



**INTERNATIONAL SEMINAR  
OF ARTISTIC ROLLER SKATING**

**ROCCARASO 2010**

**FIGURE EXERCISES**

**Technical conclusions regarding the kinematic study of  
figure exercises in artistic roller skating**

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**S.I.P.A.R. Scuola Italiana Pattinaggio Artistico a Rotelle**

# **STUDY AND INVESTIGATION OF FIGURE EXERCISES REGARDING BIOMECHANIC STUDY**

**Forward outside right – and back inside left BRACKET**

**Forward outside right – and back outside left COUNTER**



**Italian National Team at World Championship 2009 in Friburg**

## INTRODUCTION

The Italian School of Artistic Roller Skating in collaboration with the University of Bologna, Faculty of Sport Sciences, took under study a few figure exercises from the standpoint of biomechanics.

Some studies relating to the jumps “axel” and “toeloop” were published in the past in collaboration with the University of Sport Sciences of Rome, still available at the website of FIHP-SIPAR under “Studies”.

This study of compulsory exercises was made on Italian athletes of different schools and techniques.

The tested compulsory exercises are: forward outside right bracket, back inside left bracket, forward outside right counter, back outside left counter.

We have cut seriously faulty exercises, often due to the emotion of the athletes before a sea of cameras and wires, the stress for many performed repetitions or for non-concentration due to many hours of work : such exercises are always at our disposal to understand and identify the reason of the mistakes and their origin.

The work was long for both university teachers and for us, especially as concerned the reading and interpretation of data; at first we were puzzled as what has been detected by computerized system was the opposite of what usually is taught: After talking with the teachers of the University, it was realized that the computer program gave as reference not pressure or relieving wheels , but the wheels during deceleration or acceleration and this has made us breathe a sigh of relief.

