 'read' the emotions of others" (Rizzolatti-Vozza 2008), that is to be able to decode the probable intentions of others and regulate consequently their behavior, for example by moving away from an angry individual or by approaching a person who expresses emotions such as tranquillity or joy.
To do this we have two ways: one of a "cognitive matrix" (according to which we can, for example, infer what the other feels by observing them and thinking over their behavior) the other that has to do with the "mirror" system we are analyzing. The latter occurs through a mechanism of "embodied simulation" (*Embodied simulation,* in Treccani 2013): the same areas are activated in the cerebral cortex that would be activated if we were the first person to experience the emotion we are detecting in the other. We feel "The same emotion of the observed person, and we speak of *empathy*" (Rizzolatti-Vozza 2008).

This also happens in the case of pain perception. If we see, for example, someone banging their head on a wall, we "feel" their pain through the same kind of embodied simulation; in reality, as we well know from our experience, we do not actually feel pain, but we understand very well what the other person feels, through a mostly unconscious process.
The implications for human communication, and in particular non-verbal communication, can be many, as well as practical applications in education. How important can it be to have an efficient "mirror" system and therefore to be able to "viscerally" read the intentions and emotions of the other to create an interpersonal connection, or to set up a social learning environment that is as friendly and efficient as possible? These are just some of the reflections and insights that derive from the research, with great potential for this and other areas of human interaction.

*Bibliography*

L. Hinman, J. Thomas, V.S. Ramachandran, *Neuroscience and the Emerging Mind: A Conversation on Human Consciousness and Compassion with the Dalai Lama* (from "Compassion without borders" featuring... the 14th Dalai Lama 2012 tour), video from the April 19, 2012 event, available online at: https://www.youtube.com/watch?v=xgtz4RuH7II (last accessed January 9th, 2021)

G. Rizzolatti, L. Vozza, *Nella mente degli altri. Neuroni specchio e comportamento sociale,* Zanichelli, 2008

*Simulazione incarnata* in *Treccani.it, sub vocem*, available online at: https://www.treccani.it/encyclopedia/simolazione-incarnata_(Lessico-del-XXI-Secolo)/ (last accessed January 9, 2021).

# Bibliography

## *Books*


W. Bates, *Perfect Sight Without Glasses [The Cure of Imperfect Sight by Treatment Without Glasses]*, The Central Fixation Publishing Company, s.l.: 1920.

V. Biino, *Manuale di scienze motorie e sportive*, Hoepli Milano*: 2006*.

A.R. Calavalle, *Ginnastica ritmica sportiva*, Società Stampa Sportiva, Roma: 1998.

F. Casolo, *Didattica per le attività motorie per l'età evolutiva*, Vita e pensiero, Milano, 2011.

F. Casolo, *Il corpo che parla*, Vita & Pensiero, Milano: 2012.

F. Casolo, *Lineamenti di teoria e metodologia del movimento umano*, Vita e pensiero, Milano: 2002.

P. Ekman, *Te lo leggo in faccia. Riconoscere le emozioni anche quando sono nascoste,* Editore Amrita, Giaveno (TO): 2008.

D. Finnigan, *The Complete Juggler: All the Steps from Beginner to Professional,* Jugglebag, USA: 1991.

D. Goleman, *Emotional Intelligence*, Bantam Books, New York, 1995 (trad. it. *Intelligenza emotiva*, Rizzoli, Milano: 1997).

E.T. Hall, *La dimensione nascosta. Il significato delle distanze tra i soggetti umani,* Bompiani, Milano: 1968.

H.D. Harre, *Teoria dell'Allenamento. Indicazione di una metodica generale di allenamento*. Società Stampa Sportiva, Roma: 2005.

J. Le Boulch, *Teoria e pratica della psicomotricità funzionale. A scuola con Jean Le Boulch,* Armando editore, Roma: 2012.

Y. Lebreton, *Étienne Decroux. La statuaria mobile e le azioni*, Titivillus Mostre Editoria, San Miniato (PI): 2015.

J. Lecoq, *Il corpo poetico: un insegnamento della creazione teatrale*, Controfibra, Milano: 2016.

P. Legrenzi, *Fondamenti di psicologia generale. Teorie e pratiche*, Il Mulino, Bologna: 2014.

A. Lowen, *Il linguaggio del corpo,* Feltrinelli, Milano: 1978.

D. Noyè, *Gestire i Conflitti Interpersonali. Dal confronto alla collaborazione*, Tecniche Nuove, Milano: 2017.

J. Panksepp, *Affective Neuroscience: The Foundations of Human and Animal Emotions*, Oxford University Press, New York: 1998.

G. Palmisciano*, 500 giochi per la coordinazione oculo-manuale,* Edizioni mediterranee 1995.

I. Sannicandro, *La Propriocezione*, Calzetti & Mariucci, Torgiano (PG): 2007.

P. Schilder, *Immagine di sé e schema corporeo*, Pgreco, Milano: 2019.

R.A. Schimdt, T.D. Lee, *Controllo motorio e apprendimento,* Calzetti & Mariucci, Torgiano (PG): 2011.

F. Sgrò, *Edu-Extragames. Tecnologie per l'educazione motoria,* Franco Angeli, Milano: 2014.

V. Spolin, *Giochi di teatro per le scuole*, Dino Audino Editore, Roma: 2005.

C. Vicini, D. Alpini, P. Vannucchi, *Manuale pratico di riabilitazione vestibolare*, F & F Parretti grafiche, Firenze: 1989.

J. Weineck, *L'allenamento ottimale*, edited by P. Bellotti, Calzetti & Mariucci, Torgiano (PG):2009.

## *Articles*

J. Boyke, J. Driemeyer, C. Gaser, et al., *Training-Induced Brain Structure Changes in the Elderly,* in "J Neurosci" 2008; 28 (28): 7031-7035. doi: 10.1523/JNEUROSCI.0742-08.2008.

B. Draganski, C. Gaser, V. Busch, et al., *Neuroplasticity: changes in gray matter induced by training*, in "Nature" 2004; 427 (6972): 311-312 doi: 10.1038/427311a.

A. Ikiri, *Tools for the Body (schema)*, in "Article in Trends in Cognitive Sciences", March 2004, DOI: 10.1016/j.tics.2003.12.008.

P. Salovey, J.D. Mayer (a cura di), *Emotional Intelligence*, in "Imagination, Cognition and Personality", vol. 9, n. 3, 1990, pp. 185-211.

J. Scholz, M.C. Klein, T.E. Behrens, et al., *Training induces changes in white-matter architecture*, in "J Cogn Neurosci" 2012; 24 (8): 1664-1670. doi: 10.1162/jocn_a_00240.

F. Scoppa, *Posturologia e schema corporeo*, in "Attualità in Terapia Manuale e Riabilitazione", 3, n. 4, october-december 2001.

## *Unpublished works*

S. Desanghere, *"Look at me!". The circus approach: working with children and young people through the circus arts. Stories and methods on how to deal with diversity and accessibility*. Booklet realized with the support of PEYC (Professionalizing European Youth Circuses), 2016. Disponibile su: http://www.peyc.eu/wp-content/uploads/2016/03/Look-at-me_web.pdf (last accessed: March 30th, 2017).

A.R. Losavio, *Teoria e metodologia del movimento umano nell'età evolutiva*, dispense online del Corso di laurea in Scienze motorie, Università Ecampus, 2015.