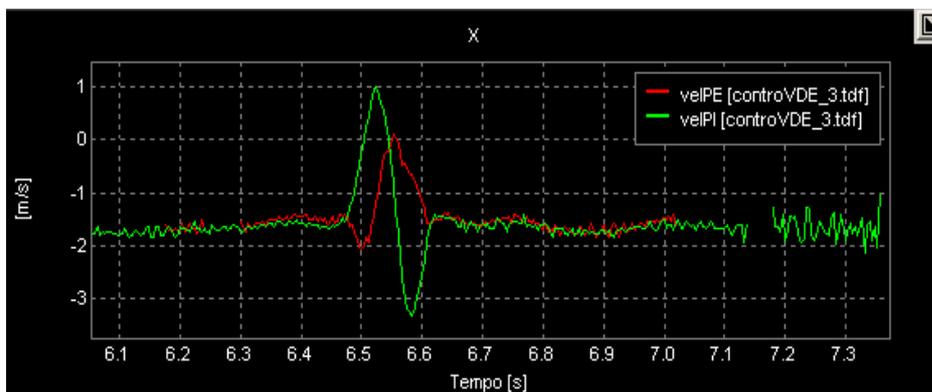
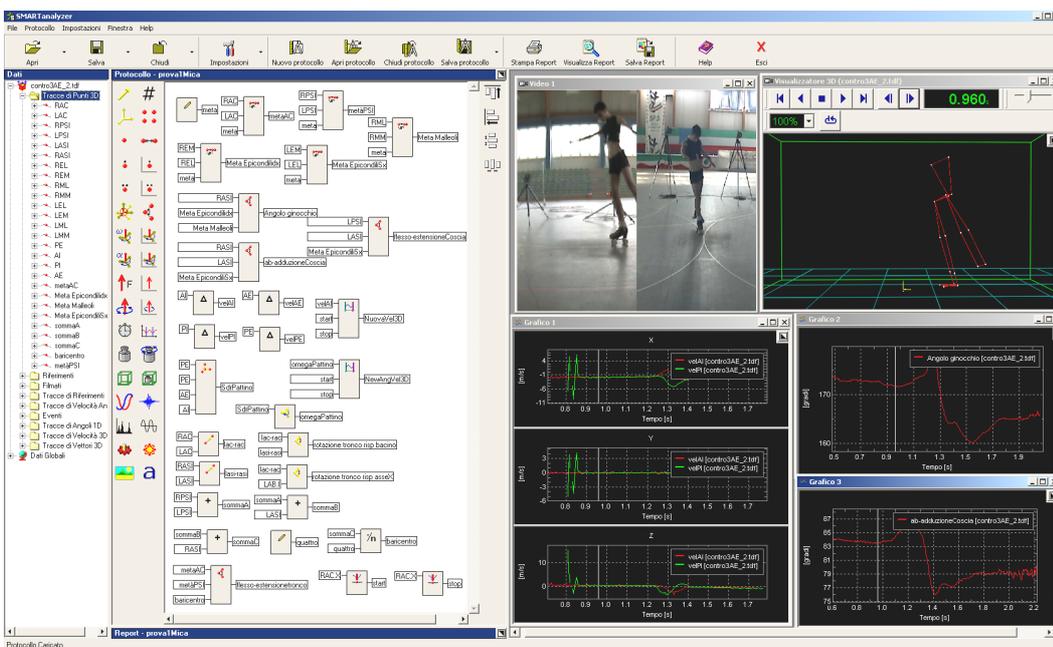
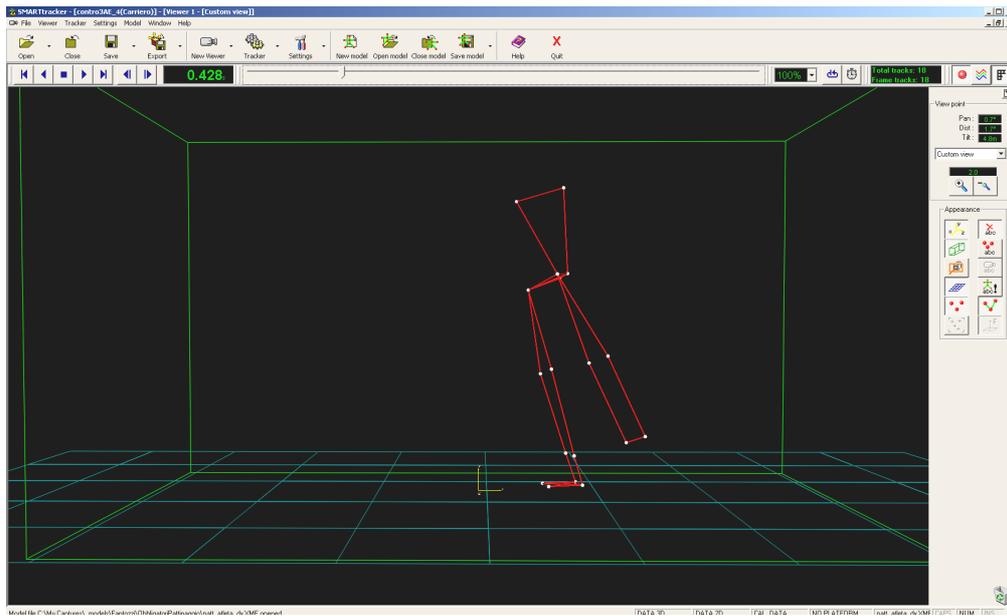
It is clear, however, that the morphological structure of the athletes often requires coaches the use of technical and postural variants , in order to perform an exercise ”technically correct”.

What has emerged however, confirms that we are on the right, but that technique is absolutely improvable, starting as first with the body posture.

We have many data for each athlete in all the exercises performed, which can be detected at any time there is the need to investigate other aspects of the performing thereof.

Sara Locandro

# Some pictures of how we worked to get the results



## **WHAT CAME OUT FROM STUDIES**

The exercises performed correctly were those in which athletes had good posture and alignment, as first the body axis, from head to employed foot, during the torsion.

We analyze exercises of some athletes, chosen for this study with the help of the original short film from which we obtained the biomechanics data.

### **Forward outside right bracket**

The athletes are preparing themselves to perform the bracket with the body axis correct, positioning of the free skate “heel on trace“, while the posture and position of the shoulders / arms are improvable.

At about a meter from the longitudinal axis, where the bracket is skated, skaters perform a torsion bust / shoulder / trunk, controlled and almost imperceptible, maintaining unchanged the position of the hips.

This study and the short films confirm what we said in recent years: athletes perform the difficulty with the wheels still on the trace , consequence of a correct inclination axis, only when the inversion begins the anterior wheels change direction with the forward inside wheel that leaves the trace and the forward outside wheel on trace. Going on with the inversion the forward inside wheel decelerates and then stops, while the forward outside one accelerates until the skate is completely positioned on the axis with the anterior wheels out of the trace of about a truck; this point is called neutral because the wheels are “still”.

Carrying on with the inversion, the forward outside wheel remains still, while the forward inside accelerates during the change of edge and only after having closed the exit angle all the wheels begin their motion.

It was noted that the maximum loading of the forward outside bracket is in the exit, i.e., the knee is more bent than at the initial loading.

### **Back inside left bracket**

The examined athletes are preparing to perform the back inside bracket with the body axis in the correct position, with the free skate “toe on trace”.

At about a meter before the axis, the athletes perform a moderate torsion trunk / shoulders with the approach of the toe of the free skate to the heel of the employed foot; compared with the forward bracket the first arc of the back bracket results slightly longer and deeper.

The back inside bracket is, among the examined exercises, the one performed later, :the possible explanation is, as shown by biomechanical study, “that the athletes have a worse visual feedback than in the other exercises, due to the body position and the swinging position of the free leg, which prevents a good view of the trace “

In this moment the back wheels of the employed skate are already out of the trace; at the moment of the inversion the back wheels change direction going further outside the circle with the result that the outside back wheel decelerates and then stops, letting the inside back one glide up to the neutral point of the axis, where both stop.

Continuing the inversion the inside wheel remains stationary, while the outside one accelerates (change of edge) and only concluded the exit angle all the wheels set in motion.

During the counter-torsion of the bracket, as in the enclosed text of biomechanical studies, were observed **lifted wheels** and this might let us reflect on the truck with more weight and on the travel edge during this phase.

## **POSSIBLE MISTAKES OF THE FORWARD OUTSIDE - AND BACK INSIDE BRACKET**

### **1. GREATER DEPTH OF A TRUCK**

- In the **forward outside bracket**, and in the back inside one, it can happen that athletes with incorrect posture in reference to the alignment of the body axis,, the position of free leg, the tensions of the body, and then to the inclination, shortly before the inversion, decrease the slope, and thus flatten the edge of the employed foot leaving totally the trace and causing a greater depth: in this way it will be executed a too big toe
- **The mistake of the draw “too big toe”**: in the forward bracket it starts before the execution of the difficulty in the approaching to the longitudinal axis. It depends on the incorrect inclination of the body due to a torsion, that sometimes is too strong and detrimental to the alignment, to a head position not aligned with the rest of the body, but moved outside and to an unfavorable and not very functional shift of the free leg.
- **The appropriate correction**: in this case, you must insist on maintaining the correct inclination of the body towards the axis, let enforce a minimum torsion holding the free leg steady and controlled: there will be so great technical and postural improvements.

- Furthermore, in the balanced step that comes before the bracket, the hip of the free leg is slightly back regarding the employed one; this means that it is slightly in tension back. The hip of the supporting leg, on the contrary, must be aligned with the respective shoulder and must have the trace as reference.
- In the **back inside bracket** the problem of the “ too big toe” occurs also bringing the free foot near the supporting one incorrectly ; the flattening of the edge and the decreasing of the inclination will cause a greater depth of a truck.

## 2. BRACKET PERFORMED OUT OF AXIS

We note that athletes tend to perform the difficulty late regarding the longitudinal axis, as mentioned above.

## 3. HOOKS AND ASYMMETRY OF THE ARCS

- It was observed, that some athletes keep the pressure of the outside edge in the forward bracket, and of the inside one in the back bracket throughout the whole inversion, changing it only at the end of the exit angle: in this case we have what is commonly called “ hook” and that creates a draw of asymmetrical arcs.
- The mistake of the “advanced change of the edge” often depends on the flattening of the edge during the torsion of the trunk as you approach the longitudinal axis.
- The mistake of the ”postponed change of the edge”, happens however, when, during the torsion of the bust you perform a more or less exaggerated stretching of the shoulders respect to the hips towards the direction of travel, with a consequent late change of edge : this causes exaggerated hooks.
- The reason for these asymmetries is often the incorrect torsion arm-shoulder-trunk and the incorrect positioning of the free leg in the movements, that are executed at the moment of the take-off, when the free leg in its movement from forward to backward is placed crossed or too inside the circle and therefore during the torsion we do not have the right body alignment.
- Sometimes even an incorrect bracket may appear correct if performed with speed, quickness and ability; visually this mistake is difficult to identify if you are not more than “technically” trained, but is considered anyway a mistake.

## METHODOLOGY AND TECHNICAL CORRECTIONS

### FORWARD OUTSIDE BRACKET

- **A good performance** begins from the start or the take off, in both cases it is necessary that the athlete has a proper inclination, the free leg immediately placed and in maximum tension behind the heel or  $\frac{1}{2}$  skate on trace and the toe of the skate slightly rotated outwards; shoulders should be aligned with the corresponding hip.
- The optimum posture when you are preparing a forward bracket is the same as above described.
- **Position of head**  
At the moment of the torsion head must remain aligned with the body axis always looking top-down.
- **Position arms/shoulders**  
**The position of the arms / shoulders before the difficulty: the right arm aligned with the corresponding hip (the right hand must have as reference the trace), while the left arm is in tension backwards, but slightly out of the trace with alignment of left shoulder and hip.**  
This position promotes the controlled torsion shoulders / arms / trunk

### BACK INSIDE BRACKET

- **How to keep the inside edge after the take off up to the bracket?**  
It is necessary to perform a good take off with a precise change of inclination, the position of the free leg forward well-defined, with the inside wheels on the trace; after this we can begin moving the free leg from forward to back and the rotation of arms and shoulders. This must end at about  $\frac{1}{3}$  of the circle. The optimum posture, preparing the bracket, will be: alignment of the shoulders to the hips, heel or  $\frac{1}{2}$  skate positioned on the trace with the free leg stretched and the free hip in tension backwards.
- **Position of head**  
Head must always be aligned with the body axis, visualizing the travel circle without losing the alignment, especially during changes of position of arms and shoulders.

➤ **Position arms / shoulders**

The position before back right inside bracket: right arm / shoulder aligned with each other, while the left arm will be aligned with the corresponding hip and positioned slightly and in tension inside the circle.

## **FORWARD OUTSIDE RIGHT COUNTER**

Even in **the forward outside counter** as in the outside bracket, it was observed, that before starting the inversion the front wheels are still on the trace, while when the inversion begins, they place outside the trace reaching at the axis the correct depth of  $\frac{1}{2}$  skate.

Taking into consideration the positions of some athletes, who have performed the exercise, we can see that in the forward counter, before the rotation, some perform a slight serpentine, because at the moment of the torsion, head does not remain on axis but moves inward the next circle and thereby the hip of the free leg is slightly rotated outwards.

As a result of these inaccurate positions in the first part of the counter, athletes cannot maintain a proper axis and then perform a slight hook

In the forward outside counter athletes perform a less bending of the supporting leg than in the other tested difficulties in the first phase of execution.

## **BACK OUTSIDE LEFT COUNTER**

Some tested athletes do not perform the back counter with a perfect body alignment and also they do not perform a proper torsion in axis but only a motion (spin) of the right side with clear rotation inwards of the right leg, this causes a slight additional pressure on the outside travel edge, with following change and “flattening” of the edge to perform the required depth of exit.

These changes bring the athletes to perform the change of direction with a greater depth of the axis and later respecting it.

The second part (the exit angle) is correct because athletes are quick to retrieve and position correctly the alignment of all body parts.

## **POSSIBLE MISTAKES**

### **1. Excessive length and depth**

This mistake is determined by the decrease of the inclination towards the center of the circle you are traveling before, during and after the counter

### **2. Out of axis**

We observe that athletes tend to perform the difficulty late regarding the longitudinal axis

### **3. Hook and asymmetry of the arc**

It can be determined by a serpentine, before the inversion and by an insufficient or excessive inclination at the exit.

## **METHODOLOGY**

In the forward counter the position and thus the inclination and the edge, remain as in the bracket, the athlete must not think to change the circle or to the depth of  $\frac{1}{2}$  skate; he must always keep the alignment of the body axis, of the free leg well controlled and positioned before, during and after the torsion. The difficulty of this exercise is that there should never be a change of edge

To perform a good back counter is very important to perform a good take off that must follow the rules of a perfect inclination, alignment and free leg forward with the inner wheels on trace.

In the back outside counter athletes perform a greater bending of the supporting leg regarding the other difficulties tested in the first part of the performing, while in the exit the loading is reduced.

In the counters, the movement of the skate is quicker than in the bracket

## **SUGGESTIONS**

In all exercises with problems, we found some physical or technical postural weaknesses more or less serious : in the first case the coach must take a step back in the technical work and correct absolutely, earlier in the process, the posture, if necessary restarting from basic exercises as the “curves”, and in the second case using supports such as plantar, personalized shoes, postural exercises, etc. and he must be good in personalizing the pure technique of introducing variables depending on the subject with whom he is working.

## SUMMARY

### **SOME NEGATIVE EXAMPLES EMERGED IN THE PERFORMANCES OF THE VARIOUS ATHLETES IN THE SHORT FILMS AND FROM THE STUDIES.**

**Head** not aligned with the body axis creates problems before the inversions as the flattening of edge and the incorrect inclination at the exit

**Shoulders and arms** with obvious differences in position (too high or too low with each other) have shown during the performance problems of stability and edge.

**The free skate**, not having placed the heel more or less on the trace, but completely outside or inside,(this happens even when the hips are aligned (almost perpendicular to the tangent point of the travel on the trace) in a exasperated way, travels more at the inversion and then it is possible that the change of edge happens not at the axis but later (slight hook or asymmetry of the arcs).

**An early change of inclination** causes a flattening of the edge, so the first arc will be longer or “flat” compared to the second one.

**Incorrect posture among shoulders, trunks and hips**, such as an exaggerated stretching of the shoulders, dovetails 80% to the incorrect position of the body alignment and causes a loss of correct placement of the free leg and often, before the difficulty, an advanced torsion.

**In the outside counter** the incorrect, but late performing in axis is visually a hook as there is light between skate and trace.

Most of the tested athletes perform difficulties late regarding the axis; this problem has not only one answer, but it could have many: the pace of implementation wrong, the problem of a distorted visual feedback, the incorrect alignment or postural tension at the torsion, this should not be neglected by he coach etc.. etc..

## **CONCLUSION**

The work done by the University of Sport Sciences of Bologna was excellent and gave a positive response to the technical work we are doing for years for us coaches, who have believed and believe in our technique, also with some variable; it will certainly stimulate more to interpret the come out information, to improve even more.

P.S. As we often say in meetings and stage (but unfortunately not all coaches believe it) important is to build young athletes with strong basis; no matter if the victory is not immediate, it is important that they reach the highest categories with a solid basis built by posture and correct technique to become

**TRUE CHAMPIONS AND HAVE A CAREER LONG AND FULL OF  
SATISFACTION!**

**ANTONIO MERLO and RAFFAELLO MELOSSI**

## Antonio Merlo



He began his competitive career when he was 10 years old, winning 13 national titles in single and 3 in pairs.

As skater he took part at a European Championship with a second place and at six World Championships for single specialty, best placings were a third and a fourth place, while with pairs specialty he obtained two fourth places.

He was the first athlete to perform in the competition the double toe loop, the double ritt and to present spins with the sequence of three, unknown in Italy, exercises learned under the guidance of the American athlete Darlyn

Barrel coming to Italy, to improve, with him, figure exercises.

After sporting activity, at the age of 23, he got himself noticed as a coach and was immediately introduced into the national team as federal coach, from 1972 to 1980.

From 1970 to 1992 he taught in the city of Piacenza, Castelsangiovanni, Reggio Emilia, Padua, Modena, Monza bringing to the national and international fore many athletes.

Since 1990 he was appointed coach of the Italian Team, teacher S.I.P.A.R. and C.T.A (judges committee);, under his guidance many champions, who have shaped the history of Italy in the last 20 years, winning many medals of various metals, especially gold medals at the European Championships and World Championships. He was the first coach to bring the world dance title in Italy thanks to the Bornati brother and sister.

He has been called to give his technical assistance to athletes and coaches from countries like Colombia, Spain, Israel, France, Portugal, Argentina; he is still teacher of CEPA (European Committee for Artistic Skating).

He wrote in 2006 technical books for Free and Figure exercises, that are still the reference books for the Italian School of Skating and for the Judges.

## Raffaello Melossi

Born in Massa Marittima (Gr) on 30/3/1973. He obtained the Diploma in Geomining. He attended the Faculty of Geology at the University of Siena  
As athlete he has played competitive activity from 1981 to 1993 at the Sports Club "Pattinatori Massetani". He began teaching in 1993 and in 1995 he received the 3rd Level as Coach. In 1997 he began teaching in the newly born Sports Club Bagno di Zavorrano up to 2000 year when he moved to Prato where he still teaches in the Sports Club AP Primavera Prato.  
In 2005 he was appointed Assistant National Coach.



### **The most important won titles are:**

World Championships: 7 golds, 2 silver, 3 bronze;

European Championships: 9 gold, 8 silver, 4 bronze;

These results were obtained with the athletes:

World champions: Luca Lallai, Marco Santucci, Giulia Fornai

Vice-World Champion: Candida Cocchi

Bronze Medal: Michela Atzori

In addition to World and European titles won several Italian titles.

Currently collaborates with many Italian companies and has done internships in Spain, Portugal, France and China Taipei.